Board of Education

5 Minortown Road ~ Woodbury, CT 06798
www.ctreg14.org

Mission: The mission of Connecticut Region 14 Schools is to educate all students to their highest level of academic potential and to teach them the skills and knowledge to become capable, creative, collaborative lifelong learners and responsible members of the world community.

Board of Education Goals:
Academic Performance - The district will strive to improve academic performance for all students on multiple assessment indicators and the staff will be committed to continuous improvement.
Communication - Region 14 will develop partnerships with all stakeholders in the school community to highlight the exemplary programs the district offers
Safety - Region 14 will provide safe and secure facilities equipped with technology, enabling a 21st century learning environment that supports the values of the district
Budget - Region 14 will prepare a budget that meets the needs of every student and communicates the needs and priorities of Region 14 in a clear and concise manner.

A G E N D A
Special Meeting
Curriculum Committee Meeting
Tuesday, September 1, 2026; 2:30 p.m.
Central Office Conference Room

I. Call to order

II. Curriculum Documents for Approval
- A. English 9 (Revision)
- B. Algebra 1A
- C. Chemistry: Matter and Energy
- D. AP Physics 1
- E. 6th Grade Math
- F. 7th Grade Math
- G. 7th Grade Advanced Math
- H. 8th Grade Advanced Math
- I. Nutrition (6th Grade Culinary)
- J. What's Cooking (7th Grade Culinary)
- K. Tasty Treats (8th Grade Culinary)

III. Adjourn

REGION 14 CURRICULUM REVISION COVER SHEET

Course Title: English 9

Date of Prior Curriculum Document Development/Revision: 2022

Extent of the Revision: (Please check the description that best applies)

- ☐ **Minor Revisions -** no significant impact on content (adjustments to assessments/sequence/VoL attributes)
- ☑ **Major Revisions -** One or more units have changed or have been removed, the content remains similar to that of the originally approved document
- ☐ **Complete Overhaul -** The course is significantly different from the previously approved curriculum

Date of Revision: 8/25/26

Authors of Revised Curriculum:Rebecca Gambardella, Maura White, Katy Aseltine

If “Minor Revisions” is selected above, please provide a brief overview of the anticipated impact of the revisions on student course outcomes.

If “Major Revisions” is selected above, please provide a brief description of the revisions, the rationale for the revisions, and the anticipated impact on student course outcomes.

Simplified Units to Four Quarters: One Unit Per Quarter

- Revision of PBAs/addition of resources/revision of vision of learner attributes
- Combined Units 1 and 2. Revised units to include a grammar focus/Greek and Latin roots.
- Combined Units 3 and 6.
- Removal of Unit 5

If “Complete Overhaul” is selected above, please provide the rationale for the overhaul and the anticipated impact on student course outcomes.

ENGLISH 9 CURRICULUM





Grade Level(s): Honors and College Prep

Curriculum Author(s): Rebecca Gambardella, Maura White, and Kathryn Aseltine

Course Description: Grade 9 units explore the power of language with a particular focus on the essential questions of self-discovery. The class introduces key terms, concepts, understandings and questions that will serve as a foundation for high school going forward. Students read multiple genres of fiction (novels, short stories, poems, and plays) and nonfiction (memoirs, speeches, essays, articles) to sharpen their awareness of language and to develop their understanding of the author's purpose and craft. Both whole-class novel instruction and independent reading are featured in developing critical thinking, reading and writing skills. Students write regularly, composing analytical pieces as well as personal and creative pieces. In addition, students develop speaking and listening skills through small group and class discussions, as well as individual and collaborative presentations. Research skills are developed in a unit that includes multiple forms of resources available in the Library Media Center. Throughout the year, students set goals, monitor their progress towards them, and reflect on their growth.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Unit 1: The Power of Expression	How does the study of language (including vocabulary) support our writing?	Students will understand that the study of literature can improve their understanding of not only vocabulary and grammar, but of the world around them.	TCC4(9-12); CCE2(9-12)
Unit 2: The Power of Persuasion	How can language be used to persuade? How do we use language to persuade others? How are we persuaded by language?	Students will understand that language can be used to persuade, and, by learning the elements of rhetoric and persuasion, students will be able to better identify and critically assess rhetoric.	TCC2(9-12); CCE1(9-12)
Unit 3: The Power of Change	How can words change the world?	Words change lives; lives change the world.	CCE3(9-12); DE1(9-12)
Unit 4: The Power of Language	How does language play a role in shaping our identities?	We see parts of ourselves in literary characters and gain access to a window into the lives of others.	CCE 4(9-12); TI1(9-12)

Unit 1 - The Power of Expression

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:
Common Core State Standards (CCSS):
RL.9-10.4-6, RI.9-10.4-6, W.9-10.1-3
RL.9-10.1-7, RI.9-10.4-6, W.9-10.1-5, L.9-10.1-4, SL.9-10.3,6

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.

CCE2(9-12): I can give and receive actionable and relevant feedback with openness to be able to determine meaningful revisions for success.

Understandings: Students will understand that…

- Literature is a reflection of the world in which we live; by studying characters and themes we can better understand ourselves and others.
- By consistently practicing grammar skills and strategies such as apostrophe use and commas, we consistently improve ourselves as writers.
- Implementing engaging and accurate transition words enhances the meaning and the clarity of our writing.
- Studying Greek and Latin roots will help students build their vocabulary skills, which in turn will boost their skills as readers and writers.

Essential Questions:

- What role can fiction and memoirs play in revealing essential human truths that connect us all?
- How can practicing grammar skills make us better communicators?
- How can varying one's use of transition words improve the overall quality of a piece?
- How can the study of Greek and Latin roots benefit us when we read a challenging or novel text?

Students will know…

- Literary devices including, but not limited to, theme, characterization, plot, setting, conflict and point of view.

Students will be able to…

- Analyze the author's message (theme) across a variety of texts including the genres of short story and memoir.

• A variety of transition words including, but not limited to: however, in contrast, consequently, additionally, moreover, furthermore, on the other hand, conversely, previously, subsequently • A variety of Greek and Latin root words including, but not limited to: anti, auto, bio, geo, path, photo, bene, brev, aqu, terr, vac, pac • The purpose of an apostrophe to create a possessive noun and the difference between plural possessive nouns and singular possessive nouns. They will also know the purpose of an apostrophe to create a contraction. • Students will know how to use a comma after a phrase or a dependent clause.	• Make inferences and draw conclusions about character development based on the characters' thoughts, words, and actions. Students will be able to make assessments about the author's use of characterization in each story by examining these attributes closely with attention to detail. • Apply their knowledge of Greek and Latin roots when reading unfamiliar texts to determine the meaning of new vocabulary words in context. • Demonstrate their knowledge of the apostrophe by using it correctly every time they use a contraction or a possessive noun. • Demonstrate their understanding of the proper use of the comma by using it correctly in their own writing, whether that is a formal summative essay or a shorter in class reflection.

Key Vocabulary:

Literary Vocabulary:
First person point of view, third person point of view - limited vs. omniscient, irony, internal conflict, external conflict, characterization

Words in Context: ("The Most Dangerous Game") - imprudent, invariably (focus on im and in), palpable, tangible, venerable (focus on able/ible). peril, scruples, debacle, aristocrat, chateau, ennui - nouns; last two French

Grammar Vocabulary - apostrophe, subject, predicate, comma, semicolon

Assessment Evidence	
Performance Tasks: **Test**: **Root, Grammar, Transition Words, Greek and Latin Roots** **PBA Essay Based on Short Stories/*Tuesdays with Morrie.*** In this PBA Essay, students will focus on a theme that stands out to	**Other Evidence:** **Formative Assessments** 1) Pre-tests on Greek and Latin Roots and Grammar 2) Whole Class Discussions 3) Individual/Small Group Conferences

them or characterization that made an impact on them.	4) Practice Games such as Blooket **Interim Assessments** 1) Reading Quizzes 2) Vocab (Greek and Latin Roots) Quizzes 3) Written Reflections 4) Creative interpretations of short stories' characterization or theme

Learning Plan

TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.

Students will integrate their learning of vocabulary (specifically Greek and Latin roots) both in and out of the classroom as they encounter new words, whether in a science class, history class, agriculture class, or a book they chose for themselves.

Additionally, students will integrate their learning of transitions and grammar into their own writing, as writing is a recursive process and each new piece offers an opportunity for reflection and improvement. In particular, this focus will help students hone in on the clarity of their written work.

Finally, studying literature is a way for students to study the human condition, and nothing could be more applicable to their daily lives. Why do people make the decisions they do? Why is life sometimes unfair? What motivates people toward good… or evil? These questions and more will be explored in our examination and discussion of literature.

CCE2(9-12): I can give and receive actionable and relevant feedback with openness to be able to determine meaningful revisions for success.

Within this unit, students will have multiple opportunities to explore literature. In whole class discussions, they may receive feedback that helps them to see another perspective or view a text in a different light. The reverse is also true; as they share their insights with others, students can work together to better understand each story we read.

In addition to oral feedback, students will also receive and provide writing feedback to each other on their writing pieces. Each student will also have the opportunity for teacher feedback on their writing as well.

Teacher Resources include, but are not limited to:

Vocabulary Workbook, Chompchomp.com, Blooket, Khan Academy Grammar Lessons, *Tuesdays with Morrie*, "The Most Dangerous Game,"

“Thank You Ma’m,” “A Sound of Thunder,” “Marigolds,” “The Necklace,” and “The Gift of the Magi.” Assorted poetry.

Unit 2 - The Power of Persuasion

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals: Common Core State Standards
Common Core State Standards (CCSS):

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

CCE1(9-12): I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias.

Understandings: Students will understand that…

- Words hold power.
- Effective arguments require a balance of ethos (credibility), pathos (emotional appeal), and logos (logic and evidence) to persuade others.
- Missing, incomplete, or flawed evidence weakens arguments and reduces the writer/speaker’s credibility.
- Words hold specific feelings and emotions (connotation vs. denotation / literal meaning)

Essential Questions:

- How do authors use specific words and devices to influence how audiences think, feel, and act?
- How can The Rhetorical Triangle be applied in real-world settings/scenarios?
- How can I use evidence to support and strengthen my arguments?
- How are words interpreted by others? Can words have hidden meanings?

Students will know…

- The elements of The Rhetorical Triangle (Ethos, Pathos, Logos)
- Relevant ancient Greek history/context, including that Aristotle developed The Rhetorical Triangle and his contributions to

Students will be able to…

- Identify the elements of The Rhetorical Triangle (Ethos, Pathos, Logos) and how they are used in a variety of texts and mediums to persuade others

Western thought. ● A variety of Greek and Latin root words related to rhetoric, persuasion, and studied texts. ● How rhetoric is used to persuade others beliefs, thoughts, ideas, and actions. ● That persuasion and rhetoric are constantly bombarding us, and that we must critically assess the speaker/writer, their logic and evidence. ● Connotation and Denotation, as specific discipline-related vocabulary, as well as the associated connotation of various words. ● That word choice, vocabulary, sentence structure, punctuation, etc. help shape an argument. ● That clear logic and evidence is imperative for a credible, strong argument ● Literary terms including, but not limited to: dystopia, utopia, propaganda, rhetoric, tone, allegory, historical allegory, totalitarianism, protagonist, antagonist, world-building, satire	● Evaluate how word choice and tone shape an argument ● Evaluate the intent, credibility, and effectiveness of persuasive speech through rhetorical analysis (SPACECAT, etc.) ● Write persuasively with a clear, strong thesis and specific supporting evidence ● Develop a logical counterargument and use appropriate supporting evidence ● Revise their writing to improve word choice, sophistication, fluency, and clarity. ● Identify the specific elements related to the literary dystopian genre
Key Vocabulary: The Rhetorical Triangle, Aristotle, Connotation & Denotation, anaphora, epistrophe, dystopia, utopia, propaganda, rhetoric, tone, allegory, historical allegory, totalitarianism, protagonist, antagonist, world-building, satire	
Assessment Evidence	
Performance Tasks: *Summative Assessments:* PBA #1 - Creative Choice Assignment: ● Write a dystopian story/play/journal developing themes common to this genre (e.g., the abuse of language in *Animal Farm,* abuse of technology in *House of the Scorpion*). PBA #2 - Persuasive Essay / Speech Write a 5 paragraph persuasive speech related to a selected topic from class literary studies, including a clear, strong thesis, developed logical arguments, and supporting evidence.	**Other Evidence:** Formative Assessments 1) CommonLit and SAT-style reading comprehension quizzes 2) Class and small-group discussions and book-talks 3) Individual and peer writing conferences 4) IXL practice quizzes, Blooket Interim Assessments: 1) Reading Quizzes, comprehension and literary analysis 2) Vocabulary Quizzes Greek & Latin Roots 3) Vocabulary / Content Quizzes on The Rhetorical Triangle, Dystopian Genre 4) Writing Workshops, Rough Draft

	5) Creative product commercial (video / presentation) 6) Socratic Seminar

Learning Plan

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

Students will begin this unit with a study of Aristotle's Rhetorical Triangle and the elements of persuasion and rhetoric (ethos, pathos, logos). Students will be able to identify, analyze, and evaluate how the elements of the Rhetorical Triangle are used in various non-fiction texts, including famous historical speeches and in such real-world examples as advertisements and commercials. Students will be able to assess and evaluate the credibility of sources, logic, and evidence.

Students will utilize their new learning to write a well-developed 5 paragraph essay/speech on a selected topic. Through direct instruction, modeling, peer editing, and individual conferences and workshops, students will focus on developing a strong, clear thesis statement, logical arguments, supporting evidence, counterargument, and a powerful conclusion. Students will revise for word choice, fluency, organization, logical structure, and punctuation.

Students will then transition to identifying elements of rhetoric in fiction and literature through a study of dystopian short stories and the class novel *Animal Farm* or *House of the Scorpion*.

Through a study of the dystopian genre, students will analyze how rhetoric is used by fictional characters to persuade and - in the case of dystopian fiction - control others.

Students will complete the unit by world-building a vivid, original dystopian short story.

CCE1(9-12): I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias.

Students will meet this Learner Expectation through whole-class and small-group literary discussions on the selected texts, Socratic Seminar on a related topic/issue, and Writers' Workshop / Peer Editing Sessions.

Teacher Resources include, but are not limited to:

- *Animal Farm*, *Refugee,* "The Lottery," *Antigone,* Assorted speeches (e.g. Sojourner Truth *Ain't I a Woman?,* JFK's *Inaugural Address*, MLK's *Letter from Birmingham Jail*, etc.) and short stories (e.g. *The Beautiful People, The Lottery,* etc.)
- Video / Film Clips from the Winston Churchill biopic *The Darkest Hour* (2017), *Selma* (2014), The Giver (2014), various television

commercials, Khan Academy, TED talks
- IXL, Khan Academy, CommonLit

Unit 3 - The Power of Change

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:
Common Core State Standards (CCSS): RL.9-10.1-10.10; W.9-10.1a-101e; W.9-10.4-10.10; SL.9-10.1-10.6

Vision of A Learner Attributes:

CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.

DE1(9-12): I can acknowledge, process, and respond appropriately to others' comments and perspectives.

Understandings: Students will understand that...

- Great literature helps build bridges of understanding and empathy to others.
- Language is of enormous importance in the face of difficulty, adversity, and injustice.
- Words reveal truths of the human condition.
- Stories help us better understand others and ourselves.
- The historical context of a text is key to understanding the text itself and human history.
- Writing brings light to injustice.

Essential Questions:

- Why does an author write about traumatic life experiences, either real or fictionalized?
- How does the historical context of a work inform our understanding of current cultural phenomena and possible future issues?
- What is the importance of memory and remembrance?
- What role does literature play in shaping our understanding of the past and changing our future world?
- How can literature inform our beliefs on justice?

Students will know…

- The Holocaust was a horrific tragedy, and millions of people were killed, tortured, imprisoned, and displaced as a result of hatred.
- The Holocaust is one of many genocides throughout human history.

Students will be able to…

- Identify key historical events of the Holocaust.
- Define Holocaust, Holocaust, genocide.
- Trace and analyze themes in scenes from *Night* (faith, silence, indifference, inhumanity, abuse of power, adversity, resilience, perseverance) or another mentor/studied text.
- Explore why writers choose to write about historical tragedies

• Genocides still exist in the modern world. • Injustice takes many forms.	and real-world injustice. • Employ research skills to write an original piece of historical fiction (Holocaust Journal PBA). • Effectively analyze, evaluate, and synthesize research materials.
Key Vocabulary: memoir, Holocaust, anti-semitism, genocide, historical fiction, symbolism, foreshadowing, figurative language, irony, anaphora & epistrophe, connotation & denotation, justice / injustice, realism, romanticism, allegory, first-, second-, third-person narrator, omniscient narration, allusion, motif	
Assessment Evidence	
Performance Tasks: *Summative Assessments:* PBA #1: Creative Writing/Research Holocaust Journal Students will utilize research skills to create a real-to-life fictional character from the Holocaust and write a journal from the character's perspective. (Group Project / Collaborative) PBA #2: Thematic Essay on Text (e.g. Justice, Empathy, etc.) Students will write a literary analysis essay on one theme from the selected mentor text(s).	**Other Evidence:** *Formative Assessments*: • KWL charts • Reading comprehension questions • IXL • CommonLit and SAT-style quizzes • Vocabulary-building activities, Greek & Latin root words • Character Charts • Whole-class and small-group discussions • Self and peer editing sessions Interim Assessments: • Reading comprehension & analysis quizzes • Vocabulary and Root Quizzes • Rough Draft and Writers' Workshop Conferences • Written Reflections • Research notes • Mini-Memoir Writing Assignment • Socratic Seminar
Learning Plan	

CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.

DE1(9-12): I can acknowledge, process, and respond appropriately to others' comments and perspectives.

This unit will begin with a broad look at historical fiction and non-fiction, focusing on the theme of injustice in selected texts. Students will work together in literature circles and during whole class discussions to explore the selected texts' themes.

Students will also collaborate during Writers' Workshops and editing sessions for the various written tasks within this unit. Students will learn how to give and receive appropriate, effective feedback and how to revise their work for improvement.

Students will then read the mentor text *Night* and conduct a focused study of Elie Wiesel's Holocaust memoir, culminating in a research-based creative writing project. Students will be asked to develop an original work of historical fiction through The Holocaust Journal Project, incorporating research skills, creative writing, art, and optional multimedia tools for the final product.

Teacher Resources include, but are not limited to:
Mentor Texts: *Night* by Elie Wiesel, "Acceptance Speech for Nobel Peace Prize" by Elie Wiesel
Maus, Dear Martin, Persepolis, Les Miserables (selected excerpts including, but not limited to: "The Bishop's Candlesticks"), Les Miserables High School Edition

Films / Videos: *The Last Days* (1998) Academy-Award-winning documentary film on Hungarian Holocaust survivors
Les Miserables (2012)
Selected film & movie clips

Khan Academy, IXL, CommonLit, Blooket, Ted Talks

Unit 4 - The Power of Language

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals: Common Core State Standards (CCSS): RL.9-10.1-7, RI.9-10.4-6, W.9-10.1-3, L.9-10.1-4, SL.9-10.1-2

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

CCE 4(9-12): I can communicate and express my understanding in an authentic, respectful and relevant way, using the most effective mode of expression.

TI1(9-12): I can implement a realistic plan and adapt when necessary to achieve my goals.

Understandings: Students will understand that…	**Essential Questions:**
• Love influences us to think, feel, and act in new ways. • Love empowers us to be more ourselves. • Romeo and Juliet are trapped in tragedy. . • Shakespeare's masterful use of figurative language including allusion, metaphor, simile and others creates nuance and depth to his dialogue, character development, conflict and themes. • We see parts of ourselves in the characters in Shakespeare and gain access to a window into the lives of others.	• According to literature, how does love shape our identities? • As we examine literature, what are we shown about how our experiences with love help us transition into maturity? • What causes teenagers to do things to extremes? • What language strategies does Shakespeare use to make his plays powerful? • How does art help us to understand our own lives?
Students will know…	**Students will be able to…**
• Shakespeare wrote in a variety of genres, including 37 plays meant to be public (comedies, tragedies, histories), as well as 154 sonnets meant to be private. • Strategies help when struggling with a Shakespearean text (e.g., reread, read on, substitute a word that makes sense, use part of the word known, make a connection). • Language works on many levels of meaning (e.g., figurative vs. literal). • We cannot escape the meanings of words (e.g., fate of family names).	• Make connections between William Shakespeare's life and times and his art. • Apply a variety of strategies to understand new words and construct meaning . • Interpret how William Shakespeare's language expresses themes in his sonnets and throughout the play *Romeo and Juliet.* • Write a sonnet implementing iambic pentameter and rhyme scheme.

• The Shakespearean sonnet has specific features including a specific abab cdcd, efef, gg rhyme scheme, three quatrains and a rhyming couplet at the end and iambic pentamenter. • Aristotle's definition of tragic hero includes certain characteristics (e.g. protagonist of noble birth has a fatal flaw (e.g., pride), suffers a reversal of fortune, begins in ignorance but ends in knowledge.)	• Write about literature in the present tense. • Craft a thesis statement, identify appropriate evidence to support the thesis, devise a conclusion. • Apply the writing process (planning, writing, revising, editing, rewriting, or trying a new approach).

Key Vocabulary: exposition, rising action, climax, falling action, resolution, prologue, sonnet, dialogue, stage directions, blank verse, iambic pentameter, scansion, aside, verbal irony, dramatic Irony, situational irony, foreshadowing, protagonist, antagonist, foil characters, soliloquy, monologue, tragic hero, tragic flaw, allusion, figurative language ,theme, argument/counterargument, MLA citation for Shakespearean plays

Act One: pernicious, portentous, (adj), visage, disparagement, revelry (nouns)
Act Two: enmity, rancor, knave (nouns), feign, countervail
Act Three: amorous, garish, jocund, absolve, denote
Act Four: beguile, dirge, inundation, pensive, wayward
Act Five: apothecary, penury, sepulcher, inauspicious, thwart

Assessment Evidence

Performance Tasks: *Summative Assessments:* • Argument Essay (e.g., Does love at first sight exist?) • Creative Choice Project: Options include but are not limited to Letters between Characters, Modernizing the Story, Writing a Deleted Scene, Character Journal Entries, Matching Songs to Scenes and Explaining How the Lyrics Reflect the Scenes, "Dear Abby," Alternate Endings, Mash-up between a Character from *Romeo and Juliet* and Another Book (This may be an individual, collaborative, or individual project.)	**Other Evidence:** *Formative Assessments:* K-W-L; Quick Writes; Predictions; Venn Diagram; Doodle (draw your understanding); 2 Roses and a Thorn (2 things you liked, 1 that confused you or you didn't like); 3 Summaries (10 words, 50 words, 100 words); Jigsaw; Answer the Essential Question; Check for Transfer (Identify conflict, theme, character's emotions, text's lessons); Text Rendering (in a sentence, phrase, word); Theme in 3 Words *Interim Assessments:* Original Sonnet; Original True Love/Tragic Love Dialogues; Vocabulary Quizzes; Collaborative Comparison of Romeo's Description of Rosaline (1.1) to His Description of Juliet (1.5; 2.2); Collaborative Comparison of Romeo's Speech to Friar Lawrence (3.3)

	to Juliet's Speech (4.1); Reenactment of Key Scenes; Analysis of How Sound Devices Create Character (1.5); Collaborative Analysis of Romeo and Juliet's Search for Identify; Collaborative Comparison of Movie and Play Versions of *Romeo and Juliet* ; Small Group Theme Debates (Love/Lust; Fate/Free Will; Romance/Tragedy; Juliet: Feminist/Victim), Quizzes on text and vocabulary

Learning Plan

TI1(9-12): I can implement a realistic plan and adapt when necessary to achieve my goals.

Students will develop their abilities to plan for composing their own unique sonnet in which they must incorporate iambic pentameter, rhyme scheme, and poetic devices such as simile, metaphor and personification.

Additionally, students must make a realistic plan to compose their argumentative essays, collecting text evidence and making character evaluations as they read.

Finally, students must adapt and go in a very different direction of writing when they compose their own creative piece about the play, whether that is character diary entries, a modernization or other unique take on the story. They must plan this out while staying true to their creative process and voice.

CCE 4(9-12): I can communicate and express my understanding in an authentic, respectful and relevant way, using the most effective mode of expression.

Students will demonstrate this ability in our discussions of who is to blame for the deaths of Romeo and Juliet and also the eternal question - Does love at first sight truly exist? They will have multiple opportunities both in writing to demonstrate their authentic, respectful and relevant communication skills.

Teacher Resources include, but are not limited to:

- Mentor texts: *Romeo and Juliet*, Shakespeare's Sonnets
- Compose Your Own Sonnet Rubric
- John Green: *Romeo and Juliet Parts 1 and 2: Crash Course English Literature*
- Various film versions of *Romeo and Juliet*
- Choice novels for independent reading from LMC

ALGEBRA 1A CURRICULUM



REGION 14 SCHOOL DISTRICT
VISION OF A LEARNER

Grade Level(s): 9

Curriculum Author(s): Nicole Cowles, Lauren O'Brien, and Shannon Belanger

Course Description: Algebra 1A/1B is a 2 year sequence covering the same content of Algebra 1; however, extra emphasis will be placed on the development of prerequisite skills and problem solving strategies in order to ensure all students can successfully master the concepts of Algebra. In these courses, students will learn through cooperative investigations of the major topics of Algebra. The goals of this course are to improve student mathematical literacy and problem solving skills. Topics in Algebra 1A include: one-variable statistics, linear equations, functions, linear functions, and linear inequalities in one- and two-variables.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
One Variable Statistics (5-7 weeks)	How can data be represented and interpreted to make real-world decisions?	Data can be represented in multiple graphical and numerical ways to reveal trends and insights.	DE4(9-12); TCC2(9-12); TCC3(9-12)
Linear Expressions and Equations (13-15 weeks)	What methods or strategies do you use to decide how to solve a problem? How does this extend to the validity of a solution to a problem?	To obtain a solution, one must utilize *inverse operations* to reverse mathematical processes in a systematic sequence, ensuring the equality remains balanced.	TI1(9-12); TCC3(9-12)
Linear Functions (12-13 weeks)	How can understanding linear functions and their multiple representations help us model real-world situations, interpret relationships, and problem solve effectively?	Understanding the different representations of functions - verbal, graphical, using tables, and algebraic - allows us to model real-world situations, identify relationships, make predictions, and solve problems effectively. Different representations provide unique insight into the behavior and characteristics of functions.	TCC2(9-12); TCC3(9-12)
Linear Inequalities in One and Two Variables (3-4 weeks)	Inequalities express a range of possible solutions, rather than a single answer.	What characteristics drive using an inequality instead of an equation?	P4(9-12)

Unit 1 - One Variable Statistics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **S.ID.A.1** Represent data with plots on the real number line (dot plots, histograms, and box plots).
- **S.ID.A.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
- **S.ID.A.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- **DE4(9-12)**: I can work respectfully with all members of my community and support the needs of others.
- **TCC2(9-12)**: I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
- **TCC3(9-12)**: I can integrate relevant information to produce multiple valid solutions.

Understandings: Students will understand that…	**Essential Questions:**
● Data can be represented in multiple graphical and numerical ways to reveal trends and insights.	● How can data be represented and interpreted to make real-world decisions?

• Measures of center and spread can be used to summarize quantitative data. • The context of data matters when interpreting statistical findings.	• What can measures of center and spread tell us about a data set? • How do outliers and distribution shape influence interpretation of data?
Students will know... • Data involving one quantitative variable can be displayed and analyzed using dot plots, histograms, and box plots. • Mean and median are used to describe and compare the center of a distribution; interquartile range (IQR) and standard deviation are used to describe and compare the spread of a distribution.	**Students will be able to...** • Create and interpret dot plots. • Create and interpret histograms. • Calculate the mean, median, mode, range, 5 number summary, and IQR. • Use technology to calculate the five-number summary and the standard deviation. • Interpret the standard deviation and compare the standard deviation between two data sets. • Create and interpret box plots. • Discuss the impact of outliers on the mean and the median.
Key Vocabulary: Dot Plot, Histogram, Frequency, Mean, Median, Mode, Range, Skewed Left, Skewed Right, Symmetric, Box Plot, Five Number Summary, Quartile, Interquartile Range, Outlier, Standard Deviation	
Assessment Evidence	
Performance Tasks: WS 1-4 - Students will collect data from their classmates and analyze the data graphically and by calculating summary statistics. **TCC2(9-12)** Unit 1 project - Students will find data online related to a topic of interest. Students will analyze the data graphically and by calculating summary statistics. **TCC3(9-12)**	**Other Evidence:** Quiz 1-1 - reading and interpreting histograms and dot plots; calculating one variable statistics; analyzing shape of graphs Quiz 1-2 - reading and interpreting box plots; comparing spread (standard deviation); impact of outliers on mean and median
Learning Plan	
The beginning of the school year begins by establishing routines, including the use of Building Thinking Classrooms in Mathematics as an instructional strategy, building community, and integrating to the expectations at the high school. **DE4(9-12)**	

We begin our one-variable statistics unit having students create, interpret, and analyze dot plots and histograms. Students use data from the dot plot to calculate the mean, median, mode, and range. We discuss the shapes of graphs, looking at skewness, and discussing how skewness impacts the mean and the median of the data. Students are assessed by WS 1-4, an in-class assignment, which requires them to collect data from their classmates and to analyze this data by creating graphs and by calculating summary statistics. **TCC2(9-12)** Students are also assessed on this first part of the unit by a quiz (quiz 1-1).

Next students learn how to calculate the 5 number summary and how the box plot (box and whisker plot) display the 5 number summary. Students learn about standard deviation and use the graphing calculator to calculate mean, standard deviation, and 5 number summary. Students are assessed by a quiz (quiz 1-2).

The final assessment for the unit is a project. Students find data online about a topic of their choosing. They analyze the data by calculating statistics and creating graphs. **TCC3(9-12)**

Teacher Resources: IM Algebra 1 Unit 1: One-Variable Statistics; Amplify Desmos; IXL; Khan academy; teacher created worksheets and assessments; interactive notebook pages; Socrative; Blooket; Quizizz; Kahoot

Unit 2 - Linear Expressions and Equations

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear*** *and quadratic functions, and simple rational and exponential* ***functions.***
- **A.CED.A.3 Represent constraints using equations**, inequalities, or systems thereof, **while evaluating solutions for viability within a modeling framework**. *For instance, use inequalities to describe dietary or budgetary restrictions regarding food pairings*.
- **A.REI.A.1** Explain each step in solving a simple equation as follows from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- **A.REI.B.3 Solve linear equations** and inequalities **in one variable**, including equations with coefficients represented by letters.
- **A.SSE.A.1** Interpret expressions that represent a quantity in terms of its context.*
    - **A.SSE.A.1.A** Interpret parts of an expression, such as terms, factors, and coefficients.
- **A.SSE.A.2** Use the structure of an expression to identify ways to rewrite it.
- **A.SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the

expression.*

- **N.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;** choose and interpret the scale and the origin in graphs and data displays.
- **N.Q.A.2** Define appropriate quantities for the purpose of describing modeling.
- **N.Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- **TI1(9-12)**: I can implement a realistic plan and adapt when necessary to achieve my goals.
- **TCC3(9-12)**: I can integrate relevant information to produce multiple valid solutions.

Understandings: Students will understand that…	**Essential Questions:**
• Algebra consists of numbers, variables, operations, and rules for relationships between those entities. • A variable represents an unknown quantity. • Real-life situations can be modeled algebraically. • Solving an equation means finding the value(s) for the variable that makes the equation true. • To obtain a solution, one must utilize *inverse operations* to reverse mathematical processes in a systematic sequence, ensuring the equality remains balanced.	• What does it mean to simplify an expression completely? • What is the difference between simplifying an expression and solving an equation? • What methods or strategies do you use to decide how to solve a problem? How does this extend to the validity of a solution to a problem? • Does each equation have a distinct solution and how do you know? • How can equations be used to model information?
Students will know…	**Students will be able to…**

• Expressions and equations can be used to model real world situations. • Simplifying an algebraic expression is an extension of using order of operations to simplify a numerical expression. • Inverse operations are used to solve linear equations. • Linear equations can have one, none, or infinitely many solutions.	• Perform arithmetic on integers. • Simplify numerical expressions using order of operations. • Evaluate expressions. • Write expressions to represent real world situations. • Solve one and two step equations, including application problems. • Simplify expressions completely, using combining like terms and/or distributive property • Solve multi-step equations, including those with variables on both sides. • Write equations to model and solve real world situations. • Identify when an equation has one solution, no solution, or infinitely many solutions.
Key Vocabulary: Coefficient, Combine Like Terms, Constant, Difference, Distributive Property, Expression, Equation, Equality, Infinite Solutions, Interpret, Inverse Operation, Justify, Like Terms, Modeling, No Solution, Order of Operations, PEMDAS, Persevere, Product, Properties of Equality, Quotient, Simplify, Solve, Solution, Sum, Term, Variable	
Assessment Evidence	
Performance Tasks: Summative Assessment - Unit 2 test **TCC3(9-12)** • Evaluate expressions • Simplify expressions completely • Solve 1 step, 2 step, and multi step equations, including variables on both sides • Solve application problems by writing and solving linear equations	**Other Evidence:** Quiz 2-1 - solving 1 step equations, evaluating expressions, writing expressions for real world situations Quiz 2-2 - solving 2 step equations, including application problems Quiz 2-3 - simplifying expressions by combining like terms and/or distributive property Quiz 2-4 - solving 2 step equations which require combining like terms and/or distributive property New Year's Matholution - At the start of the new year, students reflect on their progress and set a goal for the rest of the school year. **TI1(9-12)**

Learning Plan
This unit starts with an informal exploration of equation solving and equality through picture puzzles. Students review order of operations and negative numbers. They learn several strategies for adding and subtracting integers (counters and number lines), then move on to multiplying and dividing integers. They learn about variables, evaluating expressions, and writing simple expressions to represent real world situations. Quiz 2-1 assesses these topics. The second topic in this unit is solving 2-step equations, including application problems. Students are encouraged to write equations to solve problems, as this will be beneficial as the situations become more complex. Quiz 2-2 assesses these topics. Next students learn to simplify expressions by combining like terms and/or using the distributive property. Quiz 2-3 assesses these topics. The fourth topic involves solving equations which become 2 step equations after one side is simplified by combining like terms and/or using the distributive property. Quiz 2-4 assesses this. Finally students solve multi-step equations, including application problems. The unit 2 test assesses students on all of these topics, which are important foundational topics as they begin their study of algebra. **TCC3(9-12)** After the test, students study special cases of linear equations; equations which have either no solution or infinitely many solutions. During the first class after winter break, students are asked to reflect on their habits and progress in the first part of this course, and they write a “New Year’s Matholution” which is hung up in the classroom to help them through the rest of the school year. **TI1(9-12)**
Teacher Resources: IM Algebra 1 Unit 2: Linear Equations, Inequalities, and Systems; State of CT Algebra 1 Model Curriculum Unit 2; Amplify Desmos; IXL; Khan academy; teacher created worksheets and assessments; interactive notebook pages; Socrative; Blooket; Quizizz; Kahoot

Unit 3 - Linear Functions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **F.IF.A.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x).*
- **F.IF.A.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- **F.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative;*** *relative maximums and minimums; symmetries; end behavior; and periodicity.**
- **F.IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**
- **A.CED.A.2** Create equations that describe numbers or relationships. **Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.**
- **A.REI.D.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- **F.IF.B.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
- **F.IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
    - **F.IF.C.7.A Graph linear** and quadratic **functions and show intercepts**, maxima, and minima.
- **F.BF.A.1** Write a function that describes two quantities.
- **F.IF.C.8** Write a function defined by an expression in different by equivalent forms to reveal and explain different properties of the function.
- **F.LE.A.2 Construct linear** and exponential **functions, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).**

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.

- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- **TCC2(9-12)**: I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
- **TCC3(9-12)**: I can integrate relevant information to produce multiple valid solutions.

Understandings: Students will understand that...

- A function maps each input (domain) to exactly one output (range), and is often expressed as f(x).
- Function notation helps evaluate and interpret functions in different contexts, connecting mathematical expressions to real-world situations.
- Understanding the different representations of functions - verbal, graphical, using tables, and algebraic - allows us to model real-world situations, identify relationships, make predictions, and solve problems effectively. Different representations provide unique insight into the behavior and characteristics of functions.
- Linear functions describe relationships and quantities with a constant additive rate of change, known as the slope.
- Equations represent relationships between quantities and can be graphed on a coordinate plane.
- The graph of a linear function (a line) represents a set of infinite solutions to a two variable equation.
- The average rate of change describes how a function's output changes over an interval.
- Graphs of functions reveal key features like intercepts and slope.

Essential Questions:

- How do we distinguish between relations and functions?
- What is a function, and how can we represent it using equations, graphs, and tables?
- How do we use function notation to evaluate and interpret functions?
- How can mathematical functions be used to represent, analyze, and solve real-world problems, and what insights do different forms of representation provide?
- How can understanding linear functions and their multiple representations help us model real-world situations, interpret relationships, and problem solve effectively?
- What is a linear function, and how can it be represented using equations, graphs, and tables?
- What is the significance of a linear function's slope and y-intercept in the context of modeling linear applications?
- How do changes in the form of a linear equation affect its graph and the relationship between variables?

Students will know...	Students will be able to...
• Functions are relations with each element domain paired with exactly one element of the range. • Function notation is another way to represent your dependent variable. • Functions can be represented by tables, equations, graphs and mapping diagrams. • Domain is the set of all x-values and range is the set of all y-values in a relation. • Linear functions do not include exponents, variables in the denominator, or variables under radicals. • Linear functions can be identified from equations, graphs, and tables. • Slope is a constant rate of change that can be calculated from a graph, table, equation, or two points. • The y-intercept is often referred to as the initial value. It can be identified from an equation or from a graph. • The x-intercept is often referred to as the zero of the function - when the value of the function is zero. • Linear functions can be built from graphs, descriptions, or input-output pairs.	• Understand that a function is a relationship where each input (domain element) has exactly one output (range element). • Represent relations in tables, graphs, equations and mapping diagrams. • Identify the domain (set of possible inputs) and range (set of possible outputs) from a graph, mapping diagram, or table. • Use function notation to represent functions and evaluate them for given inputs. • Solve for the input given an output of a function from an equation. • Interpret and plot functions on a coordinate plane, recognizing how graphs represent the function's behavior. • Interpret graphs to find key features in a scenario. • Use functions and function notation to describe contextual situations. • Identify and classify linear functions from graphs, tables, and equations. • Calculate the slope of a line from a graph, table, equation, and/or two points. • Interpret the meaning of intercepts given a situation, equation, or graph. • Graph linear functions using slope-intercept form. • Graph linear functions in standard form by rewriting into slope-intercept form or by finding the intercepts. • Write equations of linear functions given a graph or a context. • Analyze and interpret the slope and intercepts of a linear function in real-world situations.

Key Vocabulary: Ordered pair, Coordinate Plane, Quadrant, Axis, Relation, Function, Mapping Diagram, Graph, Table, Domain, Range, Independent Variable, Dependent Variable, Function Notation, Linear Function, Slope, Constant Rate of Change, Y-intercept, X-intercept, Slope-Intercept Form, Standard Form, Origin, Solution

Assessment Evidence	
Performance Tasks: Summative Assessment - Unit 3 test **TCC3(9-12)** ● Determine if a relation is a function ● Domain and range ● Function notation ● Linear vs non-linear ● Identify slope from equation, graph, and table of values ● Sketch graph of linear function ● Write equation of line from graph and from problem situation ● Interpret real world meaning of slope and intercepts from graph of problem situation	**Other Evidence:** Concept check 3.1 - plotting points, identifying quadrants Quiz 3-1 - function vs non; identify domain and range from mapping diagram and table of values Quiz 3-2 - function notation; independent vs dependent variable Concept check 3.2 - slope of a graph Quiz 3-3 - slope from a graph and from a table of values; linear vs non linear **TCC2(9-12)** Quiz 3-4 - identify slope and y-intercept and graph line from slope-intercept form; rewrite equations into slope-intercept form; write equation of line given slope and y-intercept Quiz 3-5 - identify slope, x-intercept, and y-intercept from graph; write equation given graph; graph by finding intercepts; interpret real world meaning of intercepts from problem situation **TCC2(9-12)**

Learning Plan
The unit begins with a review of plotting points on the coordinate plane, which is assessed with a concept check. Then students learn about relations and functions, including identifying functions from mapping diagrams, tables of values, graphs, and situations. Students learn about domain and range, and identify domain and range from mapping diagrams and from tables of values. Quiz 3-1 assesses these topics.Next students learn about function notation and independent vs dependent variables. This is assessed through Quiz 3-2. Next students learn about slope and how to calculate slope from a graph of a line, as well as from a table of values. Students decide if a table of values represents a linear or non-linear function. Quiz 3-3 assesses students on these skills. The next topic of study is the slope-intercept form of a linear equation. Students learn to graph a line that is in slope-intercept form and to rewrite an equation into slope-intercept form. Students also study the real world meaning of the slope and the y-intercept in a problem situation. Quiz 3-4 assesses these topics.

Students then learn about intercepts and how to graph a line that is in standard form by finding the intercepts. Students learn about the real world meaning of the x-intercept and the y-intercept in a problem situation. Quiz 3-5 assesses these topics. Finally students practice writing the equations of lines from graphs and from problem situations. The unit 3 test assesses all of the topics from this unit.
Teacher Resources: IM Algebra 1 Unit 4: Functions; IM Algebra 1 Unit 2: Linear Equations, Inequalities, and Systems; State of CT Algebra 1 Model Curriculum Unit 2; Amplify Desmos; IXL; Khan academy; teacher created worksheets and assessments; interactive notebook pages; Socrative; Blooket; Quizizz; Kahoot

Unit 4 - Linear Inequalities in One and Two Variables

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **A.CED.A.1 Create** equations and **inequalities in one variable and use them to solve problems.** *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
- **A.CED.A.3 Represent constraints by equations on inequalities,** and by systems of equations and/or inequalities, and **interpret solutions as viable or nonviable options in a modeling context**.
- **A.REI.B.3 Solve linear** equations and **inequalities in one variable**, including equations with coefficients represented by letters.
- **A.REI.D.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality)**, and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- **P4(9-12)**: I can take-on challenges and continuously engage in my own long-term strategies to overcome them to demonstrate through personal experience that failures are more instructive than discouraging.

Understandings: Students will understand that...

- Inequalities express a range of possible solutions, rather than a single answer.
- The properties of equality and inverse operations are used to solve inequalities in one-variable.

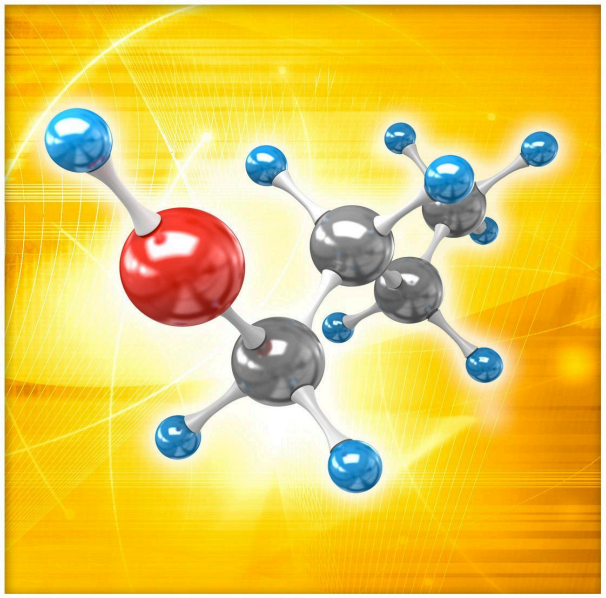
Essential Questions:

- How can inequalities be used to model information?
- How do inequality properties compare to those of equations?
- What characteristics drive using an inequality instead of an equation?
- What is a solution set for a linear inequality?

• The solutions to a linear inequality in two-variables lie in a half-plane, the region of the coordinate plane that contains all of the ordered pairs that satisfy the inequality.	
Students will know... • Inequalities are solved using inverse operations. • If you multiply or divide each side of an inequality by a negative number, the direction of the inequality sign is reversed. • The solutions to a linear inequality in one-variable are graphed on a number line. • A linear inequality in two-variables divides the coordinate plane into two half-planes. One side of the boundary line will represent solutions and is shaded to show this.	**Students will be able to...** • Solve and graph multi-step inequalities in one-variable. • Model real-world situations using inequalities in both one-variable and two-variables. • Graph linear inequalities in two-variables.
Key Vocabulary: Inequality, Greater Than, Less Than, At Least, No More Than, Solution, Solution Set, Dashed Line, Solid Line, Flip the Inequality Sign	
Assessment Evidence	
Performance Tasks: Donut problem - students investigate linear inequalities through this real world situation. **P4(9-12)**	**Other Evidence:** Quiz 4-1 - writing and graphing inequalities for real world situations; solving and graphing linear inequalities, including real world situations Quiz 4-2 - graphing linear inequalities in two-variables, including rewriting to identify the slope and y-intercept
Learning Plan	
This unit builds off of the previous 2 units, but now our understanding of linear equations in one- and two-variables is extended to linear inequalities in one- and two-variables. We start with an exploration of inequalities in the real world, such as “you must be at least 18 to vote”. Then we move to solving linear inequalities in one-variable and representing the solutions on a number line. This includes real world problems. Students are assessed on this topic with quiz 4-1. Students are introduced to linear inequalities in two-variables through the donut problem. **P4(9-12)** Students graph linear inequalities in two-variables, including rewriting inequalities to identify the slope and y-intercept. Students are assessed on this topic with quiz 4-2.	

The final exam is cumulative and follows unit 4.
Teacher Resources: IM Algebra 1 Unit 4: Functions; IM Algebra 1 Unit 2: Linear Equations, Inequalities, and Systems; State of CT Algebra 1 Model Curriculum Unit 2; Amplify Desmos; IXL; Khan academy; teacher created worksheets and assessments; interactive notebook pages; Socrative; Blooket; Quizizz; Kahoot

CHEMISTRY: MATTER & ENERGY CURRICULUM



Grade Level(s): 11-12

Curriculum Author(s): Melissa Hodges, Tobias Denman & Kathleen Yocis

Course Description: This course is offered to students interested in studying Chemistry from a practical point of view as an investigative, hands-on, and activity-based journey into chemistry. Chemistry is studied through the conceptual lens of Matter and Energy with real-world applications. Topics include the atom through fireworks, chemical reactions in everyday life, nuclear reactions with a focus on power plants, and fire and the energy it exhibits among others.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Unit #1: Atomic Structure & Nuclear Processes	What is matter made of?	Matter is composed of atoms with internal structure composed of protons, neutrons and electrons.	TCC2:(9-12), CCE1:(9-12), TI3:(9-12), P3:(9-12)
Unit # 2: Periodic Table	How is the periodic table organized?	Element position on the periodic table determines chemical behavior.	TCC4:(9-12), CCE3:(9-12)
Unit #3: Chemical Bonding	How do different types of bonds affect properties?	Bond type determines physical and chemical properties.	CCE3 (9-12), CCE2 (9-12)
Unit #4: Physical/Chemical Properties and Reactions	How can matter and the changes that matter undergoes be classified and described?	Chemical reactions rearrange atoms but conserve mass.	TCC2 (9-12), DE4 (9-12)
Unit #5: Reaction Rates, Concentration and Equilibrium	How can we predict the amount of products and rate of a chemical reaction?	Reaction rates depend on temperature, concentration, effectiveness of collisions and surface area.	TCC2 (9-12), DE4 (9-12)

Unit 1 - Atomic Structure & Nuclear Processes

Desired Results - Students will use the Periodic Table to determine the structure of atoms.

Established Goals:

NGSS Standards:

HS-PS1-1 - Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms
HS-PS1-8 - Develop models to illustrate the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
HS-ESS1-2 - Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
HS-ESS1-3 - Communicate scientific ideas about the way stars, over their life cycle, produce elements.
PS1.A-H1 - Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.
PS1.A-H2 - The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect the pattern of outer electron states.

Common Core State Standards:

RST.9-10.7 - Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words
RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities
MP.2 - Reason abstractly and quantitatively

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)
TCC2: I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
CCE1: I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias
TI3: I can formulate and investigate probing questions to further my learning.
P3: I can accept constructive feedback and use setbacks to adjust my learning journey in order to reach my goals.

Understandings: Students will understand that…

- The energy of light can be calculated using $E = h\nu$.
- The wavelength and frequency of light can be calculated using $c = \lambda\nu$.

Essential Questions:

- What is matter made of?
- How do scientists know what atoms look like?
- How has the atomic model changed over time?

• Every element and compound produces characteristic light when ignited that can be used to identify that element or compound. • the rules that govern where electrons exist in an atom. (2 electrons per orbital; electrons fill orbitals lowest in energy first; electrons sharing the same orbital will have opposite spins; electrons will fill separate orbitals before pairing) • Periodic trends are all a result of the attraction between the nucleus and valence electrons. • Atomic number, number of subatomic particles and mass number are related to the location of an element on the periodic table. • Certain isotopes of elements are radioactive, which have practical medical and technological applications.	• How do the nuclei of atoms and energy change during a nuclear reaction? • What causes the colors in a fireworks display?
Students will know… • how to use the subatomic particle makeup of an atom to determine mass number, atomic number, identity of an element and ionic charge. • the difference between fission and fusion. • how nuclear half-life is determined. • Average atomic mass can be calculated using: Average Atomic Mass = (mass isotope)(%/100) + (mass isotope)(%/100) + …. • the energy of light can be calculated using E = hv. • the wavelength and frequency of light can be calculated using c = λv. • every element and compound produces characteristic light when ignited that can be used to identify that element or compound. • the rules that govern where electrons exist in an atom. (2 electrons per orbital; electrons fill orbitals lowest in energy first; electrons sharing the same orbital will have opposite spins; electrons will fill separate orbitals before pairing)	**Students will be able to...** • calculate mass number, atomic number, ionic charge using the number of subatomic particles of a particular element. • calculate the average atomic mass of an element, given the percent abundance of its various isotopes. • explain and predict the arrangement of electrons in an atom. • use flame tests or electromagnetic spectra as a way of identifying elements. • predict chemical and physical properties of elements based on their position on the periodic table. • explain the relationship between frequency, wavelength and frequency of light.
Key Vocabulary: atom, molecule, element, chemical symbol, proton, neutron, electron, nucleus, electron cloud, atomic number, periodic table, mass number, isotope, average atomic mass, wavelength, frequency, electromagnetic spectrum, atomic emission spectra, energy level, quantum, quantum mechanical model of the atom, atomic orbital, Heisenberg uncertainty principle, electron configuration, electron spin, valence electron,	

electron dot structure

Assessment Evidence

Performance Tasks:

- Measurement Lab
- Elements: The Building Blocks of Matter Lab
- Isotope Lab
- Flame Tests Lab
- Nuclear Energy Lab
- Radioactive Decay Lab

Other Evidence:

- Unit Test
- Investigation 1 Quiz
- Periodic table worksheet
- Physical Properties of Gaseous Elements Worksheet
- Atomic Structure Worksheet
- Average Atomic Mass Worksheet
- Electron Configuration Worksheet
- Wavelength, frequency energy worksheet
- Half life worksheet
- Composition of Stars Worksheet
- Fission/Fusion Worksheet
- Lab safety quiz
- Lab safety contract

Learning Plan

NGSS Standards:

HS-PS1-1 - Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms

- Electron configuration worksheet

PS1.A-H1 - Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons.

- Atomic structure worksheet
- Isotope Lab
- Nuclear Energy Lab
- Radioactive Decay Lab

PS1.A-H2 - The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect the pattern of outer electron states.

- Electron configuration worksheet
- Atomic Structure Worksheet
- Elements: The Building Blocks of Matter Lab

HS-PS1-8 - Develop models to illustrate the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

- Radioactive Decay
- Nuclear energy lab

HS-ESS1-2 - Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

- Flame test lab
- Wavelength, frequency energy worksheet

HS-ESS1-3 - Communicate scientific ideas about the way stars, over their life cycle, produce elements

- Flame test lab

Common Core State Standards:

MP.2 - Reason abstractly and quantitatively

- Isotope lab
- Flame test lab
- Radioactive Decay

RST.9-10.7 - Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words

- Radioactive Decay
- Flame Test Lab
- Wavelength, frequency energy worksheet

RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

- Nuclear Energy Lab

HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities

- Measurement Lab

Vision of A Learner "I Can" Statements

TCC2: I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- Elements: The Building Blocks of Matter Lab

CCE1: I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias

- Nuclear Energy Lab

TI3: I can formulate and investigate probing questions to further my learning.

- Flame Test Lab

P3: I can accept constructive feedback and use setbacks to adjust my learning journey in order to reach my goals.

- Measurement Lab

Teacher Resources: Experience Chemistry: Investigations 1 and 17, Flinn Safety Laboratory video, Safety Contract & Assessment
Sample Calendar

Unit 2 - Periodic Table

Desired Results - Students will use the periodic table to predict properties of elements.

Established Goals:

NGSS Standards:

HS-PS1-1 - Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms

HS-PS1-2 - Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

Common Core State Standards:

RST.9-10.7 - Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.

WHST.9-12.5 - develop and strengthen writing

HSS.ID.B.6 - represent data on two quantitative variables on a scatter plot and describe how the variables are related

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.

TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.

Understandings: Students will understand that…

- The periodic table organizes elements based on atomic structure
- Patterns in properties repeat predictably
- Element position on the periodic table determines chemical behavior
- The position of an element on the periodic table gives us information about its chemical and physical properties.

Essential Questions:

- How is the periodic table organized?
- What patterns exist among elements?
- How can we predict properties of elements?
- How is an elements' properties related to its position on the periodic table?

Students will know...

- periodic trends are all a result of the attraction between the nucleus and valence electrons.

Students will be able to…

- explain and predict the arrangement of electrons in an atom.

	• predict chemical and physical properties of elements based on their position on the periodic table. • explain the why behind the periodic trends.

Key Vocabulary: electron configuration, ionization energy, electronegativity, atomic radius, alkali metal, alkali earth metal, transition metal, halogen, noble gas, effective nuclear charge, shielding, metal, nonmetal, metalloid

Assessment Evidence

Performance Tasks:
- Develop a Periodic Table lab
- Metals, Nonmetals, Metalloids Lab
- Periodic Trends and Properties Lab

Other Evidence:
- Graphing Periodic Properties
- CER Periodic Trends
- CER Electron Configuration and Element Properties
- Size Trends and Shielding Effect
- CER Effective Nuclear Charge and Electron Shielding
- Unit test

Learning Plan

Established Goals:

NGSS Standards:

HS-PS1-1 - Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms
- CER Electron Configuration and Element Properties

HS-PS1-2 - Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
- CER Electron Configuration and Element Properties
- Metals, Nonmetals, Metalloids Lab
- Periodic Trends and Properties Lab

Common Core State Standards:

RST.9-10.7 - Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words
- Size Trends and Shielding Effect

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.
- CER Periodic Trends
- CER Electron Configuration and Element Properties
- CER Effective Nuclear Charge and Electron Shielding

WHST.9-12.5 - develop and strengthen writing
- CER Periodic Trends
- CER Electron Configuration and Element Properties
- CER Effective Nuclear Charge and Electron Shielding

HSS.ID.B.6 - represent data on two quantitative variables on a scatter plot and describe how the variables are related
- Graphing Periodic Properties

Vision of A Learner "I Can" Statements

CCE3: I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.
- Metals, Nonmetals, Metalloids Lab

TCC4: I can integrate my learning to adapt to experiences in the classroom, career and life.
- Periodic Trends and Properties Lab

Teacher Resources: Experience Chemistry: Investigation 2
Sample Calendar

Unit 3 - Chemical Bonding

Desired Results - Students will create and understand the 3D structure of compounds and their properties.

Established Goals:

NGSS Standards:

HS-PS1-2 - Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
HS-PS1-3 - Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles

Common Core State Standards:

RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.
WHST.9.12.7 - Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.
MP.2 - Reason abstractly and quantitatively
MP.4 - Model with mathematics

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)
CCE2: I can give and receive actionable and relevant feedback with openness to be able to determine meaningful revisions for success.
CCE3: I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products

Understandings: Students will understand that...

- The physical and chemical properties of substances is related to how atoms are bonded
- Atoms arrange themselves in compounds to minimize repulsion between electrons, but maximize attraction between neighboring atoms and compounds.
- Atoms bond to achieve stability

Essential Questions:

- How do atoms bond and how can we predict the type of bond that will form?
- How do atoms arrange themselves in 3-D space when they bond?
- What do ionic, metallic and covalent compounds look like on a microscopic level?

• Bond type determines physical and chemical properties • Molecular structure influences behavior	• Why do atoms form bonds? • How do different types of bonds affect properties? • How can we represent molecules?
Students will know… • bonding electrons arrange themselves in 3D space to minimize repulsion between them. • electronegativity differences and average electronegativity values determine if bonds are nonpolar, polar, metallic or ionic. • the strength of ionic bonds is related to the size of the ions and their charge. • electrons are transferred to form ionic bonds; electrons and shared to form covalent bonds; electrons are shared in a “sea of electrons” to form metallic bonds. • bonds form so that atoms will have 8 electrons in their valence shell. • ionic compounds tend to dissolve in water, have high melting and boiling points, and conduct electricity when dissolved in water or as a liquid. • nonpolar covalent compounds do not dissolve in water, do not conduct electricity and have low melting and boiling points. • polar covalent compounds dissolve in water, do not conduct electricity and have medium melting and boiling points. • metallic compounds do not dissolve in water, conduct electricity and have a variety of melting and boiling points.	**Students will be able to…** • predict the type of bonding present between two atoms in a binary compound based on position in the periodic table and the electronegativity of the elements. • use Lewis dot structures and VSEPR theory to predict the geometry of molecules and make predictions about molecular polarity, shape and bond angles. • Bond Angle and Shape Names (Honors Only) • describe the relationships between the properties of polar and nonpolar molecules and the forces of attraction between the particles. • explain the properties of ionic compounds. • explain the properties (phase, vapor pressure, viscosity, etc.) of small and large molecular compounds in terms of the strengths and types of intermolecular forces. • predict bond types based on physical and chemical properties. • build covalent molecules using model kits and draw them in 3-D space.
Key Vocabulary: Lewis Dot Structures, VSEPR theory, octet rule, bond polarity, molecular polarity, intermolecular forces, solubility, surface tension, boiling point, conductivity, polar, nonpolar, London Dispersion Forces, dipole-dipole forces, hydrogen bonding, resonance, ionic, covalent, metallic	
Assessment Evidence	
Performance Tasks: • Characteristics of Ionic Bonds Lab • Investigating Metallic Bonds Lab • Investigating Covalent Bonds Lab	**Other Evidence:** • Electron Dot Structures of Ionic Compounds • Compare Ionic and Metallic Bonding CER • Analyzing Data: Patterns in Melting Points of Metals

• Intermolecular Forces Lab	• Analyzing Data: Bond Polarity • Analyzing Data: Molecular Polarity • Compare Molecular Compound Properties CER • Electron Dot Structures of Covalent Compounds • Unit test

Learning Plan

NGSS Standards:

HS-PS1-2 - Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

- Characteristics of Ionic Bonds Lab
- Investigating Covalent Bonds Lab
- Investigating Metallic Bonds Lab

HS-PS1-3 - Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles

- Intermolecular Forces Lab

Common Core State Standards:

RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

- Compare Ionic and Metallic Bonding CER
- Compare Molecular Compound Properties CER

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.

- Compare Ionic and Metallic Bonding CER
- Compare Molecular Compound Properties CER

WHST.9.12.7 - Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

- Compare Ionic and Metallic Bonding CER
- Compare Molecular Compound Properties CER

WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.

- Compare Molecular Compound Properties CER

MP.2 - Reason abstractly and quantitatively

- Analyzing Data: Patterns in Melting Points of Metals
- Analyzing Data: Bond Polarity
- Analyzing Data: Molecular Polarity

MP.4 - Model with mathematics

- Analyzing Data: Patterns in Melting Points of Metals
- Analyzing Data: Bond Polarity
- Analyzing Data: Molecular Polarity

Vision of A Learner "I Can" Statements

CCE2: I can give and receive actionable and relevant feedback with openness to be able to determine meaningful revisions for success.

- Characteristics of Covalent Bonds Lab

CCE3: I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products

- Intermolecular Forces Lab

Teacher Resources: Experience Chemistry: Investigation 3 (Experiences 1-4)
Sample Calendar

Unit 4 - Physical/Chemical Properties and Reactions

Desired Results - Students will predict physical and chemical properties of matter

Established Goals:

NGSS Standards:

HS-PS1-3 - Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles

HS-PS1-2 - Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS-PS2-6 - Communicate scientific, and technical information about why the molecular level structure is important in the functioning of designed materials.

Common Core State Standards:

RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.

WHST.9.12.7 - Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

HSN.Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems

WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.

MP.2 - Reason abstractly and quantitatively

MP.4 - Model with mathematics

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.
- DE4(9-12): I can work respectfully with all members of my community and support the needs of others.

Understandings: Students will understand that...	**Essential Questions:**
• Matter has distinct physical and chemical properties	• How can matter be classified and described?

• Chemical reactions rearrange atoms but conserve mass • Observable evidence indicates chemical change • Atoms react with one another to form new molecules in predictable ways. • The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants.	• What happens during a chemical reaction? • How can we identify different types of reactions? • How can we predict physical properties of matter?
Students will know... • the rules related to writing and balancing a chemical equation. • the forms of evidence that a chemical reaction has occurred. • how to interpret a balanced chemical equation in terms of atoms, molecules & ions.	**Students will be able to...** • write, balance, classify and interpret a chemical equation. • predict the physical properties of matter based on how atoms are bonded • Interpret a phase diagram
Key Vocabulary: melting point, boiling point, phase diagram, phase change, chemical change, combustion, law of conservation of mass, balanced equation, chemical equation, reaction, physical change	
Assessment Evidence	
Performance Tasks: • Correlate Material Properties and Bond Type Lab • Measure the Energy of a Phase Change Lab • Melt Ionic and Covalent Compounds Lab • Evaluate Chemical Reactions Lab	**Other Evidence:** • Relate Intermolecular Forces to States of Matter CER • Analyzing Data: Phase Change Graphs • Analyzing Data: Metals and Nonmetals: Data About their Properties • Analyzing Data: Analyzing Chemical Reactions • Analyzing Data: Balancing Equations • Unit test
Learning Plan	
NGSS Standards: HS-PS1-3 - Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles • Melt Ionic and Covalent Compounds Lab • Correlate Material Properties and Bond Type Lab • Measure the Energy of a Phase Change Lab	

HS-PS1-2 - Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
- Correlate Material Properties and Bond Type Lab

HS-PS2-6 - Communicate scientific, and technical information about why the molecular level structure is important in the functioning of designed materials.
- Evaluate Chemical Reactions Lab

Common Core State Standards:

RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Relate Intermolecular Forces to States of Matter CER

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.
- Correlate Material Properties and Bond Type Lab
- Measure the Energy of a Phase Change Lab
- Melt Ionic and Covalent Compounds Lab
- Evaluate Chemical Reactions Lab

WHST.9.12.7 - Conduct short as well as more sustained research projects to answer a question or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- Relate Intermolecular Forces to States of Matter CER

HSN.Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems
- Balancing equations worksheet

WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.
- Relate Intermolecular Forces to States of Matter CER

MP.2 - Reason abstractly and quantitatively
- Analyzing Data: Phase Change Graphs
- Analyzing Data: Metals and Nonmetals: Data About their Properties
- Analyzing Data: Analyzing Chemical Reactions
- Analyzing Data: Balancing Equations

MP.4 - Model with mathematics
- Analyzing Data: Phase Change Graphs
- Analyzing Data: Metals and Nonmetals: Data About their Properties
- Analyzing Data: Analyzing Chemical Reactions
- Analyzing Data: Balancing Equations

Vision of A Learner "I Can" Statements

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- Evaluate Chemical Reactions Lab

DE4(9-12): I can work respectfully with all members of my community and support the needs of others.

- Correlate Material Properties and Bond Type Lab

Teacher Resources: Experience Chemistry: Investigation 4 (Experiences 1-4) and Investigation 6 (Experience 1)
Sample Calendar

Unit 5 - Reaction Rates, Concentration and Equilibrium

Desired Results - Students will understand how to manipulate the amount of products produced during a chemical reaction.

Established Goals:
NGSS Standards:
HS-PS1-4 - Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
HS-PS1-5 - Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature and concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-6 - Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

Common Core State Standards:
WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.
MP.2 - Reason abstractly and quantitatively
HSN.Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)
DE4(9-12): I can work respectfully with all members of my community and support the needs of others.
TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

Understandings: Students will understand that…

- reactions shift to establish a set ratio between products and reactants even when disturbed
- changes in temperature, concentration and surface area can affect the rate of a reaction.

Essential Questions:

- How do reactions respond to disturbances to the equilibrium mixture?
- How can we affect the rate of a reaction?

Students will know...	**Students will be able to...**
• chemical equilibrium occurs when a reaction and its reverse reaction proceed at the same rate. • once equilibrium is achieved, the amount of each reactant and product remains constant, even though the reaction continues. • Equilibrium constants relate concentrations the products to the concentration of reactants • if a reaction at equilibrium is disturbed by a change in temperature, pressure, or the concentration of one of the components, the reaction will shift its equilibrium position to counteract the effect of the disturbance. • the factors that will increase the rate of dissolution and rate of reaction.	• predict how a reaction will respond to changes in temperature, pressure and amount of product or reactant. • predict how temperature, surface area and concentration affect the rates of reactions.

Key Vocabulary: equilibrium, reaction rate, catalyst, product, reactant, Le Chatelier's Principle, activation energy, surface area, concentration, collision theory, precipitate, reversible process

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Reaction Rate Lab • Collision Theory Lab • Explore Chemical Equilibrium Lab	• Analyzing Data: Factors that Affect Reaction Rates • Interpreting Energy Diagrams Worksheet

Learning Plan

NGSS Standards:

HS-PS1-4 - Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
- Collision Theory Lab

HS-PS1-5 - Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature and concentration of the reacting particles on the rate at which a reaction occurs.
- Reaction Rate Lab

HS-PS1-6 - Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.
- Explore Chemical Equilibrium Lab

Common Core State Standards:

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.

- Reaction Rate Lab
- Collision Theory Lab
- Explore Chemical Equilibrium Lab

MP.2 - Reason abstractly and quantitatively

- Analyzing Data: Factors that Affect Reaction Rates

HSN.Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems

- Interpreting Energy Diagrams Worksheet

Vision of A Learner "I Can" Statements

DE4(9-12): I can work respectfully with all members of my community and support the needs of others.

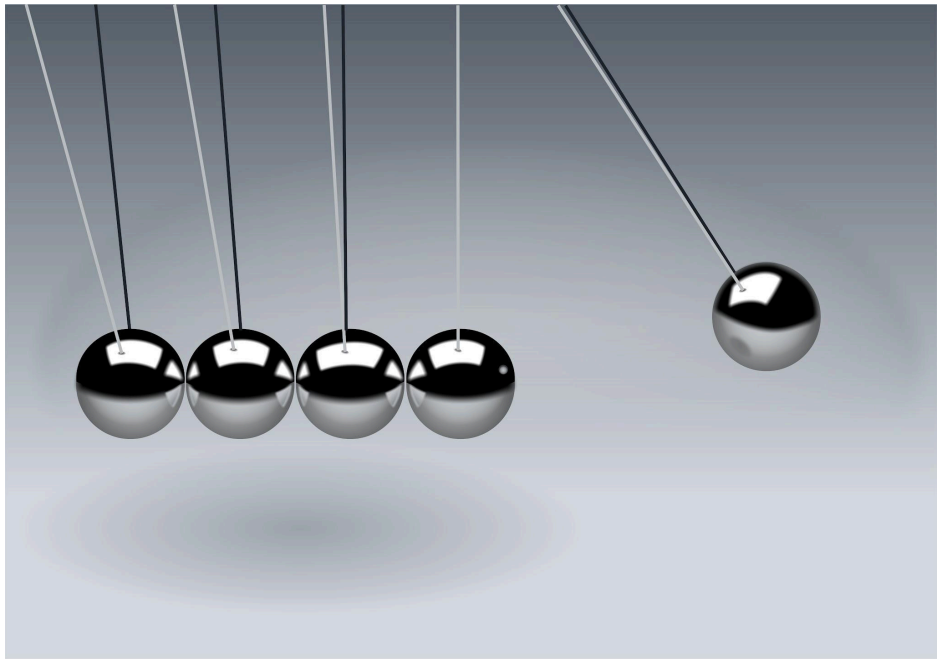
- Reaction Rate Lab

TCC2(9-12): I can evaluate evidence from multiple perspectives, and recognize their limitations and implications, in order to justify new conclusions.

- Collision Theory Lab

Teacher Resources: Experience Chemistry: Investigation 12 (Experiences 1-3)
Sample Calendar

AP PHYSICS 1 CURRICULUM



Grade Level(s): 11 and 12

Curriculum Author(s): Rebecca Pope

Course Description:
Per the college Board, AP Physics 1 is an algebra-based, introductory college-level physics course that explores topics such as Newtonian mechanics (including rotational motion); work, energy, and power; momentum; simple harmonic motion, and fluids. Through inquiry-based learning, students will develop scientific critical thinking and reasoning skills. This course requires that 25 percent of the instructional time will be spent in hands-on laboratory work, with an emphasis on inquiry-based investigations that provide students with opportunities to apply the science practices. Students taking AP Physics 1 must take the AP Exam in May. Students should have successfully completed geometry and Algebra II (may be concurrent).

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Kinematics	How do we describe and predict motion?	Kinematics allows us to represent and model how objects move using graphs, diagrams, and equations.	CCE3(9-12); DE4(9-12); TCC3(9-12)
Force and Translational Dynamics	How do forces change an object's motion?	Newton's laws describe the relationship between forces and changes in motion.	TCC4(9-12); TI3(9-12); P2(9-12)
Work, Energy, and Power	How is energy transferred and conserved in physical systems?	Energy is conserved and can be transferred through work or transformed between kinetic and potential forms.	TCC1(9-12); DE1(9-12); TI2(9-12)
Linear Momentum	What happens when objects collide or interact?	Momentum is conserved in closed systems and provides insight into collisions and interactions.	AA1(9-12); P1(9-12); CCE2(9-12)
Torque and Rotational Dynamics	What causes objects to rotate or remain in balance?	Torque, moment of inertia, and angular acceleration determine rotational motion and equilibrium.	P4(9-12); AA2(9-12)

Energy and Momentum of Rotating Systems	How does energy and momentum behave in rotating systems?	Rotating systems conserve angular momentum and energy just as linear systems do.	AA2(9-12); TI4(9-12)
Oscillations	How do oscillating systems behave and how can we model them?	Simple harmonic motion results from restoring forces and can be described with position, velocity, and energy graphs.	P3(9-12); TI1(9-12)
Fluids	How do fluids exert forces and move through systems?	Pressure, buoyancy, and flow are governed by forces and conservation principles.	AA4(9-12); CCE4(9-12)

Unit 1 - Kinematics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among net force, mass, and acceleration.
- HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs.

AP Physics 1 Framework:

- Topic 1.1–1.5: Scalars and Vectors, Displacement, Velocity, Acceleration, Graphical Analysis, and Relative Motion.
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- CCE3(9-12): I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.
- DE4(9-12): I can work respectfully with all members of my community and support the needs of others.
- TCC3(9-12): I can integrate relevant information to produce multiple valid solutions.

Understandings: Students will understand that…

- Motion is described using multiple representations: verbal, graphical, and mathematical.
- Acceleration is a change in velocity over time and can be analyzed through kinematics equations and graphs.
- Frame of reference affects the observed motion of objects.

Essential Questions:

1. How can the motion of objects be predicted and/or explained?
2. Can equations be used to answer questions regardless of the questions' specificity?
3. How can the idea of frames of reference allow two people to tell the truth yet have conflicting reports?
4. How can we use models to help us understand motion?
5. Why is the general rule for stopping your car "when you double your speed, you must give yourself four times as much distance to stop?"

Students will know…	**Students will be able to…**
• Definitions and differences between scalar and vector quantities. • Kinematic equations for motion with constant acceleration. • How to construct and interpret position-time and velocity-time graphs. • The significance of frames of reference in analyzing motion.	• Create and interpret multiple representations of motion (graphs, equations, verbal). • Solve problems using kinematic equations. • Analyze motion from various frames of reference. • Communicate findings using scientific reasoning and evidence.
Key Vocabulary: Displacement, velocity, acceleration, scalar/vector, frame of reference, position-time graph, velocity-time graph	
Assessment Evidence	
Performance Tasks: 1. Motion Mapping Lab. DE4(9-12), CCE3(9-12) 2. Mini Catapult Design, Build, Test, Calculate. CCE3(9-12), DE4(9-12)	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions focused on using kinematic equations and a variety of graphs to solve motion problems in 1 and 2 dimensions. • **Unit Assessment:** AP-style multiple-choice and free-response questions focused on using kinematic equations and a variety of graphs to solve motion problems in 1 and 2 dimensions.
Learning Plan	
• Motion Mapping: DE4(9-12), CCE3(9-12) • Vernier Graph Matching: DE4(9-12), TCC3(9-12) • Ball Drop Lab: DE4(9-12), TCC3(9-12) • Reaction Time Lab: DE4(9-12), TCC3(9-12) • Vector Navigation Treasure Hunt: CCE3(9-12), DE4(9-12) • Mini Catapults: CCE3(9-12), DE4(9-12)	
Teacher Resources: • AP Physics 1 Course & Exam Description (CED) • Vernier Graphical Analysis software	

- PhET simulations: “The Moving Man,” “Vector Addition”
- Text: OpenStax *Physics for AP Physics 1*
- AP Classroom
- Google Sheets/Desmos for graphical analysis
- POGIL

Unit 2 - Force and Translational Dynamics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS2-1: Analyze data to support Newton’s second law of motion.
- HS-PS2-2: Use mathematical representations to support the claim that the total momentum of a system is conserved.
- HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems.

AP Physics 1 Framework:

- Topics 2.1–2.9: Systems and Center of Mass, Forces, Newton's Laws, Friction, Circular Motion
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes:

- TCC4(9-12): I can integrate my learning to adapt to experiences in the classroom, career and life.
- TI3(9-12): I can formulate and investigate probing questions to further my learning.
- P2(9-12): I can strengthen my weaknesses by identifying, initiating, and practicing appropriate strategies to become confident in my ability to overcome my challenges.

Understandings: Students will understand that…

- The motion of objects can be predicted by analyzing the forces acting upon them.

Essential Questions:

1. How do forces affect the motion of objects in systems?
2. How can free-body diagrams help us understand and solve motion problems?

• Newton's laws describe how forces relate to changes in motion. • Real-world systems involve interacting forces and frictional effects. • Circular motion requires a net centripetal force directed toward the center of the path.	3. Why do objects behave differently on flat surfaces vs. inclined planes or circular paths?
Students will know… • Definitions and applications of Newton's First, Second, and Third Laws. • How to construct and analyze free-body diagrams. • The role of net force in changing motion. How to calculate and apply frictional, gravitational, tension, normal, and spring forces. • The principles of circular motion and the need for centripetal force.	**Students will be able to…** • Analyze systems using Newton's laws and vector mathematics. • Create and interpret free-body diagrams. Solve problems involving multiple forces, including friction and circular motion. • Justify and support claims with evidence and correct physics principles.
Key Vocabulary: Net force, Free-body diagram, Newton's First, Second, and Third Laws, Inertia, Normal force, Friction (static/kinetic), Tension, Spring force (Hooke's Law), Circular motion, Centripetal force	
Assessment Evidence	
Performance Tasks: • Friction Lab TI3(9-12), TCC4(9-12) • Hooke's Law Investigation: TI3(9-12) • Centripetal Force Lab: TI3(9-12), TCC4(9-12)	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions focused on solving for unknown variables in a variety of force problems. • **Unit Assessment:** AP-style multiple-choice and free-response questions focused on solving for unknown variables in a variety of force problems.
Learning Plan	
• Newton's Second Law Investigation: TI3(9-12) • Friction Lab: TI3(9-12), TCC4(9-12) • Hooke's Law Investigation: TI3(9-12)	

- Motion on an Inclined Plane: TI3(9-12), TCC4(9-12)
- Atwood Machine Build and Assess: TI3(9-12), P2(9-12)
- Centripetal Force Lab: TI3(9-12), TCC4(9-12)
- Earth's Orbital Period Calculation: TI3(9-12), TCC4(9-12)

Teacher Resources:

- College Board AP Physics 1 Course and Exam Description
- Vernier force sensors or spring scales
- Vernier Graphical Analysis
- PhET simulations: "Forces and Motion," "My Solar System"
- Text: OpenStax *Physics for AP Physics 1*
- AP Classroom
- Video demos (e.g., MIT Physics, The Physics Classroom)
- POGIL

Unit 3 - Work, Energy, and Power

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS3-1: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
- HS-PS3-2: Develop and use models to illustrate that energy is associated with motion and position of an object.
- HS-PS3-3: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

AP Physics 1 Framework:

- Topics 3.1–3.5: Translational Kinetic Energy, Work, Potential Energy, Conservation of Energy, and Power
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC1(9-12): I can ask purposeful, insightful questions to find a variety of innovative solutions.
- DE1(9-12): I can acknowledge, process, and respond appropriately to others' comments and perspectives.
- TI2(9-12): I can evaluate my objectives and a variety of credible resources to find the best solutions for any challenge.

Understandings: Students will understand that…

- Work is a mechanism for energy transfer and depends on force and displacement.
- The total energy in a closed system remains constant, even as energy changes forms.
- Power describes the rate at which energy is transferred or transformed.

Essential Questions:

1. How is energy transferred or transformed in physical systems?
2. What does it mean to say that energy is conserved?
3. How do different forms of energy interact in systems we can model and measure?

Students will know…

- Work-energy theorem and the definition of work.
- Equations for kinetic and potential energy
- Principle of conservation of energy in closed systems
- Power equations
- How to construct and analyze energy bar charts, graphs, and diagrams

Students will be able to...

- Calculate work done by forces, including variable and constant forces
- Apply conservation of mechanical energy to predict outcomes in motion and collisions
- Use energy bar charts and system schema to model energy transformations
- Analyze real-world systems to evaluate energy efficiency and power output

Key Vocabulary: Work, Kinetic energy, Potential energy (gravitational, elastic), Conservation of energy, Power, Open System, Closed System, Energy transformations

Assessment Evidence	
Performance Tasks: ● Work and Energy Investigation: TCC1(9-12) ● Roller Coaster Build: DE1(9-12), TI2(9-12)	**Other Evidence:** ● **Interim Assessments:** AP-style multiple-choice and free-response questions focused on conservation of energy, energy transformations, and the work-energy theorem. ● **Unit Assessment:** AP-style multiple-choice and free-response questions focused on conservation of energy, energy transformations, and the work-energy theorem.

Learning Plan
● PhET Simulation: Energy Skate Park: TCC1(9-12) ● Systems and Energy Investigation: TCC1(9-12) ● Work and Energy Investigation: TCC1(9-12) ● Rollercoaster Build: DE1(9-12), TI2(9-12)
Teacher Resources: ● College Board AP Physics 1 Course and Exam Description ● Vernier motion sensors ● PhET: “Energy Skate Park,” “Masses and Springs” ● Desmos for data analysis ● Text: OpenStax *Physics for AP Physics 1* ● Whiteboards for energy diagrams and peer critique ● AP Classroom ● POGIL

Unit 4 - Linear Momentum

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS2-2: Use mathematical representations of Newton's second law to support the claim that the total momentum of a system is conserved.
  HS-PS2-3: Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

AP Physics 1 Framework:

- Topics 4.1–4.4: Linear Momentum, Impulse, Conservation of Linear Momentum, Elastic and Inelastic Collisions
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- AA1(9-12): I can evaluate different approaches and justify the best pathway to success.
- P1(9-12): I can self-reflect and seek feedback to build upon my strengths, apply those strengths to overcome obstacles, and share my strategies with others.
- CCE2(9-12): I can give and receive actionable and relevant feedback with openness to be able to determine meaningful revisions for success.

Understandings: Students will understand that…

- Momentum is a conserved quantity in isolated systems.
- Impulse is the change in momentum and is caused by a net external force over time.
- Collisions (elastic and inelastic) involve different transformations of kinetic energy, though momentum is always conserved.

Essential Questions:

1. How does momentum help us understand interactions between objects?
2. Why is total momentum conserved even when kinetic energy isn't?
3. How can collisions be modeled to reduce forces experienced by objects?

Students will know…	**Students will be able to…**
• Definition and mathematical representation of momentum Impulse-momentum theorem Law of conservation of momentum • Differences between elastic, inelastic, and perfectly inelastic collisions • Real-world applications of momentum conservation and impulse (e.g., car safety)	• Analyze and solve problems involving momentum and impulse • Calculate changes in momentum and determine effects of force and time • Apply conservation of momentum to systems before and after collisions • Compare and contrast elastic vs. inelastic collisions using data and representations
Key Vocabulary: Momentum, Impulse, Conservation of momentum, Elastic collision, Inelastic collision, Perfectly inelastic collision, System	
Assessment Evidence	
Performance Tasks: • Crash Barrier Build. AA1(9-12), CCE2(9-12), P1(9-12): • Collisions investigation: Elastic. P1(9-12): • Collisions Investigation: Inelastic. P1(9-12):	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions focused on linear momentum, impulse, and collisions. • **Unit Assessment:** AP-style multiple-choice and free-response questions focused on linear momentum, impulse, and collisions.
Learning Plan	
• Crash Barrier Build. AA1(9-12), CCE2(9-12), P1(9-12): • Conservation of momentum investigation. AA1(9-12) • Collisions investigation: Elastic. P1(9-12): • Collisions Investigation: Inelastic. P1(9-12):	
Teacher Resources: • College Board AP Physics 1 CED and Progress Checks Vernier dynamics carts and motion sensors and Graphical Analysis software • PhET: “Collision Lab,” • Crash barrier challenge materials • Video references: slow-motion collisions, car crash testing	

- Text: OpenStax *Physics for AP Physics 1*
- AP Classroom
- POGIL

Unit 5 - Torque and Rotational Dynamics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS2-1: Analyze data to support the claim that Newton's second law describes the mathematical relationship among net force, mass, and acceleration, and extend this understanding to rotational systems.
- HS-ETS1-2: Design and evaluate solutions by breaking a larger problem into simpler parts to understand systems of rotation and equilibrium.

AP Physics 1 Framework:

- Topics 5.1–5.6: Rotational Kinematics, Connecting Linear and Rotational Motion, Torque, Rotational Inertia, Rotational Equilibrium, Newton's Second Law in Rotational Form
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- P4(9-12): I can take-on challenges and continuously engage in my own long-term strategies to overcome them to demonstrate through personal experience that failures are more instructive than discouraging.
- AA2(9-12): I can assess my past successes and mistakes to change my approach.

Understandings: Students will understand that…

- Torque causes changes in rotational motion similar to how force causes linear acceleration.
- Rotational systems follow laws analogous to linear systems, including rotational equilibrium and Newton's second law in rotational form.
  Moment of inertia depends on how mass is distributed relative to the axis of rotation.

Essential Questions:

1. How is rotational motion similar to and different from linear motion?
2. What factors determine how easily an object rotates?
3. How can we model rotational systems to predict motion and equilibrium?

Students will know…	**Students will be able to...**
• The relationship between torque, force, and lever arm. • Equations of rotational kinematics. • Definitions of moment of inertia and its dependence on mass distribution. • Newton's second law for rotation.	• Calculate torque and analyze its direction using right-hand rule • Determine net torque and resulting angular acceleration of systems • Compare and compute moments of inertia for various geometric objects • Design and solve for systems in rotational equilibrium • Apply linear-rotational analogies to predict object behavior
Key Vocabulary: Torque, lever arm, angular velocity, angular acceleration, moment of inertia, rotational equilibrium, rotational kinematics, newton's second law (rotational), axis of rotation	
Assessment Evidence	
Performance Tasks: • Torque and rotational Dynamics Lab. P4(9-12), AA2(9-12) • Rotational Inertia Race. P4(9-12)	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions solving for unknown variables using and manipulating rotational kinematic equations. • **Unit Assessment:** AP-style multiple-choice and free-response questions solving for unknown variables using and manipulating rotational kinematic equations.
Learning Plan	
• PhET: "Balancing Act," "Rotational Motion" P4(9-12) • Rotational Inertia and Newton's First Law. AA2(9-12) • Torque and rotational Dynamics Lab P4(9-12), AA2(9-12) • Newton's Second Law in Rotational Form. AA2(9-12) • Rotational Inertia Race. P4(9-12)	
Teacher Resources: • College Board AP Physics 1 CED and Progress Checks • Force sensors, meter sticks, pivot clamps, weights	

- PhET: “Balancing Act,” “Rotational Motion”
- Text: OpenStax *Physics for AP Physics 1*
- Desmos or google sheets for graphing rotational data
- AP Classroom
- POGIL

Unit 6 - Energy and Momentum of Rotating Systems

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS3-1: Create a computational model to calculate the change in energy in a system, including rotational kinetic energy.
- HS-PS2-2: Use mathematical representations to support momentum conservation, including angular momentum.
- HS-ETS1-2: Evaluate solutions to complex real-world problems involving rotating systems.

AP Physics 1 Framework:

- Topics 6.1–6.6: Rotational Kinetic Energy, Torque and Work, Angular Momentum, Conservation of Angular Momentum, Rolling Motion, Orbital Motion
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- AA2(9-12): I can assess my past successes and mistakes to change my approach.
- TI4(9-12): I can apply my strengths and anticipate challenges to reach my current and future goals.

Understandings: Students will understand that…	**Essential Questions:**
• Rotating systems store and transform energy, which can be analyzed similarly to linear systems. • Angular momentum is a conserved quantity in isolated systems, similar to linear momentum. • Rolling motion combines translational and rotational components and can be modeled with conservation laws.	1. How does energy behave in rotating systems, and how can we quantify it? 2. What determines how much angular momentum a system has, and when it’s conserved? 3. How can we apply conservation principles to rolling or orbiting objects?
Students will know…	**Students will be able to...**

• Definition and formula for rotational kinetic energy. • Torque as a method of doing rotational work. • Angular momentum and its conservation. • The conditions under which angular momentum is conserved. • How to model rolling motion and combine translational + rotational dynamics. • Basic principles of orbital motion under Newtonian gravity.	• Analyze and calculate energy in rotating systems • Apply the work-energy principle to systems with rotational motion • Use conservation of angular momentum to predict rotational behavior after collisions or mass shifts • Model systems that roll without slipping • Represent orbital motion using circular motion principles and Newton's law of gravitation
Key Vocabulary: Rotational kinetic energy, angular momentum, conservation of angular momentum, rolling motion, torque and work, orbit, moment of inertia, angular velocity	
Assessment Evidence	
Performance Tasks: • Calculating Kinetic Energy of a Rolling Object. TI4(9-12) • Moment of Inertia Investigation. AA2(9-12), TI4(9-12)	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions solving for unknown variables using and manipulating energy and momentum equations for rotating systems. • **Unit Assessment:** AP-style multiple-choice and free-response questions solving for unknown variables using and manipulating energy and momentum equations for rotating systems.
Learning Plan	
• Kinetic Energy of a Rolling Object - Translational vs. Rotational vs. Total. TI4(9-12) • Relating Work and Torque. AA2(9-12) • Moment of Inertia Investigation. AA2(9-12), TI4(9-12) • Conservation of Angular Momentum Demonstrations. AA2(9-12):	
Teacher Resources: • College Board AP Physics 1 CED • Rotational motion apparatus (rotating platform, disks, hoops) • PhET: "My Solar System," "Rotation"	

- Text: OpenStax *Physics for AP Physics 1*
- Google Sheets or Desmos for graphical analysis
- AP Classroom
- Video references: figure skaters, rotating ice platforms, rolling toy races
- POGIL

Unit 7 - Oscillations

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves.
- HS-PS3-2: Develop and use models to illustrate that energy is associated with motion and position in oscillating systems.
  HS-ETS1-2: Design and evaluate systems that optimize desired characteristics, such as frequency and amplitude in oscillations.

AP Physics 1 Framework:

- Topics 7.1–7.4: Defining Simple Harmonic Motion (SHM), Frequency and Period, Representing SHM, Energy in SHM
  Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- P3(9-12): I can accept constructive feedback and use setbacks to adjust my learning journey in order to reach my goals.
- TI1(9-12): I can implement a realistic plan and adapt when necessary to achieve my goals.

Understandings: Students will understand that…

- Simple harmonic motion is periodic and predictable when a system is subject to a restoring force.
- The motion of oscillating systems can be described using graphs, equations, and energy models.
- Energy in oscillating systems is continually transferred between kinetic and potential forms.

Essential Questions:

1. What makes motion “simple harmonic”?
2. How does energy change throughout the motion of an oscillator?
3. How can we mathematically and visually represent oscillating systems?

Students will know…

- Characteristics of SHM: amplitude, frequency, period,

Students will be able to...

- Identify SHM based on force and acceleration relationships

equilibrium, restoring force. • Hooke's Law • SHM equations for spring and pendulum systems. • Energy transformations and conservation in SHM.	• Calculate period and frequency for masses on springs and pendulums • Create and interpret position-time, velocity-time, and energy graphs for oscillators • Model and evaluate energy transformations in SHM • Design and evaluate systems that exhibit SHM
Key Vocabulary: Simple Harmonic Motion (SHM), restoring force, amplitude, frequency, period, equilibrium, Hooke's Law, spring constant, oscillator, damping	
Assessment Evidence	
Performance Tasks: • Oscillators Investigation. TI1(9-12) • Calculating Gravitational Field Strength Using a Pendulum. P3(9-12)	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions using the characteristics of oscillators in simple harmonic motion to solve for unknown quantities. • **Unit Assessment:** AP-style multiple-choice and free-response questions using the characteristics of oscillators in simple harmonic motion to solve for unknown quantities.
Learning Plan	
• Springs and Masses PhET Simulation. TI1(9-12) • Oscillators Investigation. TI1(9-12) • Calculating Gravitational Field Strength Using a Pendulum. P3(9-12) • Trigonometric Functions in SHM - A pendulum. P3(9-12)	
Teacher Resources: • College Board AP Physics 1 CED and AP Classroom • Mass-spring systems (horizontal & vertical setups) • Vernier motion sensors, force sensors, graphical analysis software • PhET: "Masses and Springs," "Pendulum Lab" • Text: OpenStax *Physics for AP Physics 1* • Google Sheets or Desmos for graphical analysis	

- AP Classroom
- POGIL

Unit 8 - Fluids

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

NGSS Standards:

- HS-PS2-1: Analyze data to support claims about the behavior of systems, including fluid systems.
  HS-PS3-2: Develop and use models to illustrate fluid motion and pressure-energy relationships.
- HS-ETS1-2: Design and evaluate solutions involving fluid systems and constraints like buoyancy and pressure.

AP Physics 1 Framework:

- Topics 8.1–8.4: Internal Structure and Density, Pressure, Fluids and Newton's Laws, Fluids and Conservation Laws
- Science Practices: Creating Representations, Mathematical Routines, Scientific Questioning and Argumentation

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- AA4(9-12): I can create opportunities to extend my learning by remaining open-minded in any situation.
- CCE4(9-12): I can communicate and express my understanding in an authentic, respectful and relevant way, using the most effective mode of expression.

Understandings: Students will understand that…	**Essential Questions:**
• Fluid pressure increases with depth and affects object motion and buoyancy. • Newton's laws apply to objects in fluids, including floating and sinking. • Conservation of mass and energy govern fluid flow (continuity and Bernoulli's principles).	1. How do fluids exert forces, and how can we predict their effects? 2. What determines whether an object sinks or floats? 3. How do fluids behave in motion, and how is that governed by conservation laws?
Students will know…	**Students will be able to…**

• Definitions of pressure and density. Hydrostatic pressure. • Buoyant force and archimedes' principle. • Continuity equation. • Bernoulli's equation (qualitative understanding).	• Calculate pressure, density, and buoyant force in fluid systems • Analyze equilibrium of floating/sinking objects using force diagrams Apply the continuity equation to simple fluid flow problems • Model real-world fluid scenarios using conservation principles • Justify predictions with data, graphs, and physical laws
Key Vocabulary: Fluid, pressure, density, buoyant force, archimedes' Principle, continuity, bernoulli's principle, hydrostatic pressure, volume flow rate	
Assessment Evidence	
Performance Tasks: • Buoyancy calculations lab. CCE4(9-12) • Continuity Equation Challenge: AA4(9-12)	**Other Evidence:** • **Interim Assessments:** AP-style multiple-choice and free-response questions solving for pressure and fluid dynamics. • **Unit Assessment:** AP-style multiple-choice and free-response questions solving for pressure and fluid dynamics.
Learning Plan	
• Determining the weight of a car using tire pressure. AA4(9-12) • PhET Buoyancy Lab. CCE4(9-12) • Buoyancy calculations lab - Measure displaced water volume and weight to confirm Archimedes' Principle. CCE4(9-12) • PhET Fluid Flow Simulation CCE4(9-12) • Continuity Equation Challenge - Apply and test continuity equation with a real or simulated pipe system. AA4(9-12)	
Teacher Resources: • College Board AP Physics 1 CED • Graduated cylinders, overflow cans, force sensors, various objects • PhET: "Fluid Pressure and Flow" • Text: OpenStax *Physics for AP Physics 1* • Google Sheets or Desmos for graphing fluid flow data • AP Classroom	

- POGIL

GRADE 6 MATH CURRICULUM



Grade Level(s): 6th Grade Math

Curriculum Author(s): Cate Lyman and Jessica Traver

Course Description:**Math 6** continues to build on concepts learned in elementary school through student discourse and the use of visual and concrete models. A major focus in 6th grade is the development of ratios, equivalent ratios, and unit rates. Multiple representations such as discrete diagrams, double number lines, and ratio tables are used as tools to interpret and solve ratio problems. These strategies are then extended to the study of percentages. Students extend their work with multiplying fractions in 5th grade to develop an understanding of the division of fractions using both tape diagrams and ratio tables. Students then build upon strategies from 5th grade to develop efficient algorithms for multiplying and dividing multi-digit numbers including decimals. Expressions, equations, and inequalities with variables are also introduced in 6th grade. Students use visual representations such as tape diagrams and hanger models to first reason about and solve equations. Then students learn to use variables to represent an unknown and write and solve one-step equations. Geometry topics include hands-on activities to develop the area formulas of triangles and other quadrilaterals, the volume of rectangular prisms, and utilizing nets to find surface areas of three-dimensional figures. Students also learn about statistical variability as well as display and summarize data in dot plots, histograms, and box plots.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Unit 1: Area and Surface Area	How can we use mathematical reasoning and representations to understand the space objects occupy in two and three dimensions?	Decomposing and recomposing shapes allows us to understand and calculate area and surface area in ways that apply to real-world objects.	TCC1(6-8); TCC3(6-8); **TCC4**(6-8); CCE1(6-8); CCE3(6-8); **CCE4**(6-8); DE4(6-8); TI2(6-8); **P4**(6-8); AA2(6-8); AA3(6-8)
Unit 2: Introducing Ratios	How can we describe and compare relationships between quantities using ratios?	Ratios are tools to represent relationships between quantities and can be expressed and interpreted in different ways depending on the context.	TCC1(6-8); TCC3(6-8); TCC4(6-8); CCE1(6-8); CCE3(6-8); **DE4**(6-8); P3(6-8); **P4**(6-8); AA2(6-8); AA3(6-8)
Unit 3:Unit Rates & Percentages	How can unit rates and percentages help us compare quantities and make informed decisions?	Unit rates and percentages provide powerful strategies for solving real-world problems involving comparisons, savings, efficiency, and growth.	**TCC1**(6-8); TCC3(6-8); TCC4(6-8); **CCE1**(6-8); CCE3(6-8); DE1(6-8); DE4(6-8); TI4(6-8); P3(6-8); P4(6-8); AA2(6-8); AA3(6-8)
Unit 4: Dividing Fractions	How can understanding the meaning of fraction operations help us solve real-world problems?	Fraction multiplication and division can be modeled, understood, and applied in a variety of contexts involving parts of a whole or when something is getting bigger or smaller..	**TCC1**(6-8); TCC4(6-8); CCE1(6-8); **CCE3**(6-8); CCE4(6-8); **DE4**(6-8); TI4(6-8); P3(6-8); P4(6-8); AA2(6-8); AA3(6-8)
Unit 5: Arithmetic in Base 10	How can fluency with operations help us solve problems accurately and efficiently?	Proficiency with base-ten operations enables us to reason flexibly, solve multi-step problems, and assess the reasonableness of our solutions.	TCC1(6-8); CCE1(6-8); CCE3(6-8); **CCE4**(6-8); DE4(6-8); **P3**(6-8); P4(6-8); AA2(6-8); AA3(6-8)

Unit 6: Expressions and Equations	How do rational numbers and the coordinate plane help us describe and analyze the world around us?	Expressions allow us to generalize patterns and relationships, and properties of operations help us manipulate them meaningfully and efficiently.	TCC1(6-8); **TCC4**(6-8); **CCE1**(6-8); CCE4(6-8); DE4(6-8); P3(6-8); P4(6-8); AA2(6-8); AA3(6-8)
Rational Numbers	How do rational numbers and the coordinate plane help us describe and analyze the world around us?	Rational numbers and coordinate grids provide a structured way to represent and reason about quantities, directions, and locations in two dimensions.	**TCC1**(6-8); TCC3(6-8); CCE3(6-8); CCE4(6-8); DE4(6-8); TI2(6-8); **P4**(6-8); AA2(6-8); AA3(6-8)
Data Sets and Distributions	How can collecting, displaying, and analyzing data help us make informed decisions?	Data can be collected, organized, represented, and analyzed to answer questions, identify patterns, and support conclusions about real-world situations.	TCC1(6-8); TCC4(6-8); CCE1(6-8); **CCE3**(6-8); **DE4**(6-8); P3(6-8); P4(6-8); AA2(6-8); AA3(6-8)

Unit 1 - Area and Surface Area

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

CCSS.MATH.CONTENT.6.G.A.1 – Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing or decomposing into known shapes.
CCSS.MATH.CONTENT.6.G.A.4 – Represent three-dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area.
CCSS.MATH.CONTENT.6.EE.A.2 – Write, read, and evaluate expressions in which letters stand for numbers.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC3: I can combine new information with my own ideas to generate solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

TI2: I can identify my objectives and apply the best resources to my learning.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA2: I can identify past successful strategies and apply them independently.

AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that…	**Essential Questions:**
Area is a measurable attribute of two-dimensional figures and can be found through decomposition. Nets are two-dimensional representations of three-dimensional figures and can be used to calculate surface area. Mathematical expressions can represent real-world contexts and general relationships.	How can we use decomposition to find the area of complex shapes? In what ways can we represent and calculate surface area? How do expressions help us describe and solve real-world problems?
Students will know…	**Students will be able to...**
Definitions and properties of area and surface area. Strategies to decompose complex shapes into known figures. The concept of nets for 3D figures. How to evaluate and write expressions.	Calculate the area of polygons and composite figures. Use nets to find the surface area of 3D figures. Represent geometric situations with expressions. Use mathematical reasoning to justify their thinking.

Key Vocabulary: Area, surface area, polygon, parallelogram, triangle, trapezoid,compose , decompose, base, height, net, edge, face, vertex,exponent, squared, cubed, prism, pyramid.

Assessment Evidence

Performance Tasks:
TCC4, CCE4, P4

Mid Unit Assessment:

- Find the area of a two-dimensional region with straight boundaries by decomposing, rearranging, subtracting, or enclosing shapes, and explain the solution method.
- Apply the formula for area of a parallelogram to find the area, the length of a base, or the height.
- Understand bases and heights in a parallelogram and recognize base-height pairs to use to calculate its area.
- Find the area of a polygon by decomposing it into parallelograms and triangles.
- Understand bases and heights in a triangle and recognize base-height pairs to use to find the area of a triangle.
- Understand why the process of finding the area of a triangle can be expressed generally as $A = \frac{1}{2} \cdot b \cdot h$ (or equivalent) and apply the formula to find the area of a triangle.

End of Unit Assessment:

- Identify or create a net that represents a prism or pyramid.
- Use a net to calculate the surface area of a prism or pyramid and explain the solution method.
- Interpret and write expressions using second and third power exponents to represent the area of a square or the volume of a cube. Write expressions, with or without exponents, to represent the surface area of a given cube.

Other Evidence:

CheckPoints
CER Responses
Exit Tickets
Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

Learning Plan			
Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Developing Area Concepts: Decompose and Rearrange	Sort and compare tiling patterns; decompose and compose shapes using tangrams; refine definition of area; explore decomposition, rearrangement, subtraction, and enclosure strategies.	6.G.A.1	TCC1, TCC4, CCE4, P4, DE4
Finding Area Using Formulas: Parallelograms and Triangles	Decompose parallelograms into rectangles; discover base-height relationships; develop area formulas for parallelograms and triangles; practice identifying bases and heights in various orientations.	6.G.A.1	TCC1, TCC3, CCE1
Applying Area Formulas to Polygons	Apply decomposition and formula strategies to find areas of irregular and regular polygons; synthesize multiple strategies for complex problems.	6.G.A.4	TCC3, P4, AA2, AA3, TI2
Understanding Surface Area in 3D	Visualize polyhedra and explore nets; find surface area by calculating and summing face areas; develop surface area formulas; distinguish between surface area and volume.	6.G.A.4	CCE1, CCE3, P4, DE4

Connecting Geometry to Algebra	Explore patterns for squares and cubes; represent area and surface area using algebraic notation (s^2, $6s^2$); connect geometric understanding to algebraic thinking.	6.EE.A.2	TCC1, TCC3, CCE3, AA3

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 1 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Family-facing video summaries of each section (Vimeo/YouTube)

Physical manipulatives, tangrams, pattern blocks, polyhedron nets, and grid paper

Digital tools: IXL, Delta Math

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Unit 2 - Introducing Ratios

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

CCSS.MATH.CONTENT.6.RP.A.1 – Understand ratio concepts and use ratio language to describe relationships between two quantities.

CCSS.MATH.CONTENT.6.RP.A.3 – Use ratio and rate reasoning to solve real-world problems (e.g., recipes, unit pricing, constant speed).

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC2: I can evaluate data gathered from multiple perspectives and draw conclusions.

TCC3: I can combine new information with my own ideas to generate solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3:I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA2: I can identify past successful strategies and apply them independently.

AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that...	**Essential Questions:**
Ratios compare quantities and represent relationships.	What does a ratio express, and how do we use it?
Equivalent ratios reflect proportional relationships.	How can we show that two ratios are equivalent?
Multiple representations (tables, diagrams, expressions) deepen understanding of ratios.	How can different ways of representing ratios (diagram, table, expression) help us solve problems?
Students will know…	**Students will be able to...**
Definitions: ratio, rate, equivalent ratio, unit rate, “per.”	Create and interpret ratio representations.
Representations: double number line, tape diagram, table, expression.	Determine and explain equivalence of ratios.
Contexts: mixtures, recipes, unit price, constant speed.	Solve real-world ratio and rate problems using multiple approaches.
	Identify and compute unit rates.

Key Vocabulary: Ratio, rate, equivalent ratio, unit rate, per, double number line, tape diagram, table, “at this rate,” constant speed.

Assessment Evidence

Performance Tasks:
DE4, P4

End of Unit Assessment:

- Create and interpret discrete diagrams that represent situations involving ratios.
- Create and interpret sentences that describe ratios.
- Explain equivalent ratios in terms of the quantities in a recipe being multiplied by the same number to create a different size batch of something with the same taste or same shade.
- Generate equivalent ratios and justify that they are equivalent.
- Given prices and quantities or distances and times, calculate the price for 1 object or the distance traveled in 1 unit of time. Express each using the word “per.”
- Justify whether two situations do or do not happen at the same rate, by determining if the ratios in the situations are equivalent.
- Use a double number line diagram to represent and find equivalent ratios.
- Choose multipliers strategically when solving multi-step problems involving equivalent ratios.
- Use a table of equivalent ratios to solve problems.
- Choose representations and solution methods to reason about ratios and sums of quantities.
- Use diagrams or other strategies to solve problems involving ratios and the total amount.

Other Evidence:
CheckPoints
CER Responses
Exit Tickets
Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

Learning Plan

Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute

Understanding Ratios and Equivalent Ratios	Describe associations between quantities using ratio language; sort and classify tiling patterns; explore recipes and color mixtures to develop the concept of equivalent ratios; refine definition of ratio.	6.RP.A.1	TCC3, TCC4, P4
Representing Equivalent Ratios with Visual Models	Use double number line diagrams to represent equivalent ratios; transition from discrete diagrams to more abstract representations; solve problems involving constant speed and batches.	6.RP.A.3, 6.RP.A.3.b	TCC2, TCC3, AA2
Organizing Equivalent Ratios in Tables	Represent equivalent ratios in table format; find missing values in ratio tables; compare two different ratio representations; explore when tables are more efficient than other models.	6.RP.A.3, 6.RP.A.3.a	TCC1, TCC2, CCE1
Solving Ratio and Rate Problems	Apply equivalent ratio strategies to solve complex ratio problems; work with part-part-whole relationships; solve comparison and scaling problems using multiple	6.RP.A.3	CCE3, CCE4, AA3, P3

	representations.		
Applying Ratio Reasoning to Real-World Contexts	Use ratio and rate reasoning to solve authentic problems; apply multiple strategies and representations; justify and communicate mathematical thinking.	6.RP.A	CCE1,CCE4, P4, AA3

Teacher Resources:

Illustrative Mathematics Grade 6 Unit 2 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Family-facing video summaries of each section (Vimeo/YouTube)

Physical tools: centimeter rulers, graph paper, colored pencils

Digital tools: IXL, Delta Math

Unit 3 - Unit Rates and Percentages

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

CCSS.MATH.CONTENT.6.RP.A.2 – Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0.

CCSS.MATH.CONTENT.6.RP.A.3 – Use ratio and rate reasoning to solve real-world and mathematical problems, including percent problems.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC3: I can combine new information with my own ideas to generate solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing

various types of feedback to my peers.

DE1: I can search for multiple perspectives and compare and contrast those perspectives.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

TI4: I can identify my strengths and areas for growth, set goals toward improvement, and seek support as needed.

P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA2: I can identify past successful strategies and apply them independently.

AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that...	**Essential Questions:**
Unit rates describe a ratio in terms of one unit and help compare quantities. Percents are another way to represent ratios and can be used to describe real-world contexts. Ratio, rate, and percent reasoning can be represented through multiple models.	What does a unit rate tell us and how can we use it? How can percentages represent real-world situations? What strategies help us solve ratio, rate, and percent problems?
Students will know…	**Students will be able to...**
• Definitions: unit rate, percent, equivalent ratios, part/whole relationships. • Representations: tape diagrams, tables, double number lines, percent bars.	• Identify and compute unit rates. • Solve problems involving percents, including percent increase/decrease and discounts. • Choose and apply representations to solve problems.

Key Vocabulary: Unit rate, percent, equivalent ratios, quantity, tape diagram, double number line, part, whole, discount, tax, tip.

Assessment Evidence

Performance Tasks: TCC1, CCE1 End of Unit Assessment: ● Recognize that when we measure things in two different units, the pairs of measurements are equivalent ratios. ● Apply this understanding to convert a measurement from one unit to another unit. ● Use a “rate per 1” to solve problems involving unit conversion. ● Apply reasoning about ratios and unit rates to solve problems and explain the solution methods. ● Calculate the two unit rates associated with a ratio and interpret them in the context of a situation. ● Choose a strategy to solve problems involving percentages and explain the solution method. ● Create tape diagrams, double number line diagrams, or tables to represent situations involving percentages.	**Other Evidence:** CheckPoints CER Responses Exit Tickets Various Thinking Tasks using Building Thinking Classrooms instructional strategies. (**TCC1, CCE1**)

Learning Plan

Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Understanding Units of Measurement and Conversions	Anchor understanding of standard units of measurement with benchmark objects; classify units by attribute; perform unit conversions; use ratio reasoning in measurement contexts.	6.RP.A.3.d	TCC1, TCC3
Unit Rates and Rates Per 1	Compare speeds and prices using rates per 1; understand that equivalent ratios have the same unit rate; find unit rates to compare situations; apply rate reasoning to real-world problems.	6.RP.A.2, 6.RP.A.3.b	TCC3, P4, AA2
Understanding Percentages as Rates Per 100	Discover what "percent" means through gridded diagrams; use double number line diagrams to represent percentages; make connections between percentages, money, and other contexts; express quantities as percentages.	6.RP.A.3.c	TCC1, AA3, CCE1

Finding and Using Percentages	Calculate percentages using benchmark values and double number lines; solve problems involving finding the part, whole, or percentage; apply percentage reasoning to discounts, comparisons, and real-world situations.	6.RP.A.3.c	TCC3, TCC4, P4, CCE1, CCE4
Applying Unit Rates and Percentages to Real-World Problems	Solve complex problems integrating unit rates and percentages; justify solutions using multiple strategies; communicate mathematical thinking in authentic contexts.	6.RP.A	TCC1, P4, AA3, CCE1, CCE4

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 3 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Family-facing video summaries of each section (Vimeo/YouTube)

Visual tools: percent bars, 100 grids, graph paper

Digital Tools: IXl, Delta Math

Unit 4 - Dividing Fractions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

CCSS.MATH.CONTENT.6.NS.A.1 – Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

CCSS.MATH.CONTENT.6.NS.B.2 – Fluently divide multi-digit numbers using the standard algorithm.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays,

performance-based projects, whole group, and/or small group discussions. **DE4**: I can be respectful and responsible and build positive relationships with all members of the school community. TI4: I can identify my strengths and areas for growth, set goals toward improvement, and seek support as needed. P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey. P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow. AA2: I can identify past successful strategies and apply them independently. AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that…	**Essential Questions:**
Multiplying and dividing fractions can be understood using models and real-world contexts. Division of fractions can be interpreted as how many groups or how much in one group. Fluency with fractions supports problem solving and reasoning in daily life.	What does it mean to divide fractions, and how can we model it? When do we multiply versus divide with fractions in real-life situations? What strategies help build fluency in fraction operations?
Students will know…	**Students will be able to...**
The meanings of multiplication and division with fractions. How to interpret and apply reciprocal relationships. How to use visual models such as tape diagrams and number lines.	Multiply and divide fractions and mixed numbers. Represent and solve problems using models and equations. Justify their reasoning and critique others' thinking.

Key Vocabulary: Multiply, divide, reciprocal, fraction, mixed number, product, quotient, inverse operation, unit fraction.

Assessment Evidence	
Performance Tasks: TCC1, DE4 End of Unit Assessment: ● Create a diagram and a multiplication or division equation to represent the relationship in situations involving equal-size groups, and coordinate these representations. ● Interpret a division expression in two ways: as an answer to a "How many groups?" question or to a "How many in each group?" question. ● Create a diagram, a multiplication equation, and a division equation to represent a problem that involves a fractional divisor and that asks "How many groups?" or "How much in one group?" ● Solve problems involving division of fractions by using diagrams, writing equations, or reasoning about the relationship between multiplication and division. Explain the strategies used. ● Apply the division algorithm for fractions to calculate quotients of fractions and mixed numbers. ● Determine the volume of a rectangular prism by packing it with unit cubes with appropriate unit-fraction edge lengths and by multiplying the edge lengths. ● Solve problems about length comparison, the side lengths and area of a rectangle, and the edge lengths and volume of a rectangular prism using fraction division.	**Other Evidence:** CheckPoints Mid-Unit Assessment CER Responses Exit Tickets Various Thinking Tasks using Building Thinking Classrooms instructional strategies. (**TCC1, DE4**)

Learning Plan			
Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Understanding Division with Fractions	Explore the relationship between dividend, divisor, and quotient; reason about how the size of divisor affects the quotient; interpret division situations in concrete contexts; extend understanding from whole numbers to fractions.	6.NS.A.1, 6.EE.A.2.b	TCC1, P4, AA3. CCE1
"How Many Groups?" Interpretations	Use pattern blocks and diagrams to find how many groups when group size is a fraction; connect to multiplication equations; reason about equal-size groups of fractions using visual models and concrete materials.	6.NS.A.1	TCC3, TI2, CCE4, DE4
"How Much in Each Group?" Interpretations	Explore division questions asking "how much in each group"; use diagrams and area models to find unknown amounts; develop understanding of both interpretations of division with fractions.	6.NS.A.1, 6.G.A.1, 6.G.A.2	TCC4, P4, AA3, CCE1

Algorithms for Dividing Fractions	Develop and apply the algorithm for dividing fractions; connect to unit rates and reciprocals; practice calculating quotients using efficient methods.	6.NS.A.1	TCC1, P3, CCE3, DE4
Applying Fraction Division to Real-World Problems	Solve complex problems involving areas with fractional side lengths; apply fraction division to find dimensions; use multiple representations to solve problems; communicate reasoning.	6.NS.A.1, 6.G.A.1, 6.G.A.2	TCC4, P4, AA3

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 4 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Family-facing video summaries of each section (Vimeo/YouTube)

Visual tools: fraction tiles, number lines, area model templates

Digital Tools: IXl, Delta Math

Unit 5 - Arithmetic In Base Ten

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

CCSS.MATH.CONTENT.6.NS.B.2 – Fluently divide multi-digit numbers using the standard algorithm.

CCSS.MATH.CONTENT.6.NS.B.3 – Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA2: I can identify past successful strategies and apply them independently.

AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that…	**Essential Questions:**
Procedural fluency with decimals and whole numbers strengthens problem-solving ability. Efficient algorithms can be applied to real-world contexts. Estimating and evaluating reasonableness are critical mathematical practices	What strategies help ensure accuracy when working with decimals and large numbers? How do algorithms support efficiency and flexibility in computation? When and why should we estimate in problem-solving?
Students will know... ● Standard algorithms for operations with whole numbers and decimals. ● Strategies for estimating and checking reasonableness. ● Applications of operations to solve real-world problems.	**Students will be able to...** ● Fluently add, subtract, multiply, and divide multi-digit decimals and whole numbers. ● Use estimation and mental math to check reasonableness. ● Apply arithmetic strategies in authentic problem-solving situations.

Key Vocabulary: Sum, difference, product, quotient, decimal point, place value, algorithm, estimate, rounding, benchmark numbers.

Assessment Evidence

Performance Tasks: CCE4, P3 End of Unit Assessment: ● Explain the sum or difference of two decimals in terms of combining like base-ten units and composing (or decomposing) a larger unit from (or into 10) units of a lower value. ● Use the standard algorithm to add or subtract decimals with multiple non-zero digits. ● Multiply decimals by using whole-number multiplication and applying place value to position the decimal point. ● Calculate the quotient of a whole-number or a decimal dividend and a decimal divisor, and explain the strategy used.	**Other Evidence:** CheckPoints Mid-Unit Assessment CER Responses Exit Tickets Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

Learning Plan

Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Exploring, Adding, and Subtracting Decimals	Activate prior knowledge of decimals in shopping context; use diagrams to represent decimal addition and subtraction; develop strategies for adding and subtracting decimals with few and many non-zero digits; practice estimation and precise calculations.	6.NS.B.3	TCC4, CCE3, P3
Multiplying Decimals	Use fractions to understand decimal multiplication; explore multiple methods for multiplying decimals; create	6.NS.B.3	TCC1, CCE3, DE4

	diagrams to represent multiplication; calculate products using standard algorithms; reason about decimal placement.		
Dividing Decimals	Represent division with diagrams; develop and practice long division algorithm; extend to decimal quotients.: connect equivalent fractions to rewrite division problems with decimal divisors as equivalent whole-number division problems; extend division to decimals by decimals.	6.NS.B.3	P4, AA3, TCC4
Applying Decimal Operations to Real-World Problems	Plan and solve problems involving decimal operations in authentic contexts including measurement and surface area of boxes; apply fluency with all four operations; communicate mathematical thinking and reasoning about precision.	6.NS.B.3	TCC3, CCE1, TI4

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 5 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Teacher created Lessons and Google Slides to supplement Division lessons using equivalent fractions

Family-facing video summaries of each section (Vimeo/YouTube)

Visual tools: Printable place value charts and decimal grids

Digital Tools: IXl, Delta Math

Unit 6 - Expressions and Equations

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- CCSS.MATH.CONTENT.6.EE.A.1 – Write and evaluate numerical expressions involving whole-number exponents.
- CCSS.MATH.CONTENT.6.EE.A.2 – Write, read, and evaluate expressions in which letters stand for numbers.
- CCSS.MATH.CONTENT.6.EE.A.3 – Apply the properties of operations to generate equivalent expressions.
- CCSS.MATH.CONTENT.6.EE.A.4 – Identify when two expressions are equivalent.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA2: I can identify past successful strategies and apply them independently.

AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that…	**Essential Questions:**
Variables and expressions can represent real-world and mathematical relationships. Equivalent expressions are different ways of representing the same quantity. Properties of operations help simplify and evaluate expressions.	What do variables and expressions represent? How do we determine if two expressions are equivalent? How do we use the properties of operations to simplify expressions?
Students will know…	**Students will be able to...**
The structure and meaning of numerical and algebraic expressions. Definitions and roles of variables, terms, coefficients, constants, and exponents. The properties of operations: commutative, associative, distributive.	Write and interpret expressions. Use substitution to evaluate expressions. Generate and identify equivalent expressions. Explain reasoning verbally and in writing.

Key Vocabulary: Variable, expression, coefficient, constant, term, evaluate, equivalent, simplify, exponent, substitution.

Assessment Evidence

Performance Tasks: TCC4, AA2 End of Unit Assessment: ● Solve equations of the form x+p=q or *px*=*q* and justify the reasoning or strategy used (e.g., inverse operations, tape diagrams) ● Understand that solving an equation with a variable means finding a value for the variable that makes the equation true, and use substitution to determine whether a number is a solution to the equation. ● Justify whether two expressions are “equivalent,” or equal to each other for every value of their variable. ● Use the distributive property to write equivalent algebraic expressions. ● Evaluate expressions with variables and whole-number exponents using the order of operations. ● Determine equivalence of expressions with exponents by evaluating and comparing; explain why the order of operations matters. ● Create a table, graph, and equation to represent the relationship between two quantities. ● Identify the independent and dependent variable in a situation.	**Other Evidence:** CheckPoints Mid-Unit Assessment CER Responses Exit Tickets Various Thinking Tasks using Building Thinking Classrooms instructional strategies.
Learning Plan	

Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Equations in One Variable	Use tape diagrams and equations to represent relationships; explore truth of equations; understand what it means to solve; practice solving equations of the form x + p = q and px = q; apply to real-world situations; represent situations with equations.	6.EE.B.5, 6.EE.B.6, 6.EE.B.7	TCC1, P4, AA3
Equal and Equivalent Expressions	Write expressions with variables; understand the difference between equal and equivalent; explore the distributive property in depth; use circle models to explore how multiplication as equal groups leads to the distributive property; justify why decomposing a factor creates equivalent expressions, apply distributive property to simplify and expand expressions; develop algebraic fluency.	6.EE.A.3, 6.EE.A.4	TCC3, CCE3, AA2, DE4
Expressions with Exponents	Develop meaning of exponents; write and interpret expressions with exponents; apply order of operations; evaluate expressions with exponents; find equivalent	6.EE.A.1	CCE1, CCE4, P4

	exponential expressions.		
Relationships Between Quantities	Explore two related quantities; investigate how quantities change together; represent relationships using equations, tables, and graphs; identify patterns; interpret relationships in multiple representations.	6.EE.C.9, 6.RP.A.3.a, 6.RP.A.3.b, 6.RP.A.3.c	TCC3, CCE4, DE4
Applying Expressions and Equations to Real-World Problems	Create tables, equations, and graphs to represent real-world situations; use multiple representations to solve problems; analyze relationships between quantities in authentic contexts.	6.EE.A, 6.EE.B	TCC1, CCE3, CCE4

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 6 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Teacher created Lessons and Google Slides to supplement Distributive Property lessons (multiplication as equal groups)

Family-facing video summaries of each section (Vimeo/YouTube)

Digital Tools: IXl, Delta Math

Unit 7 - Rational Numbers

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- CCSS.MATH.CONTENT.6.NS.C.5 – Understand that positive and negative numbers describe quantities having opposite directions or values.
- CCSS.MATH.CONTENT.6.NS.C.6 – Understand a rational number as a point on the number line.
- CCSS.MATH.CONTENT.6.NS.C.7 – Understand ordering and absolute value of rational numbers.
- CCSS.MATH.CONTENT.6.NS.C.8 – Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC3:I can combine new information with my own ideas to generate solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA2: I can identify past successful strategies and apply them independently.

Understandings: Students will understand that...	**Essential Questions:**
Positive and negative numbers together represent quantities with opposite directions or values (temperature, elevation, debits/credits)	How can we represent and interpret situations involving opposite directions or values?
Zero is a reference point; numbers to the left/below are negative, and numbers to the right/above are positive	What does it mean to order and compare numbers that include negatives?
The absolute value of a number represents its distance from zero, regardless of direction	How does absolute value help us understand magnitude independent of direction?
Opposite numbers are equidistant from zero on a number line (e.g., -3 and 3)	How can inequalities represent constraints or conditions in real-world contexts?
Rational numbers (including negative fractions and decimals) can be ordered and compared using their position on a number line	What does the coordinate plane reveal about the relationships between two quantities?
Inequalities describe relationships between numbers and have infinitely many solutions that can be represented on a number line	How do common factors and multiples help us organize and simplify numeric relationships?
The coordinate plane with four quadrants allows us to locate and describe points using ordered pairs with positive and negative coordinates	
Common factors and common multiples help us understand relationships between whole numbers and simplify expressions	

Students will know…	**Students will be able to...**
Definitions: positive number, negative number, rational number, opposite, integer, absolute value, inequality, solution to an inequality, quadrant, coordinate plane, common factor, greatest common factor (GCF), common multiple, least common multiple (LCM) The meaning of symbols: − (negative), | | (absolute value), < (less than), > (greater than) That opposite numbers have equal absolute values How to interpret ordered pairs in context and identify which quadrant a point is in based on the signs of its coordinates That when comparing two negative numbers, the number closer to zero is greater (e.g., That the distance between two points on the coordinate plane can be found using absolute value Strategies for finding GCF and LCM (listing factors/multiples, using prime factorization, or systematic organization)	Represent positive and negative numbers in real-world contexts and explain the meaning of zero Plot and order rational numbers on a number line; identify opposites and absolute values Compare rational numbers using inequality symbols Write and graph inequalities (x>c or x<c) on a number line with appropriate notation Determine if a value is a solution to an inequality; find and interpret multiple solutions in context Plot ordered pairs with signed coordinates in all four quadrants and find distances using absolute value Find GCF and LCM; apply GCF to factor expressions Solve real-world problems involving negative numbers, inequalities, coordinates, and factors/multiples
Key Vocabulary: positive number, negative number, opposite (numbers), rational number, sign, absolute value,inequality, solution to an inequality, quadrant, x- coordinate, y-coordinate, factor, common factor, greatest common factor (GCF), least common multiple (LCM)	

Assessment Evidence	
Performance Tasks: TCC1, P4 End of Unit Assessment: ● Interpret rational numbers and absolute values in real-world contexts ● Plot rational numbers and their opposites on a number line, recognizing that opposites share the same absolute value ● Use words and symbols to compare rational numbers, including when absolute value is involved ● Determine whether a given value is a solution to an inequality ● Write inequality statements to represent constraints or conditions ● Create and label number line diagrams to represent all solutions to an inequality ● Understand how the signs of ordered pairs indicate quadrant location ● Plot points given coordinates or identify coordinates of points in all four quadrants ● Use coordinates and absolute value to find horizontal and vertical distances between points ● Identify factors of a number and find common factors of two numbers in real-world situations ● Identify multiples of a number and find common multiples of two numbers in real-world situations.	**Other Evidence:** CheckPoints CER Responses Exit Tickets Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

Learning Plan			
Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Negative Numbers and Absolute Value	Extend understanding of the number system to include negative numbers; use positive and negative numbers in context (temperature, elevation); represent on vertical and horizontal number lines; understand meaning of zero in context; introduce absolute value and distance from zero; compare and order rational numbers.	6.NS.C.5, 6.NS.C.6, 6.NS.C.7.a, 6.NS.C.7.b, 6.NS.C.7.c	TCC1, CCE1, DE4
Inequalities and the Coordinate Plane	Write and graph inequalities; find solutions of inequalities; interpret inequality statements; construct and use coordinate plane with negative coordinates; find distances in coordinate plane; represent shapes using ordered pairs.	6.NS.C.6.a, 6.NS.C.6.b, 6.NS.C.6.c, 6.NS.C.8	TCC3, CCE1, AA2
Common Factors and Multiples	Find common factors and greatest common factor; find common multiples and least common multiple; apply to real-world problem contexts; use factor and multiple	6.NS.B.4	TCC4, CCE3, P4

	relationships in computation.		
Applying Rational Numbers to Real-World Problems	Draw and create designs on the coordinate plane; solve problems using rational numbers in all four quadrants; apply coordinate geometry in authentic contexts.	6.NS.C	TCC4, CCE3, DE4

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 7 Teacher Guide and Teacher Course Guide

Google Slides for presentations

Family-facing video summaries of each section (Vimeo/YouTube)

Printable coordinate grids and number lines

Digital Tools: IXl, Delta Math

Unit 8 - Data Sets and Distributions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- CCSS.MATH.CONTENT. 6.SP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
- CCSS.MATH.CONTENT.6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, spread, and overall shape.
- CCSS.MATH.CONTENT.6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- CCSS.MATH.CONTENT.6.SP.B.5

  (a) Summarize numerical data sets in relation to their context.
  (b) Describe the nature of the attribute under investigation.
  (c) Give quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation).
  (d) Relate the choice of measures of center and variability to the shape of the data distribution.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1: I can ask relevant questions to evaluate possible solutions.

TCC3(6-8): I can combine new information with my own ideas to generate solutions.

TCC4: I can apply my learning to new experiences, determine if it works, and adjust in the future.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

CCE4: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussion
ns.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

TI2: I can identify my objectives and apply the best resources to my learning.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

AA3: I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that... Statistical questions anticipate variability in data. Different graphical displays reveal different characteristics of a data set. Measures of center and variability describe data in meaningful ways. Data analysis helps us make evidence-based decisions.	**Essential Questions:** What makes a question statistical? How do graphs help us understand data? Which measures best describe a data set? How can data help us make decisions?
Students will know... The characteristics of statistical questions. The difference between categorical and numerical data. Mean, median, range, interquartile range, and mean absolute deviation. How to create and interpret dot plots, histograms, and box plots. How to describe the shape and spread of a distribution.	**Students will be able to...** Develop statistical questions. Collect and organize data. Create dot plots, histograms, and box plots. Calculate mean, median, range, IQR, and MAD. Compare two data sets using graphs and summary statistics. Draw conclusions and justify claims using data.

Key Vocabulary: Statistics, Statistical Question,Data Set, Distribution, Variability, Mean, Median, Range, Interquartile Range (IQR), Mean, Absolute Deviation (MAD), Dot Plot, Histogram, Box Plot	
Assessment Evidence	
Performance Tasks: CCE3, DE4 End of Unit Assessment: ● Comprehend and use the terms “numerical” and “categorical” to describe data sets. ● Justify whether a question is “statistical” based on whether variability is expected in the data that could be collected. ● Describe a distribution represented by a dot plot, including informal observations about its center and spread. ● Interpret a histogram to answer statistical questions about a data set. ● Compare the means and mean absolute deviations of different distributions. ● Interpret the mean and mean absolute deviation (MAD) in the context of the data. ● Compare the means and mean absolute deviations of different distributions. ● Interpret the mean and mean absolute deviation (MAD) in the context of the data. ● Compare the means and mean absolute deviations of different distributions. ● Interpret the mean and mean absolute deviation (MAD) in the context of the data.	**Other Evidence:** CheckPoints Mid-Unit Assessment CER Responses Exit Tickets Various Thinking Tasks using Building Thinking Classrooms instructional strategies.
Learning Plan	

Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute
Data, Variability, and Statistical Questions	Collect and explore different kinds of data; distinguish between categorical and numerical data; identify and ask statistical questions; understand variability in data; record appropriate units of measurement.	6.SP.A.1, 6.SP.A.2, 6.SP.A.3	TCC1, CCE1, DE4
Dot Plots and Histograms	Create and interpret dot plots; use dot plots to answer statistical questions; understand when to use histograms; read and interpret histograms; describe distributions on histograms; understand shapes, centers, and spreads of distributions.	6.SP.B.4, 6.SP.B.5.a, 6.SP.B.5.b	TCC3, CCE3, P4
Measures of Center and Variability	Understand and calculate mean; interpret mean as balance point; introduce mean absolute deviation (MAD); compare data using mean and MAD; use measures to make comparisons between distributions.	6.SP.B.5.c, 6.SP.B.5.d	TCC4, CCE3, TI2
Median, Quartiles, and Box	Find and interpret median; compare mean and median;	6.SP.B.5	TCC3, CCE4, P4

Plots	understand quartiles and interquartile range (IQR); create and interpret box plots; use box plots to compare distributions and make inferences.		
Applying Data Analysis to Real-World Problems	Collect and organize data to solve authentic problems; choose appropriate representations and measures; make inferences and conclusions from data; communicate statistical findings and reasoning.	6.SP.A, 6.SP.B	TCC1, CCE3, AA3

Teacher Resources:

Illustrative Mathematics Grade 6, Unit 8 Teacher Guide and Teacher Course Guide

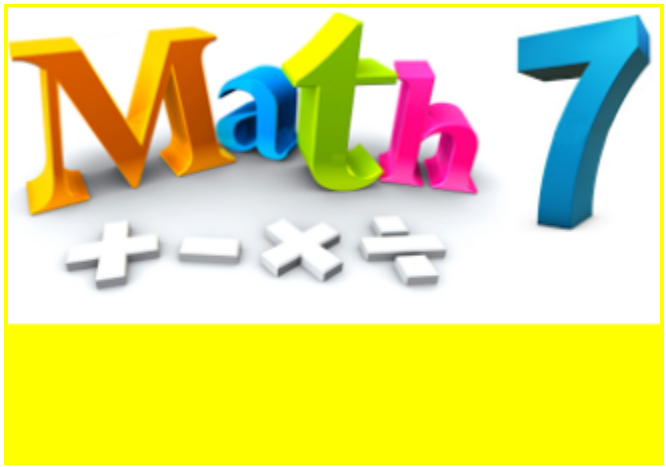
Google Slides for presentations

Family-facing video summaries of each section (Vimeo/YouTube)

Rulers, Playing cards, index cards

Digital Tools: IXl, Delta Math

GRADE 7 MATH CURRICULUM



Grade Level(s): Grade 7

Curriculum Author(s): Cate Lyman, Jaime Peterson

Course Description: Math 7 continues to emphasize visual representations of mathematical situations to deepen conceptual understanding and support procedural understanding. Students explore more deeply the concepts of ratios and rates through the topics of scaled copies, proportional relationships, and percents. Students use tables, graphs, and equations to analyze proportional relationships and solve real-world and mathematical problems. Students investigate and develop the formulas for the circumference and area of a circle applying the knowledge of proportional and nonproportional relationships. Students build upon the introduction of integers in the 6th grade to include arithmetic with positive and negative numbers. Students then further the work started in 6th grade with expressions, equations, and inequalities to solve multi-step equations. In the final 2 units, students apply their arithmetic and algebraic skills to the study of triangles, angle relationships, volume and surface area of prisms, probability, and sampling.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Unit 1: Scale Drawings	How can we use scale copies and scale drawings to represent real-world spaces and solve problems?	Scale copies and Scale drawings are mathematical models that maintain proportional relationships and allow for accurate representation and problem-solving involving real-life dimensions.	TI3(6-8), CCE3(6-8), TCC3(6-8), **AA2(6-8)**, **DE4(6-8)**, P1(6-8)
Unit 2: Proportional Relationships	What does it mean for two quantities to be in a proportional relationship?	Proportional relationships express a constant multiplicative comparison between quantities and can be represented in multiple equivalent ways.	**TCC2(6-8)**, **CCE1(6-8)**, **CCE4(6-8)**, TI3(6-8), AA2(6-8), P3(6-8), DE4(6-8)
Unit 3: Measuring Circles	How do we measure and calculate attributes of circles, and why is it useful?	Understanding the consistent relationship between a circle's dimensions allows us to calculate circumference and area, which are essential for solving real-world problems involving circular shapes.	TCC1(6-8), CCE3(6-8), DE4(6-8), **TI1(6-8)**, **AA2(6-8)**
Unit 4: Proportional Relationships and Percent	How can we use percent and proportional reasoning to solve	Percent problems are rooted in proportional reasoning and help us	**TCC3(6-8)**, TCC4(6-8), **CCE1(6-8)**, DE4(6-8), TI1(6-8), TI3(6-8), AA2(6-8)

	practical problems?	make sense of financial and everyday contexts.	
Unit 5: Operations with Rational Numbers	How do operations with rational numbers help us solve problems involving real-world quantities?	Operations with rational numbers follow consistent rules and allow us to model and solve problems involving gains, losses, changes, and comparisons.	**TCC3(6-8)**, CCE1(6-8), P3(6-8), **DE4(6-8)**
Unit 6: Expressions, Equations and Inequalities	How can algebraic reasoning help us represent and solve real-world problems?	Expressions, equations, and inequalities model relationships and can be used to find unknowns and describe real-world scenarios efficiently.	TCC1(6-8), TCC3(6-8), TCC4(6-8), CCE3(6-8), TI4(6-8), **P3(6-8)**, **AA1(6-8), AA2(6-8),** DE4(6-8)
Unit 7: Geometry and Angles	How do geometric relationships help us understand and solve spatial problems?	Geometric relationships and properties allow us to analyze, measure, and model two- and three-dimensional figures in both mathematical and real-life contexts.	**TCC4(6-8)**, CCE1(6-8), CCE4(6-8), TI1(6-8), TI3(6-8), P3(6-8), DE4(6-8)
Unit 8: Probability and Statistics	How can we use probability and data to make predictions and informed decisions?	Probability models and data analysis help us describe uncertainty, make predictions, and draw conclusions based on evidence.	CCE1(6-8), TI3(6-8), **AA2(6-8)**, AA4(6-8), DE4(6-8)

Unit 1 - Scale Drawings

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.G.A.1: Solve problems involving scale drawings of geometric figures.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TI3 (6-8): I can compose specific questions that are relevant to a task that support my learning.
- CCE3 (6-8): I can participate in collaborative conversations by listening, formulating questions, making connected comments and providing various types of feedback to my peers.
- TCC3(6-8): I can combine new information with my own ideas to generate solutions.
- **AA2(6-8)**:I can identify past successful strategies and apply them independently.
- **DE4(6-8)**:I can be respectful and responsible and build positive relationships with all members of the school community.
- P1(6-8) I can build my personal tool-box to identify my personal strengths and challenges and develop strategies to practice overcoming any obstacles.

Understandings: Students will understand that…	**Essential Questions:**

• A scaled copy preserves angle measures and side relationships using a constant scale factor. • The scale factor determines the proportional relationship between the side lengths of the original figure and its scaled copy. • Scale drawings use a constant ratio to represent length across dimensions.	• What features must remain consistent for a copy to be considered a scaled copy? • How can we determine the scale factor between two figures? • In what ways does a scale factor affect the size and shape of a figure? • How can scale drawings represent real-world spaces accurately? • What effect does changing the scale factor have on side lengths?
Students will know… • A scaled copy maintains the same shape as the original figure by preserving angle measures and proportional side lengths. • The scale factor is the multiplier applied to each side length to produce a scaled copy. • How to distinguish between a scaled and non-scaled copy by examining side length ratios and angle measures. • That a scale factor greater than 1 produces an enlargement, while a scale factor less than 1 produces a reduction. • Definitions: scale factor, original vs. copy, corresponding angles/segments.	**Students will be able to…** • Identify whether a figure is a scaled copy of another using side ratios and angle measures. • Determine the scale factor between two figures. • Create scaled copies using a given scale factor, both on grid paper and using geometric tools. • Explain why a figure is or isn't a scaled copy using precise mathematical language. • Reason proportionally to solve problems involving scaled figures and drawings. • Identify and draw scaled copies of figures. • Construct and interpret scale drawings (e.g., maps, floor plans). • Calculate actual lengths from scale drawings and vice versa.
Key Vocabulary: scale factor, original, scale drawing, corresponding, actual, reciprocal	

Assessment Evidence

Performance Tasks:
AA2, DE4
Summative Assessment:

- Identifying corresponding sides and angles
- Working with scale factors
- Creating scaled copies of figures
- Converting between actual and scale measurements
- Working with different units (yards, cm, km)
- Using maps with different scales
- Creating and interpreting floor plans
- Solving multi-step problems with scale drawings

Other Evidence:
Checkpoint A- Scaled copies
Exit Ticket requiring creation of a scale drawing
Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
What is a Scaled Copy?	Sort images into scaled vs. non-scaled groups and justify classifications.	7.G.A.1	TI3, CCE3, TCC3, DE4, P1
Drawing Scaled Copies	Use grids to draw scaled copies with given scale factors.	7.G.A.1	TI3, CCE3, TCC3, AA2, DE4, P1
Understanding Scale Factor	Match scale factors with scale drawings and explain relationships.	7.G.A.1	TCC3, CCE3, AA2, DE4, P1
Scaling Perimeter and Area	Investigate how perimeter changes with scale using cutouts.	7.G.A.1	TCC3, TI3, AA2, DE4, P1
Using Scale Diagrams	Interpret and apply scales to solve real-world problems.	7.G.A.1	TI3, CCE3, TCC3, AA2, DE4, P1

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 1
- Family-facing video summaries of each block (Vimeo/YouTube)
- Paper, tracing paper, and patty paper, index cards
- Coordinate grid handouts and rulers
- IXL
- Delta Math

Unit 2 - Proportional Relationships

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.RP.A.2, 7.RP.A.2a/b/c: Recognize and represent proportional relationships via ratios, tables, graphs.

7.RP.A.3: Solve multi-step ratio & percent problems using proportional reasoning.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC2(6-8): I can evaluate data gathered from multiple perspectives and draw conclusions.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
CCE4 (6-8): I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
AA2 (6-8): I can identify past successful strategies and apply them independently.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that… • Proportional relationships have a constant ratio (unit rate). • Representations (table, graph, tape, algebraic) are equivalent. • Many real-world problems can be solved with proportional reasoning.	**Essential Questions:** • What makes a relationship proportional? • How does the constant of proportionality describe the relationship between two quantities? • How do equations, tables, and graphs show the same proportional relationship? • How can we use proportional reasoning for real-world problems?
Students will know… • Equivalent ratios, scale factor • Unit rate / constant of proportionality, proportional relationship • There are multiple equivalent representations of proportional relationships (tables, graphs, equations) • Interpreting the constant of proportionality/unit rate in context • The difference between proportional and non-proportional relationships.	**Students will be able to...** • Use tape diagrams, tables, double number lines to model ratios. • Identify a proportional relationship by analyzing tables, graphs and equations. • Calculate and interpret unit rates/constant of proportionality. • Identify proportional vs. non-proportional relationships. • Solve contextual problems involving recipes and speed.
Key Vocabulary: ratio, proportion, unit rate, constant of proportionality, scale factor, fraction, decimal, percent, equivalent,origin, coordinate plane	
Assessment Evidence	
Performance Tasks: **TCC2, CCE1, CCE4** Summative Assessment: • Identifying and representing proportional relationships in graphs, tables, and equations	**Other Evidence:** CER responses Checkpoint A-Proportional Relationships with Tables Interim Assessment-Proportional Relationships with Equations Checkpoint C-Proportional vs Non Proportional Relationships

• Understanding that proportional relationships pass through origin • Interpreting points on proportional graphs • Solving problems with constant speed • Calculating and interpreting unit rates • Comparing rates using graphs • Completing proportional tables • Finding missing values in proportional relationships • Analyzing temperature conversion formulas for proportionality • Creating and labeling graphs • Writing equations to represent proportional relationships	Checkpoint D-Proportional Relationships with Graphs Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
What Is a Proportional Relationship?	Explore everyday examples using double number lines and tape diagrams.	7.RP.A.2	TCC2, CCE1,TI3, P3, DE4
Representing Proportions with Tables	Create and extend tables to identify and apply constant of proportionality.	7.RP.A.2a	TCC2, CCE1, CCE4, TI3, AA2, P3, DE4
Using Equations to Model Proportions	Write equations to represent proportional relationships.	7.RP.A.2c	TCC2, CCE4, TI3
Comparing Relationships	Compare different representations (tables, graphs, equations) of relationships and identify which representation is most helpful for different situations.	7.RP.A.2a–c	TCC2, CCE4, TI3, CCE1, AA2, P3
Graphing Proportional Relationships	Plot data from tables and identify the origin and unit rate.	7.RP.A.2b	CCE4, TCC2, TI3, AA2
Connecting Representations	Choose and work with appropriate	7.RP.A.2	TCC2, TI3, AA2, CEE4

	representations (tables, equations,graphs) to solve proportional relationships in real world contexts.		

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 2
- Family-facing video summaries of each block (Vimeo/YouTube)
- Coordinate grid handouts and rulers
- IXL
- Delta Math

Unit 3 - Measuring Circles

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.G.B.4: Know and apply formulas for circumference & area of circles.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC1(6-8): I can ask relevant questions to evaluate possible solutions.
CCE3(6-8): I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.
TI1(6-8): I can create a plan with manageable steps to reach my goals.
AA2(6-8): I can identify past successful strategies and apply them independently.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that…

- Circumference ÷ diameter = constant π.
- Area = π × radius².

Essential Questions:

- How is the circumference related to diameter and π?
- Why is the area of a circle πr^2?

• Circle formulas apply in contexts like circular tracks, wheels, gadgets.	• How can measurements in circles model real-world contexts?
Students will know… • Definitions of radius, diameter, chord, circumference, area. • The numerical value & significance of π (~3.14 or fraction). • Formulas for circumference ($C = \pi d$ or $2\pi r$) and area ($A = \pi r^2$).	**Students will be able to…** • Identify the appropriate formula and compute circumference & area in exercises and applied problems.
Key Vocabulary: circle, radius, diameter, chord, π, circumference, area, unit².	
Assessment Evidence	
Performance Tasks: **TI1, AA2** Summative Assessment: • Calculating circumference and area of circles • Understanding the relationship between radius and circumference (π) • Finding perimeter and area of composite shapes • Solving real-world problems involving circles • Distinguishing when to use circumference vs. area in context • Working with measurements and approximations • Multi-step problem solving with circles and composite figures	**Other Evidence:** Checkpoint A-Circumference of Circles Exit Slip on Area of Circles Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Exploring Circles	Identify parts of a circle (radius, diameter, chord, center) using diagrams.	7.G.B.4	TCC1, CCE3, DE4
Circumference Formula	Use measurements to justify C = πd and C = 2πr.	7.G.B.4	TCC1,TI1,AA2,CCE3
Radius, Diameter, and Area	Explore how changing radius affects area using sketches and formulas.	7.G.B.4	TCC1,TI1,AA2,CCE3
Understanding A = πr²	Use decomposition to understand and visualize the area formula.	7.G.B.4	TCC1,TI1,AA2,CCE3
Solving Area and Circumference Problems	Apply formulas in real-world problems involving wheels, pizzas, clocks.	7.G.B.4	TCC1,TI1,AA2,CCE3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 3
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

Unit 4 - Proportional Relationships and Percent

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **7.RP.A.1** – Compute unit rates associated with ratios of fractions.
- **7.RP.A.2** – Recognize and represent proportional relationships between quantities.
- **7.RP.A.3** – Use proportional relationships to solve multistep ratio and percent problems.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC3(6-8): I can combine new information with my own ideas to generate solutions.
TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.
TI1(6-8): I can create a plan with manageable steps to reach my goals.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
AA2(6-8): I can identify past successful strategies and apply them independently.

Understandings: Students will understand that…	**Essential Questions:**
• Increases and decreases can be represented as fractions of initial amounts • Proportional relationships involving percent often build upon reasoning with fractional quantities. • Percent represents a ratio out of 100 and can be modeled as a fraction or a decimal. • Percent problems can be solved using proportional reasoning. • Understanding how to work with percent enables informed decision-making in real-world scenarios involving comparisons, discounts, and increases.	• How are percent and proportional relationships connected? • What strategies can help solve multi-step percent problems? • In what ways does using percent help us describe relationships between quantities in everyday life?
Students will know…	**Students will be able to...**
• How to calculate unit rate and constant of proportionality with fractional quantities. • That percent means “per hundred” and can be represented as a fraction, decimal, or ratio. • How to represent percent situations using tables, equations, and tape diagrams. • That proportional reasoning can be extended to percent problems, even when quantities are fractional. • The differences between percent increase and decrease.	• Represent proportional relationships using tables, graphs, verbal descriptions, and equations with fractional quantities. • Use tables, tape diagrams, and double number lines to solve percent problems involving fractional values. • Write and solve equations to represent percent changes. • Explain their reasoning using multiple representations and mathematical language.
Key Vocabulary: Proportional relationship, Constant of proportionality, Unit rate, Percent increase / decrease, Discount, Markup, Tax, Tip	
Assessment Evidence	

Performance Tasks: **TCC3, CCE1** Summative Assessment: ● Finding percentages of quantities ● Working with percent increase ● Calculating discounts and sales tax ● Calculating and working with percentages ● Finding percent change ● Computing markups, discounts, and commissions ● Solving multi-step percent problems (e.g., tax after discount)	**Other Evidence:** Interim on Proportional Relationships with Fractions Exit Slips on Percent Increase and Decrease Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Ratios and Unit Rates with Fractions	Students compute scale factors and unit rates associated with ratios of fractions. They solve problems involving constant speed where the distance traveled and elapsed time are both given as fractional values.	7.RP.A.1	TI2, TCC2
Representing and Comparing Proportional Relationships with Fractions	Review proportional relationships involving fractional quantities. Match and interpret tables, graphs, equations, and verbal descriptions of proportional scenarios with fractional	7.RP.A.1, 7.RP.A.2a–c, 7.EE.A.2	TCC3, CCE3

	values		
Introducing Percent	Use real-world contexts to define percent and connect to ratios.	7.RP.A.3	TCC3, CCE1,TI3, AA2, DE4
Percent Increase/Decrease	Solve and represent problems involving price changes.	7.RP.A.3	TI1, TCC4, TCC3, TI3, CCE1
Multi-step Percent Problems	Use strategies to solve problems involving multiple percents.	7.RP.A.3	TCC4, TI1, AA2, TCC3, TI3, CCE1
Real-World Percent Problems	Analyze and solve complex percent tasks involving reasoning.	7.RP.A.3	TCC4, TCC3, TI3, TI1, AA2, CCE1

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 4
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

Unit 5 - Operations with Rational Numbers

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.NS.A.1 – Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers.

7.NS.A.2 – Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.A.3 – Solve real-world and mathematical problems involving the four operations with rational numbers.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC3(6-8): I can combine new information with my own ideas to generate solutions.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that...	**Essential Questions:**
• Rational numbers include positive and negative numbers, including fractions and decimals.	• What makes a number rational?

• Rules for operations with integers extend to all rational numbers. • Rational number operations help us solve real-world problems involving gain/loss, credit/debt, elevation, temperature, and more.	• How do operations with rational numbers differ from operations with whole numbers? • How can visual models help us understand operations with negative numbers?
Students will know… • Definitions and examples of rational numbers. • How to add, subtract, multiply, and divide rational numbers, including signed fractions and decimals. • How to apply the properties of operations to rational numbers.	**Students will be able to...** • Use number lines and rules to solve problems involving signed numbers. • Solve real-world problems with rational numbers using all four operations. • Justify operations and solutions with models, equations, or reasoning.
Key Vocabulary: Rational number, Integer, Opposite, Absolute value, Additive inverse, Commutative, associative, distributive properties Product, quotient	
Assessment Evidence	
Performance Tasks: **TCC3, DE4** Summative Assessment: • Working with signed numbers (positive and negative) • Understanding and using the number line with rational numbers • Performing operations with signed numbers (including fractions) • Solving equations with negative numbers	**Other Evidence:** Integer Computation Assessment Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

• Interpreting signed numbers in real-world contexts • Understanding and calculating rates of change with signed numbers • Working with bank transactions and account balances	

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Rational Number Line	Place and compare rational numbers using a number line.	7.NS.A.1	TCC3, CCE1, P3, DE4
Adding/Subtracting Rationals	Model addition and subtraction with number lines and real-world contexts.	7.NS.A.1	TCC3, CCE1, P3, DE4
Multiplying Rational Numbers	Use patterning and models to discover rules for multiplication.	7.NS.A.2a	TCC3, CCE1, P3, DE4
Dividing Rational Numbers	Interpret division using story problems and numeric models.	7.NS.A.2b	TCC3, CCE1, P3
Multi-step Problems	Apply operations in context (banking, temperature, elevation).	7.NS.A.3	TCC3, CCE1, P3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 5
- Desmos Integer Activities
- Family-facing video summaries of each block (Vimeo/YouTube)
- Number Lines
- IXL
- Delta Math

Unit 6 - Expressions, Equations and Inequalities

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.EE.A.1 – Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions.

7.EE.A.2 – Understand that rewriting an expression can reveal relationships between quantities.

7.EE.B.3 – Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers.

7.EE.B.4 – Use variables to represent quantities and construct simple equations and inequalities.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC1(6-8): I can ask relevant questions to evaluate possible solutions.
TCC3(6-8): I can combine new information with my own ideas to generate solutions.
TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.
CCE3(6-8): I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

TI4(6-8): I can identify my strengths and areas for growth, set goals toward improvement, and seek support as needed.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
AA1(6-8): I can implement different pathways to success and recognize the pros and cons of each.
AA2(6-8): I can identify past successful strategies and apply them independently.

Understandings: Students will understand that...	**Essential Questions:**
• Algebraic expressions can be used to represent and manipulate quantities. • Equations and inequalities model relationships between variables and constants. • Solving equations involves finding values that make statements true.	• How can expressions, equations, and inequalities represent real-world problems? • What is the difference between solving and evaluating? • How does rewriting an expression help you understand a situation?
Students will know…	**Students will be able to...**
• How to combine like terms and apply properties of operations. • How to solve multi-step equations and inequalities. • How to represent and reason about mathematical situations algebraically.	• Construct and manipulate algebraic expressions. • Solve equations and inequalities involving rational numbers. • Represent situations using symbols and justify their reasoning.

Key Vocabulary: Expression, Equation, Inequality, Variable, Coefficient, Constant, Inverse operation, Solution

Assessment Evidence

Performance Tasks:
P3, AA1, AA2
Summative Assessment:

- Expanding and factoring expressions
- Combining like terms
- Identifying equivalent expressions
- Finding and correcting errors in algebraic reasoning
- Writing inequalities to represent situations
- Solving inequalities
- Representing solutions on number lines
- Understanding inequality notation and meaning
- Modeling with expressions and inequalities
- Multi-step problems involving:
    - Financial situations (gift cards, purchases)
    - Temperature changes
    - Fuel consumption
    - Time-based scenarios

Key skills assessed include:

1. Converting between verbal and algebraic representations
2. Understanding and using negative coefficients
3. Interpreting solutions in context
4. Working with rational numbers in expressions

Other Evidence:
Checkpoint A-Representing Situations
Checkpoint B-Solving Equations
Mid Unit Assessment
Interim on Inequalities
Interim on Writing Equivalent Expressions
Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Vocabulary of Expressions	Identify and define parts of algebraic	7.EE.A.1	TCC1, TCC3, CCE3, P3, DE4

	expressions.		
Writing Equations	Translate word problems into equations and expressions.	7.EE.B.3	TCC1, TCC3, CCE3, P3,TCC4, TI4, AA1, AA2
Solving Equations	Solve one- and two-step equations using inverse operations.	7.EE.B.4a	TCC1, TCC3, CCE3, P3,TCC4, TI4, AA1, AA2
Solving Inequalities	Represent and solve inequalities using number lines.	7.EE.B.4b	TCC1, TCC3, CCE3, P3,TCC4, AA2
Simplifying Expressions	Use properties to combine like terms and simplify expressions.	7.EE.A.1–2	TCC1, TCC3, CCE3, P3,TCC4, TI4, AA1, AA2

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 6
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

Unit 7 - Geometry and Angles

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **7.G.A.1** – Solve problems involving scale drawings.
- **7.G.A.2** – Draw geometric shapes with given conditions.
- **7.G.B.4–6** – Solve problems involving circles, area, surface area, and volume.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
CCE4(6-8): I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
TI1(6-8): I can create a plan with manageable steps to reach my goals.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that…	**Essential Questions:**
• Angle relationships—such as supplementary, complementary, vertical, and adjacent—help us find unknown angles and support logical reasoning. • Cross sections show the two-dimensional shapes formed when slicing three-dimensional figures and help build spatial understanding. • Geometry helps us describe and analyze real-world shapes and objects. • Area and volume formulas model real-life capacities and spaces.	• How can we use angle relationships to find unknown values? • What do cross sections reveal about three-dimensional figures? • How do geometric models represent real-world spaces? • What can you learn by exploring the properties of shapes? • How can we apply geometric reasoning to solve measurement problems?
Students will know…	**Students will be able to...**
• Types of angles and their relationships: adjacent, vertical, complementary, and supplementary. • Properties of triangles, including angle sums and relationships among parts. • The concept and geometric interpretation of cross sections of solids. • How to calculate area, surface area, and volume.	• Use angle relationships to find missing angle measures. • Determine if given side lengths create a triangle. • Describe and sketch the cross section formed by slicing a three-dimensional figure. • Solve problems involving area, surface area, and volume of two- and three-dimensional figures. • Use reasoning to justify geometric conclusions and communicate thinking.
Key Vocabulary: angle, adjacent, vertical, supplementary, complementary, triangle, cross section, area, surface area, volume, prism, pyramid	

Assessment Evidence

Performance Tasks:
TCC4
Summative Assessment:

- Understanding vertical angles
- Working with supplementary and complementary angles
- Using angle relationships to find missing values
- Understanding triangle conditions and constructions
- Analyzing cross-sections of 3D figures
- Working with pyramids and prisms
- Calculating surface area and volume

Other Evidence:
Checkpoint A-Angle Relationships
Interim on Volume and Surface Area
Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Angle Relationships	Explore and justify relationships among angles (vertical, supplementary).	7.G.B.5	TCC4, CCE4, TI3, TI1, CCE1, DE4
Constructing Triangles	Identify patterns of given side lengths that create triangles.	7.G.A.2	TCC4, CCE1, CCE4, TI1, TI3, P3
Area of 2D Figures	Apply formulas to find areas of triangles, trapezoids, circles.	7.G.B.4	TCC4, CCE1, CCE4, TI1, TI3, P3
Surface Area	Solve problems involving surface area of 3D figures.	7.G.B.6	TCC4, TI1, CEE4, TI3, P3
Volume of Prisms	Calculate volume of right prisms and connect to real-world contexts.	7.G.B.6	TCC4, CCE1, CCE4, TI1, TI3, P3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 7
- Family-facing video summaries of each block (Vimeo/YouTube)
- Desmos
- IXL
- Delta Math

Unit 8 - Probability and Statistics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **7.SP.A.1–2** – Understand and use random sampling to draw inferences about populations.
- **7.SP.B.3–4** – Draw informal comparative inferences about two populations.
- **7.SP.C.5–8** – Investigate chance processes, calculate and interpret probabilities.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)
CCE1(6-8), TI3(6-8), **AA2(6-8)**, AA4(6-8)

CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
AA2(6-8): I can identify past successful strategies and apply them independently.
AA4(6-8): I can seek opportunities to learn more and continue to push my thinking.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that…	**Essential Questions:**
• Probability helps describe the chance of events occurring. • Random samples support conclusions about larger populations. • Data can be used to compare groups and make informed decisions.	• How can we use data to make predictions? • What does probability tell us about outcomes? • How can random sampling lead to valid conclusions?
Students will know… • How to calculate probabilities and compare likelihoods. • How to use random sampling and understand variability. • How to compare data sets and draw informal inferences.	**Students will be able to...** • Analyze data using measures of center and variability. • Calculate and interpret probabilities of simple and compound events. • Use tools such as tables, lists, and tree diagrams to analyze chance processes.
Key Vocabulary: Probability, Sample space, Random sample, Compound event, Likelihood, Mean, median, and mode	
Assessment Evidence	
Performance Tasks: **AA2, AA4** Summative Assessments: • Understanding populations and samples • Evaluating sampling methods • Making inferences from samples • Recognizing sampling bias	**Other Evidence:** Interim on Single Step Probability Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

- Estimating population proportions
- Interpreting dot plots and histograms
- Identifying representative samples
- Making predictions from data displays
- Understanding data distributions
- Working with measures of center (mean, median)
- Understanding variability (IQR)
- Comparing data sets using multiple measures
- Making conclusions about meaningful differences between groups

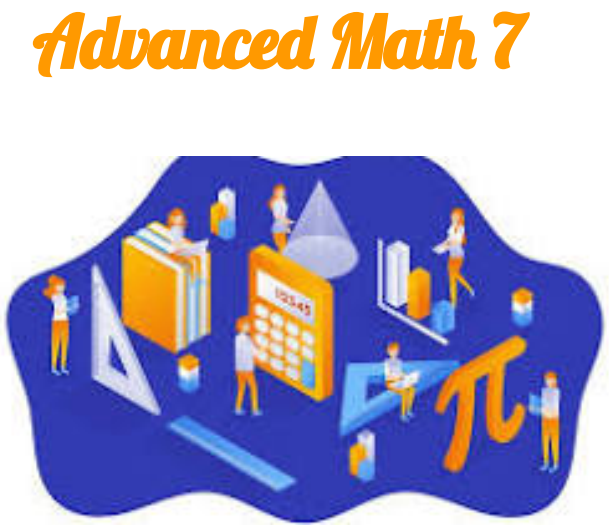
Learning Plan

Lessons	Activities	Standards	Vision Attributes
Understanding Probability	Use spinners and dice to explore probability and outcomes.	7.SP.C.5	CCE1, TI3, AA2, AA4, DE4
Theoretical vs. Experimental	Conduct probability experiments and compare results.	7.SP.C.6	CEE1, TI3, AA4, AA2
Compound Events	Explore compound probability with organized lists and tables.	7.SP.C.7	TI3, AA2, CCE1
Interpreting Data	Analyze collected data and describe likelihood with justification.	7.SP.A.1–2	AA4, TI3, CCE1, AA2

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 8
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

ADVANCED GRADE 7 MATH CURRICULUM



Grade Level(s): Grade 7

Curriculum Author(s): Cate Lyman, Jaime Peterson

Course Description: Advanced Math 7 covers some 8th-grade topics in addition to all of the 7th grade standards described above. Students expand upon the 7th grade topics of rates and proportional relationships in an introduction to linear functions and further develop the study of equations to include variables on both sides of the equal sign, and equations with no solutions, exactly one solution, and infinitely many solutions.. Other 8th-grade topics include the concept of transformations (rotations, reflections, translation, and dilations), and congruence in 2-dimensional shapes. Students must be highly motivated, willing to work at a faster pace, and demonstrate strength and perseverance in 6th grade standards including algebraic reasoning and numeracy. ***Students will have required math work to complete over the summer.***

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Unit 1: Scale Drawings	How can we use scale copies and scale drawings to represent real-world spaces and solve problems?	Scale copies and Scale drawings are mathematical models that maintain proportional relationships and allow for accurate representation and problem-solving involving real-life dimensions.	TI3(6-8), CCE3(6-8), TCC3(6-8), **AA2(6-8)**, **DE4(6-8)**, P1(6-8)
Unit 2: Proportional Relationships	What does it mean for two quantities to be in a proportional relationship?	Proportional relationships express a constant multiplicative comparison between quantities and can be represented in multiple equivalent ways.	**TCC2(6-8)**, **CCE1(6-8)**, **CCE4(6-8)**, TI3(6-8), AA2(6-8), P3(6-8), DE4(6-8)
8th Grade Unit 2 - Dilations, Similarity, and Introducing Slope (Lesson 10) and 8th Grade Unit 3- Linear Relationships (Lessons 5-8)	How do we recognize, describe, and represent relationships that change at a constant rate?	Comparing figures and developing a geometric understanding of slope as a consistent rate of change and Linear relationships describe situations with a constant rate of change, and understanding slope allows us to connect equations, graphs, and real-world contexts.	TCC2(6-8), CCE1(6-8),CCE4(6-8), **TI3(6-8)**, **AA2(6-8)**, P3(6-8), DE4(6-8)
Unit 3: Measuring Circles	How do we measure and calculate attributes of circles, and why is it useful?	Understanding the consistent relationship between a circle's dimensions allows us to calculate circumference and area, which are	TCC1(6-8), CCE3(6-8), DE4(6-8), **TI1(6-8)**, **AA2(6-8)**

		essential for solving real-world problems involving circular shapes.	
Unit 4: Proportional Relationships and Percent	How can we use percent and proportional reasoning to solve practical problems?	Percent problems are rooted in proportional reasoning and help us make sense of financial and everyday contexts.	**TCC3(6-8)**, TCC4(6-8), **CCE1(6-8)**, DE4(6-8), TI1(6-8), TI3(6-8), AA2(6-8)
Unit 5: Operations with Rational Numbers	How do operations with rational numbers help us solve problems involving real-world quantities?	Operations with rational numbers follow consistent rules and allow us to model and solve problems involving gains, losses, changes, and comparisons.	**TCC3(6-8)**, CCE1(6-8), P3(6-8), **DE4(6-8)**
Unit 6: Expressions, Equations and Inequalities	How can algebraic reasoning help us represent and solve real-world problems?	Expressions, equations, and inequalities model relationships and can be used to find unknowns and describe real-world scenarios efficiently.	TCC1(6-8), TCC3(6-8), TCC4(6-8), CCE3(6-8), TI4(6-8), **P3(6-8)**, **AA1(6-8), AA2(6-8),** DE4(6-8)
8th Grade Unit 4 - Linear Equations and Linear Systems (Lessons 2-4, 7-8)	What do the solutions to linear equations tell us about the relationships between quantities?	Linear equations help us represent and solve real-world problems by showing how different quantities are connected. Solving them helps us figure out what values make sense together—and when no solution is possible.	**AA2(6-8)**, TI3(6-8), **CCE4(6-8)**, TCC2(6-8), P3(6-8), DE4(6-8)

Unit 7: Geometry and Angles	How do geometric relationships help us understand and solve spatial problems?	Geometric relationships and properties allow us to analyze, measure, and model two- and three-dimensional figures in both mathematical and real-life contexts.	**TCC4(6-8)**, CCE1(6-8), CCE4(6-8), TI1(6-8), TI3(6-8), P3(6-8), DE4(6-8)
Unit 8: Probability and Statistics	How can we use probability and data to make predictions and informed decisions?	Probability models and data analysis help us describe uncertainty, make predictions, and draw conclusions based on evidence.	CCE1(6-8), TI3(6-8), **AA2(6-8)**, AA4(6-8), DE4(6-8)
8th Grade Unit 1 - Rigid Transformations and Congruence (Lessons 1-9, 11-13)	How can we use transformations and angle relationships to understand the structure of shapes and the way lines and angles connect and interact?	Understanding geometric transformations and angle relationships helps students recognize when shapes are the same size and shape, and how lines and angles behave in predictable ways. These tools allow students to make sense of shapes, movements, and connections in geometry.	**TCC2(6-8)**, TI3(6-8), **CCE4(6-8)**, AA1 (6-8), **AA2(6-8)**, P3(6-8)

Unit 1 - Scale Drawings

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.G.A.1: Solve problems involving scale drawings of geometric figures.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- TI3 (6-8): I can compose specific questions that are relevant to a task that support my learning.
- CCE3 (6-8): I can participate in collaborative conversations by listening, formulating questions, making connected comments and providing various types of feedback to my peers.
- TCC3(6-8): I can combine new information with my own ideas to generate solutions.
- **AA2(6-8)**:I can identify past successful strategies and apply them independently.
- **DE4(6-8)**:I can be respectful and responsible and build positive relationships with all members of the school community.
- P1(6-8) I can build my personal tool-box to identify my personal strengths and challenges and develop strategies to practice overcoming any obstacles.

Understandings: Students will understand that…	**Essential Questions:**
• A scaled copy preserves angle measures and side relationships	• What features must remain consistent for a copy to be

using a constant scale factor. • The scale factor determines the proportional relationship between the side lengths of the original figure and its scaled copy. • Scale drawings use a constant ratio to represent length across dimensions. • Enlarging or reducing a figure changes area by the square of the scale factor. • Units in scale representations can be proportional or unitless and must be interpreted correctly.	considered a scaled copy? • How can we determine the scale factor between two figures? • In what ways does a scale factor affect the size and shape of a figure? • How can scale drawings represent real-world spaces accurately? • What effect does changing the scale factor have on lengths and area? • How can we reason with and choose appropriate units in scale contexts?
Students will know… • A scaled copy maintains the same shape as the original figure by preserving angle measures and proportional side lengths. • The scale factor is the multiplier applied to each side length to produce a scaled copy. • How to distinguish between a scaled and non-scaled copy by examining side length ratios and angle measures. • That a scale factor greater than 1 produces an enlargement, while a scale factor less than 1 produces a reduction. • Definitions: scale factor, original vs. copy, corresponding angles/segments. • How to interpret scales like 1 cm:10 km and convert between unit-included and unitless scales.	**Students will be able to…** • Identify whether a figure is a scaled copy of another using side ratios and angle measures. • Determine the scale factor between two figures. • Create scaled copies using a given scale factor, both on grid paper and using geometric tools. • Explain why a figure is or isn't a scaled copy using precise mathematical language. • Reason proportionally to solve problems involving scaled figures and drawings. • Identify and draw scaled copies of figures. • Construct and interpret scale drawings (e.g., maps, floor plans). • Calculate actual lengths/areas from scale drawings and vice versa. • Explain how scale factors affect dimensions and area.

Key Vocabulary: scale factor, original, scale drawing, corresponding, actual, reciprocal, area

Assessment Evidence

Performance Tasks:
AA2, DE4
Summative Assessment:

- Identifying corresponding sides and angles
- Working with scale factors
- Creating scaled copies of figures
- Converting between actual and scale measurements
- Working with different units (yards, cm, km)
- Using maps with different scales
- Creating and interpreting floor plans
- Solving multi-step problems with scale drawings

Other Evidence:
Checkpoint- Scaled copies
Exit Ticket requiring creation of a scale drawing
Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
What is a Scaled Copy?	Sort images into scaled vs. non-scaled groups and justify classifications.	7.G.A.1	TI3, CCE3, TCC3, DE4, P1
Drawing Scaled Copies	Use grids to draw scaled copies with given scale factors.	7.G.A.1	TI3, CCE3, TCC3, AA2, DE4, P1
Understanding Scale Factor	Match scale factors with scale drawings and explain relationships.	7.G.A.1	TCC3, CCE3, AA2, DE4, P1
Scaling Perimeter and Area	Investigate how perimeter and area change with scale using cutouts.	7.G.A.1	TCC3, TI3, AA2, DE4, P1
Using Scale Diagrams	Interpret and apply scales to solve real-world problems.	7.G.A.1	TI3, CCE3, TCC3, AA2, DE4, P1

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 1
- Family-facing video summaries of each block (Vimeo/YouTube)
- Paper, tracing paper, and patty paper, index cards
- Coordinate grid handouts and rulers
- IXL
- Delta Math

Unit 2 - Proportional Relationships

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.RP.A.2, 7.RP.A.2a/b/c: Recognize and represent proportional relationships via ratios, tables, graphs.

7.RP.A.3: Solve multi-step ratio & percent problems using proportional reasoning.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC2(6-8): I can evaluate data gathered from multiple perspectives and draw conclusions.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
CCE4 (6-8): I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
AA2 (6-8): I can identify past successful strategies and apply them independently.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that… • Proportional relationships have a constant ratio (unit rate). • Representations (table, graph, tape, algebraic) are equivalent. • Many real-world problems can be solved with proportional reasoning.	**Essential Questions:** • What makes a relationship proportional? • How does the constant of proportionality describe the relationship between two quantities? • How do equations, tables, and graphs show the same proportional relationship? • How can we use proportional reasoning for real-world problems?
Students will know… • Equivalent ratios, scale factor • Unit rate / constant of proportionality, proportional relationship • There are multiple equivalent representations of proportional relationships (tables, graphs, equations) • Interpreting the constant of proportionality/unit rate in context • The difference between proportional and non-proportional relationships.	**Students will be able to...** • Use tape diagrams, tables, double number lines to model ratios. • Identify a proportional relationship by analyzing tables, graphs and equations. • Calculate and interpret unit rates/constant of proportionality. • Identify proportional vs. non-proportional relationships. • Solve contextual problems involving recipes and speed.
Key Vocabulary: ratio, proportion, unit rate, constant of proportionality, scale factor, fraction, decimal, percent, equivalent,origin, coordinate plane	
Assessment Evidence	
Performance Tasks: **TCC2, CCE1, CCE4** Summative Assessment: • Identifying and representing proportional relationships in graphs, tables, and equations • Understanding that proportional relationships pass through	**Other Evidence:** CER responses Checkpoint-Proportional Relationships with Tables Interim Assessment-Proportional Relationships with Equations Checkpoint-Proportional vs Non Proportional Relationships Checkpoint -Proportional Relationships with Graphs Various Thinking Tasks solving systems using Building Thinking

origin • Interpreting points on proportional graphs • Solving problems with constant speed • Calculating and interpreting unit rates • Comparing rates using graphs • Completing proportional tables • Finding missing values in proportional relationships • Analyzing temperature conversion formulas for proportionality • Creating and labeling graphs • Writing equations to represent proportional relationships	Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
What Is a Proportional Relationship?	Explore everyday examples using double number lines and tape diagrams.	7.RP.A.2	TCC2, CCE1,TI3, P3, DE4
Ratios and Unit Rates with Fractions	Students compute scale factors and unit rates associated with ratios of fractions. They solve problems involving constant speed where the distance traveled and elapsed time are both given as fractional values.	7.RP.A.1	TI2, TCC2
Representing Proportions with Tables	Create and extend tables to identify and apply constant of proportionality including fractional quantities.	7.RP.A.2a	TCC2, CCE1, CCE4, TI3, AA2, P3, DE4
Using Equations to Model Proportions	Write equations to represent proportional relationships including	7.RP.A.2c, 7.EE.A.2	TCC2, CCE4, TI3

	fractional quantities.		
Comparing Relationships	Compare different representations (tables, graphs, equations) of relationships and identify which representation is most helpful for different situations.	7. RPA. 1, 7.RP.A.2a–c	TCC2, CCE4, TI3, CCE1, AA2, P3
Graphing Proportional Relationships	Plot data from tables and identify the origin and unit rate.	7.RP.A.2b	CCE4, TCC2, TI3, AA2
Connecting Representations	Choose and work with appropriate representations (tables, equations,graphs) to solve proportional relationships in real world contexts.	7.RP.A.2	TCC2, TI3, AA2, CEE4

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 2 and Unit 4
- Family-facing video summaries of each block (Vimeo/YouTube)
- Coordinate grid handouts and rulers
- IXL
- Delta Math

8th Grade Unit 2 - Dilations, Similarity, and Introducing Slope (Lesson 10) and 8th Grade Unit 3- Linear Relationships (Lessons 5-8)

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **CCSS 8.G.A.3 / 8.EE.B.6**: Use similarity (including slope triangles) to understand that any two points on a line determine the same slope, and write equations of lines via reasoning from similar triangles
- **CCSS 8.EE.B.5**: Graph proportional relationships and interpret the unit rate as the slope of the graph.
- **CCSS 8.EE.B.6**: Use similar triangles to explain why the slope m is the same between any two points on a non-vertical line in the

coordinate plane
- **CCSS 8.F.B.4**: Construct and compare linear models and recognize solutions of a linear equation as points on its graph.

Standards for Mathematical Practice
- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- **AA2 (6-8)**: I can identify past successful strategies and apply them independently.
- TCC2(6-8): I can evaluate data gathered from multiple perspectives and draw conclusions.
- CCE4 (6-8**):** I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
- **TI3(6-8)**: I can compose specific questions that are relevant to a task to support my learning.
- P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

Understandings: Students will understand that…

- All slope triangles on the same line are similar, yielding a consistent slope that defines the relationship between vertical and horizontal change.
- A proportional relationship is a linear relationship whose graph passes through the origin, with slope equal to the constant of proportionality.
- All linear relationships have a constant rate of change (slope); even non-proportional ones can be viewed as translated versions of proportional lines.
- The slope of a line represents how much y changes per unit change in x, and is consistent across any pair of points—established through similar triangles.

Essential Questions:

- How do similar triangles help us understand slope and describe lines?
- How are proportional and linear relationships similar? How are they different?
- In what ways does slope describe how a quantity changes?

Students will know...	**Students will be able to...**
• Definitions: similarity, slope, slope triangle • That similarity of triangles underpins the concept of slope • Definitions: proportional relationship, linear relationship, rate of change, slope, vertical intercept • How slope relates to constant rates and corresponding graph features.	• Identify when two figures are similar and justify using transformations • Create and interpret graphs, tables, equations (y = mx + b) of proportional and linear relationships. • Derive slope using similar triangles and calculate from two points.

Key Vocabulary: Similar, Slope, slope triangle, Equation of a line, Proportional relationship, Rate of change, Slope, Linear relationship, Vertical intercept (y-intercept)

Assessment Evidence

Performance Tasks: **AA2** & **TI3** Summative Assessment • Calculating the slope of a line • Writing equations for lines from graphs • Finding the slope between two given points • Interpreting the slope and y-intercept in context	**Other Evidence:** Exit Tickets analyzing student learning Check Point Assessments Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

Learning Plan

Lesson Focus	Activities	Standards	Vision Attributes
Slope via Similar Triangles	Use slope triangles to derive slope	8.G.A.3, 8.EE.B.6, 8.G.A.4	TI3, AA2, CCE4
Non-Proportional / Linear Relationships	Stack cup data, compare to proportional model, observe vertical translation.	8.EE.B.6	TCC2, TI3, CCE4

Representations of Linear Relationships	Match contexts, tables, graphs with intercepts; craft equations.Craft Equations	8.F.B.4	TCC2, CCE4, AA2
Finding & Calculating Slope	Work with positive slopes; use slope triangles/off-grid coordinates.	8.EE.B.6	TI3, AA2, TCC2

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Grade 8 Unit 2 and Unit 3
- Family-facing video summaries (Vimeo/YouTube) explaining content and vocabulary
- Geometry toolkits: tracing paper, graph paper, ruler, patty paper
- Introduction Linear Relationships Activity
- IXL
- DeltaMath

Unit 3 - Measuring Circles

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.G.B.4: Know and apply formulas for circumference & area of circles.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC1(6-8): I can ask relevant questions to evaluate possible solutions.
CCE3(6-8): I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.
TI1(6-8): I can create a plan with manageable steps to reach my goals.
AA2(6-8): I can identify past successful strategies and apply them independently.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that…	**Essential Questions:**
• Circumference ÷ diameter = constant π. • Area = π × radius². • Circle formulas apply in contexts like circular tracks, wheels, gadgets.	• How is the circumference related to diameter and π? • Why is the area of a circle πr²? • How can measurements in circles model real-world contexts?
Students will know… • Definitions of radius, diameter, chord, circumference, area. • The numerical value & significance of π (~3.14 or fraction). • Formulas for circumference (C = πd or 2πr) and area (A = πr²).	**Students will be able to…** • Identify the appropriate formula and compute circumference & area in exercises and applied problems.

Key Vocabulary: circle, radius, diameter, chord, π, circumference, area, unit².

Assessment Evidence

Performance Tasks: **TI1, AA2** Summative Assessment: • Calculating circumference and area of circles	**Other Evidence:** Checkpoint-Circumference of Circles Exit Slip on Area of Circles

• Understanding the relationship between radius and circumference (π) • Finding perimeter and area of composite shapes • Solving real-world problems involving circles • Distinguishing when to use circumference vs. area in context • Working with measurements and approximations • Multi-step problem solving with circles and composite figures	Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Exploring Circles	Identify parts of a circle (radius, diameter, chord, center) using diagrams.	7.G.B.4	TCC1, CCE3, DE4
Circumference Formula	Use measurements to justify $C = \pi d$ and $C = 2\pi r$.	7.G.B.4	TCC1,TI1,AA2,CCE3
Radius, Diameter, and Area	Explore how changing radius affects area using sketches and formulas.	7.G.B.4	TCC1,TI1,AA2,CCE3
Understanding $A = \pi r^2$	Use decomposition to understand and visualize the area formula.	7.G.B.4	TCC1,TI1,AA2,CCE3
Solving Area and Circumference Problems	Apply formulas in real-world problems involving wheels, pizzas, clocks.	7.G.B.4	TCC1,TI1,AA2,CCE3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 3
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

Unit 4 - Proportional Relationships and Percent

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **7.RP.A.1** – Compute unit rates associated with ratios of fractions.
- **7.RP.A.2** – Recognize and represent proportional relationships between quantities.
- **7.RP.A.3** – Use proportional relationships to solve multistep ratio and percent problems.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC3(6-8): I can combine new information with my own ideas to generate solutions.
TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.
TI1(6-8): I can create a plan with manageable steps to reach my goals.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
AA2(6-8): I can identify past successful strategies and apply them independently.

Understandings: Students will understand that…	**Essential Questions:**

• Increases and decreases can be represented as fractions of initial amounts • Proportional relationships involving percent often build upon reasoning with fractional quantities. • Percent represents a ratio out of 100 and can be modeled as a fraction or a decimal. • Percent problems can be solved using proportional reasoning. • Understanding how to work with percent enables informed decision-making in real-world scenarios involving comparisons, discounts, and increases.	• How are percent and proportional relationships connected? • What strategies can help solve multi-step percent problems? • In what ways does using percent help us describe relationships between quantities in everyday life?
Students will know… • How to calculate unit rate and constant of proportionality with fractional quantities. • That percent means “per hundred” and can be represented as a fraction, decimal, or ratio. • How to represent percent situations using tables, equations, and tape diagrams. • That proportional reasoning can be extended to percent problems, even when quantities are fractional. • The differences between percent increase and decrease.	**Students will be able to...** • Represent proportional relationships using tables, graphs, verbal descriptions, and equations with fractional quantities. • Use tables, tape diagrams, and double number lines to solve percent problems involving fractional values. • Write and solve equations to represent percent changes. • Explain their reasoning using multiple representations and mathematical language.
Key Vocabulary: Proportional relationship, Constant of proportionality, Unit rate, Percent increase / decrease, Discount, Markup, Tax, Tip	
Assessment Evidence	
Performance Tasks: **TCC3, CCE1** Summative Assessment: • Finding percentages of quantities • Working with percent increase • Calculating discounts and sales tax	**Other Evidence:** Interim on Proportional Relationships with Fractions Exit Slips on Percent Increase and Decrease Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

• Calculating and working with percentages • Finding percent change • Computing markups, discounts, and commissions • Solving multi-step percent problems (e.g., tax after discount)	

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Introducing Percent	Use real-world contexts to define percent and connect to ratios.	7.RP.A.3	TCC3, CCE1,TI3, AA2, DE4
Percent Increase/Decrease	Solve and represent problems involving price changes.	7.RP.A.3	TI1, TCC4, TCC3, TI3, CCE1
Multi-step Percent Problems	Use strategies to solve problems involving multiple percents.	7.RP.A.3	TCC4, TI1, AA2, TCC3, TI3, CCE1
Real-World Percent Problems	Analyze and solve complex percent tasks involving reasoning.	7.RP.A.3	TCC4, TCC3, TI3, TI1, AA2, CCE1

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 4
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

Unit 5 - Operations with Rational Numbers

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.NS.A.1 – Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers.

7.NS.A.2 – Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

7.NS.A.3 – Solve real-world and mathematical problems involving the four operations with rational numbers.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC3(6-8): I can combine new information with my own ideas to generate solutions.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that...	**Essential Questions:**
• Rational numbers include positive and negative numbers, including fractions and decimals.	• What makes a number rational?

• Rules for operations with integers extend to all rational numbers. • Rational number operations help us solve real-world problems involving gain/loss, credit/debt, elevation, temperature, and more.	• How do operations with rational numbers differ from operations with whole numbers? • How can visual models help us understand operations with negative numbers?
Students will know… • Definitions and examples of rational numbers. • How to add, subtract, multiply, and divide rational numbers, including signed fractions and decimals. • How to apply the properties of operations to rational numbers.	**Students will be able to...** • Use number lines and rules to solve problems involving signed numbers. • Solve real-world problems with rational numbers using all four operations. • Justify operations and solutions with models, equations, or reasoning.
Key Vocabulary: Rational number, Integer, Opposite, Absolute value, Additive inverse, Commutative, associative, distributive properties Product, quotient	
Assessment Evidence	
Performance Tasks: **TCC3, DE4** Summative Assessment: • Working with signed numbers (positive and negative) • Understanding and using the number line with rational numbers • Performing operations with signed numbers (including fractions) • Solving equations with negative numbers • Interpreting signed numbers in real-world contexts • Understanding and calculating rates of change with signed	**Other Evidence:** Integer Computation Assessment Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

numbers ● Working with bank transactions and account balances	

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Rational Number Line	Place and compare rational numbers using a number line.	7.NS.A.1	TCC3, CCE1, P3, DE4
Adding/Subtracting Rationals	Model addition and subtraction with number lines and real-world contexts.	7.NS.A.1	TCC3, CCE1, P3, DE4
Multiplying Rational Numbers	Use patterning and models to discover rules for multiplication.	7.NS.A.2a	TCC3, CCE1, P3, DE4
Dividing Rational Numbers	Interpret division using story problems and numeric models.	7.NS.A.2b	TCC3, CCE1, P3
Multi-step Problems	Apply operations in context (banking, temperature, elevation).	7.NS.A.3	TCC3, CCE1, P3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 5
- Desmos Integer Activities
- Family-facing video summaries of each block (Vimeo/YouTube)
- Number Lines
- IXL
- Delta Math

Unit 6 - Expressions, Equations and Inequalities

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

7.EE.A.1 – Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions.

7.EE.A.2 – Understand that rewriting an expression can reveal relationships between quantities.

7.EE.B.3 – Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers.

7.EE.B.4 – Use variables to represent quantities and construct simple equations and inequalities.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC1(6-8): I can ask relevant questions to evaluate possible solutions.
TCC3(6-8): I can combine new information with my own ideas to generate solutions.
TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.
CCE3(6-8): I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.
TI4(6-8): I can identify my strengths and areas for growth, set goals toward improvement, and seek support as needed.

P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
AA1(6-8): I can implement different pathways to success and recognize the pros and cons of each.
AA2(6-8): I can identify past successful strategies and apply them independently.

Understandings: Students will understand that...	**Essential Questions:**
• Algebraic expressions can be used to represent and manipulate quantities. • Equations and inequalities model relationships between variables and constants. • Solving equations involves finding values that make statements true.	• How can expressions, equations, and inequalities represent real-world problems? • What is the difference between solving and evaluating? • How does rewriting an expression help you understand a situation?
Students will know…	**Students will be able to...**
• How to combine like terms and apply properties of operations. • How to solve multi-step equations and inequalities. • How to represent and reason about mathematical situations algebraically.	• Construct and manipulate algebraic expressions. • Solve equations and inequalities involving rational numbers. • Represent situations using symbols and justify their reasoning.

Key Vocabulary: Expression, Equation, Inequality, Variable, Coefficient, Constant, Inverse operation, Solution

Assessment Evidence

Performance Tasks: **P3, AA1, AA2** Summative Assessment:	**Other Evidence:** Checkpoint-Representing Situations Checkpoint-Solving Equations

• Expanding and factoring expressions
• Combining like terms
• Identifying equivalent expressions
• Finding and correcting errors in algebraic reasoning
• Writing inequalities to represent situations
• Solving inequalities
• Representing solutions on number lines
• Understanding inequality notation and meaning
• Modeling with expressions and inequalities
• Multi-step problems involving:
  ○ Financial situations (gift cards, purchases)
  ○ Temperature changes
  ○ Fuel consumption
  ○ Time-based scenarios
Key skills assessed include:
1. Converting between verbal and algebraic representations
2. Understanding and using negative coefficients
3. Interpreting solutions in context
4. Working with rational numbers in expressions
	Mid Unit Assessment
	Interim on Inequalities
	Interim on Writing Equivalent Expressions
	Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Vocabulary of Expressions	Identify and define parts of algebraic expressions.	7.EE.A.1	TCC1, TCC3, CCE3, P3, DE4
Writing Equations	Translate word problems into equations and expressions.	7.EE.B.3	TCC1, TCC3, CCE3, P3,TCC4, TI4, AA1, AA2
Solving Equations	Solve one- and two-step equations using inverse operations.	7.EE.B.4a	TCC1, TCC3, CCE3, P3,TCC4, TI4, AA1, AA2

Solving Inequalities	Represent and solve inequalities using number lines.	7.EE.B.4b	TCC1, TCC3, CCE3, P3,TCC4, AA2
Simplifying Expressions	Use properties to combine like terms and simplify expressions.	7.EE.A.1–2	TCC1, TCC3, CCE3, P3,TCC4, TI4, AA1, AA2

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 6
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

8th Grade Unit 4 - Linear Equations and Linear Systems (Lessons 2-4, 7-8)

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **8.EE.C.7**: Solve linear equations in one variable, including those with variables on both sides, and interpret solutions in context.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- **CCE4**:I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance based projects, whole group, and/or small group discussions.
- TI3: I can compose specific questions that are relevant to a task to support my learning.
- DE4: I can be respectful and responsible and build positive relationships with all members of the school community.
- P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
- **AA2**: I can identify past successful strategies and apply them independently.
- TCC2: I can evaluate data gathered from multiple perspectives and draw conclusions.

Understandings: Students will understand that…	**Essential Questions:**
• Performing the same operation on both sides of an equation preserves equality (like balance scales). • Linear equations in one variable may have no solution, exactly one, or infinitely many; solution structure depends on equivalence of expressions.	• How do we maintain balance when solving equations—especially with variables on both sides? • What strategies help us find all, some, or no solutions of a linear equation?
Students will know…	**Students will be able to...**
• Techniques for solving equations: simplifying, combining like terms, using inverse operations, and balancing. • Categories of equation outcomes: no solution, one solution, infinitely many.	• Solve single-variable linear equations—including those with variables on both sides. • Analyze an equation to classify its solution set (none, one, infinite). • Apply solution methods in real-world context problems.

Key Vocabulary: variable, coefficient, constant, like terms, inverse operations, solution, no solution, infinite solutions

Assessment Evidence

Performance Tasks:	**Other Evidence:**
AA2 & **CCE4** Summative Assessment • Write equivalent equations and describe the moves that are used • Solve multi-step linear equations with variables on one or both sides • Show all work and check solutions	Exit Tickets analyzing student learning Various Thinking Tasks solving systems using Building Thinking

• Justify the type of solution based on simplification and comparison of both sides • Solve a word problem involving comparing two linear cost models in a real world context • Interpret the solution in context	

Learning Plan

Lesson Focus	Activities	Standards	Vision Attributes
Number Puzzles & Balanced Moves	Solve/write puzzles using balance diagrams	8.EE.C.7	TCC2, TI3, P3
Keeping the Equation Balanced	Simplify and isolate variable steps	8.EE.C.7	TI3, TCC2, P3 , AA2, CCE4, DE4
Balanced Moves & Strategic Solving	Tackle multi-step equations with variables both sides	8.EE.C.7	TCC2, TI3, P3, AA2
Equations with All/No Solutions	Analyze situations leading to infinite or no solutions	8.EE.C.7	TI3, TCC2, P3 , AA2, CCE4
Solving “How Many Solutions?”	Classify and justify solution types	8.EE.C.7	TCC2, CCE4, TI3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Grade 8 Unit 4
- Family Lesson Videos (Solving equations & systems)—Vimeo/YouTube
- Balance diagrams & puzzle worksheets – analog tools for equation understanding
- Variables on Both Sides-Cell Phone Problem
- IXL
- Deltamath

Unit 7 - Geometry and Angles

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **7.G.A.1** – Solve problems involving scale drawings.
- **7.G.A.2** – Draw geometric shapes with given conditions.
- **7.G.B.4–6** – Solve problems involving circles, area, surface area, and volume.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.
CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
CCE4(6-8): I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
TI1(6-8): I can create a plan with manageable steps to reach my goals.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that… ● Angle relationships—such as supplementary, complementary, vertical, and adjacent—help us find unknown angles and support logical reasoning. ● Cross sections show the two-dimensional shapes formed when slicing three-dimensional figures and help build spatial understanding. ● Geometry helps us describe and analyze real-world shapes and objects. ● Area and volume formulas model real-life capacities and spaces.	**Essential Questions:** ● How can we use angle relationships to find unknown values? ● What do cross sections reveal about three-dimensional figures? ● How do geometric models represent real-world spaces? ● What can you learn by exploring the properties of shapes? ● How can we apply geometric reasoning to solve measurement problems?
Students will know… ● Types of angles and their relationships: adjacent, vertical, complementary, and supplementary. ● Properties of triangles, including angle sums and relationships among parts. ● The concept and geometric interpretation of cross sections of solids. ● How to calculate area, surface area, and volume.	**Students will be able to...** ● Use angle relationships to find missing angle measures. ● Determine if given side lengths create a triangle. ● Describe and sketch the cross section formed by slicing a three-dimensional figure. ● Solve problems involving area, surface area, and volume of two- and three-dimensional figures. ● Use reasoning to justify geometric conclusions and communicate thinking.
Key Vocabulary: angle, adjacent, vertical, supplementary, complementary, triangle, cross section, area, surface area, volume, prism, pyramid	
Assessment Evidence	
Performance Tasks: **TCC4** Summative Assessment: ● Understanding vertical angles ● Working with supplementary and complementary angles ● Using angle relationships to find missing values ● Understanding triangle conditions and constructions ● Analyzing cross-sections of 3D figures	**Other Evidence:** Checkpoint -Angle Relationships Interim on Volume and Surface Area Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

• Working with pyramids and prisms • Calculating surface area and volume	

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Angle Relationships	Explore and justify relationships among angles (vertical, supplementary).	7.G.B.5	TCC4, CCE4, TI3, TI1, CCE1, DE4
Constructing Triangles	Identify patterns of given side lengths that create triangles.	7.G.A.2	TCC4, CCE1, CCE4, TI1, TI3, P3
Area of 2D Figures	Apply formulas to find areas of triangles, trapezoids, circles.	7.G.B.4	TCC4, CCE1, CCE4, TI1, TI3, P3
Surface Area	Solve problems involving surface area of 3D figures.	7.G.B.6	TCC4, TI1, CEE4, TI3, P3
Volume of Prisms	Calculate volume of right prisms and connect to real-world contexts.	7.G.B.6	TCC4, CCE1, CCE4, TI1, TI3, P3

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 7
- Family-facing video summaries of each block (Vimeo/YouTube)
- Desmos
- IXL
- Delta Math

Unit 8 - Probability and Statistics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **7.SP.A.1–2** – Understand and use random sampling to draw inferences about populations.
- **7.SP.B.3–4** – Draw informal comparative inferences about two populations.
- **7.SP.C.5–8** – Investigate chance processes, calculate and interpret probabilities.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

CCE1(6-8): I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.
AA2(6-8): I can identify past successful strategies and apply them independently.
AA4(6-8): I can seek opportunities to learn more and continue to push my thinking.
DE4(6-8): I can be respectful and responsible and build positive relationships with all members of the school community.

Understandings: Students will understand that…	**Essential Questions:**
• Probability helps describe the chance of events occurring. • Random samples support conclusions about larger populations. • Data can be used to compare groups and make informed decisions.	• How can we use data to make predictions? • What does probability tell us about outcomes? • How can random sampling lead to valid conclusions?
Students will know… • How to calculate probabilities and compare likelihoods. • How to use random sampling and understand variability. How to compare data sets and draw informal inferences.	**Students will be able to...** • Analyze data using measures of center and variability. • Calculate and interpret probabilities of simple and compound events. • Use tools such as tables, lists, and tree diagrams to analyze chance processes.
Key Vocabulary: Probability, Sample space, Random sample, Compound event, Likelihood, Mean, median, and mode	
Assessment Evidence	
Performance Tasks: **AA2, AA4** Summative Assessments: • Understanding populations and samples • Evaluating sampling methods • Making inferences from samples • Recognizing sampling bias • Estimating population proportions • Interpreting dot plots and histograms • Identifying representative samples • Making predictions from data displays • Understanding data distributions • Working with measures of center (mean, median) • Understanding variability (IQR) • Comparing data sets using multiple measures	**Other Evidence:** Interim on Single Step Probability Various Thinking Tasks solving systems using Building Thinking Classrooms instructional strategies.

• Making conclusions about meaningful differences between groups	

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Understanding Probability	Use spinners and dice to explore probability and outcomes.	7.SP.C.5	CCE1, TI3, AA2, AA4, DE4
Theoretical vs. Experimental	Conduct probability experiments and compare results.	7.SP.C.6	CEE1, TI3, AA4, AA2
Compound Events	Explore compound probability with organized lists and tables.	7.SP.C.7	TI3, AA2, CCE1
Interpreting Data	Analyze collected data and describe likelihood with justification.	7.SP.A.1–2	AA4, TI3, CCE1, AA2

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Unit 8
- Family-facing video summaries of each block (Vimeo/YouTube)
- IXL
- Delta Math

8th Grade Unit 1 - Rigid Transformations and Congruence (Lessons 1-9, 11-13)

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- 8.G.A.1: Verify experimentally the properties of rotations, reflections, and translations.
- 8.G.A.2: Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence.
- 8.G.A.3: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

- **TCC2 (6-8)**: I can evaluate data gathered from multiple perspectives and draw conclusions.
- **CCE4 (6-8)**: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
- AA1(6-8): I can implement different pathways to success and recognize the pros and cons of each.
- **AA2 (6-8)**: I can identify past successful strategies and apply them independently.
- TI3 (6-8): I can compose specific questions that are relevant to a task to support my learning.
- P3 (6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

Understandings: Students will understand that...

- Rigid transformations (translations, rotations, and reflections) preserve size and shape.
- Two figures are congruent if there is a sequence of rigid motions that maps one onto the other.
- Coordinates can be used to describe and perform

Essential Questions:

- How do rigid motions help us understand congruence?
- What makes two shapes congruent or not congruent?
- How can we describe transformations precisely using coordinates?

transformations.	
Students will know... • Definitions and properties of rigid transformations: translation, rotation, and reflection. • The definition of congruence in terms of rigid motions. • How to identify and describe a sequence of transformations. • That the corresponding parts of congruent figures have equal measurements.	**Students will be able to…** • Perform and describe transformations using mathematical vocabulary and coordinates. • Use transformations to justify whether two figures are congruent. • Construct arguments and explanations using geometric transformations. • Identify and verify that corresponding parts of congruent figures have equal measurements.
Key Vocabulary: Rigid transformation, Translation, Rotation, Reflection, Congruent, Coordinates, Sequence of transformations, Image, Pre-image, corresponding, corresponding parts, transformation	
Assessment Evidence	
Performance Tasks: **TCC2, CCE4 & AA2** End of Unit Assessment: • Identify and apply translations, rotations, and reflections visually and on coordinate planes • Understand and use the properties of rigid transformations, including preservation of lengths and angles • Analyze and perform sequences of transformations in the correct order • Apply transformations to coordinates • Justify and explain transformations by identifying corresponding parts and assessing if a transformation is possible • Justify that two polygons on a grid are congruent using the definition of "congruence" in terms of rigid transformations	**Other Evidence:** CER Responses Exit Tickets analyzing given transformations or describing sequences Various Thinking Tasks using Building Thinking Classrooms instructional strategies
Learning Plan	

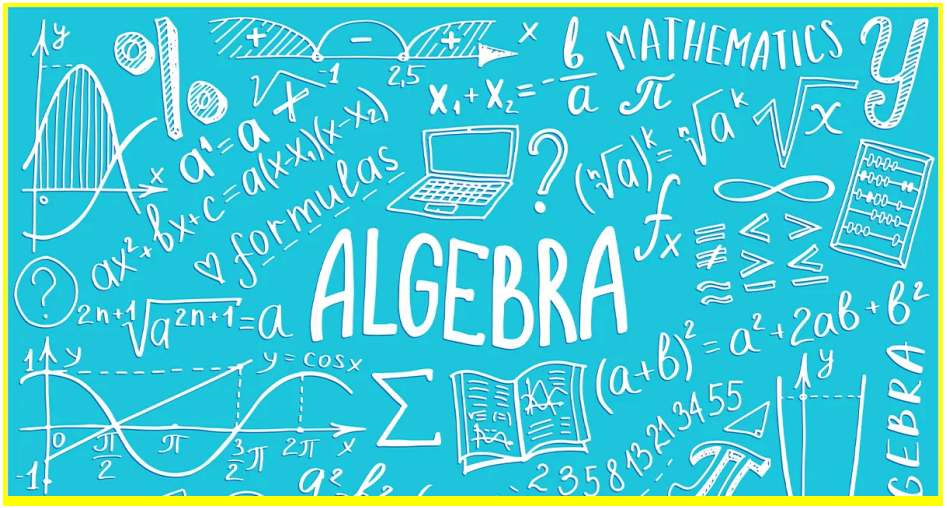
Lesson Focus	Learning Activities	CCSS	Vision of a Learner Attribute

Intro to Rigid Transformations	Paper folding and tracing to show translations, rotations, reflections	8.G.A.1	TI3, P4, CCE1, DE4, P3
Using Transparencies & Tools	Use tracing paper to verify congruence via rigid motions	8.G.A.2	TCC2, CCE4, TI3
Congruence through Transformations	Collaborative problem-solving to justify congruence	8.G.A.2	CCE4, TCC2,P3
Describing Transformations on a Grid	Grid-based tasks describing transformations algebraically	8.G.A.3	TCC2, TI3, AA2, CCE4, P3
Practice with Sequences	Students create and apply sequences of transformations	8.G.A.2	TCC2, TI3, AA2, CCE4, P3
Define congruence through rigid transformations and understand that corresponding parts are equal.	Students use rigid transformations and tools to compare figure pairs and determine congruence, discovering that equal area or perimeter alone is insufficient.	8.G.A.2	TCC2, CCE4, AA1

Teacher Resources:

- Illustrative Mathematics Teacher Guide, Grade 8 Unit 1
- Family-facing video summaries of each block (Vimeo/YouTube)
- Desmos Geometry Tools (for digital transformations)
- Paper, tracing paper, and patty paper
- Coordinate grid handouts and rulers
- IXL
- Deltamath

ADVANCED 8TH GRADE MATH CURRICULUM



REGION 14 SCHOOL DISTRICT
VISION OF A LEARNER

Grade Level(s): Advanced 8th Grade Math

Curriculum Author(s): Cate Lyman, Connor Mooney

Course Description: Advanced Math 8 is a high school Algebra course that also includes completing the 8th-grade math standards. Students in this class must be highly motivated, demonstrate strength of the 7th grade standards including algebraic reasoning and numeracy and perseverance while working at a faster pace. In algebra, students learn to model the real world through the study of one- and two-variable statistics, linear equations in one and two variables, systems of linear equations and inequalities, functions, exponential relationships, and quadratic functions. Students learn to represent real-world situations through tables, graphs, and equations and analyze these models to solve problems and make decisions. Students will be expected to clearly communicate in writing and orally using mathematical evidence to support answers. In addition to the standard Algebra curriculum, students will cover many of the 8th-grade topics such as similarity and congruence in 2-dimensional shapes, number systems including irrational numbers, the volume of cylinders, cones, and spheres, bivariate data, and probability in the form of two-way frequency tables, rules of exponents and scientific notation, a study of right triangles and the Pythagorean theorem.***Students will have required math work to complete over the summer.***

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Solving Linear Equations & Inequalities	How can equations and inequalities be used to model information?	To obtain a solution to an equation, no matter how complex, it always involves the process of undoing the operation. Each step in solving an equation must maintain the equality of the statement.	T13(6-8), **P4**(6-8), TCC2(6-8), **CCE1**(6-8), **DE4**(6-8)
Congruence, Dilations and Similarity	How can we use angle relationships and proportional reasoning to understand and compare shapes?	Understanding angle relationships and transformations like dilations helps us explain how shapes relate to one another. These tools allow us to identify when shapes are exactly the same in form and when they are proportionally similar, even if different in size.	TI3(6-8), P4(6-8), TCC2(6-8);CCE1(6-8), CCE3(6-8), DE4(6-8), **TI2**(6-8)**,** P3(6-8)
Volume	How do the dimensions of a three-dimensional shape determine how much space it takes up?	Volume formulas show how the size of a shape's dimensions—like radius and height—affect the amount of space it can hold. These formulas help us solve real-world problems involving cylinders, cones, and spheres.	CCE3(6-8), DE4(6-8), P3(6-8), **AA2**(6-8)**, CCE1**(6-8)

Linear Functions, Inequalities and Systems	How do systems help us solve real-world problems with multiple constraints?	A solution to a system of equations is the point where all equations intersect. A solution to a system of inequalities is the region of the coordinate plane that contains the ordered pairs that satisfy all of the inequalities.	**TCC1**(6-8), TCC4(6-8), CCE3(6-8), **CCE4**(6-8)**,** DE4(6-8), P3(6-8), AA4(6-8), TI3(6-8)
Pythagorean Theorem And Irrational Numbers	How do geometric relationships and number properties help us solve problems involving distance and irrational numbers?	The Pythagorean Theorem connects geometry and algebra, and understanding irrational numbers expands our view of the number system beyond rational values.	CCE3(6-8), DE4(6-8), P3(6-8), **TCC4**(6-8)**, TCC2**(6-8)
Introduction to Statistics	How can we use statistics to summarize and describe sets of data?	Graphs and summary statistics can be used to describe one variable data; scatterplots and trend lines can be used to describe two variable data.	TCC3(6-8), DE3(6-8), TI4(6-8)
Exponents and Scientific Notation	How do the properties of exponents and scientific notation help us represent and work with very large or very small numbers?	Exponent rules and scientific notation allow us to represent and manipulate very large or small numbers efficiently, revealing structure and patterns in the number system	**CCE3**(6-8), DE4(6-8), **P3**(6-8)
Exponential Functions	What are the characteristics of exponential growth and decay and how is this reflected in real-world phenomena?	Exponential functions represent relationships involving a constant multiplicative rate of change, which represent rapid growth or decay.	TCC3(6-8); TI3(6-8); CCE4(6-8)
Operations with Polynomial Expressions	How can you verify two algebraic expressions that appear to be different are equivalent?	Polynomial expressions can be simplified and factored using different strategies.	TCC2(6-8); CCE4(6-8); DE1 (6-8)
Introduction to Quadratic Functions	What are the characteristics of quadratic functions and how can they	Understanding multiple representations—graphical,	TCC3(6-8); AA1(6-8), P1 (6-8)

	be used to model real-world phenomena?	numerical, algebraic, and contextual—of quadratic relationships allows us to analyze and solve real-world problems involving solutions and maximum or minimum values.	

Unit 1 - Solving Linear Equations & Inequalities

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.**
- **A.CED.A.3 Represent constraints by equations on inequalities,** and by systems of equations and/or inequalities, and **interpret solutions as viable or nonviable options in a modeling context**.
- **A.CED.A.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
- **A.REI.A.1** Explain each step in solving a simple equation as follows from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- **A.REI.B.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **A.SSE.A.1** Interpret expressions that represent a quantity in terms of its context.*
    - **A.SSE.A.1.A** Interpret parts of an expression, such as terms, factors, and coefficients.
- **A.SSE.A.2** Use the structure of an expression to identify ways to rewrite it.
- **A.SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

<table>
<tr><td colspan="2">Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)
TCC2: I can evaluate data gathered from multiple perspectives and draw conclusions.
CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow. mistakes as opportunities to learn and grow.
TI3: I can compose specific questions that are relevant to a task to support my learning.
DE4: I can be respectful and responsible and build positive relationships with all members of the school community.
P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.</td></tr>
<tr><td>Understandings: Students will understand that...
Algebra consists of numbers, variables, operations, and rules for relationships between those entities.
A variable represents an unknown quantity.
Real-life situations can be modeled algebraically.
To obtain a solution to an equation, no matter how complex, it always involves the process of undoing the operation. Each step in solving an equation must maintain the equality of the statement.
Inequalities express a range of possible solutions, rather than a single answer.</td><td>Essential Questions:
How can the algebraic properties of real numbers extend beyond integers?
What methods or strategies do you use to decide how to solve a problem? How does this extend to the validity of a solution to a problem?
Does each equation have a distinct solution and how do you know?
How can equations and inequalities be used to model information?
How do inequality properties compare to those of equations? How are they similar? How are they different? What characteristics drive using an inequality instead of an equal sign?
What is a solution set for a linear inequality?</td></tr>
<tr><td>Students will know...
Explain the steps in solving equations.
Understand how the properties of equality and inverse operations are used to solve equations and inequalities in</td><td>Students will be able to...
Solve multi-step equations, justifying each step in the solving process.
Solve equations with variables on both sides, including</td></tr>
</table>

one-variable. ● Understand the difference between the properties of equality vs. combining like terms and when to use each (seeing structure). ● The order of operations and apply it when simplifying expressions or solving equations. ● Explain the steps in solving inequalities. ● Understand how the properties of inequalities and inverse operations are used to solve inequalities. ● Understand the difference between the properties of equations vs the properties of inequalities (i.e.: multiplying or dividing by a negative). ● The difference between equations and inequalities. ● Some equations have no solution, one solution, or infinitely many solutions. ● Inequalities express a range of possible solutions rather than a single answer.	examples of special cases with no solutions or infinite solutions. ● Rewrite and explain literal equations (equations with formulas). ● Translate real-world problems into algebraic equations. ● Solve and graph multi-step inequalities in one-variable. ● Solve and graph compound inequalities in one-variable. ● Model real-world situations using inequalities. Apply compound inequalities to real-world situations.
Key Vocabulary: **Part 1 Solving Equations:** Argument, Coefficient, Combine Like Terms, Constant, Difference, Distributive Property, Expressions, Equation, Equality, Infinite Solutions, Interpret, Inverse Operation, Justify, Like Terms, Modeling, No Solution, Order of Operations, PEMDAS, Persevere, Product, Properties of Equality, Proportional, Quotient, Rate, Ratio, Solve, Solution, Sum, Term, Variable **Part 2 Solving Inequalities:** At Least, Compound Inequality, Greater Than, Inequality, Interpret Less Than, Modeling, No More Than, Solution, Solution Set	
Assessment Evidence	
Performance Tasks: **P4**, **CCE1**, **DE4** End of Unit Assessment ● Recognizing when equations represent the same relationship. ● Using algebraic manipulation to justify equivalence. ● Translating a verbal description into an equation.	**Other Evidence:** 2.1-2.4 Quiz 2.5-2.8 Quiz (Literal Equations) Exit Tickets analyzing multi step equations Exit Tickets with student reflections on Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

• Solving for a given variable • Analyzing real-world constraints • Evaluating statements about solutions using a graph. • Understanding how changes in one variable affect another in a linear relationship. • Defining variables clearly. • Incorporating base costs and per-unit costs into an equation. • Showing algebraic steps and clearly indicating the solution. • Isolating a specified variable. • Applying inverse operations in equations involving multiple variables. • Creating a table of possible solutions. • Writing an equation to represent a total weight constraint. • Graphing the solutions to an equation. • Determining and interpreting slope in context.	

Learning Plan

Lesson Focus	Learning Activities	Standards	VoL Attributes
1–3: Writing and Modeling with Equations	Model real situations (e.g., pizza party, constraints) using expressions, equations; identify variables.	HSA-CED.A.2, HSA-CED.A.3, HSN-Q.A.2	TI3, TCC2, P4, CCE1, DE4
4–5: Equations and Their Solutions / Graphs	Solve single-variable equations; graph linear equations; connect algebraic and graphical forms.	HSA-REI.A.1, HSA-CED.A.4, HSF-IF.A.3	TI3, TCC2, P4, CCE1
6–9: Manipulating Equations & Rewriting	Generate equivalent equations; explain transformation steps; choose which variable to isolate.	HSA-REI.A.1, HSA-REI.A.2, HSA-REI.B.3, HSA-CED.A.3, HSA-CED.A.4	TCC2, P4, CCE1
10–11: Connecting Equations to	Interpret slope and intercept	HSA-REI.D.10, HSF-IF.B.6,	TI3, TCC2, P4, CCE1, DE4

Graphs	graphically; connect structure of equation to visual features.	HSF-LE.A.1	

Teacher Resources: Algebra 1 Textbooks; IM Algebra 1 Unit 2: Linear Equations, Inequalities, and Systems; State of CT Algebra 1 Model Curriculum Unit 2; Desmos; IXL; TI Smartview Software; Teacher created in-class notes, activities, and problem sets

Unit 2 - Congruence, Dilations, and Similarity

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:
8.G.A.1: Understand that a dilation is defined by a center and a scale factor; analyze images of circles and lines under dilation.
8.G.A.2: Understand similarity by connecting dilations and rigid motions to define when figures are similar.
8.G.A.3: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
8.G.A.3 / 8.EE.B.6: Use similarity (including slope triangles) to understand that any two points on a line determine the same slope.
8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC2: I can evaluate data gathered from multiple perspectives and draw conclusions.

CCE1:I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

P4: I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow. mistakes as opportunities to learn and grow.

TI3: I can compose specific questions that are relevant to a task to support my learning. **DE4**: I can be respectful and responsible and build positive relationships with all members of the school community. P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey. CCE3: I can participate in collaborative conversations by actively listening, formulating questions ,making connected comments and providing various types of feedback to my peers. **T12**: I can identify my objectives and apply the best resources to my learning.	
Understandings: Students will understand that... Angle relationships in triangles and between parallel lines and transversals follow consistent, predictable patterns. Informal reasoning and visual models can justify geometric facts like the angle sum of a triangle or relationships formed by transversals. A dilation scales distances from a center by a constant factor while preserving angle measures. Two figures are similar if one can be obtained from the other via rigid motions and dilation. All slope triangles on the same line are similar, yielding a consistent slope that defines the relationship between vertical and horizontal change.	**Essential Questions:** What angle relationships always exist in triangles and with parallel lines? How does changing the scale of a figure affect its size and shape? What criteria determine whether two figures are similar? How do similar triangles help us understand slope and describe lines?
Students will know... Properties of angle relationships: vertical, adjacent, complementary,	**Students will be able to…** Use informal arguments to justify angle relationships in geometric

supplementary, corresponding, alternate interior. That the sum of the angles in a triangle is always 180°, and how to justify that informally. That dilations preserve angle size but scale length by the factor That similarity of triangles underpins the concept of slope	figures and with parallel lines. Construct dilations on and off the grid using a given center and factor Identify when two figures are similar and justify using transformations
Key Vocabulary: Dilation, Scale Factor, Center of Dilation, Similarity, Slope, Slope Triangle**,** Rigid transformation, Translation, Rotation, Reflection, Congruent, Coordinates, Sequence of transformations, Image, Pre-image, Angle Sum, Transversal, Alternate Interior Angles, Corresponding Angles, Vertical Angles	
Assessment Evidence	
Performance Tasks: **T12**: I can identify my objectives and apply the best resources to my learning. **DE4**: I can be respectful and responsible and build positive relationships with all members of the school community. End of Unit Assessment ● Finding missing angles and side lengths of congruent polygons ● Finding an unknown angle formed by intersecting lines ● Understanding properties of dilations (lines, circles, angles) ● Identifying which statements about dilations are true ● Determining which pairs of triangles are similar based on angle information ● Selecting all lines that have a given slope	**Other Evidence:** CER Responses 2.1-2.5 Quiz 2.6-2.9 Quiz Exit Tickets analyzing student learning and reflections Check Point Assessments Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

• Determining if a student correctly drew a similar polygon • Finding missing side lengths using similarity • Calculating the slope of a line • Determining whether a specific point lies on the line • Drawing two dilations of a polygon using given centers and scale factors • Showing and explaining why the dilated figures are similar • Working with parallel lines and triangle angle relationships • Finding unknown angle measures • Understanding 180° rotations and their effect on triangle congruence • Identifying and justifying congruent angles • Applying knowledge of angle sums in triangles and quadrilaterals	

Learning Plan

Lesson Focus	**Learning Activities**	**CCSS**	**Vision of a Learner Attribute**
Angle Relationships in Triangles (Unit 1: lesson 14)	Ex;lore angle sums using triangle diagrams and folding	8.G.A.5	TI3, P4, CCE1, DE4, P3, TCC2
Angles with Parallel lines and Transversals (Unit 1: lesson 15 and 16)	Use visuals and reasoning to explore angle pliers and informal proof	8.G.A.5	TI3, P4, CCE1, DE4, P3, TCC2
1- 2. Projecting & Scaling	Hands-on with cut-outs and radial/circular grids exploring scale factor	CCSS 8.G.A.1	TI3, P4, DE4
3-5. Dilation on Grids and Coordinate Plane	Use square grids & coordinates for dilations	CCSS 8.G.A.1, 8.G.A.3	TCC2, DE4
6-9. Exploring Similarity	Compare polygons, define similarity, analyze ratio of sides	CCSS 8.G.A.2, 8.G.A.4, 8.G.A.5	CCE1, TCC2, CCE3, DE4

10-12. Slope via Similar Triangles	Use slope triangles to derive slope	CCSS 8.G.A.3, 8.EE.B.6, 8.G.A.4	TI3, TCC2, DE4, P3

Teacher Resources:

- Illustrative Mathematics Unit 1 & 2 Teacher Guide: detailed lesson narratives and alignment
- Family-facing video summaries (Vimeo/YouTube) explaining content and vocabulary
- Geometry toolkits: tracing paper, graph paper, ruler, protractor, patty paper (MP5 support)
- Digital tools: Desmos/GeoGebra for modeling dilations and slope triangles
- IXL
- Formative assessment protocols: exit tickets, partner critique, reflection prompts focused on transformations and slope reasoning
- 6–8 VoL Attribute List (for guiding student reflection and integration of soft skills)

Unit 3 - Volume

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

G.GMD.A.3: Use volume formulas for cylinders, cones, and spheres and understand relationships between their volumes and dimensions.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

AA2: I can identify past successful strategies and apply them independently.

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

CCE1: I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions ,making connected comments and providing various types of feedback to my peers.

Understandings: Students will understand that…	**Essential Questions:**
• Volumes of cylinders, cones, and spheres change predictably with dimensions and can be modeled as functions • Volume formulas reveal relationships between dimensions: cylinder and prism; cone and cylinder; sphere as dimension scales	• How do measurements of three-dimensional figures change when dimensions change—what is the functional relationship?
Students will know... How dimensions affect volumes: $V = \pi r^2 h$, $V = (1/3)\pi r^2 h$, $V = (4/3)\pi r^3$	**Students will be able to…** Use and compare volume formulas; analyze how volume responds to changes in radius or height.

Key Vocabulary: Volume, Cylinder, Cone, Sphere, Radius, Height, Volume Formulas, Equation

Assessment Evidence

Performance Tasks:	**Other Evidence:**
AA2: I can identify past successful strategies and apply them independently.	Exit Tickets analyzing student learning and reflections Check Point Assessments

CCE1: Respect differing viewpoints, actively listen to others, and apply new knowledge to thinking. Summative Assessment ● Recall and write the correct volume formulas for: Cylinder, Cone, and Sphere ● Use given dimensions and apply appropriate formulas to: Find the volume of a cylinder, Find the volume of a cone, Find the volume of a sphere ● Given the volume of a cylinder, work backwards to find the missing height using algebraic reasoning	Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

Learning Plan

Lesson Segment	Learning Activities	CCSS	Vision Traits
Cylinders & Cones	Investigate how volume changes with height and radius; derive volume formulas; represent relationships with functional graphs.	G.GMD.A.3	CCE1, CCE3, DE4, P3, AA2
Spheres & Scaling	Compare volumes of different solids; examine how volume scales with radius using function concepts.	G.GMD.A.3	CCE1, CCE3, DE4, P3, AA2

Teacher Resources:
Illustrative Mathematics Unit 5 Teacher Guide (lesson narratives & standards)

Family-facing video summaries for each section (Inputs & Outputs; Functions; Solid Volumes)

Geometry toolkits: tracing paper, graph paper, rulers, colored pencils, cylinders/prisms for volume exploration

Volume formula reference & derivation aids (visual and symbolic)

Digital modeling tools: Desmos/GeoGebra for exploring linear and volume functions

IXL

Formative assessments and protocols: exit tickets, peer critique

Unit 4 - Linear Functions, Inequalities, and Systems

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **A.CED.A.2** Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- **A.CED.A.3** Create equations that describe numbers or relationships. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
- **A.REI.C.5** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
- **A.REI.C.6** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- **A.REI.D.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- **A.REI.D.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*
- **A.REI.D.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding

half-planes.

- **A.SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.***F.IF.B.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
- **F.IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
- **F.IF.C.7.A Graph linear** and quadratic **functions and show intercepts**, maxima, and minima.
- **F.IF.C.8** Write a function defined by an expression in different by equivalent forms to reveal and explain different properties of the function.
- **F.LE.A.2 Construct linear** and exponential functions, **given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).**

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- **TCC3(6-8):** I can combine new information with my own ideas to generate solutions.
- **TCC4(6-8)**: I can apply my learning to new experiences, determine if it works, and adjust in the future.
- **AA1(6-8)**: I can implement different pathways to success and recognize the pros and cons of each
- **CCE4(6-8)**: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

Understandings: Students will understand that…

- Linear functions describe relationships and quantities with a constant additive rate of change, known as the slope.
- Equations represent relationships between quantities and can be graphed on a coordinate plane.
- The graph of a linear function (a line) represents a set of infinite solutions to a two variable equation.
- The average rate of change describes how a function's output

Essential Questions:

- How can understanding linear functions and their multiple representations help us model real-world situations, interpret relationships, and problem solve effectively?
- What is a linear function, and how can it be represented using equations, graphs, and tables?
- What is the significance of a linear function’s slope and y-intercept in the context of modeling linear applications?

changes over an interval. • Graphs of functions reveal key features like intercepts and its slope. • Systems of equations and inequalities can model real-world scenarios involving more than one variable. • A solution to a system of equations is the point where all equations intersect. • A solution to a system of inequalities is the region of the coordinate plane that contains the ordered pairs that satisfy all of the inequalities. • Multiple methods can be used to solve systems, each with its own advantages.	• How do changes in the form of a linear equation affect its graph and the relationship between variables? • What does it mean for an ordered pair to be a solution to a system? • How do you determine the most efficient method to solve a system? • How does the number of solutions of a system connect to its graph? • How do systems help us solve real-world problems with multiple constraints?
Students will know… • Linear functions do not include exponents, variables in the denominator, or variables under radicals. • Linear functions have three accepted forms: slope intercept, standard, and point-slope. • Linear functions can be identified from equations, graphs, and tables. • Slope is a constant rate of change that can be calculated from a graph, table, equation, or two points. • The y-intercept is often referred to as the initial value. It can be identified from an equation or from a graph. • The x-intercept is often referred to as the zero of the function - when the value of the function is zero. • Linear functions can be built from graphs, descriptions, or input-output pairs. • To write the equation of a line, at least one point and the slope are needed. • Parallel and perpendicular lines can be identified and written using slope criteria. Parallel lines have the same slope while perpendicular lines have opposite reciprocal slopes. • Expressions can be substituted in for variables. • The solution to a system of linear equations is the ordered pair which is a solution to each linear equation in the system.	**Students will be able to…** • Identify and classify linear functions from graphs, tables, and equations. • Calculate the slope of a line from a graph, table, equation, and/or two points. • Interpret the meaning of intercepts given a situation, equation, or graph. • Graph linear functions using slope-intercept form. • Graph linear functions in standard form by rewriting into slope-intercept form or by finding the intercepts. • Graph linear equations in point-slope form. • Write equations of linear functions given a graph, a context, a point and slope, or two points. • Write equations of parallel and perpendicular lines given a line and a point not on the line. • Solve problems involving parallel and perpendicular lines. • Translate between different representations of linear functions (graph, table, equation). • Solve a system of linear equations using graphing, substitution, and elimination methods. • Determine the most efficient method to solve a system of linear equations. • Solve a system of linear inequalities by graphing.

• There are multiple methods to solve systems of equations. All methods result in the same solution, but one method may be more efficient. • Some systems have infinitely many solutions (graphically they are the same line) or no solution (graphically it results in parallel lines). • Systems can be used to determine break-even points and to analyze data relative to the break-even point. • An inequality divides the coordinate plane into two half-planes. One side of the boundary line will represent solutions and is shaded to show this. • The solution to a system of inequalities is the overlapping region of these shaded half-planes, known as the feasible region.	• Algebraically check solutions to a system of linear equations and to a system of linear inequalities. • Determine the number of solutions to a system of linear equations. • Write and solve systems of linear equations and of linear inequalities to model real world problems.
Key Vocabulary: Linear Function, Linear Equation, Slope, Constant Rate of Change, Y-intercept, X-intercept, Slope-Intercept Form, Standard Form, Domain, Range, Function Notation, Coordinate Plane, Origin, Solution, Intercept, system of linear equations, system of linear inequalities, equivalent equation, solution, graphing method, substitution method, elimination (linear combination) method, independent, dependent, infinitely many solutions, no solution, revenue, profit, break even point	
Assessment Evidence	
Performance Tasks: TCC3, TCC4 & AA1 Systems of Linear Equations Assessment • Identifying what each variable represents in a real-world context. • Translating cost and quantity descriptions into linear equations. • Modeling two different scenarios as a system of equations. • Plotting both equations on the same coordinate plane. • Labeling axes appropriately. • Explaining the meaning of the intersection point in context. • Comparing scenarios to decide optimal choices based on the model. • Creating equations from budget and capacity constraints. • Solving for both variables to determine quantities.	**Other Evidence:** CER Responses Exit Tickets analyzing student learning and reflections Check Point Assessments Various Thinking Tasks using Building Thinking Classrooms instructional strategies.

• Using substitution to solve a system step-by-step. • Using elimination/addition to solve a system step-by-step. • Recognizing different approaches (graphing, substitution, elimination) and their uses. Systems of Linear Inequalities Assessment • Representing constraints as inequalities. • Plotting single inequalities on a coordinate plane. • Adding additional inequalities to the same graph to show combined constraints. • Finding ordered pairs that satisfy given inequalities. • Verifying whether specific points remain solutions when new constraints are added. • Translating real-world scenarios into a system of inequalities. • Determining the solution region that satisfies all inequalities. • Clearly shading or marking the feasible region on the graph. • Defining variables and interpreting them in context.	

Learning Plan

The purpose of this unit is to introduce the connection between graphs and linear equations in two variables given multiple equations. Students will discern the best approach for writing systems of equations and solving based on the information given. Systems of equations then extends to systems of inequalities, where there is a feasible region for the solution set.

- This unit starts with an informal introduction to systems of equations through the amusement park problem. Students create tables, graphs, and equations to model three different membership plans at an amusement park. Students compare these plans and look for break even points.
- Students will solve systems by the graphing method, both by hand and using technology (TI graphing calculator, desmos calculator). Students also solve application problems by graphing.
- Students learn algebraic methods for solving systems of equations. Students solve problems that are stand alone and real world problems by substitution and by elimination.
- Students will learn about special cases - inconsistent and dependent systems of equations.
- Students are introduced to systems of linear inequalities using the donut problem .

The unit will conclude with a summative test on all topics**.**

Lesson Focus	Learning Activities	CCSS Standards	VoL Attributes
IM U4 Lessons 1: Describing and Graphing Situations	Analyze tables, graphs, and descriptions to determine whether relationships are functions; interpret graphs by identifying inputs and outputs.	Build on 8.F.A.1; Address HSF-IF.A.1, HSF-IF.B.4	TCC3, TCC4, CCE4
Lessons 2–3: Function Notation & Interpretation	Match verbal descriptions to symbolic function rules; interpret function notation in context; draw connections between notation and graphs.	Address HSF-IF.A.2, HSF-IF.B.4	TCC3, TCC4
Lessons 4–5: Using Function Notation to Describe Rules	Explore “notice & wonder” tasks with functions; practice expressing rules in function notation and comparing symbolic and verbal forms.	Address HSF-BF.A.1, HSF-IF.A.2; Build on 8.F.A.1	TCC3, TCC4
Lessons 6–9: Features of Graphs, Average Rate of Change, Interpreting Graphs, Comparing Graphs	Analyze graphical features; calculate and interpret average rate of change; compare multiple representations side by side.	Build on HSF-IF.B.4	TCC3, TCC4 & AA1
Lessons 10–11: Domain and Range (Parts 1 & 2)	Determine reasonable domain and range from situations, tables, and graphs; interpret graphical features (gaps, endpoints, etc.) to describe domain and range.	Address HSF-IF.B.4, HSF-IF.B.5	TCC3, TCC4, CCE4
12–17: Systems of Linear Equations	Write and graph systems; solve via substitution and elimination; reason about number of solutions.	HSA-REI.C.5, HSA-REI.C.6, HSA-REI.D.10	TCC3, TCC4, CCE4
18–20: Linear Inequalities in One Variable	Represent situations with inequalities; solve and graph one-variable inequalities.	HSA-REI.B.3, HSA-REI.B.4	TCC3, TCC4

21–23: Linear Inequalities in Two Variables	Graph inequalities in two variables; use technology; represent and interpret solution regions.	HSA-CED.A.3, HSA-REI.D.12	TCC3, TCC4
24–26: Systems of Linear Inequalities in Two Variables	Model real-world situations using systems of inequalities; interpret feasible regions.	HSA-REI.D.12, HSA-CED.A.3	TCC3, TCC4 & AA1

Teacher Resources: IM Algebra 1 Unit 2: Linear Equations, Inequalities, and Systems; State of CT Algebra 1 Model Curriculum Unit 6; Teacher created worksheets and assessments; Desmos; Khan academy; IXL; Socrative; Blooket; Quizizz; Kahoot

Unit 5 - Pythagorean Theorem and Irrational Numbers

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **8.G.B.6: Understand and use the Pythagorean Theorem to determine unknown side lengths in right triangles in contextual and coordinate settings.**
- **8.NS.A.2: Use rational approximations of irrational numbers to locate and compare them on the number line.**
- **8.EE.A.2: Perform arithmetic with numbers expressed in scientific notation, including operations with very large or very small values (supports understanding of irrational decimal representations)**

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- **TCC2**: I can evaluate data gathered from multiple perspectives and draw conclusions.
- **TCC4**: I can apply my learning to new experiences, determine if it works and adjust in the future.
- DE4: I can be respectful and responsible and build positive relationships with all members of the school community.
- P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
- CCE3: I can participate in collaborative conversations by actively listening, formulating questions ,making connected comments and providing various types of feedback to my peers.

Understandings: Students will understand that…

- Proofs of the Pythagorean Theorem can be constructed both algebraically and geometrically by showing area equivalence.
- The set of real numbers includes irrational numbers (like $\sqrt{2}$) that cannot be expressed exactly as fractions or decimals.
- Square roots and cube roots represent side or edge lengths in geometric contexts and often require irrational approximations.
- The Pythagorean Theorem extends to coordinate geometry and three-dimensional right rectangular prisms.

Essential Questions:

- Why does $a^2 + b^2 = c^2$ for every right triangle?
- What differentiates rational from irrational numbers, and how can we estimate irrational values?
- How can we use the Pythagorean Theorem across dimensions and coordinate systems?

Students will know...

- Definitions: rational vs. irrational numbers; square root and cube root notation.
- Two proofs of the Pythagorean Theorem—using algebraic argument and area decomposition.
- How to use the Pythagorean Theorem in problem-solving across two and three dimensions.

Students will be able to...

- Apply the Pythagorean Theorem to compute distances in right triangles (including 3D prism diagonals).
- Justify the theorem using area-based reasoning or algebraic manipulation.
- Classify and approximate irrational numbers (e.g., $\sqrt{10}$, $\sqrt{2}$, $\sqrt[3]{30}$) on the number line.
- Approximate irrational results in context and compare their magnitudes relative to rational benchmarks.

Key Vocabulary: Pythagorean Theorem, hypotenuse, leg, square root, cube root, irrational number, rational number, approximate, square of a number, proof, coordinate distance, prism diagonal.

Assessment Evidence

Performance Tasks:
TCC2: Evaluate data gathered from multiple perspectives and draw conclusions.
TCC4: I can apply my learning to new experiences, determine if it works and adjust in the future.

Summative Assessment

- Calculate area given the side lengths of squares in different units (inches, units, cm).
- Determine the side length of a square when given the area in various units.
- Classify numbers as rational or irrational.
- Identify two whole numbers between which a square root falls
- Write the Pythagorean Theorem correctly.
- Use the Pythagorean Theorem to find missing side lengths in right triangles
- Apply the Pythagorean Theorem in a real-world context

Other Evidence:
Various Thinking Tasks using Building Thinking Classrooms instructional strategies.
Exit Tickets analyzing student learning and reflections
Check Point Assessments

Learning Plan

Lessons	Activities	Standards	Vision Attributes
Square Area vs. Side Length	Explore area decomposition of tilted squares; introduce $\sqrt{n}$	8.NS.A.2	TCC2, DE4, CCE3
Number Line Placement of Roots	Sequence $\sqrt{n}$ and $\sqrt[3]{n}$ using bounds; plot on number line	8.NS.A.2	TCC2, DE4, CCE3
Pythagorean Proofs	Conduct two Pythagorean Theorem proofs (algebraic and	8.G.B.6	DE4, CCE3

	geometric)		
Applying the Theorem	Solve right triangle and coordinate distance problems	8.G.B.6	DE4, CCE3
Cube Roots & 3D Diagonals	Relate cube roots to volumes; explore 3D prism diagonals	8.NS.A.2, 8.G.B.6	TCC2, DE4, CCE3, P3
Decimal Representations & Irrationality	Explore decimal representations and irrational numbers (e.g., √2)	8.NS.A.2	DE4, CCE3, P3
Culminating – Real-World Problems	Apply Pythagorean and irrational approximations in real-world contexts	All	TCC2, DE4, CCE3, P3

Teacher Resources:

- Illustrative Mathematics Unit 8 Teacher Guide with lesson narratives & standards
- Family-Friendly Unit Videos on square roots, Pythagorean proofs, and approximations
- Geometric tools: square/rectangle manipulatives, draft paper for area proof activities
- Graph paper & calculators for plotting and distance computations
- IXL
- Formative assessments: exit tickets on plotting roots and approximation justification
- Proof scaffolds: graphic organizers for algebraic and geometric theorem proofs

Unit 6 - Introduction to Statistics

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **S.ID.A.1** Represent data with plots on the real number line (dot plots, histograms, and box plots).
- **S.ID.A.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
- **S.ID.A.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- **S.ID.B.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
- **S.ID.B.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
    - **S.ID.B.6.A Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear,** quadratic, and exponential models.
    - **S.ID.B.6.C** Fit a linear function for a scatter plot that suggests a linear association.
- **S.ID.C.7** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- **S.ID.C.8** Compute (using technology) and interpret the correlation coefficient of a linear fit.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC3: I can combine new information with my own ideas to generate solutions
- DE3: I can identify my emotions and manage reactions using appropriate strategies and seek support when needed.

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- TI4(6-8): I can identify my strengths and areas for growth, set goals toward improvement, and seek support as needed.

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Understandings: Students will understand that...

- Data can be represented in multiple graphical ways to reveal trends and insights.
- Measures of center and spread can be used to summarize quantitative data.
- The context of data matters when interpreting statistical findings.
- Bivariate data can be analyzed using scatterplots and equations of the line of best fit.

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Essential Questions:

- How can data be represented and interpreted to make real-wold decisions?
- What can measures of center and spread tell us about a data set?
- How do outliers and distribution shape influence interpretation of data?
- How can the equation of a trend line be used to make predictions about bivariate data?

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Students will know...

- Data involving one quantitative variable can be displayed and analyzed using dot plots, histograms, and box plots.
- Mean and median are used to describe and compare the center of a distribution; interquartile range (IQR) and standard deviation are used to describe and compare the spread of a distribution.
- Data involving two categorical variables can be displayed and analyzed using two way tables.
- Data involving two quantitative variables can be displayed and analyzed using scatterplots.

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Students will be able to...

- Create and analyze dot plots.
- Create and analyze histograms.
- Calculate the mean, median, mode, range, and IQR.
- Use technology to calculate the five-number summary and the standard deviation.
- Interpret the standard deviation and compare the standard deviation between two data sets.
- Create and analyze box plots.
- Interpret the skewness of data.
- Use a two-way table to describe categorical data
- Create a scatterplot to display quantitative data
- Describe a scatterplot in terms of direction and strength
- Sketch a line of best fit for a scatterplot
- Use technology to calculate the equation of the line of best fit and to calculate the correlation coefficient
- Use the equation of the line of best fit to make predictions about the data set

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Key Vocabulary: Box Plot, Dot Plot, Histogram, Interquartile Range, Mean, Median, Mode, Outlier, Range, Skewed Left, Skewed Right, Skewness, Standard Deviation, Two way table, Scatterplot, Direction, Strength, Correlation

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Assessment Evidence	
Performance Tasks: TCC3, DE3, TI4 End of Unit Assessment ● Determining percentages from a given range of values. ● Calculating and interpreting the interquartile range (IQR). ● Finding and explaining the meaning of the median. ● Explaining when and why the mean can or cannot be determined from a box plot ● Comparing standard deviations between two data sets based on spread. ● Comparing standard deviations between groups and explaining reasoning without calculations. ● Identifying when mean and median are equal from a graph. ● Determining which data set has a greater standard deviation without computation. ● Finding the mode(s) from a graph. ● Predicting how adding an extreme value would affect the mean. ● Recognizing shapes of distributions (e.g., skewed, symmetric, bimodal, uniform, bell-shaped). ● Using a scientific calculator to compute mean, standard deviation, and the 5-number summary. ● Creating a box plot from given data. ● Explaining how removing an outlier affects the mean and standard deviation	**Other Evidence:** Various Thinking Tasks using Building Thinking Classrooms instructional strategies. Exit Tickets analyzing student learning and reflections Check Point Assessments
Learning Plan	

This unit is designed to have students learn how to summarize data, both graphically and through statistics.

- Students study one variable quantitative data. Students create and analyze dot plots, histograms, and boxplots. They discuss the shape of these graphs, focusing on symmetry and skewness.
- Students use one variable statistics to summarize data. They calculate mean, median, mode, range, the 5 number summary, and the interquartile range (IQR) by hand, before learning how to calculate these using technology (graphing calculator and desmos calculator). Students use technology to calculate the standard deviation.
- Students look at two variable categorical data, which is summarized in two way tables. They create tables based on data, and they describe the data by calculating relative frequencies.
- Students study two variable quantitative data by creating and describing scatterplots. They use technology (graphing calculator and desmos calculator) to determine the equation of the line of best fit and to calculate the correlation coefficient. They interpret the slope and y-intercept of the trend line and use the trend line to make predictions about the data.

Lesson Focus	Learning Activities	CCSS Standards	VoL Attributes
Getting to Know You; Data Representations (1–2)	Introduce statistical vs. non-statistical questions; represent data with dot plots, histograms, box plots; calculate five-number summary; interpret displays.	Builds on 6.SP.B.4; Addresses HSS-ID.A.1; Builds toward HSS-ID.A.2	TCC3, DE3
A Gallery of Data; Distribution Shapes (3–5)	Create and analyze data displays; describe distribution shapes using correct terminology.	Addresses HSS-ID.A.1, HSS-ID.A.2; Builds toward HSS-ID.A.3	TCC3
Describing Distributions with Numbers (6)	Calculate measures of center (mean, median) and variability (range, IQR, MAD) from data sets; connect numerical measures to data displays.	HSS-ID.A.1, HSS-ID.A.2	TCC3
The Mean as a Balance Point (7)	Use dot plots to visualize mean as balance point; explore how data changes affect mean.	HSS-ID.A.2	TCC3
The Median as a Middle (8)	Identify median from data sets and graphs; explore resistance to extreme values; compare to mean.	HSS-ID.A.2	TCC3

Choosing a Summary Statistic (9)	Decide whether mean or median is more appropriate based on distribution shape and context.	HSS-ID.A.2, HSS-ID.A.3	TCC3, DE3
The Effect of Extremes (10)	Examine how extreme values affect mean and median; use dot plots to investigate distribution shape and measures of center.	HSS-ID.A.1, HSS-ID.A.2, HSS-ID.A.3	TCC3
Comparing & Contrasting Data Distributions (11)	Compare variability using measures like MAD and IQR; connect terminology, data displays, measures of center and variability.	HSS-ID.A.1, HSS-ID.A.2, HSS-ID.A.3	TCC3, DE3, TI4
Measuring Variability with MAD (12)	Calculate Mean Absolute Deviation; interpret its meaning; compare to IQR.	HSS-ID.A.2, HSS-ID.A.3	TCC3
Measuring Variability with IQR (13)	Calculate Interquartile Range; compare to MAD in representing spread.	HSS-ID.A.2, HSS-ID.A.3	TCC3
Variability and Outliers (14)	Determine outliers using IQR; discuss effects on measures of center and spread.	HSS-ID.A.2, HSS-ID.A.3	TCC3, DE3
Summarizing Data Distributions (15)	Synthesize understanding of center, variability, and shape to describe data distributions comprehensively.	HSS-ID.A.1, HSS-ID.A.2, HSS-ID.A.3	TCC3

Teacher Resources: Algebra 1 Textbooks; IM Algebra 1 Unit 1: One-Variable Statistics; IM Algebra 1 Unit 3: Two-Variable Statistics; State of CT Algebra 1 Model Curriculum Unit 5; Desmos; TI Smartview Software; Teacher created in-class notes, activities, and problem sets; Desmos; Khan academy; IXL; Socrative; Blooket; Quizizz; Kahoot

Unit 7 - Exponents and Scientific Notation

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

8.EE.A.1: Know and apply the properties of integer exponents to generate equivalent expressions (product, power of a power, quotient, zero, negative exponents)

8.EE.A.2: Use scientific notation to express very large or very small numbers and perform operations with numbers written in scientific notation.

8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

DE4: I can be respectful and responsible and build positive relationships with all members of the school community.

P3: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

CCE3: I can participate in collaborative conversations by actively listening, formulating questions ,making connected comments and providing various types of feedback to my peers.

Understandings: Students will understand that…	**Essential Questions:**
Exponent rules (e.g. $x^a \bullet x^b = x^{a+b}$; $(x^a)^b = x^{a \bullet b}$; $x^0 = 1$; $x^{-1} = 1/x^1$ allow systematic manipulation of exponential expressions. Negative and zero exponents naturally extend exponent concepts to include division and reciprocal relationships. Scientific notation is a compact form using powers of ten that makes it easier to work with very large/small numbers, both conceptually and computationally.	How do exponent rules help us simplify expressions and solve problems? Why do negative and zero exponents make sense in terms of repeated multiplication/division? When and why is scientific notation useful for representing extremely large or small numbers?
Students will know…	**Students will be able to...**
Definitions of exponents (integer), exponent rules (product, power of a power, quotient, zero, negative), and scientific notation. When and how to apply exponent rules to rewrite expressions. How scientific notation expresses magnitude and supports calculations with large/small numbers.	Apply exponent properties to simplify and rewrite expressions. Interpret and simplify expressions with zero and negative exponents. Convert numbers into and from scientific notation. Multiply and divide in scientific notation; estimate using order of magnitude.
Key Vocabulary: Exponent, base, product rule, power of a power, quotient rule, zero exponent, negative exponent, scientific notation, order of magnitude, coefficient.	
Assessment Evidence	

Performance Tasks: **P3**: I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey. **CCE3**: I can participate in collaborative conversations by actively listening, formulating questions ,making connected comments and providing various types of feedback to my peers. Summative Assessment ● Evaluate numeric expressions with positive and negative exponents ● Demonstrate understanding of exponent meaning (e.g., 3^3, 5^{-3}) ● Simplify expressions using properties of exponents:, Product of powers, Power of a power, Negative exponents ● Writing as a single expression with a positive exponent only ● Convert standard form numbers (very large and very small) into scientific notation ● Apply correct format (significant figure × $10^{exponent}$) ● Convert from scientific notation into standard decimal form ● Demonstrate understanding of powers of 10 and decimal placement	**Other Evidence:** Various Thinking Tasks using Building Thinking Classrooms instructional strategies. Exit Tickets analyzing student learning and reflections Check Point Assessments

Learning Plan

Lesson(s)	Learning Activities	Standards	Vision Traits
Exponent Review	Review whole-number exponents; connect repeated division to negative exponents	8.EE.A.1	DE4, CCE3
Exponent Rules	Explore product, power-of-power, quotient rules through tables & pattern reasoning	8.EE.A.1	DE4, P3, CCE3

Zero & Negative Exponents	Reason through division patterns to understand x^0 and x^{-n}; apply to rational bases	8.EE.A.1	DE4, CCE3
Powers of Ten	Multiply/divide large powers of ten; understand orders of magnitude	8.EE.A.1	DE4, P3, CCE3
Scientific Notation Intro	Convert numbers to/from scientific notation; place on number lines	8.EE.A.2	DE4, CCE3
Operations in Sci. Notation	Practice multiplying/dividing scientific notation with estimation challenges	8.EE.A.2, 8.EE.A.3 , 8.EE.A.4	DE4, P3, CCE3

Teacher Resources:

Illustrative Mathematics Unit 7 Teacher Guide (lesson narratives and pedagogy)

Family-facing video summaries introducing exponent rules and scientific notation Student tools: calculators, exponent rule charts, scientific notation reference sheets

IXL
Formative tools: exit tickets on exponent simplification, mini-quizzes on notation conversion
Visual aids: exponent laws posters and order-of-magnitude number line visuals

Unit 8 - Exponential Functions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **8.EE.A.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, 3^2 times 3^(-5) = 3^(-3) = 1/3^3 = 1/27.*
- **N.RN.A.1** Explain how the definition of the meaning of a rational exponent follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define 5^(1/3) to be the cube root of 5 because we want [5^(1/3)]^3 = 5^[(1/3) x 3] to hold, so [5^(1/3)]^3 must equal 5.*
- **N.RN.A.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- **F.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities,** and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* (For this unit, we will be discussing finding the asymptote and y-intercept).*
- **F.IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.**
- **F.IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand and in simple cases using technology for more complicated cases.*
    - **F.IF.C.7.E Graph exponential** and logarithmic **functions, showing intercepts** and end behavior, and trigonometric functions, showing period, midline, and amplitude.
- **F.IF.C.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
    - **F.I.C.8.B** Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as y = (1.02)^t, y = (0.97)^t, y = (1.01)^(12t), y = (1.2)^(t/10), and classify them as representing exponential growth and decay.*
- **F.IF.C.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*

- **F.BF.A.1** Write a function that describes a relationship between two quantities.*
- **F.LE.A.1** Distinguish between situations that can be modeled with linear functions and with exponential functions.
    - **F.LE.A.1.A** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
    - **F.LE.A.1.B** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
    - **F.LE.A.1.C** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **F.LE.A.2 Construct** linear and **exponential functions,** including arithmetic and **given graph, a description of a relationship, or two input-output pairs (including reading these from a table).**
- **F.LE.A.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantitative increase linearly, quadratically, or (more generally) as a polynomial function.
- **F.LE.B.5** Interpret the parameters in a linear or exponential function in terms of a context.
- **A.REI.D.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- **A.CED.A.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- **S.ID.B.6.A** Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- **TCC3(6-8)**: I can combine new information with my own ideas to generate solutions.
- **TI3(6-8)**: I can compose specific questions that are relevant to a task to support my learning
- **CCE4(6-8)**: I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

Understandings: Students will understand that...	**Essential Questions:**
● Exponential functions represent relationships involving a	● How are exponential properties related to observed patterns?

constant multiplicative rate of change. ● Exponential functions represent relationships involving rapid growth or decay and can model real-world situations involving finance, medicine, and populations. ● Exponential and linear models both involve a constant rate of change. Exponential models are a multiplicative rate of change while linear models are an additive rate of change.	● What are the characteristics of exponential growth and decay and how is this reflected in real-world phenomena? ● How can you differentiate between an exponential model and a linear model?
Students will know... ● The properties of exponents are specific rules derived from observed patterns in mathematics. These include the product, quotient, and power rules, as well as the zero exponent and negative exponent rules. ● Rational exponents allow you to convert expressions to simplify. ● Radical expressions can be simplified by removing any perfect-square factors. ● Exponential functions change by a constant factor. ● Simple and compound interest is an exponential growth model. ● Depreciation and half-life are exponential decay models. ● Interest can compound in different time intervals. ● The graphs of exponential functions include a horizontal asymptote.	**Students will be able to...** ● Simplify expressions using properties of exponents, including integer and rational exponents. ● Convert between radicals and rational exponents to simplify expressions. ● Simplify radical expressions. ● Distinguish between exponential and linear models given graphs, tables, and equations. ● Determine the growth/decay rate of an exponential model from tables, graphs, equations, or application problems. ● Represent exponential functions graphically or as equations, including situations involving growth, decay, and compound interest. ● Model exponential equations from situations involving growth and decay, such as student loan interest or half-life. ● Use technology to model and evaluate exponential relations to solve problems. ● Graph exponential functions; identify the y-intercept and asymptote.
Key Vocabulary: Appreciation, Base, Compound Interest, Cube Root, Decay, Decay Factor, Depreciation, Exponent, Exponential Function, Growth, Growth Factor, Initial Value, Integer Exponents, Negative Exponent, Power, Power Rule, Product Rule, Quotient Rule, Radical, Rational Exponent, Square Root	
Assessment Evidence	
Performance Tasks: TCC3(6-8), TI3(6-8), & CCE4(6-8)	**Other Evidence:**

Exponentials Assessment ● Ability to recall and write the general equation for exponential growth and identify what each variable represents. ● Ability to recall and write the general equation for exponential decay and identify what each variable represents. ● Determining whether a scenario represents exponential growth or decay and explaining the reasoning. ● Identifying the initial value from a real-world context. ● Identifying the growth or decay rate from a real-world context. ● Determining the growth or decay factor from the given rate. ● Writing an equation to model a real-world exponential growth or decay situation. ● Using the model to calculate the value after a specified number of years.	

Learning Plan

In this unit, students will explore the properties of exponents and exponential functions, including their applications to everyday life. Students will distinguish between linear functions and exponential functions. This is also the first function in which students are exposed to the idea of an asymptote, a line that the graph approaches, and functions with range restrictions.

- Students will investigate the properties of exponents and simplify expressions using the properties of exponents.
- Students will extend the properties of exponents to rational exponents and convert between rational exponents and radical expressions.
- Students will compare linear and exponential models.
- Students will construct exponential functions to model growth and decay using simple and compound interest. This will include examples of tax, loans, car value, and population modeling.
- Students will graph exponential functions including their key features of the horizontal asymptote, y-intercept, and 1-2 other points.

Lesson Focus	Learning Activities	CCSS Standards	VoL Attributes
Lesson 1: Introducing Exponential Growth	Explore contexts that exhibit multiplicative change; compare linear and exponential growth using tables and graphs.	HSF-LE.A.1, HSF-LE.A.2	TCC3, CCE4
Lesson 2: Representing Exponential	Write equations to represent	HSF-LE.A.2, HSF-LE.B.5	TI3, CCE4

Growth with Equations	exponential growth situations; interpret parameters in context.		
Lesson 3: Connecting Equations and Graphs of Exponential Functions	Graph exponential functions from equations; identify initial value and growth factor.	HSF-LE.A.2, HSF-IF.C.7e	TCC3, TI3
Lesson 4: Interpreting Parameters of Exponential Functions	Interpret the meaning of parameters in exponential equations in real-world contexts.	HSF-LE.B.5, HSF-IF.B.4	CCE4
Lesson 5: Introducing Exponential Decay	Model situations with exponential decay; distinguish between growth and decay contexts.	HSF-LE.A.1, HSF-LE.A.2	CCE4, TCC3
Lesson 6: Comparing Linear and Exponential Models	Compare outputs of linear and exponential models; discuss differences in long-term behavior.	HSF-LE.A.1, HSF-LE.A.3	TCC3, TI3
Lesson 7: Graphing Exponential Decay Functions	Graph exponential decay functions; connect features of the graph to the equation.	HSF-LE.A.2, HSF-IF.C.7e	TCC3, CCE4
Lesson 8: The Role of the Base in Exponential Functions	Explore how different base values affect the shape and steepness of exponential graphs.	HSF-LE.A.2, HSF-IF.C.7e	CCE4, TCC3, TI3
Lesson 9: Transformations of Exponential Functions	Apply vertical and horizontal shifts, reflections, and stretches to exponential graphs.	HSF-BF.B.3, HSF-IF.C.7e	TCC3
Lesson 10: Interpreting Exponential Models	Interpret and compare exponential models given in different forms (graphical, tabular, equation).	HSF-LE.A.2, HSF-LE.B.5	TCC3, TI3
Lesson 11: Continuous Growth and Decay	Explore continuously compounding growth and decay models; interpret the constant rate.	HSF-LE.A.1, HSF-LE.A.4	TCC3, TI4, CCE4
Lesson 12: Choosing Linear,	Analyze situations and choose the	HSF-LE.A.1, HSF-LE.A.3	TCC3, TI4, CCE4

Quadratic, or Exponential Models	best-fitting model type; justify reasoning.		
Lesson 13: Review of Exponential Functions	Review major concepts of the unit through problem-solving and discussion.	HSF-LE.A.1, HSF-LE.A.2, HSF-LE.A.4, HSF-LE.B.5	CCE4, TCC3, TI3
Unit Assessment	Assess understanding of exponential and logarithmic functions and their applications.	HSF-LE.A.1, HSF-LE.A.2, HSF-LE.A.4, HSF-LE.B.5	CCE4, TCC3, TI3

Teacher Resources: Algebra 1 Textbooks; IM Algebra 1 Unit 5: Introduction to Exponential Functions; State of CT Algebra 1 Model Curriculum Unit 7; Desmos; TI Smartview Software; Teacher created in-class notes, activities, and problem sets

Unit 9 - Operations with Polynomial Expressions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **A.SSE.A.1** Interpret expressions that represent a quantity in terms of its context.*
  - **A.SSE.A.1.A** Interpret parts of an expression, such as terms, factors, and coefficients.
- **A.SSE.A.2** Use the structure of an expression to identify ways to rewrite it. For example, see x^4 – y^4 as (x^2)^2 – (y^2)^2, thus recognizing it as a difference of squares that can be factored as (x^2 – y^2)(x^2 + y^2).
- **A.SSE.B.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*
  - **A.SSE.B.3.A** Factor a quadratic expression to reveal the zeros of the function it defines.
  - **A.SSE.B.3.B** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- **A.APR.A.1** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- **A.APR.B.3** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- **F.IF.C.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
  - **F.IF.C.8.A** Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- **TCC2(6-8):** I can evaluate data gathered from multiple perspectives and draw conclusions
- **CCE4(6-8):** I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.
- **DE1 (6-8)**: I can search for multiple perspectives and compare and contrast those perspectives

Understandings: Students will understand that...	**Essential Questions:**
• Polynomial expressions can be simplified and factored using different strategies. • Operations on polynomials follow similar rules to operations on integers. • Factoring allows us to identify important features such as zeros of a function.	• How can polynomials be classified and simplified? • What is the difference between a constant, linear, quadratic, and cubic polynomial? • How do operations on polynomials reflect operations on numbers? • How can you verify two algebraic expressions that appear to be different are equivalent? • How do you determine which strategy to use when factoring polynomial expressions?
Students will know... • Polynomials are classified by the degree and number of terms (Monomial, Binomial, Trinomial, Polynomial, Constant, Linear, Quadratic, Cubic, Quartic, Quintic). • Distribution is an extension of the properties of exponents and multiplication. • Like terms mean the same variable and the same degree. • Standard form is the highest degree term to the lowest degree. • Factoring is the inverse of a product. • The mathematical rules for adding, subtracting, and multiplying polynomials. • Various methods of factoring including GCF, grouping, difference of squares, and trinomials.	**Students will be able to…** • Classify a polynomial by its degree and number of terms. • Simplify/Perform the operations of adding, subtracting, and multiplying on polynomial expressions. • Write a polynomial expression in standard form. • Factor the GCF from a polynomial expression. • Factor trinomials, binomials (difference of squares), and polynomials with 4 terms (grouping). • Recognize that the sum of two squares cannot be factored under the real numbers.

Key Vocabulary: polynomial, degree, term, monomial, binomial, trinomial, constant, linear, quadratic, cubic, quartic, quintic, factor, GCF (greatest common factor), grouping, distributive property, like terms, factor completely, perfect square trinomials, standard form

Assessment Evidence

Performance Tasks:

Summative Assessment: Test Unit 7 TCC2(6-8); CCE4(6-8) Topics will include:

- Classifying polynomial expressions
- Simplify polynomial expressions and rewrite in standard form
- Multiply polynomial expressions
- Factor polynomial expressions including GCF, difference of two squares, a=1, and a>1 (if time permits).

Other Evidence:

Common Formative/Interim Assessments:

- Vocabulary, adding and subtracting polynomials
- Multiplying polynomials
- Factoring the GCF
- Factoring trinomials when a=1,
- Factoring a difference of squares
- Factoring polynomial expressions by grouping

Learning Plan

This unit begins with students developing an understanding of what it means to be a polynomial. Examples and non-examples are compared to arrive at a definition. Students will classify polynomials by their degree and number of terms. Students learn to add, subtract, and multiply polynomials. Students learn how to factor the greatest common factor from a polynomial, and how to factor a trinomial into two binomials.Students learn to factor binomials when they are a difference of squares. Finally, students will use factoring by grouping to factor polynomials with 4 terms.

Lesson Focus	Learning Activities	CCSS Standards	VoL Attributes
Lesson 1: Introducing Polynomial Expressions	Explore addition, subtraction, and multiplication of polynomial expressions in context.	HSA-APR.A.1, HSA-SSE.A.1	TCC2, CCE4,
Lesson 2: Structure of Polynomial Expressions	Interpret structure of polynomials and identify terms, degree, and leading coefficients.	HSA-SSE.A.1, HSA-SSE.A.2	CCE4
Lesson 3: Adding and Subtracting Polynomials	Combine like terms and simplify polynomial expressions; interpret results in context.	HSA-APR.A.1	TCC2, CCE4, DE1
Lesson 4: Multiplying Polynomials	Multiply binomials and larger polynomials; connect to area models	HSA-APR.A.1	TCC2, CCE4, DE1

	and algebraic representations.		
Lesson 5: Special Products of Polynomials	Recognize and apply patterns such as (a+b)^2, (a-b)^2, and (a+b)(a-b).	HSA-APR.A.1, HSA-SSE.A.2	TCC2
Lesson 6: Factoring Quadratic Expressions	Factor quadratic expressions to reveal zeros of the function.	HSA-SSE.B.2, HSA-SSE.B.3a	TCC2, CCE4
Lesson 7: Factoring Special Polynomial Forms	Factor special products such as difference of squares, perfect square trinomials, and sum/difference of cubes.	HSA-SSE.B.2, HSA-SSE.B.3a	TCC2, CCE4, DE1
Unit Assessment	Assess understanding of polynomial expressions, functions, and applications.	HSA-APR.A.1, HSA-APR.B.2, HSA-APR.B.3, HSF-IF.C.7c	TCC2, CCE4

Teacher Resources: Algebra 1 Textbooks; IM Algebra 2 Unit 2: Polynomials and Rational Functions (lessons 1-4); State of CT Algebra 1 Model Curriculum Unit 8; Teacher created worksheets and assessments; Desmos; Khan academy; IXL; Socrative; Blooket; Quizizz; Kahoot

Unit 10 - Introduction to Quadratic Functions

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Common Core State Standards (* indicates a modeling standard. For standards that encompass several different topics/concepts, the bolded part is the focus for this unit. If no bolding, the entire standard pertains to this unit.)

- **A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.** *Include equations arising from linear and* ***quadratic functions****, and simple rational and exponential functions.*
- **A.CED.A.2** Create equations that describe numbers or relationships. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- **A.REI.A.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- **A.REI.B.4** Solve quadratic equations in one variable.
    - **A.REI.B.4.B** Solve quadratic equations by inspection (e.g., for x^2 = 49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.
- **F.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.** ***Key features include: intercepts;*** *intervals where the function is increasing, decreasing, positive, or negative;* ***relative maximums and minimums; symmetries; end behavior****; and periodicity.**
- **F.IF.B.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
- **F.IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
    - **F.IF.C.7.A** Graph linear and quadratic functions and show intercepts, maxima, and minima.*
- **F.IF.C.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
- **F.BF.A.1** Write a function that describes a relationship between two quantities.*
- **F.BF.B.3** Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. *An exploratory introduction*

if time permits. This is not assessed in Algebra 1, it will be taught and assessed in Algebra 2.

- **S.ID.B.6.A** Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
- **N.Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.*
- **N.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling.*
- **N.Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.*

Standards for Mathematical Practice

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics.
- MP5: Use appropriate tools strategically.
- MP6: Attend to precision.
- MP7: Look for and make use of structure.
- MP8: Look for and express regularity in repeated reasoning.

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- **TCC3(6-8):** I can combine new information with my own ideas to generate solutions.
- **AA1(6-8)**: I can implement different pathways to success and recognize the pros and cons of each
- **P1 (6-8)**: I can build a personal tool-box to identify my personal strengths and challenges and develop strategies to practice overcoming any obstacles.

Understandings: Students will understand that...

- Quadratic functions model situations involving parabolic patterns.
- The features of a parabola can be interpreted to make predictions and draw conclusions.
- If the product of two quantities equals zero, at least one of the quantities equals zero.
- There are a variety of methods to solve a quadratic equation and often one method will be more efficient than the others.

Essential Questions:

- Why is it useful to write a polynomial in factored form?
- How do you determine the most efficient method to solve a quadratic?
- How do quadratic functions model real world phenomena?
- What do the vertex and intercepts tell us about the function?

Students will know...

- Quadratic functions can be represented graphically,

Students will be able to...

- Solve quadratic equations using square roots, factoring, and the

algebraically, or numerically. • The best method for solving a quadratic equation depends on the original format of the equation. • Quadratic functions have an axis of symmetry through the vertex. • The y-value of the vertex is the maximum or minimum of the quadratic function. • The x-intercepts of the graph are the solutions of the equation. • Previous knowledge (for example, area is length x width, revenue is product x price, etc.) can be represented by/applied to quadratic equations/functions.	quadratic formula. • Defend/justify the most efficient approach to solving a quadratic equation. • Graph quadratic functions in standard form. • Connect the solutions of the equations with the x-intercepts of the function and connect the vertex with the maximum or minimum value. • Use quadratic reasoning (for example, area is length x width, revenue is product x price, maximum = vertex, etc.) to solve problems.
Key Vocabulary: Quadratic function, axis of symmetry, maximum, minimum, x-intercept, y-intercept, roots, solutions, zeros, standard form, intercept form, quadratic formula, vertical motion model, zero product property	
Assessment Evidence	
Performance Tasks: TCC3, AA1 **Summative Assessment: Test Unit 8 TCC3(9-12); AA1(9-12)** • Solve quadratic equations using most efficient method • Graph parabolas and identify key features • Write a quadratic function to model projectile motion and other real world phenomena	**Other Evidence:** Common Formative/Interim Assessments: • Solving by square roots • Solving by factoring • Solving by quadratic formula • Graphing parabolas and identifying key features
Learning Plan	
This unit continues the introduction to quadratics that students had in the polynomial unit. • Students learn how to calculate the vertex of a parabola and use that to create a complete graph of a quadratic. • Students identify the vertex, axis of symmetry, x-intercepts, y-intercept, domain, and range of a parabola. • Students learn to calculate the values of the x-intercepts by solving the quadratic equation using square roots, factoring, and the quadratic formula. • Students investigate the most efficient method for solving a quadratic equation. • Students write quadratic equations to model real world situations, such as projectile motion or area.	

Lesson Focus	Learning Activities	CCSS Standards	VoL Attributes
Lesson 1: Introducing Quadratic Functions	Explore contexts leading to quadratic relationships; distinguish between linear, exponential, and quadratic patterns.	HSF-IF.C.8a, HSF-IF.C.9	TCC3, AA1, P1
Lesson 2: Graphing Quadratic Functions	Plot quadratic functions from tables and equations; identify vertex and axis of symmetry.	HSF-IF.C.7a, HSF-IF.C.8a	TCC3, P1
Lesson 3: Interpreting Features of Quadratic Graphs	Describe maximum/minimum values, intercepts, and symmetry in context.	HSF-IF.B.4, HSF-IF.C.8a	TCC3, AA1,
Lesson 4: Comparing Quadratic and Linear Functions	Compare growth rates and graph shapes of quadratic and linear functions in similar contexts.	HSF-IF.C.9	TCC3, AA1,
Lesson 5: The Effect of 'a' in $y = ax^2$	Investigate how varying 'a' changes the width and direction of a parabola.	HSF-BF.B.3, HSF-IF.C.8a	TCC3,
Lesson 6: The Effect of 'h' in $y = a(x-h)^2$	Explore horizontal translations using vertex form; connect transformations to graph shifts.	HSF-BF.B.3, HSF-IF.C.8a	TCC3, AA1
Lesson 7: The Effect of 'k' in $y = a(x-h)^2 + k$	Analyze vertical shifts of parabolas; describe changes in vertex location.	HSF-BF.B.3, HSF-IF.C.8a	TCC3, AA1
Lesson 8: Combining Transformations	Apply multiple transformations (vertical stretch, horizontal shift, vertical shift) to quadratics.	HSF-BF.B.3, HSF-IF.C.8a	TCC3, AA1, P1
Lesson 9: Standard Form of Quadratic Functions	Expand vertex form to standard form; identify key features from standard form equations.	HSF-IF.C.8a, HSF-IF.C.8b	TCC3
Lesson 10: Factoring Quadratic Expressions	Factor trinomials to find roots; connect factoring to x-intercepts of the graph.	HSA-SSE.B.3b, HSA-APR.B.3	TCC3

Lesson 11: Solving Quadratic Equations by Factoring	Solve quadratic equations set equal to zero using factoring; interpret solutions in context.	HSA-REI.B.4b	TCC3, AA1, P1
Lesson 12: Completing the Square	Rewrite quadratic expressions by completing the square; connect to vertex form.	HSA-SSE.B.2, HSA-SSE.B.3b, HSA-REI.B.4a	TCC3, AA1, P1
Lesson 13: Solving Quadratic Equations by Completing the Square	Apply completing the square to solve equations; interpret results in context.	HSA-REI.B.4a	TCC3, P1
Lesson 14: The Quadratic Formula	Derive and apply the quadratic formula; interpret solutions including irrational and complex roots.	HSA-REI.B.4b	TCC3, AA1, P1
Lesson 15: Choosing a Solving Method (if time permits)	Compare factoring, completing the square, and the quadratic formula; choose an efficient method.	HSA-REI.B.4a, HSA-REI.B.4b	TCC3, AA1, P1
Lesson 16: Applications of Quadratic Functions (if time permits)	Model real-world situations with quadratic functions; interpret vertex and intercepts.	HSF-IF.B.4, HSF-IF.C.8a, HSF-IF.C.8b	TCC3, AA1, P1
Unit Assessment	Assess understanding of quadratic functions, equations, and applications.	HSF-IF.B.4, HSF-IF.C.7a, HSF-IF.C.8a, HSF-IF.C.8b, HSF-IF.C.9	

Teacher Resources: State of CT Algebra 1 Model Curriculum Unit 8; Algebra 1 Textbooks; Teacher created worksheets and assessments; Desmos; Khan academy; IXL; Socrative; Blooket; Quizizz; Kahoot

NUTRITION CURRICULUM



Grade Level(s): 6

Curriculum Author(s): Mike Hadoulis

Course Description: Nutrition is an introductory, exploratory, trimester-long course that focuses on skill and concepts for the beginner in culinary arts. Areas of focus include food and kitchen safety, the five major food groups, hydroponics, healthy cooking, and diet analysis. This is a hybrid course with a theoretical and practical approach to the fields of nutrition and culinary arts. Students will have the opportunity to work in the kitchen lab while learning to safely prepare nutritious foods with a variety of kitchen equipment and tools. This course sets the foundation for students looking to take dedicated cooking classes in seventh and eighth grade.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Safety and Sanitation While Preparing Nutritious Foods	How do I work safely with food and equipment in the kitchen lab?	There are a variety of components in a kitchen that can create hazardous and unsafe situations. Recognizing and identifying these components is essential in ensuring safe preparation and consumption of food.	TI1(6-8) ; TI3(6-8); AA2(6-8); AA3(6-8)
Basic Food Groups	What are the major food groups and how do they impact my diet and health?	The five major food groups and Myplate guide provide a foundation of understanding of how foods are classified, quantities required in a healthy diet, and benefits and detriments they provide to the human body.	TI2(6-8); TI3(6-8); TCC2(6-8); TCC3(6-8)
Using the Food Groups to Create a Healthy Diet	How do I use MyPlate to create a healthy and balanced diet?	When planning a healthy diet, in addition to food selections and quantities, it is important to consider factors such as age, gender, physical activity, and pre-existing conditions.	TCC2(6-8); TCC4(6-8); TI3(6-8); AA3(6-8)
Essential Vitamins and Minerals	What are vitamins and minerals and what do they do for my body?	The human body requires a wide array of vitamins and minerals to perform optimally.	TCC2(6-8); TI3(6-8); CCE2(6-8)
Preparing Healthy Foods	How do I prepare recipes that are nutritionally beneficial?	Following a recipe, utilizing healthy ingredients, and choosing healthy cooking methods are all essential factors in preparing nutritionally beneficial foods.	TCC3(6-8); TCC4(6-8); AA2(6-8); AA3(6-8); AA4(6-8)
Analyzing Food Choices to Determine Healthy and Unhealthy Qualities	How do I use my knowledge of food to determine healthy and unhealthy choices in everyday life?	In a fast-paced society with frequent time constraints, choosing healthy options can be difficult with so many prepared and processed foods.	TCC2(6-8); TI3(6-8); CCE4(6-8)
Hydroponics and Vertical Garden Operation and Maintenance	How can I use a hydroponics garden to grow herbs and vegetables?	Hydroponics is a method of growing food that uses water as the primary media and food source.	TI1(6-8); TI2(6-8); TI3(6-8); P2(6-8)

Unit 1 - Safety and Sanitation While Preparing Nutritious Foods

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **FCS.NFP.E.11** – Food Safety: Determine conditions and practices that promote safe food handling, production, and consumption
- **FCS.NFP.E.12** – Identify characteristics of foodborne pathogens and prevention methods
- **FCS.NFP.H.21** – Demonstrate techniques that prevent cross contamination
- **FCS.NFP.G.16** – Demonstrate procedures applied to safety issues

Vision of A Learner Attributes:

TI1(6-8) I can create a plan with manageable steps to reach my goals.
TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
AA2(6-8) I can identify past successful strategies and apply them independently.
AA3(6-8) I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that...

- Cross Contamination is a primary source of foodborne illness
- Knowledge and practice of safe kitchen practices significantly reduces the risk of sustaining a cooking-related injury
- Each sink in a commercial kitchen has an exclusive function and purpose
- Foods need to be stored in certain locations based potentially hazardous characteristics
- There are countless utensils in a kitchen designed for generic and highly specific uses

Essential Questions:

- Why is safety and sanitation important in a kitchen?
- What makes a kitchen safe?
- What equipment are we using in our kitchen and how do we safely use it?
- What do we really need to know before we begin to cook?

Students will know…

- What cross contamination is, and how it is caused
- Common kitchen safety practices
- The components and functions of a 3-bay sink
- Common safe food storage practices

Students will be able to…

- Identify and explain what cross contamination is, and how to prevent it.
- Identify unsafe behaviors and the potential hazards they create.

• General smallwares identification and explanation of uses	• Practice using kitchen equipment and utensils as required. • Differentiate between hand, dish, and vegetable sinks, and explain their exclusivity. • Classify and explain proper storage of various foods.
Key Vocabulary: Cross contamination, hazards, hand-washing, dish sink, hand sink, vegetable sink, cleaning, sanitizing, foodborne illness, kitchen utensils	
Assessment Evidence	
Performance Tasks: • Kitchen CSI activity • Seven Safety Errors activity • Kitchen Safety Scenarios • Kitchen Labs	**Other Evidence:** • Kitchen maintenance activities (Cleaning and managing refrigerators, rotating stock, maintaining facilities and equipment)
Learning Plan	
Classroom discussion- Think/Pair/Share- Students turn and talk with a partner to identify and discuss prior knowledge about kitchen and food safety. TI3(6-8) Kitchen CSI activity- Kitchen is taped off and filled with potential food and kitchen safety hazards. Students must identify as many hazards of possible. Teacher walkthrough and discussion to follow. AA2(6-8), Seven Safety Errors Activity- Written passage describing a food preparation scenario. Students read passage and identify seven hazards, the type of each hazard, and future remedies. (Individual or Partner) AA2(6-8) Five Kitchen Safety Scenarios: 5 written scenarios explaining potentially dangerous kitchen situations. Students must read and solve each scenario. AA2(6-8) Food Safety and Sanitation: Demonstrate food safety and sanitation procedures during hands-on kitchen labs. TI1(6-8), AA3(6-8)	

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 2 - Basic Food Groups

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **FCS.NFP.C.4** – Describe the effect of nutrients on health, appearance, and performance
- **FCS.NFP.D.10** – Utilize USDA dietary guidelines to select foods that promote a healthy lifestyle
- **FCS.NFP.B.2** – Analyze factors influencing nutrition practices

Vision of A Learner Attributes:

- TI2(6-8) I can identify my objectives and apply the best resources to my learning.
- TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
- TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
- TCC3(6-8): I can combine new information with my own ideas to generate solutions.

Understandings: Students will understand that…	**Essential Questions:**
• There are five major food groups in which most foods are classified. • Each group offers a specific set of nutritional benefits and/or detriments. • Serving sizes from each group are dictated by MyPlate. • Recommended diets are suggested based on age, gender, physical activity, and the presence/absence of pre-existing conditions	What are the major food groups? What foods make up each group? Do foods in the same group offer similar nutritional benefits? What are the nutritional benefits of each group? How many servings do I need from each group daily? How will it affect me if I don't eat recommended daily servings from each group?
Students will know…	**Students will be able to…**
• Each of the five major food groups • Foods that make up each of the five major food groups • Nutritional benefits from each of the five major food groups • Recommended daily servings for each major food group • Factors that influence diets, such as age, gender, and pre-existing conditions	• Identify 5 major food groups • Classify foods in the 5 major food groups • Explain nutritional benefits from each group • Identify daily serving recommendations from each food group.

Key Vocabulary: MyPlate, Fruits, Vegetables, Grains, Proteins, Dairy, recommended servings, age, gender, pre-existing conditions

Assessment Evidence

Performance Tasks:

Summative:

- Food group slides presentation
- Daily Food Log
- MyPlate Crossword Puzzle

Other Evidence:

Formative:

- Class discussions
- Menu analysis

Learning Plan

Classroom discussion- What are the five major food groups? Which foods belong to which group? How do these food impact nutrition? TCC2(6-8)

Food Groups Slideshow- Group or Individual Project. Students research and create a slides presentation about each of the five food groups, the foods found in each, nutritional benefits from each group, and recommended dail servings from each group.TCC2(6-8)

Daily Food Log- Students will record their food choices for one week. Upon completion, students will complete an analysis to determine if recommended daily servings were met, as well as identifying strengths and deficiencies within their own diet. TI2(6-8), TI3(6-8)

MyPlate Crossword Puzzle- Reviews all terms and concepts learned to date. TCC3(6-8)

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 3 - Using the Food Groups to Create a Healthy Diet

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **FCS.NFP.B.2** – Explain the impact of social, cultural, and economic factors on food choices
- **FCS.NFP.C.7** – Evaluate sources of nutrition information
- **FCS.NFP.A.1** – Analyze ways individuals manage resources related to food

Vision of A Learner Attributes:

- TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
- TCC4(6-8) I can apply my learning to new experiences, determine if it works, and adjust in the future.
- TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
- AA3(6-8) I can accept my mistakes in social and academic settings while learning to grow from them.

Understandings: Students will understand that...

- Diet can impact physical and emotional health
- A balanced diet is key in ensuring proper bodily functions
- Availability of processed and fast foods can pose as significant obstacles in trying to eat healthy
- Cooking methods, as well as food choices, can impact the quality of a diet.
- MyPlate is a great resource for determining correct quantities of a healthy diet
- Each food group provides essential nutritional benefits that our bodies require.

Essential Questions:

What does a healthy diet consist of?
How can I tell if my diet is healthy?
What are the benefits of a healthy diet?
How can I make healthy choices when I have limited options?
What obstacles will I face in trying to eat a healthy diet?
Is it more expensive to eat healthy than unhealthy?
What tools can I use to analyze food choices for nutritional value?
Does a healthy diet change as my age changes?
How can I eat healthy if only fast food options are available?

Students will know…

- Impacts of diet on physical and emotional health
- Components of a healthy and balanced diet

Students will be able to…

- Explain what a healthy diet looks like
- Identify benefits of consuming a healthy diet

• Risks associated with consumption of processed foods • Basic cooking methods and their impact on nutrition • General benefits and detriments associated with specific foods	• Create a healthy diet • Analyze food choices to make good decisions • Explain how age impacts dietary choices • Determine and analyze the cost of healthy and unhealthy food choices. • Create healthy alternative food choices • Modify diets based on food-based lifestyles
Key Vocabulary: Diet, Atkins, Keto, Mediterranean Diet, calories, calorie counting, exercise, natural foods, processed foods	
Assessment Evidence	
Performance Tasks: Summative: • Individual diet project • Celebrity/Athlete Diet Analysis	**Other Evidence:** Formative: • Classroom discussion
Learning Plan	
Classroom discussion- Diets- purpose, construction, applications TI3(6-8) Individual Diet Project: Students will create an individual diet based on Daily Food Log reflection from prior unit. (Individual) TCC2(6-8), TCC4(6-8), AA3(6-8) Celebrity/Athlete Diet Analysis: Students will choose a celebrity or athlete known to follow a specific diet, research the diet, and then use information learned in class to explain and assess the benefits and detriments of that diet. (Individual or Group) TCC2(6-8)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 4 - Essential Vitamins and Minerals

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- Define vitamins and minerals
- Explain benefits of consuming a diet rich in vitamins and minerals
- Create a diet plan rich in vitamins and minerals
- Identify symptoms of vitamin and mineral deficiencies

Vision of A Learner Attributes:

TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
CCE2(6-8): I can use rubrics, peer editing, conferences, and other feedback to revise my work and increase my learning.

Understandings: Students will understand that...

- Vitamins and Minerals play an essential role in healthy eating and bodily functions
- Vitamin deficiencies can have a significant impact on our overall health
- Natural foods are usually our best source of vitamins and minerals
- It is possible to overdose on vitamins

Essential Questions:

- What is a vitamin?
- What is a mineral?
- Where are vitamins found?
- Where are minerals found?
- What are the benefits of minerals and vitamins?
- How can I ensure that I am getting all of the vitamins and minerals that I need daily?
- What are the symptoms of a vitamin deficiency
- What foods are rich in vitamins and minerals?
- Can I overdose on vitamins?

Students will know…

Common vitamins and minerals and the role they play in our diets
Impacts of vitamin deficiencies
Common sources of vitamins and minerals

Students will be able to...

- Define vitamins and minerals
- Explain benefits of consuming a diet rich in vitamins and minerals

Vitamin overdose causes	• Create a diet plan rich in vitamins and minerals • Identify symptoms of vitamin and mineral deficiencies
Key Vocabulary: Vitamins, minerals, vitamins A,B,C,D,E,K, potassium, fiber, cholesterol, calcium, fats, protein, sodium, antioxidants, carbohydrates	
Assessment Evidence	
Performance Tasks: Summative: • Vitamins and Minerals Posters • Vitamins and Minerals Gallery Walk and Graphic Organizers	**Other Evidence:** Formative: • Classroom discussions
Learning Plan	
Classroom discussion: Intro to Vitamins and Minerals- the roles they play and where they are found TI3(6-8) Vitamins and Minerals Posters (Partners or Individual) Each person/group chooses one of ten different vitamins or minerals and creates a research poster. Upon completion, a poster for all ten vitamins and minerals will be completed. TCC2(6-8) Vitamins and Minerals Gallery Walk and Graphic Organizers: Students will provide feedback for each poster via gallery walk, and will complete a graphic organizer utilizing every other groups' poster (to learn about the other nine vitamins and minerals that they did not research) CCE2(6-8)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 5 - Preparing Healthy Foods

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **FCS.NFP.D.8** – Demonstrate ability to select, store, prepare, and serve nutritious foods
- **FCS.NFP.K.28** – Demonstrate cooking methods
- **FCS.NFP.G.17** – Demonstrate safe handling of tools and equipment

Vision of A Learner Attributes:

TCC3(6-8) I can combine new information with my own ideas to generate solutions.
TCC4(6-8) I can apply my learning to new experiences, determine if it works, and adjust in the future.
AA2(6-8) I can identify past successful strategies and apply them independently.
AA3(6-8) I can accept my mistakes in social and academic settings while learning to grow from them.
AA4(6-8) I can seek opportunities to learn more and continue to push my thinking.

Understandings: Students will understand that...

- Healthy cooking begins with high-quality, natural ingredients
- There are many unhealthy recipes that can use substituted ingredients to improve healthiness.
- Choice of cooking method can significantly impact nutritional benefits of foods
- There are vast resources available to locate recipes and techniques that utilize healthy foods.

Essential Questions:

- How will I know if a recipe is healthy?
- Where is the best place to find resources for healthy cooking?
- How can I make recipes that I like and are good for me?
- Are there ways to substitute healthy ingredients for unhealthy ingredients?
- How can I make healthy recipes taste good?
- Do I need to incorporate foods from each food group in order for it to be healthy?
- Are some cooking methods healthier than others?

Students will know…

- The characteristics and importance of high-quality, natural ingredients
- Possible healthy ingredient replacements for less healthy

Students will be able to…

- Identify healthy ingredients
- Identify healthy recipes
- Analyze food choices for health benefits

options • Cooking methods that help preserve nutritional values of foods • How to locate and utilize resources when cooking healthy foods	• Work safely with ingredients • Identify healthy substitutes for unhealthy ingredients • Explain loss of nutrients during cooking process • Identify healthy and unhealthy cooking methods
Key Vocabulary: Safety, mise en place, recipe, yield, converting a recipe, healthy substitutes, cooking methods, loss of nutrients	
Assessment Evidence	
Performance Tasks: Summative: • Pesto kitchen lab • Pasta Salad kitchen lab • Apple Muffins kitchen lab • Refrigerator Dill Pickles kitchen lab • Strawberry Shortcake kitchen lab	**Other Evidence:** Formative: • Classroom discussions • Hands-on kitchen projects
Learning Plan	
Classroom discussions- Healthy foods, healthy recipes, and healthy ingredient substitutes AA4(6-8) Teacher demonstrations- recipe demonstrations with integrated content and questions take place prior to all kitchen lab projects AA4(6-8) Kitchen Lab projects: TCC3(6-8), TCC4(6-8), AA2(6-8), AA3(6-8) • Pesto kitchen lab • Pasta Salad kitchen lab • Apple Muffins kitchen lab • Refrigerator Dill Pickles kitchen lab • Strawberry Shortcake kitchen lab	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 6 - Analyzing Food Choices to Determine Healthy and Unhealthy Qualities

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **FCS.NFP.B.2** – Analyze factors influencing nutrition practices
- **FCS.NFP.C.6** – Describe impact of diet trends, addictions, and disorders
- **FCS.NFP.A.1** – Analyze resource management in food decisions

Vision of A Learner Attributes:

TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
CCE4(6-8): I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

Understandings: Students will understand that...

- The availability of prepared and processed foods poses a challenge to healthy eating.
- Fast food restaurants and chain restaurants are typically not providers of many healthy food choices.
- Simple modifications to food orders can help improve their nutritional value.
- Food labels and nutrition calculators are valuable tools in helping us to make informed decisions.

Essential Questions:

- What resources are available to me as I try to make healthy choices?
- What are some of the restaurants and foodservice establishments that are more likely to have unhealthy options?
- How can I plan ahead to ensure I will have multiple food choice options?
- What are some things that I can do to create healthy alternatives to available food choices?

Students will know...

- Processed foods, despite potential risks, are appealing due to factors such as convenience and affordability
- Fast food restaurants typically offer unhealthy menu choices
- How to locate and utilize nutrition calculators
- How to use food nutrition labels to make informed choices

Students will be able to…

- Identify healthy and unhealthy components of food choices
- Utilize posted nutrition labels
- Locate and operate fast food website nutrition calculator
- Create healthy alternatives to available food choices

Key Vocabulary: Fast food, processed foods, nutrition calculator, nutrition labels, calories, daily allowance

Assessment Evidence

Performance Tasks:

Summative:

- School lunch graphic organizer
- School lunch assessment
- Fast food assessment
- Healthiest vs unhealthiest fast food assignment

Other Evidence:

Formative:

- Classroom discussion
- Utilizing nutrition calculators
- Reading food nutrition labels

Learning Plan

Classroom discussion- Think/Pair/Share- Students turn and talk to discuss and assess current school lunch offerings. Whole-class share-out and discussion TI3(6-8)

School lunch graphic organizer- Students use a current school lunch menu to analyze and highlight healthy and unhealthy choices TCC2(6-8)

School lunch assessment- Students complete a written response that generally assesses their findings from the school lunch graphic organizer TCC2(6-8)

Fast food assessment- Students utilize nutrition calculators to rate common fast food restaurants' healthiness or unhealthiness CCE4(6-8)

Healthiest vs unhealthiest fast food assignment - Students research offerings from several fast food establishments and complete an analysis to determine the healthiest and unhealthiest restaurants. TCC2(6-8)

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 7 - Hydroponics and Vertical Garden Operation and Maintenance

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- **FCS.NFP.A.1** – Analyze resource management in food decisions
- **FCS.NFP.A.1** – Analyze ways individuals manage resources related to food
- **FCS.NFP.D.8** – Food preparation
- **MS-LS2-3:** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Vision of A Learner Attributes:

TI1(6-8): I can create a plan with manageable steps to reach my goals.
TI2(6-8) I can identify my objectives and apply the best resources to my learning.
TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
P2(6-8): I can identify my relative strengths as well as areas for improvement. I can set goals, use strategies for improvement, and monitor my own learning through various means of self-assessment in order to experience growth

Understandings: Students will understand that...

- Hydroponics utilizes water as it primary growing media
- The vertical garden uses a water pump and gravity feed system to distribute water and nutrients to all levels of the garden.
- Plants require multiple supplements to maintain health in a hydroponics system.
- Plants can be trimmed and picked in a manner that allows them to continue to grow.

Essential Questions:

- What is hydroponics?
- How does the vertical garden work?
- If there is no soil, what do the plants grow in?
- How do I plant the seeds?
- How do I keep the plants healthy?
- How do I maintain the garden?
- How do I harvest the plants?

Students will know…

- The purpose and function of a hydroponics garden
- How to feed plants in the hydroponics garden
- How to fill and maintain the hydroponics garden

Students will be able to…

- Identify hydroponics
- Explain operation of the vertical garden
- Practice planting seeds

• How to plant seeds in the hydroponics garden • When and how to harvest plants in the hydroponics garden • How to cook utilizing plants grown and harvested from the vertical garden	• Identify growing media options • Explain procedure for maintaining the vertical garden • Explain how to maintain plant health • Identify procedure for harvesting mature plants
Key Vocabulary: Hydroponics, rockwool, nutrients, seeds, germinate, growing media, pruning, harvesting	
Assessment Evidence	
Performance Tasks: Summative: • Planting, maintaining, and harvesting of vertical garden- ongoing	**Other Evidence:** Formative: • Classroom discussion • Teacher demonstration • Vertical garden maintenance
Learning Plan	
Teacher demonstration of hydroponics, planting seeds, and garden setup TI3(6-8) Students plant seeds in media pods and transfer to main garden trays immediately following germination TI2(6-8) Ongoing feeding and maintenance throughout trimester P2(6-8), TI1(6-8) Main harvest after plants reach full-growth TI1(6-8) Kitchen Labs utilizing harvested plants: TI2(6-8), TI3(6-8) Penne with Pesto Kitchen Lab Refrigerator Dill Pickles Kitchen Lab Penne with Basil, Tomatoes, and Garlic Oil Kitchen Lab	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

“WHAT’S COOKING?” (COOKING I) CURRICULUM



Grade Level(s): 7

Curriculum Author(s): Mike Hadoulis

Course Description:

Cooking I is the first of two dedicated cooking classes at the middle school level. The course is available to 7th grade students and serves as an introduction to food safety and general cooking principles. Areas of focus include safe food handling, measurements and conversions, utensil and equipment identification, principles of the bakeshop, modifying box-mix recipes, and characteristics of cuisines. Students will have the opportunity to work in the kitchen lab weekly, collaborating with peer groups to prepare a variety of recipes. This course serves as a prerequisite for Cooking II, the cooking class available to 8th grade students.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Food Safety	Why is food safety such an integral and important part of food preparation?	Food safety is paramount in ensuring that food is handled safely and free of pathogens and parasites before it is consumed.	TI1(6-8); TI2(6-8); P2(6-8); P3(6-8); TCC4(6-8)
Equipment Identification	How does a working knowledge of kitchen equipment impact my ability to work effectively in a kitchen?	In a kitchen, there is a tool for everything. Understanding the function and purpose of each tool will help us to prepare food successfully and efficiently.	TCC1(6-8); TI2(6-8); TI3(6-8)
Reading and Following a Recipe	What information can I expect a recipe to provide?	A written recipe provides all of the essential information needed to successfully prepare and cook food.	TI1(6-8); TI3(6-8); P1(6-8); P4(6-8); TCC3(6-8)
Principles of the Bakeshop	How can knowledge of various bakeshop methods affect the quality of recipes I prepare?	Accurate measurements and following the sequential steps of a recipe are critical in the preparation of bakeshop recipes.	P4(6-8); AA4(6-8); CCE1(6-8); CCE3(6-8); TCC4(6-8)
Measurements and Equivalents	Why is it important to know common kitchen measurements and equivalents?	Correct measurements are crucial in any food preparation. Understanding proportions and equivalents helps cooks to work efficiently, convert recipes, and correct mistakes during measurements.	TCC2(6-8); TI2(6-8); TI3(6-8); TI4(6-8)
Principles of Cuisines	What is a cuisine and why do they vary from region to region?	Cuisines are defined as cooking styles, methods, and/or foods that are characteristic of a particular country, region, culture, or religion, and are influenced by factors such as geography, climate, conquest,	DE1(6-8); DE2(6-8); AA3(6-8); AA4(6-8)

		religion, culture, and indigenous influences	
Modifying Box-mix Recipes	How can I modify a box-mix recipe to create a time-saving and cost-effective meal?	Modifying Box-mix recipes can provide an inexpensive and time-saving alternative to scratch cooking, and can often be accomplished with on-hand ingredients.	TCC2(6-8); TCC3(6-8); AA1(6-8); AA2(6-8); CCE4(6-8)
Breakfast Cookery	What are common principles to consider when preparing breakfast foods?	Nutrition and balanced selections are important considerations when planning and preparing breakfast foods.	P4(6-8); AA4(6-8); CCE1(6-8); CCE3(6-8); TCC4(6-8)

Unit 1 - Food Safety and Sanitation

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.E.11 – Safe food handling practices
- FCS.NFP.E.12 – Foodborne illness prevention
- FCS.NFP.H.21 – Prevent cross contamination

- FCS.NFP.G.17 – Safe handling of tools and equipment

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- TI1(6-8) I can create a plan with manageable steps to reach my goals.
- TI2(6-8) I can identify my objectives and apply the best resources to my learning.
- P2(6-8) I can identify my relative strengths as well as areas for improvement. I can set goals, use strategies for improvement, and monitor my own learning through various means of self-assessment in order to experience growth.
- P3(6-8) I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
- TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.

Understandings: Students will understand that…

- Safe food handling is an essential component of food preparation.
- Cross-contamination is the transfer of harmful bacteria from potentially hazardous foods to ready-to-eat foods and/or other surfaces.
- Rotating stock is essential is managing a perishable inventory
- FATTOM are the variables that impact food viability
- Thoroughly cooking foods significantly lowers the risk of contracting foodborne illness

Essential Questions:

- Why is safety and sanitation important in a kitchen?
- What makes a kitchen safe?
- What equipment are we using in our kitchen and how do we safely use it?
- What do we really need to know before we begin to cook?

Students will know...	Students will be able to…
• Basic food safety principles • Causes and prevention of foodborne illness • Potentially Hazardous Foods • HACCP (Hazard Analysis Critical Control Points) • Temperature Danger Zone	• Handle potentially hazardous foods safely • Practice Clean/Separate/Cook/Chill • Explain and prevent foodborne illnesses • Manage a perishable inventory • Apply food safety principles to real-world cooking applications

Key Vocabulary: Hand washing, Potentially Hazardous Foods, Ready to Eat Foods, Temperature Danger Zone, First-in, First Out, Cross-Contamination, Pathogens, Clean/Separate/Cook/Chill

Assessment Evidence

Performance Tasks:	Other Evidence:
• Food and Kitchen Safety Slideshow • 5 Food Safety Scenarios • Safe Food Handler Quiz/Certification	• Jamie Oliver Video “What Not to do in the Kitchen”

Learning Plan

Classroom discussion- Food safety, foodborne illness, cross contamination, hand washing TI2(6-8)

What Not to do in the Kitchen Video- Students try to identify as many food safety mistakes as possible. Discussion and narrated re-watch to follow. TCC4(6-8)

Food and Kitchen Safety Slideshow TI1(6-8), TI2(6-8)

5 Food Safety Scenarios Activity TCC4(6-8)

Safe Food Handler Study Guide and Quiz P2(6-8), P3(6-8)

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 2 - Equipment Identification and Operation

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.A.1 – Resource management
- FCS.NFP.G.17 – Safe handling of tools and equipment

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

TCC1(6-8): I can ask relevant questions to evaluate possible solutions.
TI2(6-8): I can identify my objectives and apply the best resources to my learning.
TI3(6-8): I can compose specific questions that are relevant to a task to support my learning.

Understandings: Students will understand that…	**Essential Questions:**
Each tool in the kitchen has a purpose and function Safety is paramount when using kitchen utensils and equipment Correct operation of kitchen equipment ensures proper cooking	What are smallwares? What are utensils? What is considered equipment? What do I need to know before using kitchen equipment?
Students will know… • The identification of various kitchen tools, utensils, and equipment • How to choose utensils and smallwares for each cooking task • The purpose and function of each utensil and smallware • How to safely operate all kitchen equipment	**Students will be able to…** • Identify the majority of tools and utensils in the kitchen • Safely operate all kitchen equipment • Utilize a variety of tools to prepare recipes

Key Vocabulary: Utensils, Smallwares, Equipment, Stoves, Food Processors, Blenders, Kitchen Aid Mixers, Refrigerators, Freezers, Hand Sinks, Dish Sinks, Vegetable Sinks

Assessment Evidence	
Performance Tasks: ● Kitchen Utensil ID Charts ● Kitchen Labs	**Other Evidence:** ● Classroom discussion ● Teacher demonstrations

Learning Plan
Classroom discussion/Teacher demonstrations- various tool ID, uses, and applications TI2(6-8), TI3(6-8) Kitchen Utensil ID Charts- Students identify names and uses of most common kitchen utensils and equipment TI3(6-8) Kitchen Labs- practice correctly using kitchen utensils and equipment- matching tools/equipment to needs in the kitchen TCC1(6-8)
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 3 - Reading and Following a Recipe

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.D.8-Demonstrate professional skills in the safe handling, cleaning, and maintenance of knives, tools, and culinary equipment.
- FCS.NFP.K.28- Demonstrate professional food preparation methods and advanced techniques for commercial food production.
- FCS.NFP.H.21-Apply principles of nutrition, dietary guidelines (such as MyPlate), and customer dietary restrictions to plan, modify, and analyze menus.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- TI1(6-8) I can create a plan with manageable steps to reach my goals.
- TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
- P1(6-8) I can build a personal tool-box to identify my personal strengths and challenges and develop strategies to practice overcoming any obstacles.
- P4(6-8) I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.
- TCC3(6-8): I can combine new information with my own ideas to generate solutions.

Understandings: Students will understand that…

- A recipe contains all of the essential information necessary to successfully prepare food.
- Sequence can significantly impact the possible outcome of a recipe.
- A recipe must be read in its entirety prior to beginning
- Food preparation is not limited to the directions portion of a recipe

Essential Questions:

- What can I expect to find in a recipe?
- What are the components of a recipe?
- What information should a recipe contain?
- How important is it that I follow the recipe?

Students will know…	**Students will be able to…**
• Components of a recipe • Information they can expect to find on a recipe • Where to look on a recipe to determine mise en place preparation • How to convert a recipe to adjust yield • The importance of sequence when following a recipe	• Read a recipe • Utilize a recipe to prepare mise en place • Follow a recipe to prepare various foods • Convert a recipe to adjust yield
Key Vocabulary: Ingredients, Directions, Yield, Equipment List, Preparation Time, Total Time, Mise en Place	
Assessment Evidence	
Performance Tasks: • Reading and Following a Recipe Activity • Kitchen Labs	**Other Evidence:** • Classroom discussions • Teacher demonstrations
Learning Plan	
Classroom discussion- What is in a recipe? (Turn and Talk) TI3(6-8) Teacher demonstrations (Preceding Kitchen Lab Projects) TI3(6-8) Reading and Following a Recipe Activity- Identify recipe components and answer questions based off of a recipe. TCC3(6-8) Kitchen Labs- Weekly kitchen labs will allow students practice to read and follow recipes. P1(6-8), P4(6-8)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 4 - Principles of the Bakeshop

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.K.28 – Cooking methods
- FCS.NFP.D.8 – Food preparation
- FCS.NFP.G.17 – Safe handling of tools and equipment

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- P4(6-8) I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.
- AA4(6-8) I can seek opportunities to learn more and continue to push my thinking.
- CCE1(6-8) I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
- CCE3(6-8) I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.
- TCC4(6-8) I can apply my learning to new experiences, determine if it works, and adjust in the future.

Understandings: Students will understand that…

- Science plays a large role in the bakeshop
- Following the recipe is paramount in ensuring quality results in the bakeshop
- Leavening is responsible for food rising
- Concise measurements must be taken when preparing a recipe in the bakeshop

Essential Questions:

- What are common ingredients of the bakeshop?
- What do I need to know to be a successful baker?
- What is a leavening agent?
- What is the difference between chemical leavening agents and organic leavening agents?
- What is a quickbread?
- How does science impact recipes of the bakeshop?

Students will know…

- Common bakeshop ingredients
- Creaming Method

Students will be able to…

- Identify common ingredients of the bakeshop
- Prepare various styles of muffins

• Leavening Agents • Biscuit Method • Quick Breads • Yeast Breads	• Prepare a quick bread • Prepare a yeast bread • Execute the creaming method • Execute the biscuit method • Knead a dough
Key Vocabulary: Biscuit method, creaming method, leavening, chemical leavening agents, organic leavening agents, cutting in, kneading, proofing, punching down, yeast, sourdough	
Assessment Evidence	
Performance Tasks: • Kitchen Labs	**Other Evidence:** • Classroom discussions • Teacher demonstrations
Learning Plan	
Classroom discussions- terms, principles, vocabulary AA4(6-8), CCE1(6-8), CCE3(6-8) Teacher demonstrations (Preceding weekly kitchen lab projects) AA4(6-8), CCE1(6-8), CCE3(6-8) Demonstration videos- in Google Classroom Kitchen Labs P4(6-8), TCC4(6-8)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 5 - Measurements, Conversions, and Equivalents

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.K.28 – Cooking methods & measurement
- FCS.NFP.A.1 – Resource management

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
- TI2(6-8) I can identify my objectives and apply the best resources to my learning.
- TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
- TI4(6-8) I can identify my strengths and areas for growth, set goals toward improvement, and seek support as needed.

Understandings: Students will understand that…

- There are dry and liquid measurements
- There are numerous equivalents in the standard domestic measurements system.
- Equivalents can help ease the conversion of a recipe to modify yield
- Equivalents can be useful if an incorrect measurement is made
- Accurate measurements are paramount in successful recipe execution

Essential Questions:

- What are equivalents?
- What are some common equivalents in the standard domestic measurements system?
- How can knowing equivalents benefit me in the kitchen?
- How do I measure food properly?

Students will know…

- Common standard measuring units
- How to convert a recipe to modify yield
- Common standard measurement equivalent
- The difference between standard and metric measurements

Students will be able to…

- Problem-solve mismeasured recipes utilizing equivalent ratios
- Measure dry and liquid ingredients accurately
- Convert a recipe to modify yield
- Differentiate between standard and metric units

Key Vocabulary: Standard, Metric, Cup, Pint, Quart, Gallon, Tablespoon, Teaspoon, Equivalents, Conversions, Dry Measuring Cups, Liquid Measuring Cups, Weight, Volume, Yield

Assessment Evidence

Performance Tasks:

- Kitchen Labs
- Converting Recipes
- Equivalents Worksheets

Other Evidence:

- Classroom discussions
- Teacher demonstrations

Learning Plan

Classroom discussions- terms, basic equivalents, conversion applications TI3(6-8)

Converting recipes- prior to cooking- reducing or increasing. Discussing ratios and proportionality TCC2(6-8)

Equivalents worksheets- practice with numerous kitchen equivalents TCC2(6-8)

Kitchen Labs- apply mathematical principles to hands-on applications TI2(6-8), TI4(6-8)

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 6 - Principles of Cuisines

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.B.2 – Cultural influences on food
- FCS.NFP.D.8 – Food preparation
- FCS.NFP.A.1 – Resource management

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- DE1(6-8) I can search for multiple perspectives and compare and contrast those perspectives.
- DE2(6-8) I can recognize feelings in myself and others and respond with respect and empathy.
- AA3(6-8) I can accept my mistakes in social and academic settings while learning to grow from them.
- AA4(6-8) I can seek opportunities to learn more and continue to push my thinking.

Understandings: Students will understand that…

- Cuisines are defined as cooking styles, methods, and/or foods that are characteristic of a particular country, region, culture, or religion.
- Cuisines are impacted by factors such as geography, climate, conquest, religion, culture, and indigenous influences
- Cuisines are impacted by availability of fresh foods, meats, and shellfish.
- Knowledge of food availability and sources can guide informed decisions regarding individual food choices
- Knowledge of world and regional cuisines can guide informed consumer choices

Essential Questions:

- What is a cuisine?
- What makes up a cuisine?
- What impacts a cuisine?
- Does knowing about regional cuisine help me to understand complimentary flavors?
- Why do cooking methods vary based on a region’s cuisine?
- How does availability of food impact a region’s cuisine?
- How can knowing about world cuisine guide my choices as a consumer?

Students will know…

- Geography, Culture, Conquest, Settlement, and Climate all

Students will be able to…

- Identify influences on regional cuisines

impact regional cuisine characteristics • Food availability is often contingent on factors such as climate and geography • Cuisine characteristics and factors can guide consumer choices	• Research and report on a cuisine of their choice • Explain how certain factors impact food availability
Key Vocabulary: Cuisines, Cooking Methods, Geography, Culture, Religion, Conquest	
Assessment Evidence	
Performance Tasks: • European Country Cuisine Expo Project • Kitchen Labs	**Other Evidence:** • Classroom discussions • Teacher demonstrations • World Cuisine videos
Learning Plan	
Classroom discussion- Cuisines, characteristics, students share own cultural/ethnic cuisine knowledge DE1(6-8), DE2(6-8) Videos about different world cuisines- discussion to follow DE1(6-8), DE2(6-8), AA4(6-8) European Country Cuisine Expo Project- students research and report on a cuisine of a European Country. DE1(6-8), DE2(6-8), AA4(6-8) Identify: Climate, Cultural, Geographical, Settlement, Conquest influences on the nations cuisine. AA4(6-8) Kitchen Labs- make connections between kitchen lab projects and world/regional cuisines AA3(6-8), AA4(6-8)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 7 - Modifying Box-Mix Recipes

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.J.26 – Modify recipes
- FCS.NFP.C.7 – Evaluate food choices
- FCS.NFP.A.1 – Resource management

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
TCC3(6-8) I can combine new information with my own ideas to generate solutions.
AA1(6-8) I can implement different pathways to success and recognize the pros and cons of each.
AA2(6-8) I can identify past successful strategies and apply them independently.
CCE4(6-8): I can express my thoughts and ideas, both verbally and in writing, in order to defend my perspective. I can do this via essays, performance-based projects, whole group, and/or small group discussions.

Understandings: Students will understand that…

- Box-mix recipes provide an inexpensive and time-saving alternative to scratch cooking
- Many on-hand recipes compliment box-mix recipes
- Trial and error is a key component in the process of testing new recipe ideas
- Quantities and proportions are crucial when modifying a recipe

Essential Questions:

- What are some ways that I can improve a recipe?
- What happens when I change and/or incorporate additional ingredients?
- How do I ensure accuracy while being creative?
- How do I know which ingredients I should use to modify a recipe?

Students will know…

- Flavor and/or nutrition can be improved by modifying box-mix recipes

Students will be able to…

- Modify a box-mix recipe
- Test recipes and reflect on outcomes

• General complimentary flavors and ingredients • Recipe modification requires testing, reflection, and adjustment	• Make adjustments based on outcomes
Key Vocabulary: Seasoning, Herbs, Spices, Complimentary flavors, Proportions, Ratios	
Assessment Evidence	
Performance Tasks: • Box-mix Kitchen Lab • Modified Box-mix Kitchen Lab • Student/Whole-class taste tests • Modified recipes reflection (Written response/analysis)	**Other Evidence:** • Classroom discussions
Learning Plan	
Classroom discussion- difficulties of consistently cooking from scratch, alternatives, box-mixes- how to modify TCC3(6-8) Kitchen Labs TCC2(6-8), TCC3(6-8), AA1(6-8), AA2(6-8) 1. Standard box-mix preparation- provides a baseline for modification consideration TCC2(6-8) 2. Modified box-mix- students use a variety of on-hand ingredients to modify the box-mix recipe- whole class taste tests/feedback to follow TCC3(6-8), AA1(6-8), AA2(6-8) Modified recipes reflection- students create a written response that analyzes other groups' recipes, highlights what went well, and where there is room for improvement. CCE4(6-8):	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 8 - Breakfast Cookery

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.K.28 – Cooking methods
- FCS.NFP.D.8 – Food preparation
- FCS.NFP.G.17 – Safe handling of tools and equipment

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- P4(6-8) I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.
- AA4(6-8) I can seek opportunities to learn more and continue to push my thinking.
- CCE1(6-8) I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
- CCE3(6-8) I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.
- TCC4(6-8) I can apply my learning to new experiences, determine if it works, and adjust in the future.

Understandings: Students will understand that…

- Eggs are a quick and healthy breakfast choice
- Pan prep and temperature control are crucial in egg cookery
- Eggs are sized based on average weight per dozen
- Batters are common in breakfast cookery
- Eggs are considered a potentially hazardous food
- Safe food handling is critical when working with raw eggs

Essential Questions:

- How do factors such as heat level and cooking time change the texture and flavor of an egg?
- Why are accurate measurements so critical when mixing batters for foods like pancakes or muffins?
- How can I safely work with eggs?
- What purpose does a batter serve?

Students will know…

- Safe equipment operation
- Pan and utensil choices

Students will be able to…

- Safely work with eggs
- Prepare Eggs Over Easy

• Safe food handling with a potentially hazardous food • Sizing and components of an egg • Introductory egg preparations • Function of a batter	• Prepare Eggs Sunny Side Up • Prepare an Omelet • Prepare French Toast
Key Vocabulary: Over Easy, Sunny Side Up, batter, potentially hazardous foods, omelet, fritatta	
Assessment Evidence	
Performance Tasks: • Egg Demo Videos and Questions • Cheese Omelet Demo Videos and Questions • Egg Over Easy Kitchen Lab • Egg Sunny Side Up Kitchen Lab • Cheese Omelets Kitchen Lab • French Toast Kitchen Lab • Chocolate Chip Muffins Kitchen Lab	**Other Evidence:** • Classroom discussions • Teacher demonstrations • Instructional videos
Learning Plan	
Classroom discussion- intro to working with eggs AA4(6-8), CCE1(6-8), CCE3(6-8) Egg Demo Videos and Questions (Over Easy and Sunny Side Up) AA4(6-8) Cheese Omelet Demo Videos and Questions AA4(6-8) Kitchen Labs: P4(6-8), AA4(6-8), CCE3(6-8), TCC4(6-8) • Egg Over Easy Kitchen Lab • Egg Sunny Side Up Kitchen Lab • Cheese Omelets Kitchen Lab • French Toast Kitchen Lab • Chocolate Chip Muffins Kitchen Lab	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

“TASTY TREATS” COOKING II CURRICULUM



Grade Level(s):8

Curriculum Author(s): Mike Hadoulis

Course Description:

Cooking II is the second of two dedicated cooking classes at the middle school level, and is only offered to 8th grade students. The course builds upon the skills and concepts that were introduced in the 7th grade Cooking I class. Areas of focus include foodborne illnesses, safe knife handling and knife skills, sauce preparation, cooking methods, protein cookery, seasoning and flavoring, and American Regional Cuisine. Students will have the opportunity to work in the kitchen lab weekly, collaborating with peer groups to prepare a variety of recipes. This course will serve as a preparatory class for any of the multiple classes offered at the high school level.

Year At A Glance			
Unit Title	**Overarching Essential Question**	**Overarching Enduring Understanding**	**Vision of A Learner "I Can" Statements**
Foodborne Illnesses	Why is it important to know the sources and symptoms of foodborne illnesses?	Foodborne illnesses are typically caused by unsafe food-handling practices and can cause a variety of symptoms, ranging from mild to severe.	TI1(6-8); TI2(6-8); P2(6-8); P3(6-8); TCC4(6-8)
Knife Skills	How do various knife cuts play a role in how foods cook and develop flavors?	Accurate and uniform knife cuts ensure even cooking as well as influence the taste and texture of the recipe.	TI1(6-8); TI3(6-8); P1(6-8); P4(6-8)
Introduction to Sauces	How does knowledge of sauce-making enhance foods?	Sauces provide flavor depth as well as texture and moisture to the foods they are served with.	TCC3(6-8); TI1(6-8); TI2(6-8); P2(6-8); P3(6-8)
Cooking Methods	How does each cooking method impact the food being cooked?	Cooking methods play a significant role in determining the final taste and texture of the foods being cooked.	TCC2(6-8); TCC3(6-8); CCE1(6-8); CCE3(6-8)
Protein Cookery	How do dry and moist-heat cooking methods apply to various types and cuts of meat?	Dry-heat methods are best-suited for tender cuts of meat, while moist-heat methods should be used for tougher, less tender cuts of meat.	TCC2(6-8); TCC3(6-8); CCE1(6-8); CCE3(6-8)
Seasoning Foods and Flavor Development	How are seasonings used to effectively develop rich flavors in cooking?	Seasonings play a crucial role in flavor development. Understanding how and when to properly utilize spices, as well as dried and fresh herbs, is important when trying to achieve desired flavors.	TCC2(6-8); TCC3(6-8); AA1(6-8); AA2(6-8)

American Regional Cuisine	What factors influence each region of the cuisine of the United States of America?	American Region Cuisine is influenced by geography, culture, settlement, and climate. Availability of foods and recipe construction are highly specific, depending on these factors.	DE1(6-8); DE2(6-8); AA3(6-8); AA4(6-8)

Unit 1 - Foodborne Illnesses

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.E.11 – Safe food handling
- FCS.NFP.E.12 – Foodborne illness prevention
- FCS.NFP.H.21 – Prevent cross contamination
- FCS.NFP.E.13 – Foodborne illness as a health issue

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TI1(6-8) I can create a plan with manageable steps to reach my goals.
- TI2(6-8) I can identify my objectives and apply the best resources to my learning.
- P2(6-8) I can identify my relative strengths as well as areas for improvement. I can set goals, use strategies for improvement, and monitor my own learning through various means of self-assessment in order to experience growth.
- P3(6-8) I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.
- TCC4(6-8): I can apply my learning to new experiences, determine if it works, and adjust in the future.

Understandings: Students will understand that…

- Foodborne illnesses are largely preventable
- Potentially Hazardous Foods are the most common source of pathogens
- A majority of foodborne illnesses are caused by improper cooking and unsafe food-handling practices

Essential Questions:

- What are common foodborne illnesses?
- What symptoms accompany foodborne illnesses?
- How can I prevent foodborne illnesses?
- Can foodborne illnesses be contracted even if food is handled safely?

Students will know…

- Basic food safety principles
- Causes and prevention of foodborne illness
- Potentially Hazardous Foods

Students will be able to…

- Identify common foodborne illnesses
- Explain common symptoms of foodborne illnesses
- Explain how to prevent foodborne illnesses

• HACCP (Hazard Analysis Critical Control Points) • Temperature Danger Zone	• Identify common sources of foodborne illness
Key Vocabulary: Pathogens, Cross Contamination, Potentially Hazardous Foods, Temperature Danger Zone, FATTOM, HACCP, Time/Temperature Abuse	
Assessment Evidence	
Performance Tasks: • Food Safety Review Questions • Public Health Investigator Infographic	**Other Evidence:** • Classroom discussion • Teacher demonstrations • Instructional videos
Learning Plan	
Classroom discussion- Has anyone ever gotten sick from food? What is a foodborne illness? Types, Causes, etc. TI2(6-8), TCC4(6-8) Food safety review questions- Recaps last year's learning TI2(6-8), TCC4(6-8) Public Health Investigator Infographic- research and report on a foodborne illness- name, symptoms, causes, sources. P3(6-8) Kitchen Labs- Ongoing practical application throughout the trimester P2(6-8), TI1(6-8)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 2 - Knife Skills

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.G.17 – Safe tool use
- FCS.NFP.D.8 – Food preparation

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TI1(6-8) I can create a plan with manageable steps to reach my goals.
- TI3(6-8) I can compose specific questions that are relevant to a task to support my learning.
- P1(6-8) I can build a personal tool-box to identify my personal strengths and challenges and develop strategies to practice overcoming any obstacles.
- P4(6-8) I can step outside my comfort zone because I recognize that my mistakes are not failures, but rather an opportunity to learn and grow.

Understandings: Students will understand that…	**Essential Questions:**
• Uniform knife cuts ensure even and accurate cooking • Knife cuts vary based on application and desired outcome • Knife cuts are essential in flavor release and developement • Different knives have different applications • Safe handling of knives is essential in achieving correct knife cuts	• How do I safely handle a knife? • What are the different types of knives, and what are they used for? • What are the different types of knife cuts, and how do I perform them? • How do specific knife cuts impact the flavor and outcome of a recipe? • Why are uniform knife cuts important?
Students will know...	**Students will be able to…**
• Small, Medium, and Large Dice	• Perform small, medium, and large dice

• Chiffonade • Brunoise • Rough Chop • Mince • Safe knife-handing techniques • The role knife cuts play in a recipe	• Perform chiffonade, brunoise, rough chop and mince • Safely handle various types of knives • Identify different types of knives and their applications • Explain how a knife cut impacts a recipe • Explain why uniform knife cuts are important
Key Vocabulary: Small Dice, Medium Dice, Large Dice, Brunoise, Chiffonade, Rough Chop, Mince, Chef's Knife, Carving Knife, Boning Knife, Paring Knife.	
Assessment Evidence	
Performance Tasks: • Kitchen Labs	**Other Evidence:** • Classroom discussion • Teacher demonstrations • Instructional videos
Learning Plan	
Teacher demonstration- safe knife handling- various cuts- preceding corresponding kitchen labs TI3(6-8) Kitchen Labs- Ongoing practice throughout the trimester TI1(6-8), P1(6-8), P4(6-8) Chicken Noodle Soup- Small dice Creamy Tomato Soup- Medium dice, mince Curry Chicken- Rough Chop Spaghetti Bolognese- Brunoise, Chiffonade	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 3 - Introduction to Sauces

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Comprehensive Standard 8.5

> Demonstrate professional food preparation methods and techniques for all menu categories to produce a variety of food products that meet customer needs.

FCS 8.5.6 Prepare various stocks, soups, and sauces using safe handling and professional preparation techniques.

Vision of A Learner Attributes: Students will be able to independently use their learning to... ("I can" statements to be demonstrated)

- TCC3(6-8): I can combine new information with my own ideas to generate solutions.
- TI1(6-8): I can create a plan with manageable steps to reach my goals.
- TI2(6-8): I can identify my objectives and apply the best resources to my learning.
- P2(6-8): I can identify my relative strengths as well as areas for improvement. I can set goals, use strategies for improvement, and monitor my own learning through various means of self-assessment in order to experience growth.
- P3(6-8): I can receive and provide constructive feedback and understand the need to adjust my goals/learning journey.

Understandings: Students will understand that…

- Sauces provide flavor and moisture to a recipe
- There are five mother sauces
- Small sauces are made from mother sauces
- There are non-traditional sauces that don't use a mother sauce as a base.
- Sauces are thickened with roux, slurry, arrowroot, and starches

Essential Questions:

- What are the five mother sauces?
- What is a small sauce?
- What is a non-traditional sauce?
- How are sauces made?
- How are sauces thickened?

Students will know…

- The five mother sauces are Hollandaise, Veloute, Bechamel, Tomato, and Espagnole

Students will be able to…

- Prepare a Bechamel Sauce
- Utilize a roux to thicken a sauce

• A small sauce is the finished sauce with a mother sauce base • Common thickening agents are roux, slurry, starches, and arrowroot • Sauces add moisture and flavor to recipes	• Prepare a Tomato Sauce • Use a slurry to thicken a fruit sauce
Key Vocabulary: Hollandaise, Veloute, Tomato Sauce, Espagnole, Bechamel, Roux, Arrowroot, Slurry, Small Sauce, Mother Sauce	
Assessment Evidence	
Performance Tasks: • Macaroni and Cheese Kitchen Lab • Pizza Kitchen Lab • Fruit Pies Kitchen Lab • Spaghetti with Bolognese Sauce Kitchen Lab	**Other Evidence:** • Classroom discussion • Teacher demonstrations • Instructional videos
Learning Plan	
Teacher demonstration-Roux, Bechamel Sauce, Tomato Mother Sauce TCC3(6-8), TI2(6-8) Kitchen Labs- Ongoing practice throughout the trimester TI1(6-8), P2(6-8), P3(6-8) Macaroni and Cheese Kitchen Lab (Bechamel Sauce) Pizza Kitchen Lab (Purees Sauce) Fruit Pies Kitchen Lab (Fruit Sauce) Spaghetti with Bolognese Sauce Kitchen Lab (Tomato Mother Sauce)	
Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.	

Unit 4 - Cooking Methods

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.K.28 – Cooking methods
- FCS.NFP.D.9 – Nutrient retention
- FCS.NFP.D.8 – Food preparation

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
- TCC3(6-8) I can combine new information with my own ideas to generate solutions.
- CCE1(6-8) I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
- CCE3(6-8) I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

Understandings: Students will understand that…

- Cooking Methods play a huge role in the taste and texture of the foods being cooked
- There are dry-heat cooking methods
- There are moist-heat cooking methods
- Cooking method selection is based on foods being cooked

Essential Questions:

- What are the different types of cooking methods?
- How do I choose which method to use?
- Does it matter which cooking method I choose?
- What makes a cooking method a dry-heat or moist-heat method?
- How do cooking methods impact the food being cooked?

Students will know…

- Common dry and moist heat cooking methods
- General applications for each cooking method
- How each method impacts the food being cooked

Students will be able to…

- Pan-fry
- Saute
- Boil

	• Bake • Roast

Key Vocabulary: Dry- heat, Moist-heat, Saute, Broil, Grill, Pan-fry, Deep-fry, Bake, Roast, Boil, Steam, Poach, Simmer, Braise, Stew

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Dry Cooking Methods Chart • Moist Cooking Methods Chart • Chicken Noodle Soup • Creamy Tomato Soup • Macaroni and Cheese • Fruit Pies • Curry Chicken • Pizza • Baked French Fries • Cake Decorating Competition • Chicken Parmiagiana • Tacos' • Spaghetti with Bolognese Sauce	• Classroom discussion • Teacher demonstrations • Instructional videos

Learning Plan

Classroom discussions- Dry Cooking Methods, Moist Cooking Methods, Combination Cooking Methods, Applications TCC2(6-8), TCC3(6-8), CCE1(6-8), CCE3(6-8)

Teacher demonstrations- preceding corresponding kitchen cooking labs CCE1(6-8), CCE3(6-8)

Dry Cooking Methods Chart- Research each method and complete chart explaining method and applications TCC2(6-8) , TCC3(6-8)

Moist Cooking Methods Chart- Research each method and complete chart explaining method and applications TCC2(6-8), TCC3(6-8)
Kitchen Labs- Ongoing practice throughout the trimester TCC2(6-8), TCC3(6-8), CCE3(6-8)

Chicken Noodle Soup- Sweating, Simmering, Boiling
Creamy Tomato Soup- Sweating, Simmering
Macaroni and Cheese- Simmering
Fruit Pies- Simmering
Curry Chicken- Sweating, Sauteing, Simmering
Pizza- Baking, Simmering, Sweating
Baked French Fries- Baking
Cake Decorating Competition- Baking
Chicken Parmiagiana- Pan-frying, Broiling
Tacos- Browning, Simmering
Spaghetti with Bolognese Sauce- Sweating, Simmering

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 5 - Protein Cookery

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.K.28 – Cooking methods
- FCS.NFP.D.9 – Nutrient retention
- FCS.NFP.D.8 – Food preparation

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
- TCC3(6-8) I can combine new information with my own ideas to generate solutions.
- CCE1(6-8) I can contribute to discussions with my peers/teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully as I apply new knowledge to my thinking.
- CCE3(6-8) I can participate in collaborative conversations by actively listening, formulating questions, making connected comments and providing various types of feedback to my peers.

Understandings: Students will understand that…

- Thoroughly cooking meats and seafood is essential in preventing foodborne illnesses
- Choice of cooking method will significantly impact flavor and tenderness of meats and seafood
- Dry-heat cooking methods are best-suited for tender, high-quality cuts of meat.
- Moist-heat cooking methods are best-suited for tougher, low-quality cuts of meat.
- Resting is the process of allowing a cooked piece of meat to sit following the cooking process in order to allow all juices to redistribute.

Essential Questions:

- How does cooking meats and seafood impact the potential for contracting a foodborne illness?
- Does the cooking method I choose impact the flavor of the meat or seafood I am cooking?
- Which cooking methods should I use for high-quality cuts of meat?
- Which cooking methods should I use for low-quality cuts of meat?

Students will know…	Students will be able to…
• Basic explanations of the most common cooking methods • Dry-heat methods are used for tender, high-quality cuts of meat • Moist-heat methods are used for tougher, low-quality cuts of meat • Combination cooking methods, such as braising and stewing, use elements of both dry and moist-heat cooking methods. • How to allow a piece of meat to properly rest following the cooking process	• Pan-fry • Saute • Bake • Roast • Finish the cooking process in the over • Use a meat thermometer to determine doneness • Identify correct internal cooking temperatures for different types of proteins

Key Vocabulary: Resting, Safe Internal Cooking Temperatures, Instant-read Thermometer, Combination Cooking Methods, Connective Tissue, Coagulation

Assessment Evidence	
Performance Tasks: • Tacos Kitchen Lab • Chicken Noodle Soup Kitchen Lab • Curry Chicken Kitchen Lab • Chicken Alfredo Kitchen Lab • Spaghetti with Bolognese Sauce Kitchen Lab	**Other Evidence:** • Classroom discussion • Teacher demonstrations • Instructional videos

Learning Plan

Classroom discussion- Good cuts of meat, less-tender cuts. Applying cooking methods. CCE1(6-8), CCE3(6-8)

Teacher demonstrations- prior to all corresponding kitchen labs CCE1(6-8), CCE3(6-8)

Kitchen Labs- Ongoing practice throughout the trimester TCC2(6-8), TCC3(6-8)

- Tacos Kitchen Lab
- Chicken Noodle Soup Kitchen Lab
- Curry Chicken Kitchen Lab
- Chicken Alfredo Kitchen Lab
- Spaghetti with Bolognese Sauce Kitchen Lab

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 6 - Seasoning Foods and Flavor Development

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.K.36 – Food preparation techniques
- FCS.NFP.C.4 – Nutrient and food impact
- FCS.NFP.J.26 – Modify recipes

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- TCC2(6-8) I can evaluate data gathered from multiple perspectives and draw conclusions.
- TCC3(6-8) I can combine new information with my own ideas to generate solutions.
- AA1(6-8) I can implement different pathways to success and recognize the pros and cons of each.
- AA2(6-8) I can identify past successful strategies and apply them independently.

Understandings: Students will understand that…

- Seasoning food is paramount in flavor development
- The most basic fundamental seasonings are salt and pepper
- Dried herbs function differently in a recipe than fresh herbs
- Dried herbs require heat, moisture, and time to be fully effective
- Spice blends and rubs are effective methods to seasoning foods
- Foods should be seasoned in layers

Essential Questions:

- How do I properly season food?
- What does it mean to season food?
- How do I use dried herbs?
- How do I use fresh herbs?
- How do I use spices?
- What does it mean to season in layers?
- What are the most basic seasonings?

Students will know…

- Salt and Pepper are the building blocks of effective seasoning
- Dried herbs require heat, moisture, and time to reach their full flavoring capabilities.
- Fresh herbs are best when added near the end of the cooking process.
- Seasoning in layers ensures that flavor development is maximized

Students will be able to…

- Season various dishes with salt and pepper
- Use both dried and fresh herbs while cooking
- Use spices while preparing a recipe
- Create and prepare a spice blend
- Reduce a liquid to concentrate flavors

• Reduction is the process of simmering a food to evaporate water to concentrate flavors	

Key Vocabulary: Seasoning, Salt, Pepper, Dried Herbs, Fresh Herbs, Spices, Reduction, Layers, Spice Blend

Assessment Evidence

Performance Tasks:	**Other Evidence:**
• Chicken Noodle Soup • Creamy Tomato Soup • Macaroni and Cheese • Curry Chicken • Pizza • Baked French Fries • Chicken Parmiagiana • Tacos' • Spaghetti with Bolognese Sauce	• Classroom discussion • Teacher demonstrations • Instructional videos

Learning Plan

Classroom discussion- Spice blends, brines, rubs, marinades. Basic seasoning- layering TCC2(6-8)

Teacher demonstration- prior to all corresponding kitchen labs TCC2(6-8), TCC3(6-8)

Kitchen Labs- Ongoing, hands-on experience and practice throughout the trimester AA1(6-8) , AA2(6-8), TCC3(6-8)

- Chicken Noodle Soup
- Creamy Tomato Soup
- Macaroni and Cheese
- Curry Chicken
- Pizza
- Baked French Fries
- Chicken Parmiagiana
- Tacos'
- Spaghetti with Bolognese Sauce

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.

Unit 7 - American Regional Cuisine

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

- FCS.NFP.B.2 – Cultural influences on food
- FCS.NFP.D.8 – Food preparation
- FCS.NFP.A.1 – Resource management

Vision of A Learner Attributes: Students will be able to independently use their learning to... (“I can” statements to be demonstrated)

- DE1(6-8) I can search for multiple perspectives and compare and contrast those perspectives.
- DE2(6-8) I can recognize feelings in myself and others and respond with respect and empathy.
- AA3(6-8) I can accept my mistakes in social and academic settings while learning to grow from them.
- AA4(6-8) I can seek opportunities to learn more and continue to push my thinking.

Understandings: Students will understand that...

- The United States has a rich and diverse cuisine
- Regionality plays a large role in cuisine differences across the country
- Geography, culture, settlement, and climate all influence the cuisine of each region
- Available foods and preparations are highly specific based on regionality

Essential Questions:

- What are some common American foods?
- What are the different regions in American cuisine?
- How do geography, climate, settlement, and culture impact the foods in each region?
- How do these factors influence the availability of food in each region?

Students will know…

- Common American cuisine regions
- Common American cuisine ingredients and recipes
- The impacts of climate, geography, settlement, and culture on regional cuisine
- How availability of food impacts a region's cuisine

Students will be able to…

-
- Identify common American foods
- Identify common American recipes
- Identify American cuisine regions
- Explain the impacts of geography, climate, culture, and settlement on a region’s cuisine

Key Vocabulary: Climate, Culture, Settlement, Geography, Regionality, New England, Mid-Atlantic, Southeast, Floribbean, Tex-Mex, Plains, Great Lakes, Mountains, Southwest, Californian, Pacific Northwest

Assessment Evidence	
Performance Tasks: ● Cuisine of U.S. Cities Assignment ● Macaroni and Cheese Kitchen Lab ● American Pizza Assignment	**Other Evidence:** ● New Orleans Cuisine Video ● Lucali Video ● Classroom discussion ● Teacher demonstrations

Learning Plan

Classroom discussion- Cuisines, characteristics, students share own cultural/ethnic cuisine knowledge. Discuss American Cuisine. DE1(6-8), DE2(6-8)

Videos about different regions of American cuisine- discussion to follow DE1(6-8), DE2(6-8), AA4(6-8)

Cuisine of U.S. Cities- students research and report on a region of American Cuisine DE1(6-8), DE2(6-8) , AA4(6-8)

American Pizza Assignment- Side by side comparison of New York, New Haven, Detroit, and Chicago Style Pizzas DE1(6-8)

Identify:

Climate, Cultural, Geographical, Settlement influences on the nation's/region's cuisine. AA4(6-8)

Kitchen Labs- make connections between kitchen lab projects and American regional cuisines AA3(6-8), AA4(6-8)

Teacher Resources: The Culinary Professional, Goodheart-Wilcox Publisher, Second Edition; Servsafe Essentials, fifth Edition, National Restaurant Solutions; The New Professional Chef, The Culinary Institute of America, Sixth Edition; Instructional Videos; Resources may be added to keep current.