Grade 7 Math 7304

Content Area: **Mathematics**
Course(s):
Time Period: **1st Marking Period**
Length: **180**
Status: **Published**

Course Overview

This 7th-grade math course is designed to deepen students' understanding of mathematical concepts and their real-world applications. The course focuses on four critical areas:

1. **Proportional Relationships:** Students will explore the concept of proportionality and its applications in solving real-world problems involving ratios, percentages, and scale drawings.

2. **Rational Numbers and Expressions:** Students will develop fluency in operations with rational numbers (positive and negative fractions and decimals) and apply this knowledge to simplify expressions and solve linear equations.

3. **Geometry:** Students will explore geometric concepts such as scale drawings, informal constructions, and the properties of two- and three-dimensional shapes. They will apply this knowledge to solve problems involving area, surface area, and volume.

4. **Statistics and Probability:** Students will learn to draw inferences about populations based on samples and analyze data to make informed decisions.

Throughout the course, students will engage in problem-solving activities, collaborative projects, and hands-on explorations to develop their critical thinking and mathematical reasoning skills. By the end of the course, students will be well-prepared for higher-level math courses and have a solid foundation in the mathematical concepts essential for success in various academic and career paths.

Course Name, Length, Date of Revision and Curriculum Writer

Grade 7 Math, May 2024

Course Length: Full Year

Curriculum Writers: Jordan Hoehman and Sarah Mellios

Table of Contents

Unit 1: Add and Subtract Rational Numbers

Content Area: **Mathematics**
Course(s):
Time Period: **1st Marking Period**
Length: **21-23 days**
Status: **Published**

Summary of the Unit

In this unit, students will compare and order integers, identify keywords of negative and positive numbers, and find the absolute values of integers. Students develop a unified understanding of numbers, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They will view negative numbers in terms of everyday contexts (examples: temperature, money, sea level) and apply knowledge of integers to real-world situations. They will extend previous understandings of addition and subtraction to add and subtract rational numbers and interpret the rules of adding and subtracting with negative numbers. Students will also simplify expressions using the order of operation

Enduring Understandings

Different rules and methods can be used to evaluate adding and subtracting with negatives. including use of a number line and modeling with counters.

Adding integers requires adding or subtracting their absolute values and understanding the sign of the sum.

Subtracting a number is the same as adding that number's additive inverse.

Adding and subtracting integers is related to adding and subtracting other rational numbers.

Addition and subtraction of rational numbers can be represented by movement on a number line, because the sum (or difference) is another rational number whose location is determined by its magnitude and sign.

Two opposite numbers combine to make zero because they represent the same distance from zero on the number line.

Essential Questions

Where do you see integers in real life?

Why do we need to be knowledgeable about all forms of a number?

When should we use additive inverse?

How do we use a number line to show the addition and subtraction of rational numbers?

How do we use counters to show the addition and subtraction of rational numbers?

An integer and its opposite are the same distance from 0 on a number line and have a sum of 0.

When should we use additive inverse or multiplicative inverse?

How do we use a number line to show the addition and subtraction of rational numbers?

Essential Understandings

Adding integers requires adding or subtracting their absolute values and understanding the sign of the sum.

Subtracting a number is the same as adding that number's additive inverse.

Adding and subtracting integers is related to adding and subtracting other rational numbers.

The addition and subtraction of rational numbers can be represented by movement on a number line because the sum (or difference) is another rational number whose location is determined by its magnitude and sign.

Two opposite numbers combine to make zero because they represent the same distance from zero on the number line.

The sum of two numbers p and q on the number line, because addition can be modeled by movement along the number line.

When q is a positive number, p + q is to the right of p.

When q is a negative number, p + q is to the left of p.

The sum of a number and its opposite, p + -p is equal to zero because p and –p are the same distance from 0 in opposite directions.

Summative Assessment and/or Summative Criteria

Quizzes, tests and projects identified in unit plan.

Benchmarking and Quarterly Exams

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmark/Assessments
Integers **and Absolute Value** **1-1** (2 days)	Students will compare and order integers, explain how integers and their opposites are related, and find the absolute value of expressions.	5. Define negative/positive numbers and integers and locate them on the number line. 6. Identify keywords that would describe a negative number. Include "deposit, withdraw, profit" 7. Use inequality symbols to compare integers. 8. Define absolute value and use visual representation	• Daily homework check • Guided practice check • **Activity**: Student number line -Provide students with a random integer. Have them silently place themselves on the number line in the correct place. • Exit Ticket

Review/Quiz 1 (2 days)	Students will compare and order integers, explain how integers and their opposites are related, and find absolute value of expressions.	• Provide an opportunity to review multiple skills before assessment	• Stations review, quizizz game, teacher created review activity • Study Guide • Provide Small Group Reteach • Quiz
Add Integers **1-2** (3 days)	**Day 1:** Students will add integers by modeling with counters **Day 2:** Students will add integers by modeling on a number line. **Day 3:** Students will add integers by using rules	• **Day 1**: Use counters to model integer rules. Discuss zero pairs with a positive (yellow counter) and a negative (red counter) and how they cancel out. **Day 2:** Use the number line to model integer rules. Discuss that a positive means to move right on a number line and a negative number means to move left on a number line. • **Day 3:** Discuss the rules of adding integers with the same signs, and different signs. Show commutative and associative properties to evaluate integers. Demonstrate that a number and its opposite have a sum of 0 (additive inverse property). Interpret sums of rational numbers by describing real-world contexts such as temperature, depth and altitude, football,	• Daily homework check • Guided practice check • Exit Ticket • **Activity**: Model with counters, model with number lines, Scoot Activity, use a song to remember the rules

		and bank accounts.	
Subtract Integers **1-4** (2 days)	Understand subtraction of integers as adding the additive inverse, $p - q = p + (-q)$.	• Remind students what opposites are and their positions on a number line. Start with simple examples, such as subtracting positive integers, and progressively move to more complex examples that involve negative integers. • Emphasize the rules for subtracting integers: • Subtracting a positive integer is similar to adding its additive inverse (e.g., 8 - 3 = 8 + (-3)). • Subtracting a negative integer is similar to adding its positive counterpart (e.g., 6 - (-2) = 6 + 2).	• Daily homework check • Guided practice check • Exit Ticket • **Activity**: Color by Answer
Review/Quiz 2 (2 days)	Students will be able to add and subtract integers utilizing integer rules, number lines, and counters.	• Provide an opportunity to review multiple skills before assessment	• Stations review, Jeopardy, Trashketball, Quizizz game, teacher-created review activity • Provide Small Group Reteach • Study Guide • Quiz
Add/Subtract Decimals **1-3 and 1-5**	Students will add and subtract decimals utilizing integer rules.	• Day 1: Revisit the rules of adding and subtracting decimals. Remind students to line up the decimal points and add in zeros as a place holder.Explain that whole numbers have decimal points after the	• Daily homework check • Guided practice

(2-3 days)		number. • Day 2-3: Adding and subtracting decimals (negatives and positives). • Remind students of the previous day's lesson (see above). • Remind students of integer rules as well. • Leave integer rules on students desk for students to refer to.	check • Exit Ticket • **Activity**: Scavenger Hunt, Escape Room, Boom Cards
Add/Subtract Like and Unlike Fractions and Mixed Numbers **1-3 and 1-5** (6 Days)	Students will be able to add and subtract like/unlike fractions as well as mixed numbers utilizing integer rules.	• **Day 1**: Add/Subtract Like Fractions (positive only) Review that fractions must have common denominators to be added or subtracted. • **Day 2**: Add/Subtract Like Fractions (negatives and positives). Remind students to follow integer rules. • **Day 3**: Add/Subtract Unlike Fractions (positive only) Model different ways to how to find least common denominator. Review that only the numerators are added or subtracted. • **Day 4:** Add/Subtract Unlike Fractions (negatives and positives). Remind students to follow integer rules. • **Day 5**: Add/Subtract Mixed Numbers: Review adding and subtracting mixed numbers (positive only) . Students can change all mixed numbers to improper fractions and find a common denominator or add or subtract the whole numbers separately from the fractions. Show the pros and cons of each. • **Days 6:** Add/Subtract Mixed Numbers (negatives and positives). Remind	• Daily homework check • Guided practice check • Exit Ticket • **Activity**: Scavenger Hunt, Color by Answer, Scoot, Quizizz, Boom Cards

		students to follow integer rules. • Have integer rules displayed for students who struggle.	
Review and Assess (2-3 Days)	Students will be able to employ knowledge on adding and subtracting rational numbers, finding the absolute value of rational numbers and comparing and ordering integers.	Unit review using varied teacher-created/chosen materials and tasks	• Project • Review Games such as Jeopardy, Trashketball, and Quizizz, teacher created review activity • Provide Small Group Reteach • End of Unit 1 Assessment

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

Online mathematics assessment software such as LinkIt, iXL

Achieve the Core: Coherence Map: This website shows the connections between the Math Standards. It includes prerequisites,

subsequent standards, and examples to help plan for intervention, remediation, and enrichment. https://achievethecore.org/coherence-map/

NJSLA Mathematics Evidence Statements: This document, created by Grant Kolmer, provides PARCC and NJSLA-released tested items from 2015-2019. NJSLA MATHEMATICS EVIDENCE STATEMENTS - Google Sheets

SAVVAS EnVision
https://sso.rumba.pk12ls.com/sso/login?profile=eb&service=https://cat.easybridge.pk12ls.com/ca/dashboard.htm&EBTenant=pat-nj

ALEKS https://www.aleks.com/

Internet4Classrooms – Educational resources from Pre-K- Grade 12 www.internet4classrooms.com

National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/index.html

Illustrative Mathematics www.illustrativemathematics.org/

Georgia Department of Education https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx

Conceptual Vocabulary Cards – The vocabulary words are provided with a definition and visual representation. They are also

available in Spanish, French and Chinese. https://www.graniteschools.org/mathvocabulary/vocabulary-cards/

Learn Zillion https://learnzillion.com/

Inside Mathematics http://www.insidemathematics.org/

Engage NY https://www.engageny.org/

Standards

MATH.7.NS.A	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers
MATH.7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
MATH.7.NS.A.1.a	Describe situations in which opposite quantities combine to make 0.
MATH.7.NS.A.1.b	Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
MATH.7.NS.A.1.c	Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

MATH.7.NS.A.1.d	Apply properties of operations as strategies to add and subtract rational numbers.
MATH.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
MATH.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations
MATH.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Suggested Modifications for Special Education, ELL and Gifted Students

Special Education

Create examples and describe situations in which opposite quantities combine to make zero.

Demonstrate that a number and its opposite have a sum of 0 (are additive inverses).

Interpret sums of rational numbers by describing real-world contexts such as temperature, depth and altitude, football, and bank accounts.

Demonstrate the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

Create numbers throughout the learning environment (i.e. floor, desk, wall, construction paper etc.).

Use graph paper.

Adjust the color of numbers, graphs, and visual content.

Include written descriptions for graphics, images, and videos.

Students will be allowed to submit assignments using additional time per IEP modifications.

Students will be encouraged to use different sizes and types of font to avoid print confusion

Use tools (e.g., calculator, graph paper, or tables) to solve problems.

Develop step-by-step anchor charts, desk decals, and teacher-generated notes to solve multi-step problems using positive and negative rational numbers.

Practice adding, subtracting, multiplying, and dividing simple fractions using manipulatives, technology, and drawings in the context of solving real-world problems.

Create and practice multiplying and dividing two-digit numbers by one-digit numbers using manipulatives and drawings in the context of solving a real-world problem.

Practice choosing numbers of objects within 20 that make a number sentence true using manipulatives or drawings in the context of solving real-world problems.

Practice extending simple repeating arithmetic sequences (e.g., create a table to show the following situation: John makes $20 a week for mowing lawn).

Find the unknown number quantity within 10 that makes an equation true (e.g., $x + 5 = 10$).

Create visual, verbal, or tactile cues or reminders.

Link new learning to prior learning.

Connect to real-life experiences.

Pre-teach prerequisite skills and concepts.

Embed links to websites for additional knowledge.

Teach and model fundamental skills and procedures explicitly until they become automatic.

Provide a variety of means to assess mastery of materials taught.

Present information through different modalities (i.e. visual, auditory, tactile, kinesthetic).

Adjust the color of text, graphs, and visual content.

ELL Strategies

Utilize thermometer manipulatives.

Create an actual number line utilizing resources.

Peer coaching with students in different groups.

A translated math glossary should be provided.

Math journals for students to note questions and concerns should be used.

Use of word/picture wall.

L1 (students' native language) text and/or support should be provided.

Pictures/illustrations

Provide graphic organizers.

Develop graphic representations of number lines and show multiple examples.

Vocabulary

• Additive Inverse • Commissions • Complex Fractions • Constant • Constant of Proportionality • Dimensions • Discount • Equivalent Fractions • Fees • Fractions • Gratuity • Inequality • Markdown • Markup • Maximum • Minimum • Multiplicative Inverse • Percent • Percent of Error • Percent Rate of Change	• Principal • Proportion • Proportional Relationships • Rate • Ratio • Repeating Decimal • Scale Drawing • Scale Factor • Similar Figures • Simple Interest • Tax • Terminating Decimal • Unit Rates • Variable

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, Google Slides, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments such as Google Forms , online textbook or iXL to determine mastery of concepts taught.
- The use of Kahoot, Quizizz, iXL, Boom Cards or other types of interactive software is encouraged

Creativity and Innovation: Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters crea

- 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).

Example: Students will work collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask pr

Global and Cultural Awareness: Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interacti

- 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

Example: Through class discourse and Accountable Talk, students will be comfortable and open to express their reasoning, critical thinking and solut

Digital Citizenships: There are ethical and unethical uses of information and media.

- 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
  Example: Teachers and students will model appropriate use of all digital platforms that are being used in the classroom. Teachers and students will
  proper use of various platforms. Teachers will also monitor students' work and behavior using Go Guardian.

Information and Media Literacy: Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad
communicated.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, m
  7.SP.B.8b).

Example: Students will use a digital whiteboard, Google Slides, or other platform, graphic organizers and virtual manipulatives to show how they were able

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.2: All students will be able to identify the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Science:

- Students collect data and organize data related to the minimum and maximum temperatures of certain places. Students will plot their data on a graph, find the range of temperatures, discuss their results,

and form conclusions.

- Students will use unit rates and analyze proportional relationships to calculate the average water usage and the minimum amount of water needed to survive each day.

Physical Education:

- Students will create a 5-minute exercise video using 12 different exercise sets with at least 15 steps in each set. Students will need to summarize their workout using all four operations with integers. They will need to calculate their location at the end of each set in steps relative to their starting position.

Music:

- Students will research how composers and musicians use ratios and proportions in music. They will then find or compose a piece of music with at least three ratios between notes. Students will then make a video in which they explain how the changes in pitch are proportionally related.

Unit 2: Multiply and Divide Rational Numbers

Content Area: **Mathematics**
Course(s):
Time Period: **1st Marking Period**
Length: **25-27 days**
Status: **Published**

Summary of the Unit

In this unit, students will convert between fractions and decimals. They will extend previous understandings of multiplication and division of rational numbers and interpret the rules of multiplying and dividing with negative numbers. Students will also simplify numerical expressions using the order of operations.

Enduring Understandings

Rational numbers expressed as fractions can be written in decimal form and vice versa.

The sign of a product is determined by the signs of the factors in a multiplication expression.

The same properties used to multiply integers also apply when multiplying rational numbers.

The relationship between multiplication and division can be useful when dividing positive and negative integers.

The sign of the quotient depends on the signs of the dividend and divisor.

The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers.

Essential Questions

Where do you see integers in real life?

Why do we need to be knowledgeable about all forms of a number?

What models and relationships help you make sense of multiplying and dividing positive and negative numbers?

What is the result of multiplying a number and its inverse?

How are the operations applied in real-world contexts?

How do the properties of operations help us compute with rational numbers?

What is the relationship between multiplication and division?

What models and relationships help you make sense of multiplying and dividing positive and negative numbers?

Summative Assessment and/or Summative Criteria

Students will take a test to review concepts learned in Unit 2.

Students will demonstrate mastery through various assessment criteria included in the unit.

Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

Online mathematics assessment software such as Linkit, iXL

Topic/Selection Timeframe	**General Objectives**	**Instructional Activities**	**Benchmark/Assessments**
Multiply/Divide Integers (2-3 days) **2-1 and 2-2**	Students will be able to multiply and divide positive and negative integers	9. Review integer rules. Show Tic Tac Toe board with integer rules for students to reference/study rules from 10. Provide students with a copy of integer rules/leave copies on desk. 11. Third day can be used to practice both multiplication and division of integers.	• Daily homework check • Guided practice check • Exit Ticket • **Activities**: o Color by Answer, Scoot, Scavenger hunt, Quizizz, Blooket

Review/Quiz 1 (2 days)	Students will be able to multiply and divide positive and negative integers.	• Provide opportunity to review multiple skills prior to assessment	• Stations review, Jeopardy, Trashketball, Quizizz game, teacher created review • Provide Small Group Reteach • Study Guide • Quiz
Multiply Decimals (2 days) **2-4**	Students will multiply positive and negative decimals.	• **Day 1:** Review algorithm to multiply decimals. Remind students to not line up decimal points. • Provide small group reteach after formative assessment for students struggling with multiplying decimals • Activities can include: Scoot or Stations with answers at the next station to self check, scavenger hunt • **Day 2:** Multiply decimals with integer rules.	• Daily homework check • Guided practice check • Exit Ticket
Divide Decimals	Students will divide positive and negative	• Review algorithm to divide decimals.	• Daily homework

(2-3 days) **2-5**	decimals.	Remind students when they must move decimal point (when divisor has decimal) to make a whole number and move decimal point in dividend the same amount of times. • Explain to students that if the divisor does not have a decimal point but the dividend does, you do not need to move the decimal point in the dividend. • Remind students to put the decimal point in the correct place in quotient.. • Provide small group reteach after formative assessment for students struggling with dividing decimals	check • Guided practice check • Exit Ticket
Multiply **Fractions** (4 days)	Students will multiply fractions, and mixed numbers.	• **Day 1:** Multiply Fractions (positive only) : Review with students how to simplify fractions. Review algorithm to	• Daily homework check • Guided practice check

2-4		multiply fractions. Discuss and model cross simplifying. Remind students to multiply the numerators across and the denominators across. • **Day 2:** Multiply Fractions (negative and positive) Have students refer to integer rules. • **Day 3**: Multiply Mixed numbers : Review changing mixed numbers to improper fractions. • **Day 4:** Multiply Mixed Numbers (positive and negative) Have students refer to integer rules. Provide step cards if necessary.	• Exit Ticket
Divide Fractions (4 days) **2-5**	Students will divide fractions, and mixed numbers.	• **Day 1:** Divide Fractions (no mixed numbers - only positive) Remind students of the algorithm of dividing fractions and multiplying by the reciprocal. Review	• Daily homework check • Guided practice check • Classwork: Self Check stations

		cross simplifying. • **Day 2**: Divide Fractions (no mixed numbers - positives and negatives) Review integer rules for division/multiplication . • **Day 3:** Divide Mixed Numbers (only positives). Show that all mixed numbers need to be converted into a mixed number. Include whole numbers. Review the algorithm of multiplying by the reciprocal. • **Day 4:** Divide Mixed Numbers (negatives and positives). Review integer rules for division/multiplication . Provide copy integer rules for students if necessary.	• Exit Ticket

Converting Rational Numbers (3 days) **2-3**	**Day 1:** Students will convert decimals to fractions and fractions to decimals using place value and powers of 10 method **Day 2:** Students will be able to convert fractions to decimals by dividing the numerator by the denominator	**Day 1:** Students will convert decimals to fractions and fractions to decimals using place value and powers of 10 method. Review place value. Provide a chart (individually or displayed in room). Review making equivalent fractions with a denominator of 10, 100 or 1000. Review simplifying fractions. **Day 2:** Convert fractions to decimals by dividing the numerator by the denominator. Discuss with students keywords such as, dividend, divisor and quotient. Explain to students that the top number, the numerator, is also the dividend. Remind students that the dividend does not always have to be larger than the divisor. Review long division algorithm.	• Daily homework check • Guided practice check • Exit Ticket

	Day 3: Students will be able to convert fractions to decimals or decimals to fractions.	**Day 3:** Review and practice conversion of decimals and fractions. Provide small group reteaching for students. Use real life scenarios for conversion of rational numbers.	
Comparing and Ordering **Rational Numbers** (3 days) **2-3**	**Day 1**: Students will identify rational numbers and compare decimals using place value.	**Day 1:** Identify rational numbers. Show Rational numbers venn diagram. Discuss the different categories of numbers. Review place value system. Compare decimals using place value. Have students line up the decimal points and compare numbers starting from whole and working their way to the right.	• Daily homework check • Guided practice check • Exit Ticket

	Day 2: Students will compare and order fractions by finding common denominators. **Day 3:** Students will compare rational numbers by converting all to the same form.	**Day 2:** Compare and order fractions by finding common denominators. Review different ways to find common denominator such as listing least common multiples or the ladder method/upside down cake method. Remind students that fractions cannot be compared unless they have a common denominator. Add real world examples. **Day 3:** Show students that when comparing fractions and decimals mixed together, they must be converted to same form by using previous days skills. Show both ways. Discuss the pros and cons of both.	

Review and Assess (3 Days)	Students will be able to employ knowledge on adding and subtracting rational numbers, find the absolute value of rational numbers and comparing and ordering integers.	Unit review using varied teacher created/chosen materials and tasks	• Create small groups to review topics • Create and administer a review game, quizizz, blooket, kahoot • Administer Unit Test

Standards

MATH.7.NS.A	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers
MATH.7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
MATH.7.NS.A.2.a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
MATH.7.NS.A.2.b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $–(p/q) = (–p)/q = p/(–q)$. Interpret quotients of rational numbers by describing real-world contexts.
MATH.7.NS.A.2.c	Apply properties of operations as strategies to multiply and divide rational numbers.
MATH.7.NS.A.2.d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
MATH.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational

	numbers.
MATH.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations
MATH.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Suggested Modifications for Special Education, ELL and Gifted Students

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different sizes and type of font to avoid print confusion
- ML students will be allowed to use an internet translator or language glossary to translate vocabulary and assignments properly.
- ML students may be allowed to work with another student who is fluent in their native language.

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, Google Slides, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments such as Google Forms , online textbook or iXL to determine mastery of concepts taught.
- The use of Kahoot, Quizizz, iXL, Boom Cards or other types of interactive software is encouraged

Creativity and Innovation: Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters crea

- 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).

Example: Students will work collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask probing

Global and Cultural Awareness: Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.

- 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

Example: Through class discourse and Accountable Talk, students will be comfortable and open to express their reasoning, critical thinking and solutions to

Digital Citizenships: There are ethical and unethical uses of information and media.

- 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
  Example: Teachers and students will model appropriate use of all digital platforms that are being used in the classroom. Teachers and students will proper use of various platforms. Teachers will also monitor students' work and behavior using Go Guardian.

Information and Media Literacy: Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad communicated.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, m 7.SP.B.8b).

Example: Students will use a digital whiteboard, Google Slides, or other platform, graphic organizers and virtual manipulatives to show how they were able

Cross Curricular/21st Century Connections

Creativity and Innovation: Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.

- 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).

Example: Students will work collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask probing questions to clarify or improve arguments.

Global and Cultural Awareness: Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.

- 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

Example: Through class discourse and Accountable Talk, students will be comfortable and open to express their reasoning, critical thinking, and solutions to each other for each other.

Digital Citizenships: There are ethical and unethical uses of information and media.

- 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
  Example: Teachers and students will model appropriate use of all digital platforms that are being used

in the classroom. Teachers and students will provide examples of student work that exhibits proper use of various platforms. Teachers will also monitor students' work and behavior using Go Guardian.

Information and Media Literacy: Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).

Example: Students will use a digital whiteboard, Google Slides, or other platforms, graphic organizers, and virtual manipulatives to show how they were able to organize their thoughts and solve a problem.

Unit 3: Algebraic Expressions

Content Area: **Mathematics**
Course(s):
Time Period: **2nd Marking Period**
Length: **17-18 days**
Status: **Published**

Summary of the Unit

In this unit, students will focus on algebraic expressions. Students will define variables, identify and simplify algebraic expressions by applying the distributive property and combining like terms. Students will apply knowledge of number sense to factor linear expressions.

Enduring Understandings

Algebraic expressions can be used to represent and solve problems in real-world contexts.

Rearranging or combining like terms does not change the value of an expression.

Rewriting an expression in different forms in a problem context can shed light on the problem

All like terms must be combined in order for expressions to be simplified.

Expanded expressions represent an equivalent way to represent the original expression.

The distributive property and common factors are used to factor expressions.

The same rules apply for coefficients and constants when adding expressions.

Essential Questions

What strategies can be used to represent real situations using algebraic expressions?

How do you translate real- word problems to algebraic expressions?

What properties are required in order to rewrite and evaluate algebraic expressions?

How is the distributive property applied when rewriting and evaluating algebraic expressions?

How can mathematical relationships be represented as expressions?

Summative Assessment and/or Summative Criteria

Students will take a test to review concepts learned in Unit 3.

Students will demonstrate mastery through various assessment criteria included in the unit.

Students will demonstrate mastery on the end-of-unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

K–8 Mathematics Content Emphases

Online mathematics assessment software such as Link it, IXL

SAVVAS EnVision
https://sso.rumba.pk12ls.com/sso/login?profile=eb&service=https://cat.easybridge.pk12ls.com/ca/dashboard.htm&EBTenant=pat-nj

ALEKS https://www.aleks.com/

Internet4Classrooms – Educational resources from Pre-K- Grade 12 www.internet4classrooms.com

National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/index.html

Illustrative Mathematics www.illustrativemathematics.org/

Georgia Department of Education https://www.georgiastandards.org/Common-Core/Pages/Math-6-8.aspx

Conceptual Vocabulary Cards – The vocabulary words are provided with a definition and visual representation. They are also available in Spanish, French and Chinese. https://www.graniteschools.org/mathvocabulary/vocabulary-cards/

Learn Zillion https://learnzillion.com/

Inside Mathematics http://www.insidemathematics.org/

Engage NY https://www.engageny.org/

Topic/Selection Timeframe	**General Objectives**	**Instructional Activities**	**Benchmark/Assessments**
Evaluate Algebraic Expressions (1 Day)	Students will be able to evaluate algebraic expressions by utilizing order of operations and integer rules.	12. Use substitution property of equality to evaluate an expression 13. Review order of operations and stress that multiplication/division is solved from let to right as well as addition and subtraction. 14. Review integer rules 15. Keep integer rules on desk or provide copy of integer rules for students to refer to.	• Daily homework check • Guided practice check • Exit Ticket

Write Algebraic Expressions (2 Days)	Students will be able to translate word phrases to algebraic expressions and algebraic expressions to words.	• Translate word situations to algebraic expressions. • Create and review reading word problems (i.e. highlight important information in text). • Verbally define a variable and what is used for.	• Daily homework check • Guided practice check • Exit Ticket • Activities: Scavenger Hunt, Matching Activity (words and algebraic expressions)
Distributive Property (2 Days) **3-3**	Students will apply the Distributive Property to rewrite algebraic expressions.	• Review multiplication integer rules • Define and hold class discussion of the word distribute (ie: the teacher will distribute your homework at the end of class today)	• Daily homework check • Guided practice check • Error Analysis (errors including not distributing to the second term or integer rule errors) • Exit Ticket
Review/ Quiz (2 days)	Students will employ knowledge of writing and evaluating algebraic expressions and use Distributive Property to rewrite algebraic expressions.	• Provide opportunity to review multiple skills prior to assessment	• Stations review, Jeopardy, Trashketball, Quizizz game • Provide Small Group Reteach • Study Guide • Quiz
Identify Parts of an	Students will identify parts of an	• Identify and define the following vocabulary	• Daily homework check

Expression (1 Day) **3-1**	algebraic expression.	words: terms, like terms, constants, coefficients • Compare/contrast like vs. unlike terms. • Discuss variables raised to different powers are not like terms	• Guided practice check • Activity: Color by Like Terms • Exit Ticket
Combine Like Terms (2-3 Days) **3-1**	Students will combine like terms to simplify algebraic expressions.	• Review signed integer addition and subtraction rules • Use shapes/symbols to identify different sets of like terms • Reinforce addition and subtraction of coefficients only • Mathgames.com "Add and Subtract Like Terms"	• Daily homework check • Guided practice check • Exit Ticket
Adding and Subtracting Linear Expressions (2 Days) **3-2**	Students will add and subtract linear expressions by simplifying like terms.	• Explain to students that rewriting an expression in different forms in a problem context can shed light on the problem • Show students that they can stack expressions vertically on top of each other when adding or	• Daily homework check • Guided practice check • Exit Ticket

		subtracting expressions. • Remind students to pay close attention to the signs in front of the terms when combining. • Remind students that like terms need to be stacked on top of each other in same column. Pay close attention to variables raised to different powers. • Add perimeter questions with shapes to simplify expressions	
Factor Linear Expressions (2 Days) **3-4**	Students will use the properties of mathematics to factor linear expressions.	• Define greatest common factor and review how to find it (ladder method/upside down cake method, factor trees, or list factors of numbers)	• Daily homework check • Guided practice check • Exit Ticket
Project/Review/Assess (3 days)	Students will be able to employ knowledge on multiplying and	Unit review using varied teacher created/chosen materials and tasks	• Create small groups to review topics • Create and administer a review game, quizizz,

	dividing rational numbers, converting between fractions and decimals and comparing and ordering rational numbers.	Algebraic Expressions Project: Give students an expression (not simplified). Students will simplify expression by combining like terms. With simplified expression, they will evaluate, translate into word phrases, add and subtract other terms to the simplified expression, factor, and distribute another number to the simplified expression.	blooket, kahoot • Algebraic Expressions Project • Administer Unit Test

MATH.7.EE.A	Use properties of operations to generate equivalent expressions
MATH.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MATH.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MATH.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations
MATH.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Standards

MATH.7.EE.A	Use properties of operations to generate equivalent expressions

MATH.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MATH.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MATH.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations
MATH.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

Suggested Modifications for Special Education, ELL and Gifted Students

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different sizes and types of font to avoid print confusion
- ML students will be allowed to use an internet translator or language glossary to translate vocabulary and assignments properly.
- ML students may be allowed to work with another student who is fluent in their native language.
- Utilize manipulatives.
- Create an actual number line utilizing resources.
- Peer coaching with students in different groups.
- A translated math glossary should be provided.
- Math journals for students to note questions and concerns should be used.
- Use of word/picture wall.
- Students' native language text and/or support should be provided.
- Pictures/illustrations
- Provide graphic organizers.
- Develop graphic representations of number lines and show multiple examples.
- Create and use various tools or graphic organizers to help solve real-life and mathematical problems with rational numbers.
- Create and practice solving equations that do not change when rational numbers are used.
- Use tools that can enable quick and accurate solutions to equations.
- Create and modify steps to perform operations on all forms of rational numbers.
- Use tools (e.g., calculator, graph paper, or tables) to solve problems.

- Develop step-by-step anchor charts, desk decals, and teacher generated notes to solve multi-step problems using positive and negative rational numbers.

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, Google Slides, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments such as Google Forms , online textbook or iXL to determine mastery of concepts taught.
- The use of Kahoot, Quizizz, iXL, Boom Cards or other types of interactive software is encouraged

TECH.8.1.8 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

TECH.8.2.8 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers

in diverse ethnic and organizational cultures.

9.2: All students will be able to identify the importance of being knowledgeable about one's interests and talents and being well-informed about postsecondary and career options, career planning, and career requirements.

Some examples include:

Science:

enVision STEM Theme (Topic 1): How Cold is Too Cold? (MS-ESS3-2, MS-ETS1-2, and MS-ETS1-3)

- Students collect data and organize data related to the minimum and maximum temperatures of certain places. Students will plot their data on a graph, find the range of temperatures, discuss their results and form conclusions.

enVision STEM Theme (Topic 2): Did You Know? (MS-ETS1-1, MS-ETS1-2, MSETS1-3, MS-ETS1-4)

- Students will use unit rates and analyze proportional relationships to calculate the average water usage and the minimum amount of water needed to survive each day.

Physical Education:

Pick A Project 1D: Step It Out (2.2.8.MSC.1)

- Students will create a 5-minute exercise video using 12 different exercise sets with at least 15 steps in each set. Students will need to summarize their workout using all four operations with integers. They will need to calculate their location at the end of each set in steps relative to their starting position.

Music:

Pick A Project 2D: Sounds of Music (1.3A.8.P4d)

- Students will research how composers and musicians use ratios and proportions in music. They will then find or compose a piece of music with at least three ratios between notes. Students will then make a video in which they explain how the changes in pitch are proportionally related.

Unit 4: Algebraic Equations and Inequalities

Content Area: **Mathematics**
Course(s):
Time Period: **2nd Marking Period**
Length: **29 days**
Status: **Published**

Summary of the Unit

In this unit students will solve one-step, two-step, and multi-step equations and inequalities. Along the way, concepts of applying the properties of equality, identifying/combining like terms, and using the distributive property will be highlighted. Students will also model real world situations through the use of equations and solve for the unknown.

Enduring Understandings

Algebraic equations can be used to represent and solve problems in real-world contexts. Real world situations can be modeled by equations. Algebraic and numeric procedures are interconnected and build on one another.

Integration of various mathematical procedures builds a stronger foundation of finding solutions.

Essential Questions

How can mathematical relationships be represented as equations?
What strategies can be used to represent real situations using algebraic equations?
In what situation would it be necessary to solve an equation for a given variable?
Why is it essential to use opposite operations to solve an equation?
How can you check the reasonableness of your solution?

Summative Assessment and/or Summative Criteria

Students will take a test to review concepts learned in Unit 4.

Students will demonstrate mastery through various assessment criteria included in the unit.

Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

Online mathematics assessment software such as Link it, IXL

K-8 Content Emphases on the NJDOE Website

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmark/Assessments
Add/Subtract One Step Equations	Students will be able to solve one step addition and	• Define properties of equality. • Use inverse operations to isolate a	• Daily homework check

(2 Days) **4-1**	subtraction equations by using the inverse operation to isolate the variable.	variable. • Use rational numbers for operations within equations. • Provide examples where the variable is on the right side of the equation. • Identify key words to write and solve equations from word problems. • Allow students to have out integer rules when solving	• Guided practice check • Exit Ticket
Multiply and Divide One Step Equations (2 Days) **4-2**	Students will be able to solve one step multiplication and division equations by using the inverse operation to isolate the variable.	• Define properties of equality. • Use inverse operations to isolate a variable. • Provide examples where the variable is on the right side of the equation. • Identify key words to write and solve equations from word problems. • Allow students to have out integer rules when solving	• Daily homework check • Guided practice check • Exit Ticket
Rational Coefficients (2 Days) **4-2**	Students will be able to solve one step equations with rational coefficients by using the inverse operation to isolate the variable	• Review dividing fractions as well as dividing decimals. • Remind students to multiply by the reciprocal when dividing fractions. • Include examples where the variable	• Daily homework check • Guided practice check

		is on the right side of the equal sign. • Allow students to have integer rules out while solving. • Provide step cards for dividing decimals or dividing fractions if needed.	• Error Analysis • Exit Ticket
Review/ Quiz (2 Days)	Students will employ knowledge of solving one step equations by completing a review and graded assessment.	• Provide opportunity to review multiple skills prior to assessment • Provide integer rules as well as step cards during review	• Stations review, Jeopardy, Trashketball, Quizizz game • Provide Small Group Reteach • Study Guide • Quiz
Two Step Equations (3 Days) **4-3**	Students will solve two step equations using reverse order of operations to isolate the variable.	• Review the properties of equalities. • Justify the order of operations to be used when isolating the variable. • Use rational numbers for operations within equations. • Identify keywords to write and solve equations from word problems. • Provide examples where variables are on the right side of the equal	• Daily homework check • Guided practice check • Exit Ticket

		sign.	
Review/ Quiz (2 Days)	Students will employ knowledge of solving one step equations by completing a review and graded assessment.	• Provide opportunity to review multiple skills prior to assessment • Provide integer rules as well as step cards during review	• Stations review, Jeopardy, Trashketball, Quizizz game • Provide Small Group Reteach • Study Guide • Quiz
Solve Multi-Step Equations (4 Days) **4-3**	Students will solve Multi-step equations using concepts of combining like terms and the distributive property.	• Review the concepts of combining like terms and the distributive properties. • Discuss the order of operations to be used to isolate the variable. (ie. Distributive Property is multiplication and must be done before combining like terms) • Use rational numbers for operations within equations. • Identify key words to write and solve equations from word problems.	• Daily homework check • Guided practice check • Exit Ticket
Review/Project/Test (3 Days)	Students will demonstrate mastery of topics and concepts presented	• Complete mixed review of solving all types of linear equations • Provide integer rules as well as step cards during review	• Stations review, Jeopardy, Trashketball, Quizizz game • Provide Small Group Reteach

			• Study Guide • Test
Intro to Inequalities (1 Day) **4-4**	Students graph inequalities on a number line and interpret possible solutions.	• Review symbols and words associated with each one. • Write inequalities from words and vice versa. • Review graphing on a number line. Discuss when to use open and closed circles when graphing. • Activity: Matching activity. Match the graph with the correct inequality and key words/scenarios.	• Daily homework check • Guided practice check • Exit Ticket
Add/Subtract One Step Inequalities (2 Days) **4-5**	Students will solve and graph solutions to linear inequalities.	• Show the parallel between inequality and equality. Emphasize that inequalities have a range of solutions. Demonstrate graphing solutions sets on the number line. Review terms associated with inequalities	• Daily homework check • Guided practice check • Exit Ticket
Multiply/Divide One Step Inequalities (2 Days) **4-6**	Students will solve and graph solutions to linear inequalities.	• Show the parallel between inequality and equality. Emphasize that inequalities have a range of solutions. Demonstrate graphing solutions sets on the number line. Review terms associated with inequalities. Emphasize that multiplying or dividing across the inequality sign of a negative	• Daily homework check • Guided practice check • Exit Ticket

		coefficient changes the inequality. Show an example and prove why	
Solve 2 Step Inequalities (2 Days) **4-7**	Students will solve and graph solutions to linear inequalities.	Emphasize the correct order to solve for the variable. Interpret the solution and possible answers. Remind students that multiplying/dividing across the inequality sign of a negative coefficient changes the inequality.	• Daily homework check • Guided practice check • Exit Ticket
Review/Quiz (2 days)	Students will demonstrate mastery of topics and concepts presented	• Provide opportunity to review multiple skills prior to assessment • Provide integer rules as well as step cards during review	• Stations review, Jeopardy, Trashketball, Quizizz game • Provide Small Group Reteach • Study Guide • Quiz

Standards

MATH.7.EE.A	Use properties of operations to generate equivalent expressions
MATH.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MATH.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MATH.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations
MATH.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MATH.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
MATH.7.EE.B.4.a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms with accuracy and efficiency. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MATH.7.EE.B.4.b	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Suggested Modifications for Special Education, ELL and Gifted Student

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different sizes and types of font to avoid print confusion
- ML students will be allowed to use an internet translator or language glossary to translate vocabulary and assignments properly.
- ML students may be allowed to work with another student who is fluent in their native language.

- Initiate discussions and provide opportunities for collaboration.
- Highlight mathematical relationships; utilize various colors to show distinctions.
- Provide multiplication and division chart to 100.
- The teacher partially completes the equation and labels essential terms.
- Interactive tools can be used in many ways to build language as well as math skills.
- Create and use various tools or graphic organizers to help solve real-life and mathematical problems with rational numbers.
- Create and practice solving equations that do not change when rational numbers are used.
- Use tools that can enable quick and accurate solutions to equations.
- Develop graphic representations of multi-step equations which show multiple examples of computations.
- Discuss if the answer is reasonable using whiteboards and charts; students can visualize.
- Develop word walls with translations side by side.
- Utilize a KWL-chart. Have the parts listed in both their L1 (students' native language) and L2 (students' target language) to clarify understanding.
- Provide math word banks and math reference sheets that are translated and copied for students.
- Have students conduct activities in small groups, pairs/triads, and share and discuss solutions.
- Create math journals for students, who can write meanings and note vocabulary in both languages

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, Google Slides, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments such as Google Forms , online textbook or iXL to determine mastery of concepts taught.
- The use of Kahoot, Quizizz, iXL, Boom Cards or other types of interactive software is encouraged

TECH.8.1.8 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

TECH.8.2.8 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Cross Curricular/21st Century Connections

Creativity and Innovation: Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.

- 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).

Example: Students will work collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask probing questions to clarify or improve arguments.

Global and Cultural Awareness: Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.

- 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

Example: Through class discourse and Accountable Talk, students will be comfortable and open to express their reasoning, critical thinking and solutions to each other with respect to each other.

Digital Citizenships: There are ethical and unethical uses of information and media.

- 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
  Example: Teachers and students will model appropriate use of all digital platforms that are being used in the classroom. Teachers and students will provide examples of student work that exhibits proper use of various platforms. Teachers will also monitor students' work and behavior using Go Guardian.

Information and Media Literacy: Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).

Example: Students will use a digital whiteboard, Google Slides, or other platform, graphic organizers and virtual manipulatives to show how they were able to organize their thoughts and solve a problem.

Unit 5: Ratios and Proportions

Content Area: **Mathematics**
Course(s):
Time Period: **3rd Marking Period**
Length: **16-17 days**
Status: **Published**

Summary of the Unit

In this unit, students will focus on analyzing proportional relationships and using them to solve real-world and mathematical problems. Students extend their knowledge and understanding of ratios and rates to formally define proportional relationships and the constant of proportionality. Students will explore how tables, graphs, and equations can represent proportional relationships.

Enduring Understandings

- Understand and communicate information using the relationships of decimals, fractions, integers, and rational/irrational numbers.
- Understand a proportional relationship when graphed is a straight line through the origin
- Realize that a specific point (x,y) on a linear graph represents a rate and understand that the point (1,r) on a linear graph represents the unit rate.
- Proportional relationships are made up of equivalent ratios. In proportions, unknowns can be determined by applying cross products to set up and solve an equation.
- Recognize that relationships may be represented using tables, graphs, equations, and verbal descriptions.
- Scale Factor influences similarity between figures in that if their corresponding sides are not proportional, they cannot be similar. Two figures are similar if they are the same shape and have congruent corresponding angles.

Essential Questions

What is unit rate/constant of proportionality and how are they used in the real world?
How might you show that two objects are proportional?
How can you identify and represent proportional relationships?
How can proportional relationships be used to solve application including determining similarity of corresponding figures?

Summative Assessment and/or Summative Criteria

- Unit Project
- Students will take a test to review concepts learned in Unit 5.
- Students will demonstrate mastery through various assessment criteria included in the unit.
- Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

Online mathematics assessment software such as Link it, iXL

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmark/Assessments
Ratios (1 day) **5-1**	Students will identify and create simple equivalent ratios	• Vocabulary: ratio • Write ratios in three different ways (fraction, colon, the word "to") • Solve word problems by expressing ratios in simplest form • Write equivalent ratios by multiplying or dividing • Suggested activity- Math Snacks:Bad Date https://mathsnacks.com/baddate-guide.html	• Daily homework check • Guided practice check/Formative assessment • Formative assessment • Exit Ticket

Rates and Unit Rate (2 days) **5-2**	• Students will use ratios and rates to describe the relationship between two quantities. • Students will calculate the unit rate and unit price from given rates.	• Write rates in fraction form with labels and divide to determine the unit rates • Use unit rate concepts to compare unit prices to determine better buy • Suggested activity: Supermarket sale prices (real world application)	• Daily homework check • Guided practice check/Formative assessment • Exit Ticket
Complex Fractions (1 day) **5-2**	Simplify complex fractions to determine the unit rate of problems involving fractions and mixed numbers	• Review how to divide fractions and mixed numbers • Solve real world word problems involving unit rate • Suggested activity: Complex fraction scavenger hunt	• Daily homework check • Guided practice check/Formative assessment • Exit Ticket
Review and Quiz 1 (2 days)	• Students will identify and create simple equivalent ratios • Students will calculate the unit rate and unit price from given rates.	• Quiz study guide • Stations review • Quizizz, review games, blooket, etc • Quiz	• Unit 5 Quiz 1 Review/Quiz • Unit 5 Project: Supermarket Project ○ Calculate unit price given a rate ○ Apply unit price to determine better buy ○ Students will

	• Simplify complex fractions to determine the unit rate of problems involving fractions and mixed numbers		create their own supermarket ad including a rate and write 2 questions relating to their ad
Write and solve proportions (2 days) **5-4**	• Students will simplify or use cross products to determine if two ratios are in proportion • Students will solve problems by constructing and solving proportions	Demonstrate how simplifying ratios is a method to determine if two ratios are in proportion Use rational numbers to demonstrate how to use cross products to determine if two ratios are in proportion when simplifying cannot be done Find the missing value in a proportion by using cross products. Show all work involved, especially when isolating the variable. Construct and evaluate proportions to solve word problems	• Daily homework check • Formative assessment • Guided practice check/Formative assessment • Exit Ticket
Scale Drawings (1 day) **5-6**	Solve problems involving scale drawings	Set up proportions and and use cross products to solve for missing measurements in similar figure problems Find the dimensions of a missing	• Daily homework check • Guided practice check/Formative

		measurement in a blue print Suggested activity: Group/Partner activity solving problems involving blue prints	assessment • Exit Ticket
Identify Proportional Relationships in tables (2 days) **5-3**	Identify proportional and non proportional relationships in tables by simplifying dependent and independent values Predict the quanitity of a value in a table that it is proportional	*Vocabulary: Constant of Proportionality (k)* Identify dependent and independent variables in tables Determine if tables are in proportion by applying k=y/x. If the k is different between any pair of y and x in the table, then the table is not in proportion. Complete tables to solve word problems involving proportional relationships and determine if the table is in proportion. If the table is in proportion, describe k. Suggested resource: Learnzillion - Independent and Dependent Variables	• Daily homework check • Guided practice check/Formative assessment • Exit Ticket
Graph Proportional Relationships (2 days) **5-5**	Graph ratios on a coordinate plane to determine if the ratios are proportional by observing if the graph is a straight line through the origin. Describe the value of an	Review graphing on a coordinate plane Label x and y axes once dependent and independent values have been established from a given table.	• Daily homework check • Guided practice check/Formative assessment • Exit Ticket

	ordered pair on a line that represents a proportional relationship.	Plot (x,y) coordinates and create a line. Discuss how the constant of proportionality is represented in a graph (when x value is 1). Find the ordered pair where x equals 1 to determine the unit rate. Write an equation in the form of y=kx where k represents the constant of proportionality. When the consant of proportionality is not evident in the graph, select any point on the proportional line to find the constant of proportionality. Use the equation k=y/x to determine the unit rate. Write an equation in the form y=kx where k represents the constant of proportionality	
Writing Equations to Represent Proportional Relationships (1 day) **5-5**	Equations in the form y = kx, where k is the constant of proportionality, can be used to represent proportional relationships and solve problems	Apply previous knowledge and understanding of finding 'k' in tables and graphs, then write and interpret equations in the form y = kx Suggested activity: Proportional relationships organizer-match the unit rate, graph and equation with given word problems	• Daily homework check • Guided practice check/Formative assessment • Exit Ticket
Review and Assess (2-3 Days)	Create and solve proportions Identify proportional and non proportional	Unit review using varied teacher created/chosen materials and tasks	• Create small groups to review topics • Create and administer a review game, quizizz, blooket, kahoot

	relationships in tables Graph ratios on a coordinate plane to determine if the ratios are proportional Find the constant of proportionality and write an equation to represent a proportional relationship		• Administer Unit Test

Standards

MATH.7.RP.A	Analyze proportional relationships and use them to solve real-world and mathematical problems
MATH.7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
MATH.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MATH.7.RP.A.2.a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
MATH.7.RP.A.2.b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

MATH.7.RP.A.2.c	Represent proportional relationships by equations.
MATH.7.RP.A.2.d	Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
MATH.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Suggested Modifications for Special Education, ELL and Gifted Students

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion
- LEP students will be allowed to use an internet translator or language glossary in order to translate vocabulary and assignments properly.
- LEP students may be allowed to work with another student who is fluent in their native language.

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, Google Slides, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments such as Google Forms , online textbook or iXL to determine mastery of concepts taught.
- The use of Kahoot, Quizizz, iXL, Boom Cards or other types of interactive software is encouraged

TECH.8.1.8 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

TECH.8.2.8 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.2: All students will be able to identify the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Unit 6: Percents

Content Area: **Mathematics**
Course(s):
Time Period: **3rd Marking Period**
Length: **15-16 days**
Status: **Published**

Summary of the Unit

In this unit, students will learn how to calculate percentages using both the percent proportion and percent equation. They will be able to calculate the change in values as a percentage. In addition, they will solve real-world applications of percents, including discounts, tax, tip, and simple interest.

Enduring Understandings

● Fractions can be written as decimals, some of which are non-repeating, non-terminating decimals called irrational numbers.

● Proportions are used to solve basic percent problems and applications of percent.

● Knowing applications of percent such as discount, sales tax, and markup can help one to be an informed consumer and make good purchasing decisions.

● Success in using and understanding percents is an essential skill required by every field and individual in society.

Essential Questions

- In what way are fractions, decimals and percents used interchangeably?
- In what ways are the percent formula and percent proportions related?
- How can you use the percent proportion and equation to calculate percent of numbers?

- How can you calculate the percent increase or decrease of data given in a real-world context?
- How does the topic of percent apply to real-life situations including discount, tax, tip, and interest?

Summative Assessment and/or Summative Criteria

- Students will take a test to review concepts learned in Unit 5.
- Students will demonstrate mastery through various assessment criteria included in the unit.
- Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7 and 8

New Jersey Department of Education Model Curriculum-Grades 7 and 8

Online mathematics assessment software such as LinkIt, iReady, Imagine Learning, etc.

Unit Plan

Topic/Selection **Timeframe**	**General Objectives**	**Instructional Activities**	**Benchmarks/Assessments**
Convert Fractions, Decimals and Percents	Review how to rewrite fractions, decimals and percents using different representations	Convert fractions to decimals, decimals to percent	• Daily homework check • Guided and independent practice • Formative assessment

6-1 (1 day)		• Convert fractions by dividing the numerator by the denominator • Convert decimals to percents, and percents to decimals • Understand that moving the decimal point two places to the right or to the left indicates multiplying or dividing by 100 Suggested activity: Graphic organizer	• Exit Ticket
Percent Proportion **6-2** (2 days)	Students will use the percent proportion to solve computational and real world problems. Use the percent proportion to find missing values (percent of a number, base or percents)	• Define terms including "percent" and discuss what students already know about percents in a real world context. • Define the percent proportion and discuss what each of the variables stand for in the formula. • Use real world problems, asking students to identify variables they know, as well as what they are trying to find. • Use the percent proportion to answer questions such as "12 is what percent of 32?", "What number is 15.5% of 450?", and "78 is 60% of what number?" • Use circle graphs and bar graphs as various representations of data as percentages.	• Daily homework check • Guided and independent practice • Formative assessment • Exit Ticket

Percent Equation **6.3** (1-2 days)	Students will use the percent equation to solve computational and real world problems. Use the percent equation to find missing values (percent of a number, base or percents)	• Define the formula for the percent equation. • Identify the meaning of each variable in the equation. • Use real world problems, asking students to identify variables they know, as well as what they are trying to find. • Use the percent equation to solve problems such as "Find 62% of 75.", "287 is what percent of 410?", and "33 is 55% of what number?" • Compare and contrast the percent proportion and percent equation. • Use calculators to improve fluency in problem-solving.	• Daily homework check • 5-step method of problem solving for word problems • Formative assessment • Use centers to review and assess: Small group instruction, online math software, hands-on manipulatives, problem solving

Percent of Change and Percent Error **6-4** (2 days)	Students will calculate percent of increase or decrease by using the percent of change formula. Solve problems involving the percent error when given a real-world scenario comparing an actual amount with an estimated amount	Day 1: Percent of Increase or Decrease • Use visuals such as bar models to demonstrate the concept of percent of change. • Apply the formula for percent of change as the difference over the original. Convert to a percent and determine if the change is an increase or decrease • Suggested activity: task card stations Day 2: Percent Error • Apply the formula for percent errore as the difference over the actual amount. Convert to a percent • Suggested activity: estimation 180. Have students take a guess as to a certain quantity when shown an image and then reveal the actual. Calculate the percent error	• Daily homework check • Guided and independent practice • Formative assessment • Exit Ticket
Mid Unit Review and Quiz (2 days)	Quiz • Percent proportion • Percent estimation • Percent equation • Percent or change/error	Review mid unit topics Suggested activity: • Study guide • Stations Review activities for mid unit topics • IXL practice	• Mid Unit Quiz

Sales Tax, Tips, and Markups **6-5** (2 days)	Students will solve real-world problems involving sales tax, tips, and markups.	• Use financial literacy questions to demonstrate situations in which a percentage would have to be added to a total cost. • Suggested activity: Students create a menu with prices and their peers must order and pay for a meal including tax and/or tip.	• Daily homework check • 5-step problem solving for word problems • Writing Prompt Extension: "If an item is marked up and then discounted by the same percent, will the store make a profit? Explain." • Unit Project: Apply tax, tip and discount to ordering from a given restaurant menu to accurately determine the cost of dining out.
Discounts **6-5** (2 days)	Students will solve real-world problems involving discounts.	• Use financial literacy questions to demonstrate situations in which a percentage would have to be subtracted from a total cost. • Suggested Activity: Class store. Students must calculate the sale prices and tax on items around the room with a given price tag	• Daily homework check • Guided practice problems • Use centers to review and assess: Small group instruction, online math software, scaffolded task cards, problem solving
Simple Interest **6-6** (1 day)	Students will solve real-world problems involving simple interest.	• Define "simple interest" and the formula for calculating simple interest. • Identify the meaning of each variable in the equation • Use real world problems, asking students to identify variables they know, as well as what they are trying to find. • Suggested Activity: Students fill in a chart about the growth of a bank	• Daily homework check • Formative assessment • Guided and independent practice • Exit Ticket

		account and create a bar graph to make a visual representation of the data.	
Review and Assess (2 days)	Students will demonstrate mastery of topics and concepts presented.	• Mixed review of problem-solving using all percent topics • Unit review using varied teacher created/chosen materials and tasks • Suggested review: Stations, choice boards, unit study guide	• End of Unit Test

MATH.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MATH.7.RP.A.2.c	Represent proportional relationships by equations.
MATH.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MATH.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MATH.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative

	rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Suggested Modifications for Special Education, ELL and Gifted Students

*Consistent with individual plans, when appropriate.

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
- LEP students will be allowed to use an internet translator or language glossary in order to translate vocabulary and assignments properly.
- LEP students may be allowed to work with another student who is fluent in their native language.

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments to determine mastery of concepts taught.
- The use of kahoot, quizizz or other types of interactive software is encouraged.

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.2.8	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

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Unit 7: Geometric Relationships

Content Area: **Mathematics**
Course(s):
Time Period: **4th Marking Period**
Length: **16 days**
Status: **Published**

Summary of the Unit

This unit is about measuremet, reasoning and angle relationships. Students will learn formulas for the area and circumference of a circle and use them to solve problems and give an informal derivation of the relationship between the circumference and area of a circle. Students will use facts about supplementary, complementary, vertical and adjacent angles in multi step problems to write and solve simple equations for an unknown angle in a figure.

Enduring Understandings

- Students will study angle relationships and line relationships.
- The measure of angles that are formed by intersecting lines can be determined when the relationship between different types of angles are known.
- An understanding of angles, lines, and geometric relationships is essential for many careers and hobbies.
- The circumference and diameter of a circle, regardless of size, have a unique and constant ratio that is an irrational number symbolized by π.
- The formula for the area of a circle can be used to solve problems by substituting the known values for area and/or radius to solve for the unknown value.

Essential Questions

- How do you use angle relationships to find unknown angle measures?
- What kind of angles are formed when a transversal intersects two parallel lines?

- What is the relationship between vertical and adjacent angles?
- How can you use the properties of congruence to solve for unknown variables?

Summative Assessment and/or Summative Criteria

Students will take a test to review concepts learned in Unit 6.

Students will demonstrate mastery through various assessment criteria included in the unit.

Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7 and 8

New Jersey Department of Education Model Curriculum-Grades 7 and 8

Online mathematics assessment software such as LinkIt, iReady, ST Math, etc.

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments
Circumference of a circle and perimeter of a semi circle **9-1**	• Identify and determine the difference between radius and diameter and their relationship to one another	• Define vocabulary terms including circumference, diameter, and radius. • Create a diagram labeling the parts of a circle. Identify the radius and diameter. Solve problems	• Daily Homework check • Small group instruction/use of centers

(2 days)	• Apply the 2 formulas for the circumference of circles to solve problems • Apply circumference of circles to real-world situations. • Find the perimeter of a semi circle given the diameter or the radius.	finding the diameter given the radius, and the radius given the diameter • Discuss the two formulas and two forms of pi used in the circumference formulas and when it is appropriate to use them. Suggested activities: Circumference task cards, scavenger hunt, quizizz	• Formative assessments • Exit Ticket
Area of a circle **9-2** (2 days)	• Apply the formula for the area of circles and semi circles to solve problems • Understand the relationship between the radius, diameter, area, of circles and semi circles • Apply area of circles to real-world situations.	• Discuss the difference between finding the circumference and the area of circles • Apply the formula to find the area of circles and semi cricles given a diameter or a radius • Apply the formula and two forms of pi used and when it is appropriate to use them. • Suggested Video https://www.youtube.com/watch?v=IwM1kKoCBDs	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket
Area of Composite Figures and Shaded Region **9-3** (3 days)	• Calculate the area of composite figures by decomposing them into basic polygons • Calculate the area of different types of polygons (rectangles, trapezoids, parallelograms, and triangles) and then sum them up to find area of a	Day 1: Review how to find the area of basic geometric figures applying the appropriate formulas • Provide students with a formula reference sheet and review how to apply the appropriate formula to calculate the area of basic geometric figures including squares, rectangles, parallellograms, trapezoids semi circles and circles. Suggested activity: area footloose game, task cards, vertical boards (thinking classroom) Day 2: Area of composite figures • Decompose composite figures into simple	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket • Unit Project-Create a castle using different geometric figures. Calculate the area by applying the appropriate formulas and determine the total area of the composite figure. Design a backyard by placing different objects in

	composite figure • Calculate the area of different types of polygons (rectangles, trapezoids, parallelograms, and triangles) and then find the difference to find the area of a shaded region • Apply the concept of area of composite figures to real-life situations and explain their significance	familiar figures and find the area of each piece. Students should write the appropriate area formula, Show their substitution and solve following order of operations. Add the areas to find the area of a shaded region Day 3: Area of a shaded region • Identify a large and shape and small shape that make up area of the shaded region. Find the area of each shape and subtract. Students should write the appropriate area formula, Show their substitution and solve following order of operations	the yard. Find the areas and subtract to find the area left over.
Quiz Review and Quiz (2 days)	• Apply the appropriate formulas to find the circumference and area of a circle, the area of a shaded region and composite figures	• Quiz study guide • Stations review • Quizizz, review games, blooket, etc • Quiz	• Unit 7 Quiz Study Guide • Unit 7 Quiz
Classify Angles (1 days)	Students will classify angles and find their measures. • Define acute, obtuse, right, straight angles • Properly name angles by letter or number	• Graphic organizer of angle types • Sorting activity to classify angles • Use real life examples to find angle measures	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket
Adjacent and Vertical Angles **9-5** (2 days)	Students will identify Adjacent angle relationships and the angles formed by paralell lines cut by a transversal. • Define supplementary, complementary, vertical and adjacent angles.	• Student-created, color-coded diagram/foldable labeling the types of angles formed by parallel lines • Calculate angle measures in application problems of parallel lines • Write equations to find the value of x by applying	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket

	• Solve for an unknown angle in a figure utilizing definitions of supplementary, complementary, vertical and adjacent angles. • Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations.	knowledge of angle relationships and degree measurements	
Classifying Triangles (2 days)	• Students will classify triangles using side lengths and angle measurements. • Write an equation to find the missing degrees of an angle in a triangle by applying the triangle sum theorem	• Vocabulary: Define and discuss triangle types ○ Acute, obstuse, right ○ Isosceles, Equilateral, Scalene • Use rulers and protractors to identify triangle classification(s) • Classifying triangles card sort activity • Write equations where 3 angle measures equal 180 degrees. Solve for a missing angle. Apply skills from equation solving such as combining like terms and properties of equality to solve.	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket
Test Review and Unit 7 Test (2 days)	• Classify vertical, complementary and supplementary angles and determine the missing degrees; • Classify triangles by angle and side and find the missing degrees and solve for x	• Test study guide • Review activities • Unit 7 Test	• Test Study Guide • Unit 7 Test

MA.7.G.A.2	Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
MA.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.

Suggested Modifications for Special Education, ELL and Gifted Students

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
- LEP students will be allowed to use an internet translator or language glossary in order to translate vocabulary and assignments properly.
- LEP students may be allowed to work with another student who is fluent in their native language

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, PowerPoint, communicators/individual dry erase boards.

- Teachers are encouraged to use electronic assessments to determine mastery of concepts taught.
- The use of kahoot, quizizz or other types of interactive software is encouraged.

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.2.8	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

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Unit 8 Surface Area and Volume

Content Area: **Mathematics**
Course(s):
Time Period: **4th Marking Period**
Length: **16 days**
Status: **Published**

Summary of the Unit

In this unit, students will focus on analyzing three dimensional figures. Students will apply formulas to calculate the surface area, and volume of various geometrical figures.

Enduring Understandings

- The formulas for surface area derives from the sum of the bases of the shape while the formula for volume is the area of the two-dimensional base multiplied by the height of the object..
- Three-dimensional figures can be measured by their surface area and volume. Surface area is more useful when you want to know how much of the surface of the figure you can cover. Volume is more useful when you want to know how much space it takes up or how much space is inside it.
- Various real-life careers would require the skills of volume.

Essential Questions

- How can three dimensional objects be measured?
- How are the formulas for surface area and volume for prisms, cylinders and pyramids derived?
- How does the substitution property apply to the concepts of finding volume and surface area?
- In what real world situation would you be required to calculate the volume and surface area of a three dimensional figure?
- How do you calculate the volume of prisms, cylinders, and pyramids?

Summative Assessment and/or Summative Criteria

- Students will take a test to review concepts learned in Unit 8
- Students will demonstrate mastery through various assessment criteria included the unit.
- Students will demonstrate mastery on the end of unit Performance Task.

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments
Surface Area of Rectangular and Triangular Prisms **10-1** (3 days)	• Identify the vocabulary terms "lateral faces" and "base" in relation to rectangular and triangular prisms • Apply the appropriate formulas to calculate the total surface area of rectangular and triangular prisms • Use the formulas to calculate the lateral surface area and total surface area of	• Discover:Use two-dimensional nets of rectangular and triangular prisms to calculate surface area. Have students create 3-D figures from the nets to visualize the relationship. • Define vocabulary terms such as lateral face and base. • Apply the formulas: Define the formula of the surface area of a prism, labeling all variables. • Demonstrate examples in which students will substitute given measurements into the formula to calculate surface area. • Complete word problems to	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket

	rectangular prisms • Explain how surface area of prisms are used in real life	practice solving for surface area in real world situations.	
Surface Area of Pyramids **10-3** (2 days)	• Apply the appropriate formulas to calculate the total surface area of pyramids	• Define vocabulary including pyramid, polygon, and slant height. • Discuss how the base of any pyramid can be any polygon and the faces will always be triangles. • Use two-dimensional nets of square and triangular pyramids to calculate surface area. Have students create 3-D figures from the nets to visualize the relationship. • Define the formula of the surface area of a pyramid, labeling all variables. • Demonstrate examples in which students will substitute given measurements into the formula to calculate surface area.	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket

		• Complete word problems to practice solving for surface area. • Continue to build a graphic organizer of area formulas.	
Quiz Review and Quiz (2 days)	• Identify different two-dimensional figures resulting from slicing three-dimensional figures. • Apply the appropriate formulas to calculate the total surface area of rectangular and triangular prisms • Apply the appropriate formulas to calculate the total surface area of pyramids	• Quiz study guide • Stations review • Quizizz, review games, blooket, etc • Quiz	• Unit 8 Quiz Study Guide • Unit 8 Quiz

Volume of Prisms and Cylinders **10-4** (4 days)	• Use the formula V=Bh where B represents the area of the shape of the base of the prism to find the volume of rectangular prisms, Triangular Prisms and Cylinders • Apply the concept of volume of prisms and cylinders in real-life situations	• Discuss the concept of volume. • Use unit cubes to visualize the volume of a prism. • Define vocabulary including volume, base area, and height. • Define the formula of the volume of a prism, labeling all variables. • Demonstrate examples in which students will substitute given measurements into the formula to calculate volume. • Complete word problems to practice solving for volume.	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket
Volume of Pyramids **10-5** (2 days)	• Use the formula V=1/3Bh where B represents the area of the shape of the base of the prism to find the volume of rectangular pyramid or triangular Prisms • Apply the concept of volume of pyramids in real-life situations	• Hands-on Activity: Students will use rice to fill hollow three dimensional models. They will then explore the relationship that a pyramid's volume is 1/3 the volume of a prism with a congruent base. • Define the formula of the volume of a pyramid labeling all variables. • Demonstrate examples in which students will substitute given measurements into the formula to calculate volume. • Complete word problems to practice solving for volume.	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket

Cross Sections of 3D Figures **10-6** (1 day)	• Identify different two-dimensional figures resulting from slicing three-dimensional figures. • Recognize and describe plane sections of right rectangular prisms and right rectangular pyramids. • Connect the concept of cross sections to real-life applications in various fields.	• Explain that a cross section is the shape that is created when a three-dimensional figure is cut by a flat surface, or a plane. • Emphasize that cross sections can be vertical or horizontal, parallel or perpendicular plane, and that they can result in different two-dimensional figures depending on the orientation of the cut. • Suggest activity: Doodle notes, IXL topic, geogebra-3D geometry and cross sections	• Daily Homework check • Small group instruction/use of centers • Formative assessments • Exit Ticket
Review and Assess (2 days)	Students will demonstrate mastery of topics and concepts presented.	• Unit 8 Test Study Guide • Review activities: stations, study guide, small group instruction,	• Unit 8 Test Study Guide • Unit 8 Test • Unit 8 Project: Tin Can Man ○ Calculate the volume of prisms and pyramids of the arms, legs, body, feed and head of a "Tin Can Man" by applying the appropriate formulas and showing all work

MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve

	problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Resources

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New Jersey Department of Education Model Curriculum-Grades 7 and 8

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- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different size and type of font in order to avoid print confusion.
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TECH.8.2.8	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Cross Curricular/21st Century Connections

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9.2: All students will be able to identify the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Unit 9: Probability

Content Area: **Mathematics**
Course(s):
Time Period: **4th Marking Period**
Length: **14-15 days**
Status: **Published**

Summary of the Unit

In this unit, students will focus on using sampling and probability models to make inferences about statistics. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

Enduring Understandings

Probability describes the likelihood of an event occurring. The closer the ratio is to 0 the less likely it is to occur. The closer the value is to 1 the more likely the event will occur.

A probability model can be used to evaluate a chance process and its outcomes to develop theoretical or experimental probability. The model has a sample space, a list of events, and the probability of each event.

Theoretical probability of an event is the number of favorable outcomes divided by the number of possible outcomes, when all outcomes are equally likely. Theoretical probability is calculated based on an equation.

Experimental probability consists of the results of an actual experiment. These probabilities are often very close, but not usually identical. The experimental probability or relative frequency of outcomes of an event can be used to estimate the exact probability of an event. Experimental probability approaches theoretical probability when the number of trials is large. The experimental probability of an outcome can be found by first assigning outcomes to devices such as spinners, coins, and number cubes.

The possible outcomes of a compound event (a combination of two or more events) can be represented using a tree diagram, a table, or an organized list. A model, such as a table, organized list, or tree diagram, can represent the sample space of a compound event.

Essential Questions

What is probability and how can I use it to describe the likelihood of an event occurring?

How can you predict the outcome of future events?

How can events be described using probability?

How can data be used to make predictions?

How can I develop and compare probability models and use them to find probabilities of events?

What is the difference between experimental and theoretical probability and how can I use these ideas to make predictions?

How are the outcomes of given events distinguished as possible?

How can I find probabilities of compound event using sample spaces represented by organized lists, tables, tree diagrams, and simulations?

Summative Assessment and/or Summative Criteria

Students will take a test to review concepts learned in Unit 9.

Students will demonstrate mastery through various assessment criteria included in the unit.

Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

Online mathematics assessment software such as Link it, iXL

Unit Plan

Topic/Selection Timeframe	General Objectives	Instructional Activities	Benchmarks/Assessments

Simple Probability **7-1** (2 days)	Students will find the probability of simple events.	16. Define vocabulary including probability, outcome, simple event, and sample space. 17. Understant that the probability of an event ranges from 0, impossible, to 1, certain, with various levels of likelihood in between 18. Categorize and order probability of events by their likelihood (impossible, very unlikely, unlikely, equally likely/unlikely, likely, very likely and certain) 19. Compare spinners with sections that are different sizes. Ask students to determine which section they are most likely to land in and why. 20. Use a number line visual to represent likelihood of events occurring. 21. Identify the probability formula. 22. Represent probablity in three different ways: ratio, decimal and percent 23. Solve word problems and real-world examples that involve calculating simple probability. 24. Suggested Activity: Use hands-on manipulatives such as marbles, dice, spinners, etc. to simulate finding probabilities.	• Daily Homework Check • Guided and independent practice • Centers activity for review: small group instruction, online math software, hands-on manipulatives, problem-solving task
Experimental and Theoretical Probability **7-2** (2 days)	Students will find and compare experimental and theoretical probabilities.	• Introduce lesson using "Theoretical vs. Experimental Probability" activity https://www.teacherspayteachers.com/Product/Theoretical-Vs-Experimental-Probability-Activity-3768199 • Define/compare theoretical and experimental probabilities; what would happen vs. what did happen (flipping a coin, spinning a spinner, rolling dice, selecting an item from a bag, etc) • As the number of trials increases, the experimental probability gets closer to the theoretical probability • Show "Yellow Starbursts video by Dan Meyer and have students calculate the probability of yellow in pack http://www.101qs.com/203-yellow-starbursts	• Daily Homework Check • Hands-on activities comparing and calculating experimental and theoretical probabilities • Exit ticket

Independent and Dependent Events **7-2** (2 days)	Students will find the probStudents will find the probability of independent and dependent events.ability of independent and dependent events.	Suggested Warm-up: Complete an experiment using two different colors of marbles. Students will first draw two marbles from a bag with replacement and make a frequency chart of their results. Then, draw two marbles from a bag without a replacement and make a frequency chart of their results. Discuss their observations. • Define independent and dependent events and discuss the procedure for calculating each. • Make connections to compound events. • Use task cards of various events for students to match with probability solutions.	• Daily Homework check • Guided and independent practice • Use popsicle sticks, clickers, or white boards to have students vote on an event being independent or dependent. • Exit Ticket: What is the difference between independent and dependent events? Describe a real-life example of each.
Review/Quiz (2 days)	Students will demonstrate mastery of topics and concepts presented	• Provide opportunity to review multiple skills prior to assessment • Provide integer rules as well as step cards during review	• Stations review, Jeopardy, Trashketball, Quizizz game • Provide Small Group Reteach • Study Guide • Quiz

Compound Events **7-3** (2-3 days)	Day 1: Sample space and fundamental counting principal Day 2: Probability of a compound event	Sample Space and Fundamental Counting Principal • Warm-up activity: Have students work in small groups or pairs to identify all possible outcomes to create a sample space. • Create tables and tree diagrams to find the sample space of two or more events • Apply the fundamental counting principal to find the total number of possible outcome of two or more events Compound Event • Define compound events and discuss how to set up probability of a compound event as the product of the probabilities of the outcomes that form the compound event. • Suggested Activity: "Lucky Lottery" https://www.cpalms.org/Public/PreviewResourceLesson/Preview/71497	• Daily Homework Check • Guided and independent practice • Online computer software *Graded classwork assignment: Simple Probability, Experimental and Theoretical Probability, Compound Events
Simulations **7-4** (2 days)	Design and use simulations to find probabilities of compound events	• Define simulation as a method that uses an artificial process (like tossing a coin) to represent the outcomes of a real process that provides information about the probability of events • Use various tools (spinners, coins, dice, etc) to design an experiment and draw conclusions	• Daily Homework Check • Guided and independent practice • Centers activity for review: small group instruction, online math software, hands-on manipulatives, problem-solving task
Review/Test (2 days)	Students will demonstrate mastery of	• Provide opportunity to review multiple skills prior to assessment	• Stations review, Jeopardy,

	topics and concepts presented	• Provide integer rules as well as step cards during review	Trashketball, Quizizz game • Provide Small Group Reteach • Study Guide • Quiz

MA.7.SP.C	Investigate chance processes and develop, use, and evaluate probability models.
MA.7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MA.7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
MA.7.SP.C.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
MA.7.SP.C.7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

MA.7.SP.C.8a	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
MA.7.SP.C.8b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.
MA.7.SP.C.8c	Design and use a simulation to generate frequencies for compound events.

Standards

MA.7.SP.C	Investigate chance processes and develop, use, and evaluate probability models.
MA.7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MA.7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
MA.7.SP.C.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
MA.7.SP.C.7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
MA.7.SP.C.8a	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
MA.7.SP.C.8b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.

Suggested Modifications for Special Education, ELL and Gifted Students

- Students will be allowed to submit assignments using additional time per IEP modifications.
- Students will be encouraged to use different sizes and type of font to avoid print confusion
- ML students will be allowed to use an internet translator or language glossary to translate vocabulary and assignments properly.
- ML students may be allowed to work with another student who is fluent in their native language.
- Initiate discussions and provide opportunities for collaboration.
- Highlight solution steps for inequalities and model examples for students to visualize.
- Teacher partially completes the equation and labels essential terms.
- Utilize interactive tools that can be used to illustrate solution methods, and build language as well as math skills.
- Provide whiteboards for students to write the equations dictated by the teacher.
- Utilize pictures and photographs to show ELLs examples of class vocabulary and concepts.
- Describe and explain orally to students in small groups how to graph solutions, and allow them to interpret in their L1 (students' native language) and/or L2 (students' target language).

Suggested Technological Innovations/Use

- Instructional technology should be used to present and assess lessons such as; Smart Notebook, Google Slides, PowerPoint, communicators/individual dry erase boards.
- Teachers are encouraged to use electronic assessments such as Google Forms , online textbook or iXL to determine mastery of concepts taught.
- The use of Kahoot, Quizizz, iXL, Boom Cards or other types of interactive software is encouraged

Creativity and Innovation: Gathering and evaluating knowledge and information from a variety of sources, including global

perspectives, fosters creativity and innovative thinking.

- 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).

Example: Students will work collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask probing questions to clarify or improve arguments.

Global and Cultural Awareness: Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.

- 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

Example: Through class discourse and Accountable Talk, students will be comfortable and open to expressing their reasoning, critical thinking, and solutions to each other with respect.

Digital Citizenships: There are ethical and unethical uses of information and media.

- 9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).
  Example: Teachers and students will model appropriate use of all digital platforms that are being used in the classroom. Teachers and students will provide examples of student work that exhibits proper use of various platforms. Teachers will also monitor students' work and behavior using Go Guardian.

Information and Media Literacy: Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.

- 9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).

Example: Students will use a digital whiteboard, Google Slides, or other platforms, graphic organizers, and virtual manipulatives to show how they were able to organize their thoughts and solve a problem.

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.2: All students will be able to identify the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

Science:

enVision STEM Theme (Topic 7): International Trending (MS-LS2-1, MS-LS2-4, MS-ESS3-4)

- Students calculate theoretical probabilities related to the demographics of a population. They will then compare the results with experimental probabilities and use the comparisons to make predictions. They also recognize the sustainability issues related to the demographics and present solutions.

Media Arts:

Pick a Project 7D: Passionate Performances (1.2.8.Pr6a)

- Students will make a video of themselves and their performance on what they have learned in the topic. The video could include posters, interpretive dance, plays, and poetry.

Unit 10: Statistics

Content Area: **Mathematics**
Course(s):
Time Period: **4th Marking Period**
Length: **15-17 days**
Status: **Published**

Summary of the Unit

In this unit, students will focus on using sampling and probability models to make inferences about statistics. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

Enduring Understandings

Statistics can be used to draw conclusions about a population. Random sampling can be used to make predictions and compare populations.

Essential Questions

How can you predict the outcome of future events?

How do you know which type of graph to use when displaying data?

How do you explain real-world problems using statistics?

How do you interpret data from statistical representations?

How can data be used to make predictions?

How are the mean, median and mode helpful in describing data?

Summative Assessment and/or Summative Criteria

Students will take a test to review concepts learned in Unit 8.

Students will demonstrate mastery through various assessment criteria included in the unit.

Students will demonstrate mastery on the end of unit performance task.

Resources

New Jersey Student Learning Standards-Grades 7

New Jersey Department of Education Model Curriculum-Grades 7

Online mathematics assessment software such as Link it, iXL

Unit Plan

Topic/Selection	General Objectives	Instructional Activities	Benchmarks/Assessments

Timeframe			
Introduction to Statistics (1 day)	Students will calculate measures of central tendency	25. Suggested Warm-up: Calculate data from the class such as height, shoe size, etc. Use this data in the lesson to follow. 26. Using data from warm-up, to review how to calculate mean, median, and mode. Define the terms of measures of central tendency.	• Daily Homework check • Guided and independent practice • Exit Ticket: Given a set of data, which measure of central tendency best represents the data?
Graph Measures of Central Tendency (1 Day)	Students will calculate measures of central tendency and graph data.	• Show different ways to display measures of central tendency. • Students will use an appropriate graph to display their calculations in line plots and histograms.	• Daily Homework check • Guided and independent practice • Exit Ticket:
Measures of Variation (2 days)	Students will calculate measures of variation.	• Review vocabulary words: quartile, first and third quartiles, interquartile range, range , outliers • Calculate quartiles, median, range, interquartile range, outliers • Show examples when there are 2 middle numbers in the lower half or the upper half of the data. The first or third quarter is the mean of those 2 numbers.	• Daily Homework check • Guided and independent practice • Exit Ticket:

Graph Measures of Variation (1 Day)	Students will calculate measures of variation and graph data	• Students will use a box and whiskers plot to graph and display their calculations. • Discuss where the quartiles are in the box and whiskers plot as well as the minimum, maximum, and median. Show outliers on box and whiskers plot • Students will create their own box and whiskers plot based off of data and finding measures of variation.	• Daily Homework check • Guided and independent practice • Exit Ticket:
Review and Assess (2 Days)	Students will calculate and graph measures of center and variation .	• Provide opportunity to review multiple skills prior to assessment	• Stations review, Jeopardy, Trashketball, Quizizz game, teacher created review • Provide Small Group Reteach • Study Guide • Quiz

Select an Appropriate Display (2 days)	Students will select, organize, and construct appropriate data displays.	• Review types of displays including bar graph, histogram, dot plot, circle graph, line graph, box plot, etc. • View examples of each and create a graphic organizer of advantages and disadvantages of each. • Activity: Students create scenarios that can be best represented by each data display. • Online Quizlet flashcards	• Daily homework check • Guided and independent practice • Centers to review and assess: small group instruction, hands-on manipulatives (task cards), problem solving task, online computer software
Using Sampling to Predict (1 -2 days) **8-1 and 8-2**	Students will identify various sampling techniques and determine the validity of a sample	• Define vocabulary: sample, population, unbiased and biased samples, etc. • Identify unbiased and biased sample types • Explain why a sample is biased or unbiased. • Explain why conclusions made from a biased sample may not be valid. • Use an unbiased sample to make a conclusion about a population. • Use 4-Corners activity to have students determine and justify whether a sample is biased or unbiased • In small groups, have students analyze data to infer/predict about a	• Daily Homework Check • Activity responses • Journal Entry: Why is sampling an important process of the manufacturing process? Illustrate your answer with an unbiased and biased sampling method you could use to check the quality of DVDs.

		population	
Compare Populations (2-3 days) **8-3 and 8-4**	Students will compare two populations using the measures of central tendency and random samples	• Define types of graphs including box plots, double box plots, and dot plots. • Using given graphs and measures of center and tendency, to identify trends in data. Determine whether there is a significant difference in the measures of center of two data sets • Recall steps to find Mean Absolute Deviation. Find the measures of center and variation of a data set. This can be used to describe visual overlap. Describe the visual overlap of two data distributions numerically. • Ask students to make inferences about data by analyzing graphs. • Use random sampling to compare populations • Suggested Activity: Students research two sets of data, such as the heights of male vs. female basketball players. Create box plots or dot plots of the data and use to make	• Daily homework check • Guided and independent practice • Exit Ticket: Use a possible double box plot to model a given scenario.

		observations, comparisons, and inferences.	
Review and Assess (3 days)	Students will demonstrate mastery of topics and concepts presented.	• Chapter review using varied teacher created/chosen materials and tasks	• End of Unit test (Statistics) • Performance Task: Students will choose a topic to complete the following: choose a sampling method to collect data, calculate measures of central tendency, choose an appropriate display for data, and a written prompt

			analyzing data.

Standards

MATH.7.SP.A	Use random sampling to draw inferences about a population
MATH.7.SP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MATH.7.SP.A.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
MATH.7.SP.B	Draw informal comparative inferences about two populations
MATH.7.SP.B.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a

	multiple of a measure of variability.
MATH.7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Suggested Modifications for Special Education, ELL and Gifted Students

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- ML students will be allowed to use an internet translator or language glossary to translate vocabulary and assignments properly.
- ML students may be allowed to work with another student who is fluent in their native language.
- Initiate discussions and provide opportunities for collaboration.
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- Provide whiteboards for students to write the equations dictated by the teacher.
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Suggested Technological Innovations/Use

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Example: Students will work collaboratively in groups to solve mathematical tasks. Students will listen to or read the arguments of others and ask probing questions to clarify or improve arguments.

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Example: Students will use a digital whiteboard, Google Slides, or other platforms, graphic organizers, and virtual manipulatives to show how they were able to organize their thoughts and solve a problem.

Cross Curricular/21st Century Connections

9.1: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

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Science:

enVision STEM Theme (Topic 7): International Trending (MS-LS2-1, MS-LS2-4, MS-ESS3-4)

- Students calculate theoretical probabilities related to the demographics of a population. They will then compare the results with experimental probabilities and use the comparisons to make predictions. They also recognize the sustainability issues related to the demographics and present solutions.

enVision STEM Theme (Topic 8): Upscale Design (MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4)

- Students will make scale drawings of existing paths or to create plans for new walking paths or bikeways.

Media Arts:

Pick a Project 7D: Passionate Performances (1.2.8.Pr6a)

- Students will make a video of themselves and their performance on what they have learned in the topic. The video could include posters, interpretive dance, plays, and poetry.

Visual Arts:

Pick a Project 8A: Sensational Sculpture (1.5.8.Cr2c)

- Students will make a three-dimensional sculpture shaped like one of the figures they learned about. They will then find the surface area and volume of the sculpture.

Unit 11: Climate Change Interdisciplinary

Content Area: **Sample Content Area**
Course(s):
Time Period:
Length:
Status: **Published**

Section Title

The Impact of Rising Temperatures: Analyzing Climate Change Data

Summary of the Unit

With the adoption of the 2020 New Jersey Student Learning Standards (NJSLS), New Jersey became a national leader by integrating climate change education across all subject areas. Climate change, defined as a long-term shift in average weather patterns like temperature and precipitation, is primarily caused by the accumulation of greenhouse gases from burning fossil fuels and other human activities. This global phenomenon has distinct local consequences that affect communities in various ways. The NJSLS aims to equip students with the knowledge and skills to understand the causes and effects of climate change locally and globally and make informed decisions that contribute to a sustainable future. Grade 7 math standards are seamlessly woven into climate change instruction, empowering students to analyze and interpret climate data using mathematical concepts. For example, students can:

27. **Calculate** percentage increases in global average temperatures since pre-industrial times (7.RP.A).
28. **Analyze** data sets on greenhouse gas emissions or sea-level rise, identifying patterns and trends (7.SP).
29. **Solve** real-world problems involving rates of change in climate variables (7.EE).
30. **Use** proportions to estimate the impact of various factors on climate change (7.RP).

By incorporating climate change examples into math lessons, students deepen their understanding of

mathematical concepts and develop critical thinking and problem-solving skills essential for addressing this pressing global challenge. This interdisciplinary approach fosters a well-rounded education that prepares students to be informed and active participants in creating a sustainable future.

Enduring Understandings

Climate is determined by the long-term pattern of temperature and precipitation averages and extremes at a location. Climate descriptions can refer to areas that are local, regional, or global in extent. Climate can be described for different time intervals, such as decades, years, seasons, months, or specific dates of the year

Natural processes driving Earth's long-term climate variability do not explain the rapid climate change observed in recent decades. The only explanation that is consistent with all available evidence is that human impacts are playing an increasing role in climate change. Future changes in climate may be rapid compared to historical changes.

The overwhelming consensus of scientific studies on climate indicates that most of the observed increase in global average temperatures since the latter part of the 20th century is very likely due to human activities, primarily from increases in greenhouse gas concentrations resulting from the burning of fossil fuels.

Essential Questions

Why is climate change regarded as the greatest public health challenge of the 21st century?

How can people reduce their impact on the environment?

How can analyzing data help someone to determine if climate change has specifically affected New Jersey?

Summative Assessment and/or Summative Criteria

ALL SUMMATIVE ASSESSMENTS CAN BE FOUND HERE: Climate Change Google Doc

DAY 1

Name:_____ Period:___ Date:_____

BrainPop Questions: (To be used with https://www.brainpop.com/topic/climate-change/)

1 Which statistic is most closely related to climate?

- (A) Average yearly snowfall in Denver is 55 inches.
- (B) Last February was unusually warm in the Northeast.
- (C) There is an ongoing drought in central Georgia.
- (D) Wind speeds in Chicago topped 30 mph today.

2 Which saying best describes the greenhouse effect's impact on our planet?

- (A) You can't get enough of a good thing
- (B) A rising tide lifts all boats
- (C) Everything in moderation
- (D) None of the above

3

If Earth is like a greenhouse, carbon gases in the atmosphere are like the:

(A) Plants

(B) Glass

(C) Sun

(D) Ground

4 How will next year's average global temperature compare to this year's average?

- (A) It will be much higher.
- (B) It will be somewhat lower.
- (C) It will be exactly the same.
- (D) It's impossible to predict.

5 Which of the following individual actions would do the most to reduce atmospheric methane?

- (A) Going vegan
- (B) Planting a tree
- (C) Riding the bus instead of driving a car
- (D) Switching to rechargeable batteries

9 "Global climate change" is preferred to "global warming" because temperature change may not be its most conspicuous effect. What can you infer is the meaning of "conspicuous"?

- (A) Harmful
- (B) Hidden
- (C) Misleading
- (D) Noticeable

10 Which of these is an opinion about climate change?

- (A) It is the most serious danger that humans face today
- (B) Many people believe it may cause species to go extinct
- (C) Burning fossil fuels has contributed to global warming
- (D) Earth's temperature has increased over the past century

Resources

All created resources: GOOGLE DRIVE

NJDOE Climate Change Education Page: https://www.nj.gov/education/climate/

NJDOE Climate Change Instructional Resources: https://www.nj.gov/education/climate/instructional/

CLEAN: https://cleanet.org/resources/42861.html

NJ Audubon Society: https://njaudubon.org/climate-education/

National Wildlife Federation Eco-Schools: https://www.nwf.org/eco-schools-us

NASA Climate Kids: (NASA Climate Kids) This site offers interactive games, videos, and articles about climate change, making it fun and engaging for middle schoolers to learn about the science.

EPA Climate Change for Kids: (Climate Change Resources for Educators and Students | US EPA) This resource provides accessible information on climate change basics, impacts, and actions individuals can take.

NOAA Climate Education: (Climate data resources | National Oceanic and Atmospheric Administration) This site offers a collection of data resources, visualizations, and educational materials on climate change, including classroom-ready activities.

Climate.gov: (https://www.climate.gov/maps-data) This website from NOAA provides a wealth of climate data, maps, and tools, including regional information relevant to students' local communities.

Unit Plan

In this section you may fill in this table or delete it and paste your own.

THEN you will associate your standards by selecting the "standards" tab above, clicking "associate standards" and selecting your standards for this unit from the list.

7th Grade Math Unit Lesson Plan 1: Greenhouse Gasses

Overview

This lesson will introduce students to the concept of greenhouse gases and their role in climate change. Students will explore real-world data and use mathematical thinking to understand the potential impacts of global warming.

Objectives

- Students will be able to define greenhouse gases and explain their impact on the Earth's atmosphere.
- Students will analyze data related to greenhouse gas emissions and temperature trends.
- Students will use mathematical reasoning to make predictions about future climate conditions.

Materials

7th Grade Math Unit Lesson Plan 2: Climate Change in New Jersey

Overview

This lesson will introduce students to climate change through a mathematical lens. By analyzing data and creating graphs, students will develop a deeper understanding of the phenomenon.

Objectives

- Students will be able to collect and organize data related to climate change.
- Students will be able to calculate probabilities related to climate events.
- Students will be able to create and interpret graphs to represent climate data.

Materials

- Whiteboard or projector
- Markers or pens
- Graph paper or computer with graphing software
- Climate data sets (e.g., temperature,

- Whiteboard or projector
- Markers or pens
- Calculators
- Graph paper
- Data on greenhouse gas emissions and temperature trends
- Posters or handouts with images of the greenhouse effect

Procedure

Introduction (10 minutes)

- Begin by asking students to share their current understanding of global warming and climate change.
- Write down key points on the board to create a class mind map.
- Introduce the concept of greenhouse gases and explain how they contribute to the greenhouse effect.
- Use BrainPop Video illustrate the greenhouse effect. (https://www.brainpop.com/topic/climate-change/)

Activity 1: Data Analysis (25 minutes)

- Provide students with data on greenhouse gas emissions and temperature trends (e.g., temperature, precipitation, sea level)
- Calculators

Procedure

Introduction (10 minutes)

- Begin by discussing the concept of climate change with students. Ask them what they know about climate change and its potential impacts.
- Explain that while climate change is a complex issue, mathematics can be used to understand and analyze it.
- Introduce the concept of probability and how it can be applied to climate events.

Activity 1: Data Collection and Analysis (25 minutes)

- Divide students into groups of 3-4.
- Provide each group with a climate data set (SEE ATTACHED CHART) (e.g., average annual temperature for a specific location over the past century).
- Instruct students to calculate the mean, median, and mode of the data set.
- Ask students to create a line graph to visualize the temperature changes over time.

emissions over time. (SEE WORKSHEETS)

- Divide students into groups and assign each group a specific greenhouse gas (e.g., carbon dioxide, methane).
- Ask groups to create graphs to visualize the data.
- Discuss the trends observed in the graphs and the potential implications for climate change.

Activity 2: Modeling Temperature Change (25 minutes)

- Introduce the concept of climate models and how scientists use them to predict future climate conditions.
- Provide students with simplified data on temperature increases associated with different levels of greenhouse gas emissions.
- Ask students to use proportional relationships to calculate potential temperature increases based on different emission scenarios.
- Discuss the challenges and uncertainties involved in climate modeling.

Activity 3: Problem Solving (20 minutes)

- Present real-world problems related to climate change and greenhouse gas emissions.
- Discuss the trends observed in the graph.

Activity 2: Probability of Extreme Weather Events (25 minutes)

- Introduce the concept of probability and how it relates to weather events.
- Provide students with data on the frequency of extreme weather events (e.g., hurricanes, droughts, floods) in a specific region.
- Ask students to calculate the probability of an extreme weather event occurring in a given year.
- Discuss the factors that can influence the probability of these events.

Activity 3: Creating a Probability Model (20 minutes)

- Ask students to create a probability model for a specific climate event (e.g., a heatwave).
- Instruct students to assign probabilities to different outcomes (e.g., high probability, medium probability, low probability).
- Discuss the limitations of probability models and the importance of considering other factors.

Assessment

- Observe student participation and

- Examples:
    - If carbon dioxide emissions continue to increase at the current rate, what might be the potential temperature increase in 50 years?
    - How can we reduce our carbon footprint and help mitigate climate change?
- Encourage students to work in groups to brainstorm solutions and develop action plans.

Assessment

- Observe student participation and engagement during group activities.
- Evaluate students' understanding of greenhouse gases and climate change through questions and discussions.
- Assess students' ability to analyze data and solve problems related to climate change.

Differentiation

- For advanced students: Provide more complex data sets and encourage in-depth research on specific climate change topics.
- For struggling students: Offer simplified data and provide additional support with calculations and graph creation.

engagement during group activities.

- Evaluate the accuracy of students' calculations and graphs.
- Assess students' understanding of probability and its application to climate change through questions and discussions.

Differentiation

- For advanced students: Introduce more complex data sets and statistical analysis techniques.
- For struggling students: Provide additional support with calculations and graph creation. Offer simplified data sets.

Extension Activities

- Research and present on the impact of climate change on a specific ecosystem or community.
- Develop a climate change awareness campaign using data and visuals.
- Explore the use of technology to model climate change scenarios

Extension Activities • Research different renewable energy sources and their potential impact on reducing greenhouse gas emissions. • Develop a presentation or poster campaign to raise awareness about climate change. • Investigate the role of international cooperation in addressing climate change.	

MATH.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MATH.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MATH.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MATH.7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
MATH.7.SP.C.7.a	Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events.
MATH.7.SP.C.8.a	Understand that, just as with simple events, the probability of a compound event is the

	fraction of outcomes in the sample space for which the compound event occurs.
MATH.7.SP.C.8.b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

Suggested Modifications for Special Education, ELL and Gifted Students

Suggested Modifications for Special Education, Multilingual Learners (MLL)/English Language Learners (ELL), and Gifted Students:

Special Education*:

- Collaboration between Content Education and Special Education teachers
- Preferential seating
- Printed and highlighted notes
- Modified test/quizzes/worksheets/written assignments
- Repetition of directions and refocus activities
- Read test/quiz/assessment questions orally if needed
- Allow for more time on assessments and assignments

MLL/ELL:

- Collaboration between Content Education and MLL/ELL teachers

- Use of audio tapes when applicable
- Use of translation dictionary when applicable
- Provide for oral performance
- Allow the use of a computer or other technological devices.
- Highlight notes
- Use of graphic organizers
- Peer liaison
- Visual aids
- Provide materials in multiple languages or at varying levels of English proficiency.
- Use visuals (e.g., diagrams, pictures) to support understanding.
- Pre-teach essential vocabulary and concepts.
- Allow for alternative forms of communication (e.g., drawing, gestures).
- Provide opportunities for peer collaboration and language practice.

Gifted Students

- Provide more elaborate, complex, and in-depth study of significant ideas and themes that integrate knowledge within and across the curriculum.
- Provide other outside sources (media, content, community) for thematic study.

- Promote self-directed and self-initiated learning.
- Allow for the development of productive thinking skills to allow students to generate new knowledge.
- Provide opportunities for independent research and exploration.
- Encourage critical thinking and problem-solving skills.
- Allow for student-led projects and presentations.
- Provide opportunities for leadership and mentorship in group activities.

*Consistent with individual plans when appropriate.

Suggested Technological Innovations/Use

Allow students to use Excel or Google Sheets to analyze data

Offer audio recordings of the data for students who prefer auditory learning.

Multiple Means of Action and Expression:

Provide various tools for data analysis (calculators, spreadsheets, online tools).

Cross Curricular/Career Readiness, Life Literacies and Key Skills Practice

CRP.K-12.CRP8 Utilize critical thinking to make sense of problems and persevere in solving them.

TECH.8.1.8.F.CS1 Identify and define authentic problems and significant questions for investigation.

TECH.8.1.8.F.CS2 Plan and manage activities to develop a solution or complete a project.

TECH.8.1.8.F Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

TECH.8.1.8.E.1 Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

TECH.8.1.8.E.CS2 Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media

TECH.8.1.8.E.CS4 Process data and report results.

TECH.8.1.8.B.1 Synthesize and publish information about a local or global issue or event (ex. telecollaborative project, blog, school web)

CAEP.9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

SCI.MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

6-8.MS-ESS2-6.2 Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

LA.RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

LA.WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

LA.SL.7.1.A Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

UDL Framework

In this climate change unit designed using the UDL framework, students will first encounter clear and attainable outcomes that highlight the significance of understanding climate change's impact on the environment and society. Their diverse needs, backgrounds, strengths, and barriers will be anticipated, ensuring that all students can access and engage with the material. They will experience instructional activities tailored to include various means of representation, expression, and engagement, such as multimedia presentations, interactive simulations, and group discussions. Students will have multiple ways to demonstrate their understanding through projects, presentations, and written reflections as part of the assessment plan. Lastly, ongoing reflection and adaptation will ensure that instructional strategies remain effective, inclusive, and aligned with students' needs and the overall learning goals.

- Multiple Means of Representation:
    - Provide data in various formats (tables, graphs, infographics).
    - Use visual aids (maps, photos) to illustrate the effects of climate change.
    - Offer audio recordings of the data for students who prefer auditory learning.
- Multiple Means of Engagement:
    - Allow students to choose how they want to analyze data (individually, in pairs, or in groups).
    - Provide options for students to present their findings (written reports, oral presentations, visual displays).
    - Incorporate real-world examples of climate change impacts to make the content relevant and engaging.
- Multiple Means of Action and Expression:
    - Provide various tools for data analysis (calculators, spreadsheets, online tools).

- Offer different levels of scaffolding for students who need more support.
- Allow students to choose how they want to demonstrate their understanding (solving problems, creating models, explaining concepts).