Wall Township Public Schools	Board Approval Date: 8/18/2026

Course Title: Math 7

Course Description: In Grade 7, instruction focuses broadly on four critical areas:
(1) developing understanding of and applying proportional relationships;
(2) developing understanding of operations with rational numbers and working with expressions and linear equations;
(3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and
(4) drawing inferences about populations based on samples.*
*See the end of document for additional information related to the critical areas of focus.

New Jersey Student Learning Standards - Mathematics

Vision for Mathematics Education in New Jersey
A New Jersey education in Mathematics builds quantitatively and analytically literate citizens prepared to meet the demands of college and career, and to engage productively in an information-driven society. All students will have access to a high-quality mathematics education that fosters a population that:

- leverages data in decision-making and as a lens for discussing, analyzing, and responding to practical questions.
- persists to make sense of and model problems arising in everyday life, society, and the workplace.
- thinks critically and strategically to assess quantitative relationships and to solutions to complex problems.
- employs precise reasoning and constructs viable arguments to deduce conclusions, recognize false statements and assess peers' reasoning.
- interprets, evaluates and critiques the mathematics embedded in social, scientific and commercial systems, as well

as the claims made in the private and public sectors.
- communicates precisely when conveying, representing, and justifying both qualitative and quantitative perspectives.

Standards for Mathematical Practice*

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report Adding It Up: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

*See end of document for additional information related to the mathematical practices.

Inclusion of Climate Change Opportunities

( ) notes opportunities to integrate specific examples of climate change education provided by additional age-appropriate resources

The goal of inclusion of climate change education implementation is to foster generations of New Jersey students that can analyze, question, interpret, to think independently, and bring critical deduction to fulfill, and to lead in jobs created by burgeoning industries of the future green economy.

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**

Students will be able to,

Act as a responsible and contributing community member and employee.
Attend to financial well-being in their life and career.
Consider the environmental, social and economic impacts of decisions.
Demonstrate creativity and innovation throughout their life and career.
Utilize critical thinking to make sense of problems and persevere in solving them.
Model integrity, ethical leadership and effective management.
Plan education and career paths aligned to personal goals.
Use technology to enhance productivity, increase collaboration and communicate effectively.
Work productively in teams while using cultural/global competence.

Computer Science & Design Thinking (CS & DT**):**

The practices describe the behaviors and ways of thinking that computationally literate students use to fully engage in today's data-rich and interconnected world. Computational thinking is at the heart of the practices and refers to the thought processes involved in expressing solutions as computational steps that can be carried out by a computer. It requires understanding the capabilities of computers, formulating problems addressed by a computer, and designing algorithms that a computer can execute. Curriculum writers and educators will want to consider how they can design learning experiences that will enable their students to develop these skills in conjunction with the content knowledge reflected in the core ideas and performance expectations. components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form

Grade 7 Overview	
Domain	**Cluster Headings**
Ratio and Proportional Relationships	Analyze proportional relationships and use them to solve real-world and mathematical problems.
The Number System	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
Expressions and Equations	Use properties of operations to generate equivalent expressions. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
Geometry	Draw, construct and describe geometrical figures and describe the relationships between them. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
Statistics and Probability	Use random sampling to draw inferences about a population. Draw informal comparative inferences about two populations. Investigate chance processes and develop, use, and evaluate probability models.

Course Sequence & Pacing	
Unit Title	**Estimated Number of Instructional Periods** Days, w/Optional , with additional learning activities included**
Unit 1: Scale Drawings	14, 16, 20
Unit 2: Introducing Proportional Relationships	17, 18, 22
Unit 3: Measuring Circles	11, 15, 18
Unit 4: Proportional Relationships and Percentages	16, 18, 22
Unit 5: Operations With Positive and Negative Numbers	17, 16, 21
Unit 6: Expressions, Equations, and Inequalities	20, 22, 30
Unit 7: Angles, Triangles, and Prisms	14, 18, 22
Unit 8: Probability and Sampling	14, 20, 25
Total Instructional Periods	123, 143, 180

**Instructional periods are scheduled for 60 minutes

Course Sequence & Pacing

Unit Expectations for Learning	Math 7
Unit 1: Scale Drawings • Describe characteristics of scaled copies and create scaled copies using equivalent ratios. • Scale figures by applying a scale factor to each length in the figure. • Draw accurate scaled copies on a grid by applying knowledge of scale factor. • Determine which scale factors create a copy that is larger, smaller, or the same size as the original. • Explore how different scale factors affect the area of scaled copies. • Explore how scale is used to represent distances in the real world. • Determine actual and scaled distances from a scale drawing. • Create scale drawings given the actual dimensions of an object and the scale. • Create scale drawings of the same object using different scales. • Calculate distances on a scale drawing, given a drawing of the same object with a different scale. • Create logos by choosing appropriate scales for scale drawings of specific sizes. • 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.	20 Periods
Unit 2: Introducing Proportional Relationships • Explore equivalent ratios and have initial, informal conversations about the key ideas in proportional relationships. • Explore proportional relationships and analyze tables of equivalent ratios.	21 Periods

• Determine, interpret, and use constants of proportionality to make sense of proportional relationships. • Use repeated reasoning about tables to write equations for proportional relationships. • Write and interpret equations that represent proportional relationships. • Find the two constants of proportionality for a proportional relationship, discover they are reciprocals, and use them to write two equations representing the relationship. • Compare proportional and nonproportional relationships. • Explore what a proportional relationship looks like graphically. • Use graphs to identify constants of proportionality. • Use graphs and equations to compare proportional relationships. • Connecting Descriptions, Tables, Graphs, and Equations. • Use proportional relationships to model the water usage of baths and showers. • Reflect on how the mathematical modeling process offers insight into a real-world context.	
Unit 3: Measuring Circles • Examine the relationship between the diagonal length and perimeter of a square in preparation to explore analogous relationships in circles. • Study both examples and non-examples of circles and develop language to describe them precisely, including the terms radius and diameter. • Explore the relationship between a circle's diameter and circumference. • Apply knowledge of circumference to calculate perimeters of shapes made from squares and parts of circles. • Surface strategies to determine the area of complex shapes and estimate the areas of shapes with curved edges. • Use repeated reasoning to make sense of the relationship between radius squares and the area of a circle. • Discover a formula for the relationship between the radius and area of a circle.	12 Periods

• Use the relationship between circumference and area to derive the formula for the area of a circle. • Apply the area formula to solve problems involving the area of circles as well as shapes composed of parts of circles and squares. • Apply knowledge of circumference and area to make sense of a challenge involving calculating the areas of two shapes based on their perimeters.	
Unit 4: Proportional Relationships and Percentages • Visualize benchmark percentages on a grid and Calculate the percent of a quantity as a rate per `100`.Compare and contrast different strategies for determining the percent of a shaded region. (Speaking and Writing) • Use tape diagrams and tables to represent situations involving a percent increase or decrease. Determine a new amount given an original amount and a percent increase or decrease and interpret a verbal description to solve problems about percent increase or decrease. (Reading and Writing) • Use equations to represent situations involving a percent increase or decrease. Use a tape diagram where `100\%` corresponds to the original value to represent adding or subtracting a percent of the original value. • Calculate the original amount given the new amount and a percent change for one-step and multistep percent problems. Explain a strategy for calculating an original value, new value, or percent change given the other two quantities. • Solve problems about price changes over time, including calculating the new price or the percentage change. Solve problems involving percent increase of more than `100\%. Compare how different prices have changed using percentages. • Calculate an original amount, new amount, or percent change in the context of sales tax and tip, including situations that involve multiple percent increases or decreases (e.g., sales tax and a discount).	18 Periods

• Use proportional relationships that represent a percent change to analyze an issue in society and interpret and discuss advantages and disadvantages of different payment systems for restaurant workers. • Know that percent error expresses error as a percentage of a desired value. Decide whether a value is within an acceptable percent error. • Answer questions involving percent increase and decrease in the world. Write questions about a situation that can be answered using proportional reasoning and percent increase or decrease. • Determine an unknown value in a proportional relationship using a table. Compare and contrast strategies for solving problems involving proportional relationships with fractional quantities, such as scale factor and constant of proportionality. • Use a constant of proportionality to solve problems involving fractional quantities and describe strategies for solving problems involving proportional relationships with fractional quantities. • Explore patterns that lead to terminating or repeating decimals when converting a fraction to a decimal using long division. Describe strategies for determining whether a fraction will be represented as a terminating or repeating decimal.	
Unit 5: Operations With Positive and Negative Numbers • Use a visual model to represent adding and subtracting positive and negative numbers. Use a visual model to represent that pairs of numbers can be combined to make `0`. • Connect different visual models that represent addition and subtraction. Add and subtract positive and negative numbers and describe how a visual model represents adding or subtracting positive and negative numbers. • Add positive and negative numbers, including decimals and fractions, on a number line. Describe a strategy for adding positive and negative decimals and fractions. • Subtract positive and negative rational numbers on a number line and compare and contrast	18 Periods

expressions that include the same numbers in different orders. • Add and subtract integers, decimals, and fractions in complex expressions. Describe whether the sum or difference of two rational numbers will be positive or negative. • Use visual models to represent multiplying integers and explain why the product of two numbers is positive or negative. • Represent rate, time, and position using the product of positive and negative numbers. Explain why the product of two negative numbers is positive in the context of rate, time, and position. • Multiply and divide integers and justify why different multiplication and division expressions have the same value. • Analyze expressions involving the four operations and justify whether a statement involving addition, subtraction, multiplication, or division is always, sometimes, or never true. • Add, subtract, multiply, and divide integers in multistep expressions. Explain how the signs and values of numbers impact the total value of an expression. • Add and subtract positive and negative numbers to solve problems involving real-world situations. Interpret information to make connections with real-world situations. • Calculate positive and negative rates to solve real-world problems. Describe how positive and negative rates can be used to make predictions. • Apply operations with positive and negative numbers to analyze real-world situations. Interpret information to develop a plan to address real-world issues.	
Unit 6: Expressions, Equations, and Inequalities • Make predictions and calculate unknown values in different patterns. • Use a tape diagram to determine an unknown value in context. Interpret a tape diagram that represents a relationship in context. • Connect tape diagrams, equations, and verbal descriptions in context. Write an equation to represent a tape diagram and a context and interpret the meaning of situations in a mathematical context.	27 Periods

• Connect features of a situation to the tape diagram, equation, and solution that represent it. Write equations of the form `px+q=r` and `p\left(x+q\right)=r` to represent situations and determine their solutions using a tape diagram. • Determine an unknown value on a hanger diagram. Describe strategies that will keep a hanger balanced. • Connect moves on hanger diagrams to moves that determine the value of a variable in an equation. Solve equations of the form `px+q=r` and `p\left(x+q\right)=r` that involve positive rational numbers. • Solve equations of the form px+q=r that involve positive and negative numbers. Explain why a solution to an equation is accurate. • Expand and factor expressions that include positive and negative coefficients. Solve equations that involve expanding an expression and analyze different strategies for solving the same equation. • Write equivalent expressions that involve factoring, expanding, and reordering terms. Justify whether factored, expanded, or reordered expressions are equivalent. • Write equivalent expressions with fewer terms by expanding, adding, and subtracting terms. Explain how to write equivalent expressions using fewer terms. • Solve equations using a variety of strategies. Compare and contrast strategies for solving the same equation. • Write and solve equations to represent situations involving positive and negative numbers. Connect visual representations, equations, and verbal descriptions of the same situation. • Understand and use the symbols to describe inequalities and draw and label a graph on the number line that represents an inequality. Interpret an inequality that represents a context. • Determine the solutions to an inequality with only positive numbers. Compare and contrast solutions to equations and solutions to inequalities. • Write an inequality to represent a context. Solve an inequality in context using its corresponding equation. Interpret the solution to an inequality. • Solve inequalities with positive and negative coefficients, and graph their solutions. Test values	

to determine which inequality symbol represents the solutions to an inequality. Explain how to determine the graph of the solutions to any inequality. • Write and solve an inequality to answer a question about a situation with a constraint. Critique solutions to an inequality, including whether fractional or negative values are reasonable.	
Unit 7: Angles, Triangles, and Prisms • Use reasoning to determine angle measures around a vertex and describe a strategy to determine angle measures around a vertex. • Determine unknown angle measures by reasoning about complementary and supplementary angles. Describe what it means for angles to be complementary or supplementary. Explain how the parts of an equation represent an angle diagram. • Use angle relationships to write equations and determine unknown angle measures. Describe what it means for two angles to be vertical. • Solve multistep problems involving complementary, supplementary, and vertical angles. Explain how to determine missing angle measures using angle relationships. • Determine whether three segments will form a triangle. Justify whether three segments form a triangle. • Determine how many non-identical polygons can be made with a given set of segments. Explain that shapes are identical copies if they match up exactly when placed on top of each other. • Use manipulatives, tools, or technology to build triangles given three measurements. Explain when there is more than one possible triangle given three measurements and why. • Use a protractor and ruler to draw triangles given three measurements. Explain how many different triangles can be drawn using given measurements. • Determine the shapes that result from a cross section. Compare and contrast cross sections of prisms and pyramids. • Determine the volume of right rectangular prisms and right triangular prisms. Explain the	10 Periods

relationship between the volume of a prism, the area of its base, and its height • Calculate the volume of a prism with a complex base using a variety of area strategies. Explain the relationship between the volume of a prism, the area of its base, and its height. • Calculate the surface area of a prism. Compare and contrast different strategies for calculating the surface area of a prism. • Apply surface area and volume strategies to answer questions about a real-world situation. Explain whether to use the surface area or volume of a prism in order to solve a problem in a real-world situation.	
Unit 8: Probability and Sampling • Describe the likelihood of events using the words impossible, unlikely, equally likely as not, likely, or certain. Explain how experiments can help determine the likelihood of future events • Understand probability as a number between `0` and `1` that represents the likelihood of an event occurring. Compare the probability of events using fractions, decimals, and percentages and explain how to use a sample space to determine the probability of an event. • Use proportional reasoning and data from a repeated experiment to make predictions about the sample space. Describe how to use the results from a repeated experiment to make predictions. • Recognize that the results of a repeated experiment approach the probability of the event. Make connections between the probability of an event and a graph representing data from a repeated experiment. • Use the results from a repeated experiment to approximate the probability of an event and explain whether an object is fair based on the results of a repeated experiment. • Create and interpret a list, table, or tree diagram that represents the sample space of a compound event. Determine the probability of a compound event. Justify whether a game is fair using one or more representations of the game's sample space.	23 Periods

• Use a simulation to estimate the probability of a compound event. Describe how a simulation can be used to estimate the probability a compound event occurs. • Design and use a simulation to estimate the probability of a compound event. Explain how to design and use a simulation to make predictions. • Calculate the mean and mean absolute deviation (MAD) for a data set. Use the shape, center, and spread to compare data sets and justify a choice using evidence from the data set. • Compare the mean of multiple samples from the same population to the mean of the population. Describe how a sample may be used when it is unreasonable to gather data about a population. • Determine whether or not a sampling method is likely to result in a representative sample. Explain why a representative sample is needed to understand a population. • Estimate unknown information about a population using proportional reasoning. Describe how a sample and proportional reasoning can be used to estimate information about a population. • Estimate a measure of center of a population based on one or more samples. Interpret box plots or dot plots that represent real-world situations. • Calculate the difference between the measures of center of two samples with similar variability as a multiple of the measure of variability. Justify whether a claim is supported based on visual and quantitative differences in the measures of center. • Use statistics from random samples to understand a population or compare two populations. Justify claims about one or more populations based on statistics from samples.	

Unit 1

Desired Results

Unit 1 Title: Scale Drawings

Unit Summary: Students examine and create scaled copies of figures, as well as explore scale drawings of real-life objects.

Sub-Unit 1: Scaled Copies (Lessons 1–5 + Practice Day + Quiz)

- Describe how scaling affects lengths, angles, and areas in scaled copies
- Use scale factors to create and compare scaled copies.
- Analyze how scaling affects lengths, angles, and areas in scaled copies using mathematically precise language.

Sub-Unit 2: Scale Drawings (Lessons 6–11 + Practice Day + Quiz)

- Represent distances in the real world using scales and scale drawings.
- Analyze strategies for creating a scale drawing to represent actual distances and areas using mathematically precise language.

Learning Standards

NJSLS Math:
7.G Geometry
A. Draw, construct, and describe geometrical figures and describe the relationships between them

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.

B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

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.

7.RP Ratios and Proportional Relationships

A. Analyze proportional relationships and use them to solve real-world and mathematical problems

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks

$\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\left(\frac{1}{2}\right)/\left(\frac{1}{4}\right)$ miles per hour, equivalently 2 miles per hour.

2. Recognize and represent proportional relationships between quantities.

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.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Math Practices: MP1, MP2, MP3, MP4, MP6, MP7, MP8

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1).
9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Computer Science & Design Thinking (CS & DT**):**

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.
8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets

Unit Essential Questions:	**Unit Enduring Understandings:**
How can you tell whether a figure is a scaled copy of another figure?	A figure is a scaled copy of another if their corresponding sides are proportional and their corresponding angles are equal.

How are lengths, angles, and areas affected when creating scaled copies? How do scales and scale drawings help bring the world to a more manageable size?	When figures are scaled, the side lengths change by a constant factor, angles stay the same, and the area changes by the scale factor. Scale drawings and scale factors help us represent real-world objects and spaces in smaller or larger, more manageable sizes while keeping their proportions accurate.
Vocabulary: proportional, scale, scale drawing, scale factor, scaled copy	

Students will be able to:

- **What Are Scaled Copies?:** Describe characteristics of scaled copies and create scaled copies using equivalent ratios. 7.G.A.1 7.RP.A.2.A MP2 MP7
- **Lengths and Scaled Copies:** Scale figures by applying a scale factor to each length in the figure. 7.G.A.1 7.RP.A 7.RP.A.2 MP7
- **Drawing Scaled Copies**: Draw accurate scaled copies on a grid by applying knowledge of scale factor. 7.G.A.1 MP3 MP5
- **Effects of Scale Factors:** Determine which scale factors create a copy that is larger, smaller, or the same size as the original. 7.G.A.1 7.RP.A.2.B MP6 MP7
- **Scaling and Area:** Explore how different scale factors affect the area of scaled copies. 7.G.A.1 7.G.B.6 MP1 MP3 MP8
- **Comparing Scale Factor and Scale:** Explore how scale is used to represent distances in the real world. 7.G.A.1 MP2
- **Scale Drawings:** Determine actual and scaled distances from a scale drawing. 7.G.A.1 7.G.B.6 7.RP.A.3 MP2 MP4

- **Creating Scale Drawings:** Create scale drawings given the actual dimensions of an object and the scale. 7.G.A.1 MP6
- **Creating Scale Drawings:** Create scale drawings of the same object using different scales. 7.G.A.1 MP7
- **Same Object, Different Scales:** Calculate distances on a scale drawing, given a drawing of the same object with a different scale. 7.G.A.1 MP6 MP7
- **Scale and Scale Factor*:** Create logos by choosing appropriate scales for scale drawings of specific sizes. 7.G.A.1 MP1 MP6

- **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.

*Optional Lesson

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 1 "Scaling Machines" - What Are Scaled Copies

Day 2: Amplify Desmos Lesson 2 "Scaling Robots" - Lengths and Scaled Copies

Slide 2: Have students select the rose image. Later in the lesson, students can select other images to create for a

challenge. Slide 11: Have all students use a common starting point.
Day 3: Practice Day: Activities are included in the table below*.

Day 4: Amplify Desmos Lesson 3 "Make It Scale" - Drawing Scaled Copies

Day 5: Amplify Desmos Lesson 4 "Scale Factor Challenges" - Effects of Scale Factors
Slide 9: This slide can be used at the end of the lesson for an extension activity.

Day 6: Practice Day: Activities are included in the table below*.

Day 7: Amplify Desmos Lesson 5 "Tiles" - Scaling and Area
Slide 1: Let students play with colors for the mosaics, but have the class use the same mosaic for the rest of the lesson.

Day 8: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–5. Consider using this time to prepare for the upcoming quiz.

Day 9: Amplify Desmos Lesson 1-5 Sub-Unit Quiz - Scaled Copies
Students will demonstrate their ability to:

- Use scale factors to create and compare scaled copies.
- Describe how scaling affects lengths, angles, and areas in scaled copies.

Day 10: Amplify Desmos Lesson 6 "Introducing Scale" - Comparing Scale Factor and Scale
Slide 8: Differentiate groups based on different scales.

Day 11: Amplify Desmos Lesson 7 "Will It Fit" - Scale Drawings
Supplement this lesson with Delta Math activity. Supplemental Material

Day 12: Practice Day: Activities are included in the table below*.

Day 13: Amplify Desmos Lesson 8 "Scaling States, Part 1" - Creating Scale Drawings
Slide 5: Differentiate groups based on different scales.
Keep student work for the following day for students to refer to.

Day 14: Amplify Desmos Lesson 9 "Scaling States, Part 2" - Creating Scale Drawings
Display student work from lesson 8 for reference.

Day 15: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 6-9. Consider using this time to prepare for the upcoming quiz.

Day 16: Teacher created digital QUIZ created with Amplify Desmos Skill plan for Lessons 6-9 Sub-Unit 2 - **Scale Drawings**
Students will demonstrate their ability to

- Represent distances in the real world using scale and scale drawings.
- Analyze strategies for creating a scale drawing to represent actual distances and areas.

Day 17: Amplify Desmos Lesson 10 "Scale Buildings" - Same Object, Different Scales
Before starting this lesson, have a warm-up with grid paper for students to practice using scale to determine the height of a building. This lesson can be used as a Building Thinking Classroom lesson.

Day 18: Amplify Desmos Lesson 11 "Team Spirit (Optional)" - Scale and Scale Factor

Day 19: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–11. Consider using this time to prepare for the upcoming assessment.

Day 20: Amplify Desmos 7.1 End of Unit Assessment

Pacing Considerations

Lesson 4: This lesson supports students in developing a conceptual understanding of scaling and scale factor, which will be addressed in more depth in upcoming lessons. If students show a strong understanding of scale drawings in earlier lessons and in Problem 1 of the Pre-Unit Check, this lesson may be omitted. If omitted, be sure to discuss how the scale factor that takes one figure to another figure relates to the scale factor that takes the second figure back to the first.

Lessons 8–9: These lessons support students in creating scale drawings using different scale factors. They could be condensed into one class period by completing Activity 1 from each lesson.

Optional Lesson 11: This lesson gives students an opportunity to use their creativity and personal experiences to apply the concepts they learned in this unit to choose an appropriate scale for a logo. This lesson can be omitted because there is no new content introduced in this lesson.

Activities for Unit 1: Amplify Lesson's 1-11*

Delta Math Skills for the Lesson
• Find the Scale Factor • Scaling Numbers (Level 1) • Scaling Numbers (Level 2)

- Find the Scale Factor (Level 2)
- Scaled Figures Level 1
- Scaled Figures Level 2
- Scaled Figures Level 3
- Create Scaled Drawings on a Grid (Level 1)
- Create Scaled Drawings on a Grid (Level 2)
- Scale Word Problems (L1)
- Scale Word Problems (L2)

Amplify:

- Unit 1 Lesson Practice
- Unit 1 Additional Practice
- ML 7.1.04 Mini-Lesson: Connecting Scale Factors to Scaled Copies
- ML 7.1.10 Mini-Lesson: Determining Unknowns in Scale Drawings
- 7.1.04 Boost Personalized Learning Activity: Connecting Scale Factors to Scaled Copies
- 7.1.10 Boost Personalized Learning Activity: Using and Determining Scale
- 7.1 Sub-Unit 1 Extensions: Scaled Copies
- 7.1 Sub-Unit 2 Extensions: Scale Drawings

Team-created weekly DeltaMath spiral cumulative reviews

Understanding Scale Drawings

***G.B.6 Activity:** Design an Energy-Efficient Home for a Changing Climate

Learning Objectives:

- Students will learn about the impact of building design on energy efficiency and climate change.
- Students will apply their knowledge of area, volume, and surface area to calculate the properties of their building designs.
- Students will solve real-world problems related to minimizing heat loss and maximizing energy efficiency through building design.

Activity Steps:

1. Introduce Climate Change and its Impact on Buildings: Begin by discussing how climate change affects our environment and the need for sustainable practices, including energy-efficient buildings. Explain that buildings consume significant amounts of energy for heating and cooling, contributing to greenhouse gas emissions.
2. Explore the Surface Area to Volume Ratio: Introduce the concept of the surface area to volume ratio and explain how it relates to heat loss in buildings. A building with a larger surface area relative to its volume loses more heat, requiring more energy for heating and cooling.
3. Design Sustainable Building Models: Divide students into groups and challenge them to design and build models of sustainable houses or buildings using everyday materials (cardboard, construction paper, etc.). Encourage them to consider various shapes and features that can minimize heat loss, such as:
    1. Compact shapes: A cube is the most reasonable shape for a house to minimize heat transfer. Encourage students to explore other compact shapes.
    2. Insulation: Explain the importance of insulation and how different materials have different R-values (thermal resistance).
    3. Passive solar design: Incorporating features like south-facing windows to capture sunlight in winter and strategically placed shading for summer.
    4. Green roofs or walls: Discuss how these can help regulate temperature and improve energy efficiency.
4. Calculate Area, Volume, and Surface Area: Have students calculate the surface area, volume, and surface area to volume ratio of their building models using the standard formulas for triangles, quadrilaterals, polygons, cubes, and right prisms.

5. Analyze and Compare Designs: Students can compare the surface area to volume ratios of their different designs and discuss how these differences might affect energy efficiency. They can present their findings to the class and explain their design choices in terms of sustainability.

Real-world Connections:

- This activity connects to the real-world problem of designing energy-efficient buildings to reduce our carbon footprint and mitigate climate change.
- Students can research sustainable architecture examples and discuss how architects apply geometry and calculations to create energy-efficient structures.
- They can also research local building codes or programs related to energy efficiency and how they incorporate geometric calculations.

Extension Activities:

- Students can research and calculate the heat loss of different building materials used in their models based on their R-values and the surface area of the building.
- They can explore different architectural software or online tools that are used to calculate energy efficiency in buildings.
- Students can design a model of a school building or other community building and calculate its energy efficiency.

Assessment Evidence

Formative Assessments: Pre-Unit Check (optional), Sub-Unit Quiz Lessons 1-5, Sub-Unit Quiz Lessons 6-9, Show What You Know

Summative Assessments: End-of-Unit Assessment
Common Benchmark Assessments: Common Cumulative Assessment
Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials

Core Instructional Program: Amplify Desmos Math Online Platform
Desmos Materials by Lesson: • blank sheets of paper (Lesson 9) • calculators (Lesson 9) • index cards (Lesson 3) • graph paper (Lessons 3, 5, 10–11) • rulers (Lessons 7–9, 11)
mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications: Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:
Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

- Small group/One to one - Additional time - Review of directions - Student restates information - Space for movement or breaks - Extra visual and verbal cues and prompts - Preferential seating - Follow a routine/schedule - Rest breaks - Verbal and visual cues regarding directions and staying on task - Checklists - Immediate feedback Alternate or reduced work within Digital Platforms such as Delta Math, and Link It assignments

Specific Strategies and Practices that Support English Language Learners

English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts - Personal Glossary - Extended Time - Simplified/Verbal Instructions - Frequent Breaks - Visual learning, including graphic organizers - Use of cognates to increase comprehension - Teacher modeling - Pairing students with beginning English language skills with students who have more advanced English language skills - Scaffolding - Word walls - Think-pair-share - Cooperative learning groups Alternate or reduced work within Digital Platforms such as Delta Math, and Link It assignments

Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice Alternate or reduced work within Digital Platforms such as Delta Math, and Link It assignments Opportunities for make-up work or reduce number of assignments - Provide access to extra help when possible

Students with 504 Plans

Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way. Students' accommodations are outlined in their individual 504 plan. -

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

-Homogenous Grouping - Small Group In-Depth Instruction - Differentiated Online Practice - Alternative Assessments - Pre-Assess to provide Differentiated Instruction to Accelerate Learning
-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 2

Desired Results

Unit 2 Title: Introducing Proportional Relationships

Unit Summary: Students explore proportional relationships in a variety of real-world contexts and make comparisons using representations such as tables, equations, and graphs.

Sub-Unit 1: Proportional Relationships in Tables (Lessons 1–3 + Practice Day + Quiz)

- Use tables to recognize proportional relationships
- Determine a constant of proportionality from a table.

Sub-Unit 2: Proportional Relationships in Equations (Lessons 4–7 + Practice Day + Quiz)

- Write and use equations to describe proportional relationships.
- Determine a constant of proportionality from an equation.

Sub-Unit 3: Proportional Relationships in Graphs (Lessons 8–10 + Practice Day + Quiz))

- Use graphs to recognize proportional relationships.
- Determine a constant of proportionality from a graph.

Sub-Unit 4: Using Proportional Relationships (Lessons 11–13 + Practice Day)

- Use proportional relationships to solve real-world and mathematical problems.

Learning Standards

NJSLS Math:

7.RP Ratios and Proportional Relationships
A. Analyze proportional relationships and use them to solve real-world and mathematical problems

2. Recognize and represent proportional relationships between quantities.

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.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.

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 Practices: MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

Interdisciplinary Connections
Career Readiness, Life Literacies, & Key Skills (CLKS)**:** **9.4.8.CT.2:** Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1). **9.4.8.DC.2:** Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8). **9.4.8.IML.2:** Identify specific examples of distortion, exaggeration, or misrepresentation of information. **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.
Computer Science & Design Thinking (CS & DT**):** 8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices. 8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets	
Unit Essential Questions: What does it mean for two things to be proportionally related? How can you tell when two things are proportionally related?	**Unit Enduring Understandings:** Two quantities are proportionally related when they have a constant ratio or rate, meaning one quantity is a constant multiple of the other. Proportional relationships can be identified by checking for a constant ratio between corresponding values, using tables, graphs, equations, or verbal descriptions.

Vocabulary: constant of proportionality, coordinate plane. equivalent ratios, origin, proportional relationship

Students will be able to:

- **Using Equivalent Ratios:** Explore equivalent ratios and have initial, informal conversations about the key ideas in proportional relationships. 7.RP.A MP6 MP7
- **Introducing Proportional Relationships With Tables:** Explore proportional relationships and analyze tables of equivalent ratios. 7.RP.A 7.RP.A.2 7.RP.A.2.A MP7
- **Constant of Proportionality:** Determine, interpret, and use constants of proportionality to make sense of proportional relationships. 7.RP.A 7.RP.A.1 7.RP.A.2.A 7.RP.A.2.B MP2
- **Proportional Relationships and Equations:** Use repeated reasoning about tables to write equations for proportional relationships. 7.RP.A.2 7.RP.A.2.C MP8
- **More Equations of Proportional Relationships:** Write and interpret equations that represent proportional relationships. 7.RP.A.2 7.RP.A.2.B 7.RP.A.2.C MP2
- **Two Equations for Each Relationship:** Find the two constants of proportionality for a proportional relationship, discover they are reciprocals, and use them to write two equations representing the relationship. 7.RP.A 7.RP.A.2 7.RP.A.2.B 7.RP.A.2.C MP2
- **Equations of Proportional Relationships:** Compare proportional and nonproportional relationships. 7.RP.A.2 7.RP.A.2.A 7.RP.A.2.C MP1 MP7
- **Introducing Graphs of Proportional Relationships:** Explore what a proportional relationship looks like graphically. 7.RP.A.2 7.RP.A.2.A MP2 MP7
- **Interpreting Graphs of Proportional Relationships:** Use graphs to identify constants of proportionality. 7.RP.A.2 7.RP.A.2.B 7.RP.A.2.D MP8
- **Proportional Relationships and Graphs:** Use graphs and equations to compare proportional relationships. 7.RP.A.2 7.RP.A.2.A 7.RP.A.2.B 7.RP.A.2.C MP1 MP2
- **Connecting Descriptions, Tables, Graphs, and Equations:** Connecting Descriptions, Tables, Graphs, and Equations. 7.RP.A.2
- **Let's Put It to Work:** Use proportional relationships to model the water usage of baths and showers. 7.EE.B.4 7.RP.A.2 MP4

- **Let's Put It to Work:** Reflect on how the mathematical modeling process offers insight into a real-world context. 7.RP.A.2 MP5

Learning Activities: Suggested or Potential Learning Activities
Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 1 "Paint" - Using Equivalent Ratios

Day 2: Amplify Desmos Lesson 2 "Balloon Float" - Introducing Proportional Relationships With Tables

Day 3: Amplify Desmos Lesson 3 "Sugar, Spice, and Everything Nice" - Constant of Proportionality

Day 4: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–3. Consider using this time to prepare for the upcoming quiz.

Day 5: Warm-Up Quiz on Amplify Desmos Lesson 1-3 skills - Proportional Relationships in Tables
Students will demonstrate their ability to:

- Use tables to recognize proportional relationships.
- Determine a constant of proportionality from a table.
- Describe the relationship between values in a table using terms such as proportional, non-proportional,

and constant of proportionality.

Then, Amplify Desmos Lesson 4 "Robot Factory."

Day 6: Amplify Desmos Lesson 5 "Snapshots" - More Equations of Proportional Relationships

Day 7: Practice Day: Activities are included in the table below*.

Day 8: Amplify Desmos Lesson 6 "Two and Two" - Two Equations for Each Relationship

Day 9: Amplify Desmos Lesson 7 "All Kinds of Equations" - Equations of Proportional Relationships

Day 10: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–7. Consider using this time to prepare for the upcoming quiz.

Day 11: Amplify Desmos Lesson 1-7 Sub-Unit Quiz - Proportional Relationships in Equations
Students will demonstrate their ability to:

- Write and use equations to describe proportional relationships.
- Determine a constant of proportionality from an equation.
- Describe relationships represented with equations using terms such as proportional, non-proportional, and constant of proportionality.

Day 12: Amplify Desmos Lesson 8 "DinoPops" - Introducing Graphs of Proportional Relationships

Day 13: Amplify Desmos Lesson 9 "Gallon Challenge" - Interpreting Graphs of Proportional Relationships

Day 14: Amplify Desmos Lesson 10 "Three Turtles" - Proportional Relationships and Graphs

Day 15: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 8-10. Consider using this time to prepare for the upcoming quiz.

Day 16: Warm-up Team-created digital quiz on Amplify Desmos Lesson 8-10 skills - Proportional Relationships in Graphs:
Students will demonstrate their ability to:

- Use graphs to recognize proportional relationships.
- Determine a constant of proportionality from a graph.
- Describe relationships represented with graphs using terms such as proportional, non-proportional, and constant of proportionality.

Then, Amplify Desmos Lesson 11 "Four Representations" - Connecting Descriptions, Tables, Graphs and Equations Putting it all Together Activity

Day 17: Practice Day: Activities are included in the table below*.

Day 18: Amplify Desmos Lesson 12 "Water Efficiency, Part 1" - Let's Put it to Work
Can be used as a Building Thinking Classroom lesson. Lesson Materials

Day 19: Amplify Desmos Lesson 13 "Water Efficiency, Part 2" - Let's Put it to Work

Day 20: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–13. Consider using this time to prepare for the upcoming assessment.

Day 21: Amplify Desmos 7.2 End of Unit Assessment

Pacing Considerations

Lesson 1: This lesson supports students in developing their understanding of key ideas about proportional relationships, which will be addressed in more depth in upcoming lessons. If most students demonstrate a strong understanding of proportional relationships, this lesson may be omitted.

Lesson 5: This lesson supports students in developing fluency writing and using equations to make sense of proportional relationships. If students show a strong understanding working with equations of proportional relationships in earlier lessons, this lesson may be omitted. If omitted, be sure to discuss how each part of an equation of a proportional relationship relates to a situation in Lessons 6, 7, and 10.

Lesson 11: This lesson gives students an opportunity to connect descriptions, tables, equations, and graphs of proportional relationships. There is no new content introduced in this lesson.

Lessons 12–13: This lesson gives students an opportunity to use their creativity and personal experiences to apply the concepts they learned in this unit to explore whether baths or showers use more water. There is no new content introduced in these lessons.

Activities for Unit 2: Lesson's 1-13*

Delta Math Skills for the Lesson
• Constant of Proportionality from Context • Proportional Reasoning (Fractions and Decimals) • Compare Rate of Change, Proportional Representations

- Comparing Rates with Conversions
- Proportional Representations
- Interpret Features of a Proportional Graph
- Interpret Features of a Proportional Graph Level 2
- Equation of a Proportional Graph
- Proportional Equation With Table/Context

Amplify:

- Unit 2 Additional Practice
- ML 7.2.03 Mini-Lesson: Determining the Constant of Proportionality
- ML 7.2.06 Mini-Lesson: Finding More Than One Equation to Represent Proportional Relationships
- ML 7.2.10 Mini-Lesson: Comparing Proportional Relationships with Graphs
- ML 7.2.11 Mini-Lesson: Representing Proportional Relationships with Multiple Representations
- 7.2.01 Boost Personalized Learning Activity: Equivalent Ratios
- 7.2.04 Boost Personalized Learning Activity: Equations of Proportional Relationships
- 7.2 Sub-Unit 1 Extensions: Proportional Relationships in Tables
- 7.2 Sub-Unit 2 Extensions: Proportional Relationships in Equations
- 7.2 Sub-Unit 3 Extensions: Proportional Relationships in Graphs
- 7.2 Sub-Unit 4 Extensions: Using Proportional Relationships

Team-created weekly DeltaMath spiral cumulative reviews

Performance Task
Enrichment Task

Assessment Evidence
Formative Assessments: Pre-Unit Check (optional), Quiz Lessons 1-3, Sub-Unit Quiz Lessons 1-7, Quiz Lessons 8-10, Lessons Show What You Know
Summative Assessments: End-of-Unit Assessment
Common Benchmark Assessments: Common Cumulative Assessments
Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials
Core Instructional Program: Amplify Desmos Math Online Platform
Desmos Materials by Lesson: • calculators (as needed) (Lessons 1 and 7) • graph paper (Lesson 13) • markers (Lesson 13) • poster paper (Lesson 13) • scientific calculators (as needed) (Lesson 3) • straightedges (Lessons 10, 13)
mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications:
Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:
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Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice Alternate or reduced work within Digital Platforms such as Delta Math, and Link It assignments - Opportunities for make-up work or reduce number of assignments - Provide access to extra help when possible

Students with 504 Plans
Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way. Students' accommodations are outlined in their individual 504 plan. -

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

-Homogenous Grouping - Small Group In-Depth Instruction - Differentiated Online Practice - Alternative Assessments - Pre-Assess to provide Differentiated Instruction to Accelerate Learning

-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 3

Desired Results

Unit 3 Title: Measuring Circles

Unit Summary: Students explore the relationships between the radius, diameter, circumference, and area of a circle. Students also practice writing and using equations to calculate missing measurements, which they will revisit in Units 4 and 6.

Sub-Unit 1: Circumference of a Circle (Lessons 1–4 + Practice Day + Quiz)

- Use the relationships between radius, diameter, and circumference to calculate unknown measurements.

Sub-Unit 2: Area of a Circle (Lessons 5–10 + Practice Day + Quiz)

- Calculate the areas of circles and complex shapes composed of fractions of circles.

Learning Standards

NJSLS Math:

7.G Geometry
A. Draw, construct, and describe geometrical figures and describe the relationships between them

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.

B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

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.

7.RP Ratios and Proportional Relationships
A. Analyze proportional relationships and use them to solve real-world and mathematical problems

2. Recognize and represent proportional relationships between quantities.

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.

b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Math Practices: MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**
9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1).

9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Computer Science & Design Thinking (CS & DT**):**

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets

Unit Essential Questions:	**Unit Enduring Understandings:**
How do we measure circles when all of our tools are straight? What is π and what does it have to do with circles? How can squares help you measure the space inside circles?	Although our measuring tools are straight, we can measure circles by using consistent relationships between linear dimensions, like diameter and circumference. π (pi) is the constant ratio of a circle's circumference to its diameter, and it helps us calculate both the circumference and the area of circles. We can use squares to estimate and calculate the area of a circle by relating it to a square with a side length equal to the radius, leading to the formula for area: $A = \pi r^2$.

Vocabulary: circumference, diameter, pi, radius

Students will be able to:

- **Perimeter and Proportional Relationships:** Examine the relationship between the diagonal length and perimeter of a square in preparation to explore analogous relationships in circles. 7.RP.A.2.A 7.RP.A.2.B MP8
- **Parts of a Circle:** Study both examples and non-examples of circles and develop language to describe them precisely, including the terms radius and diameter. 7.G.A MP3 MP6
- **Estimating and Calculating Circumference:** Explore the relationship between a circle's diameter and circumference. 7.G.B.4 7.RP.A.2.A 7.RP.A.2.B MP5 MP6
- **Calculating Perimeters of Complex Shapes:** Apply knowledge of circumference to calculate perimeters of shapes made from squares and parts of circles. 7.G.B.4 MP3 MP6 MP7
- **Estimating and Calculating Area:** Surface strategies to determine the area of complex shapes and estimate the areas of shapes with curved edges. Building Toward: 7.G.B.4 MP3
- **Exploring Circle Area:** Use repeated reasoning to make sense of the relationship between radius squares and the area of a circle. 7.G.B MP8
- **Calculating Circle Area:** Discover a formula for the relationship between the radius and area of a circle.
- **Relating Area to Circumference:** Use the relationship between circumference and area to derive the formula for the area of a circle. 7.G.B.4 7.RP.A.2.A MP3 MP6 MP7
- **Calculating Areas of Complex Shapes:** Apply the area formula to solve problems involving the area of circles as well as shapes composed of parts of circles and squares. 7.G.B.4 MP7
- **Calculating Area Given Perimeter:** Apply knowledge of circumference and area to make sense of a challenge involving calculating the areas of two shapes based on their perimeters. 7.G.B.4 MP1 MP8

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of

all students.
Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 1 "Toothpicks" - Perimeter and Proportional Relationships

Day 2: Amplify Desmos Lesson 2 "Is It a Circle" - Parts of a Circle

Day 3: Practice Day: Activities are included in the table below*.

Day 4: Amplify Desmos Lesson 3 "Measuring Around" - Estimating and Calculating Circumference

Day 5: Amplify Desmos Lesson 4 "Perimeter Challenges" - Calculating Perimeters of Complex Shapes

Day 6: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–4. Consider using this time to prepare for the upcoming quiz.

Day 7: Amplify Desmos Lesson 1-4 Sub-Unit Quiz - Circumference of a Circle
Students will demonstrate their ability to:

- Use the relationships between the radius, diameter, and circumference of a circle to calculate unknown measurements.
- Explain that the relationships between the radius, diameter, and circumference of a circle are proportional and that pi is the constant of proportionality relating circumference and diameter.

Day 8: Amplify Desmos Lesson 6 "Radius Squares" - Exploring Circle Area

Day 9: Amplify Desmos Lesson 7 "Circle Area" - Calculating Circle Area

Day 10: Amplify Desmos Lesson 8 "Why Pi?" - Relating Area to Circumference

Day 11: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–10. Consider using this time to prepare for the upcoming assessment.

Day 12: Amplify Desmos 7.3 End of Unit Assessment:

Pacing Considerations

Lesson 1: This lesson supports students in developing their understanding of key ideas about proportional relationships in geometric figures, which will be addressed in more depth in upcoming lessons.

Lesson 4: This lesson supports students in developing fluency calculating the perimeter of shapes. If students show a strong understanding working with circumference of circles in earlier lessons, this lesson may be omitted. If omitted, be sure to discuss calculating the perimeter of shapes that are composed of squares and parts of circles elsewhere in the unit.

Lesson 5 (Optional): The purpose of this lesson is to surface strategies for calculating area from Math 6. This prepares students for estimating the area of circles in the next lesson. This lesson may be omitted as it mostly addresses standards from a prior course.

Lesson 9 (Optional): This lesson supports students in developing fluency calculating the area of shapes composed of squares and parts of circles. This lesson may be omitted as it addresses standards already thoroughly covered elsewhere in the unit.

Lesson 10 (Optional): This lesson supports students in developing fluency calculating area and

circumference of shapes through a playful problem-solving challenge. This lesson may be omitted as it addresses standards already thoroughly covered elsewhere in the unit.

Activities for Unit 3: Lesson's 1-10*

Delta Math Skills for the Lesson
• Circumference (in terms of pi) • Circumference (rounding) • Circumference (Level 2) • Perimeter of Irregular Shapes • Area of a Circle (in terms of pi) • Area of a Circle (rounded) • Circumference and Area of a Circle • Area of Irregular Shape
Amplify: • Unit 3 Additional Practice • ML 7.3.03 Mini-Lesson: Determining the Circumference of a Circle • ML 7.3.09 Mini-Lesson: Calculating Areas of Complex Shapes • 7.3.04 Boost Personalized Learning Activity: Perimeter of Complex Shapes • 7.3.09 Boost Personalized Learning Activity: Area of Complex Shapes • 7.3 Sub-Unit 1 Extension: Circumference of a Circle • 7.3 Sub-Unit 2 Extension: Area of a Circle Team-created weekly DeltaMath spiral cumulative reviews

Performance Task
Extra Practice Area/Circumference
More Practice with Area
Word Problem Practice
Enrichment/Challenge Questions

Assessment Evidence

Formative Assessments: Pre-Unit Check (optional), Sub-Unit Quiz 1 & 2, Show What You Know

Summative Assessments: End-of-Unit Assessment

Common Benchmark Assessments: Common Cumulative Assessments

Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials

Core Instructional Program: Amplify Desmos Math Online Platform

Desmos Materials by Lesson: • calculators (as needed) (Lesson 4) • circular objects (Lesson 3) • coloring tools (Lessons 4–5, 9) • graph paper (optional) (Lesson 6) • measuring tools (Lesson 3) • scissors (Lesson 6) • string (Lesson 3) • tape (Lesson 6)

mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications: Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:
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Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Specific Strategies and Practices that Support English Language Learners
English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts - Personal Glossary - Extended Time - Simplified/Verbal Instructions - Frequent Breaks - Visual learning, including graphic organizers - Use of cognates to increase comprehension - Teacher modeling - Pairing students with beginning English language skills with students who have more advanced English language skills - Scaffolding - Word walls - Think-pair-share - Cooperative learning groups
Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments - Opportunities for make-up work or reduce number of assignments - Provide access to extra help when possible

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-Homogenous Grouping - Small Group In-Depth Instruction - Differentiated Online Practice - Alternative Assessments - Pre-Assess to provide Differentiated Instruction to Accelerate Learning
-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 4

Desired Results

Unit 4 Title: Proportional Relationships and Percentages

Unit Summary: Students apply what they have learned about proportional relationships to solve problems involving percent change and fractional quantities.

Sub-Unit 1: Percentages as Proportional Relationships (Lessons 1–6 + Practice Day + Quiz)

- Solve problems involving percent change using representations, such as tape diagrams, double number lines, tables, and equations.

Sub-Unit 2: Applying Percentages (Lessons 7–10 + Practice Day + Quiz)

- Use proportional reasoning to solve problems in real-world situations involving percent increase and decrease and percent error.
- Interpret situations involving percent change and apply appropriate representations to solve problems.

Sub-Unit 3: Proportional Relationships With Fractions and Decimals (Lessons 11–13 + Practice Day)

- Determine unknown values in proportional relationships involving fractional quantities.
- Convert between fraction and decimal representations.

Learning Standards

NJSLS Math:

7.EE Expressions and Equations
A. Use properties of operations to generate equivalent expressions

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. For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

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.

7.NS The Number System
NS.A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

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

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.

7.RP Ratios and Proportional Relationships
A. Analyze proportional relationships and use them to solve real-world and mathematical problems

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks

$\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\left(\frac{1}{2}\right)/\left(\frac{1}{4}\right)$ miles per hour, equivalently 2 miles per hour.

2. Recognize and represent proportional relationships between quantities.

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.

c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.

3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Math Practices: MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1).

9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).

9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Computer Science & Design Thinking (CS & DT**):**

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets

Unit Essential Questions:	**Unit Enduring Understandings:**
How are percentages and fractions related to proportional relationships? How do proportional relationships and percentages represent change in the real world?	Percentages and fractions are both ways to express proportional relationships, showing parts of a whole and helping compare quantities in a consistent way. Proportional relationships and percentages are useful for representing and analyzing real-world changes, such as increases, decreases, discounts, and interest, by comparing the size of the change to the original amount.

Vocabulary: percent decrease, percent error, percent increase, repeating decimal, terminating decimal

Students will be able to:

1. **Working With Fractions and Percentages*:** Create mosaics and determine what percentage of each mosaic is shaded different colors. Building Toward: 7.RP.A.3 MP6

2. **Percent Increase and Decrease With Tape Diagrams:** Use both tape diagrams and tables to represent percent increase and percent decrease, and then use these representations to solve problems. 7.RP.A.2 7.RP.A.3 MP2
3. Percent Increase and Decrease With Equations: Write and use equations to describe the relationship between original and new amounts after a percent increase or decrease. 7.EE.A.2 7.EE.B.4 7.RP.A.3 MP1
4. **Percent Increase and Decrease With Double Number Lines:** Expand on understanding of double number line diagrams and percentages to model and make sense of problems involving percent change. 7.RP.A.3 MP1
5. **Calculating Unknowns With Percentages:** Make connections between the representations of double number line diagrams, tables, and equations. 7.RP.A.3 MP3
6. **Real-World Situations Involving Percent:** Increase Analyze and think critically about what it means for prices and minimum wage to increase by dramatically different percentages. 7.RP.A.3 MP1 MP3
7. **Multistep Percent Problems:** Solve multistep percent problems in a common context and calculate the total after two percentages are applied. 7.EE.A.2 7.EE.B.4 7.RP.A.3 MP3 MP8
8. **More Real-World Situations Involving Percent Increase:** Analyze and discuss advantages and disadvantages of different payment systems for restaurant workers. 7.RP.A.2 7.RP.A.3 MP1 MP4
9. **Percent Error:** Consider why percent error is useful, determine percent error, and decide whether a measurement is within an acceptable range. 7.RP.A.3 MP3 MP8
10. **Posing Problems Involving Percents:** Ask and answer questions about the world by applying knowledge of increasing and decreasing percentages. 7.RP.A.3 MP5 MP6
11. **Revisiting Proportional Relationships:** Use tools, such as tables, constants of proportionality, and scale factors to determine unknown values in proportional relationships, some of which involve fractional quantities. 7.RP.A.1 7.RP.A.2 MP5
12. **Ratios and Rates With Fractions:** Use constants of proportionality to compare proportional relationships involving fractional quantities. 7.RP.A.1 MP3
13. **Writing Fractions as Decimals:** Convert fractions to decimals using long division and recognize patterns in the calculations for classifying decimals as terminating or repeating. 7.NS.A.2.D MP8

14. **RP.A.3** Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. 

*Optional Lesson

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 1 "Mosaics"- Working With Fractions and Percentages

Day 2: Amplify Desmos Lesson 2 "More and Less" - Percent Increase and Decrease with Tape Diagrams

Day 3: Amplify Desmos Lesson 3 "All the Equations" - Percent Increase and Decrease with Equations

Day 4: Amplify Desmos Lesson 4 "100%" - Percent Increase and Decrease with Double Number Lines

Day 5: Practice Day: Activities are included in the table below*. Delta Math skill check quiz

Day 6: Amplify Desmos Lesson 5 "Percent Machines" - Calculating Unknowns With Percentages

Day 7: Amplify Desmos Lesson 6 "Back in My Day" - Real-World Situations Involving Percent Increase

Day 8: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–6. Consider using this time to prepare for the upcoming quiz.

Day 9: Amplify Desmos Lesson 1-6 Sub-Unit Quiz - Percentages as Proportional Relationships
Students will demonstrate their ability to:

- Solve problems involving percent change using representations, such as tape diagrams, double number lines, tables, and equations.
- Interpret verbal descriptions and strategies to solve problems about percent change.

Day 10: Amplify Desmos Lesson 7 "Tax and Tip" - Multi-Step Percent Problems

Day 11: Amplify Desmos Lesson 8 "Plate Rate" - More Real-World Situations Involving Percent Increase

Day 12: Practice Day: Activities are included in the table below*.

Day 13: Amplify Desmos Lesson 9 "Bookcase Builder" - Percent Error

Day 14: Amplify Desmos Lesson 10 "Population and Pollution" - Posing Problems Involving Percents

Day 15: Amplify Desmos Sub-Unit 2: Lesson 7-10 DeltaMath - Applying Percentages
Students will demonstrate their ability to:

- Use proportional reasoning to solve problems in real-world situations involving percent increase, percent decrease, and percent error.
- Interpret situations involving percent change and apply appropriate representations to solve problems.
- Interpret scenarios depicting percent change and percent error.

Day 16: Teacher created lesson on converting fractions to decimals. (Amplify Lessons 11-13 used as supplemental materials.)

Day 17: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–13. Consider using this time to prepare for the upcoming assessment.

Day 18: Amplify Desmos 7.4 End of Unit Assessment:

Pacing Considerations

> **Lesson 10:** This lesson gives students an opportunity to apply what they have learned about percent increase and decrease in this unit to make sense of an issue in society. There is no new math content introduced in this lesson.

Activities for Unit 4: Lesson's 1-13*

Delta Math Skills for the Lesson
• Which is more? (Percent Comparison)

- Percent of Whole Word Problems L1
- Percent More or Less Multiplier (Level 1)
- Percent More or Less Word Problems
- Find Percent Increase/Decrease
- Percent More or Less (Formula) L1
- Percent Change Word Problems (L3)
- Expressions Percent More or Less (L1)
- Multistep Percent More or Less (Level 1)
- Percent Increase / Decrease Expressions
- Percent Error
- Relative Error (1D)

Performance Task
Extra Practice Fractions/Dec/ Percents
More Practice Converting between Fra/Dec/Percents
Percent of a Quantity Practice
Real World Problems Practice
Percent Change Practice
Enrichment/ Challenge Questions

Climate Change Activity:

Activity Title: Fair Pay, Sustainable Practices: Analyzing Restaurant Payment Systems and Climate Impact

Objective: Students will analyze different restaurant payment systems (e.g., hourly wage, tipped minimum wage, service charges) and discuss their potential environmental and social sustainability advantages and disadvantages, particularly related to climate change impacts.

Materials:

- Computer/internet access for research
- Whiteboard or chart paper
- Markers
- Case studies of different restaurants using different payment systems (can be real or hypothetical)
- Information on the environmental impacts of the restaurant industry (e.g., energy consumption, food waste, supply chains)
- Information on the social impacts of different payment systems (e.g., worker wages, job security, workplace culture)

Procedure:

1. Introduction (15 minutes):
    1. Begin by introducing the concept of sustainability in the restaurant industry, highlighting both environmental and social aspects.
    2. Discuss how business practices can impact both the environment and the people who work in them.
    3. Briefly review the standard: "Analyze and discuss advantages and disadvantages of different payment systems for restaurant workers".
2. Exploring Payment Systems (30 minutes):
    1. Divide students into small groups.
    2. Assign each group a different restaurant payment system to research:
        1. Hourly wage (with or without tips)
        2. Tipped minimum wage
        3. Service charges
        4. Other potential systems (e.g., revenue sharing)
    3. Guide groups to research the advantages and disadvantages of each system, focusing on its potential impact on:
        1. Worker income and job security
        2. Restaurant operational costs
        3. Customer experience
3. Connecting to Climate Change (45 minutes):
    1. Bring the groups back together.
    2. Facilitate a class discussion about how different payment systems can intersect with climate change:

        1. Transportation: Consider how payment structures might impact commuting distances or incentivize the use of public transportation.
        2. Energy Consumption: Discuss how higher wages could allow workers to afford more energy-efficient homes or vehicles.
        3. Food Sourcing: Explore how different payment systems might influence a restaurant's ability to invest in sustainable sourcing or partnerships with local farms.
        4. Worker Wellbeing and Heat Stress: Analyze how adequate compensation and workplace safety measures can mitigate the risks of climate change-related heat exposure in kitchens.
    3. Encourage students to consider the systemic impacts of different payment models.
4. Case Study Analysis (45 minutes):
    1. Provide students with case studies of restaurants that have implemented different payment systems and potentially integrated sustainable practices.
    2. Students analyze the case studies, focusing on the successes and challenges related to both the payment system and the sustainability initiatives.
    3. Have students present their findings and discuss the trade-offs and synergies observed in the case studies.
5. Conclusion (15 minutes):
    1. Summarize the key findings from the discussions and case studies.
    2. Reiterate the connection between restaurant payment systems, worker well-being, and climate change.
    3. Discuss potential policy implications and the role of consumers in promoting ethical and sustainable restaurant practices.

Extension Activities:

- Have students design their own sustainable restaurant payment system, considering its potential impacts on workers, the environment, and the business's bottom line.
- Students can research and present on local restaurants that have adopted innovative sustainability or payment models.

This activity allows students to critically analyze the complexities of restaurant payment systems and their connection to broader sustainability issues, including the urgent challenge of climate change.

Assessment Evidence
Formative Assessments: Pre-Unit Check (optional), Delta Math Quiz Lessons 1-4, Sub-Unit Quiz 1, Delta Math Quiz Lessons 7-10, Show What You Know
Summative Assessments: End-of-Unit Assessment
Common Benchmark Assessments: Common Cumulative Assessments
Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials
Core Instructional Program: Amplify Desmos Math Online Platform
Desmos Materials by Lesson: • calculators (Lessons 3, 6–8, 10–11) • coloring tools, three different colors (Lessons 1, 10) • graph paper (optional) (Lesson 13) • scientific calculators (as needed) (Lessons 1, 5) • poster paper (Lesson 10)
mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications: Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:
Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

- Small group/One to one - Additional time - Review of directions - Student restates information - Space for movement or breaks - Extra visual and verbal cues and prompts - Preferential seating - Follow a routine/schedule - Rest breaks - Verbal and visual cues regarding directions and staying on task - Checklists - Immediate feedback Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Specific Strategies and Practices that Support English Language Learners
English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts - Personal Glossary - Extended Time - Simplified/Verbal Instructions - Frequent Breaks - Visual learning, including graphic organizers - Use of cognates to increase comprehension - Teacher modeling - Pairing students with beginning English language skills with students who have more advanced English language skills - Scaffolding - Word walls - Think-pair-share - Cooperative learning groups Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments - Opportunities for make-up work or reduce number of assignments - Provide access to extra help when possible

Students with 504 Plans
Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way. Students' accommodations are outlined in their individual 504 plan. -

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

-Homogenous Grouping - Small Group In-Depth Instruction - Differentiated Online Practice - Alternative Assessments - Pre-Assess to provide Differentiated Instruction to Accelerate Learning

-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 5

Desired Results

Unit 5 Title: Operations With Positive and Negative Numbers

Unit Summary: Students extend what they learned in Grade 6 to add, subtract, multiply, and divide positive and negative numbers.

Sub-Unit 1: Adding and Subtracting (Lessons 1–5 + Practice Day + Quiz)

- Add and subtract positive and negative numbers using a variety of strategies.
- Describe strategies for determining the sum or difference of two rational numbers.

Sub-Unit 2: Multiplying and Dividing (Lessons 6–10 + Practice Day + Quiz)

- Perform all four operations with positive and negative numbers using a variety of strategies.
- Describe strategies for determining the sum, difference, product, or quotient of two rational numbers.

Sub-Unit 3: Applying Operations (Lessons 11–13 + Practice Day)

- Apply all four operations with positive and negative numbers to analyze changes in our environment.
- Interpret information about real-world situations involving positive and negative numbers.

Learning Standards

NJSLS Math:

7.EE Expressions and Equations

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

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. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional

$\frac{1}{10}$ of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.NS The Number System

NS.A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

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.

a. Describe situations in which opposite quantities combine to make 0. For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?

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.

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.

d. Apply properties of operations as strategies to add and subtract rational numbers.

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

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.

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 $-\left(\frac{p}{q}\right) = \frac{(-p)}{q} = \frac{p}{(-q)}$. Interpret quotients of rational numbers by describing real world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

3. Solve real-world and mathematical problems involving the four operations with rational numbers. (Clarification: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)

Math Practices: MP1, MP2, MP3, MP4, MP5, MP7, MP8

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1).
9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Computer Science & Design Thinking (CS & DT**):**

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets

Unit Essential Questions:	**Unit Enduring Understandings:**
How do you represent addition, subtraction, multiplication, or division of numbers on a number line? How is solving problems with fractions or decimals the same or different from solving problems with only whole numbers? How can positive and negative numbers be used to represent real world situations?	The number line is a useful tool for representing addition, subtraction, multiplication, and division by showing the distance and direction between numbers. Solving problems with fractions and decimals follows the same mathematical principles as with whole numbers, but it often requires more careful attention to place value, equivalent forms, and precision. Positive and negative numbers are used to represent quantities in real-world situations that have direction

	or context, such as temperature changes, financial gains and losses, or elevation above and below sea level.

Vocabulary: integer, number line, positive, negative, position, rate, time

Students will be able to:

1. **Representing Adding and Subtracting:** Develop a model for adding and subtracting positive and negative numbers. 7.NS.A.1 7.NS.A.1.A MP2 MP8
2. **Adding and Subtracting Positive and Negative Numbers:** Use floats and anchors to reason about adding and subtracting positive and negative numbers. 7.NS.A.1 7.NS.A.1.C MP7
3. **Adding on the Number Line:** Add and subtract positive and negative decimals and fractions on a number line. 7.NS.A.1.B 7.NS.A.1.D MP5 MP8
4. **Number Lines and Expressions:** Reason about representing subtraction of positive and negative numbers on a number line. 7.NS.A.1 7.NS.A.1.B 7.NS.A.1.C 7.NS.A.1.D MP3 MP7
5. **Practice with Adding and Subtracting:** Reason about the signs and values of expressions. 7.EE.B.3 7.NS.A.1 7.NS.A.1.C 7.NS.A.1.D MP1
6. **Representing Multiplication:** Extend the floats and anchors model to make sense of multiplying positive and negative integers. 7.NS.A.2 MP2
7. **Position, Rate, and Time:** Make sense of a different model for multiplying positive and negative numbers involving position, rate, and time. 7.NS.A.2 7.NS.A.2.A MP1
8. **Dividing Integers:** Make sense of division of positive and negative numbers using position, rate, and time. 7.NS.A.2.B 7.NS.A.2.C MP2
9. **Variable Expressions:** Reason about variable expressions with positive and negative numbers involving adding, subtracting, multiplying, and dividing. 7.NS.A.1 7.NS.A.1.D 7.NS.A.2 7.NS.A.2.C MP3 MP7
10. **Practice With All Four Operations:** Reason about the signs and values of expressions that include all four operations with positive and negative numbers. 7.EE.B.3 7.NS.A.1.D 7.NS.A.2.A 7.NS.A.2.C MP1 MP3

11. **Real-World Situations Involving Positive and Negative Numbers, Part 1:** Apply knowledge of addition and subtraction of positive and negative numbers to make sense of changing temperatures around the world and changing sea ice. 7.EE.B.3 7.NS.A.3 MP1
12. **Real-World Situations Involving Positive and Negative Numbers, Part 2:** Model changes on Arctic sea ice and in rising sea levels and make predictions about the future using positive and negative rates. 7.EE.B.3 7.NS.A.3 MP4
13. **Real-World Situations Involving Positive and Negative Numbers, Part 3:** Make sense of how solar panels can affect carbon emissions and electricity costs by using operations with positive and negative numbers. 7.EE.B.3 7.NS.A.2.A 7.NS.A.3 MP3 MP4

14. **7.NS.B.3 Solve real-world and mathematical problems involving the four operations** with rational numbers. (Clarification: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.).

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 1 "Floats and Anchors" - Representing Adding and Subtracting

Day 2: Amplify Desmos Lesson 2 "More Floats and Anchors" - Adding and Subtracting Positive and Negative Numbers

Day 3: Amplify Desmos Lesson 3 "Bumpers" - Adding on the Number Line

Day 4: Amplify Desmos Lesson 4 "Draw Your Own" - Number Lines and Expressions (2 days may be needed)

Day 5: Amplify Desmos Lesson 5 "Number Puzzles" - Practice with Adding and Subtracting

Day 6: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–5. Consider using this time to prepare for the upcoming quiz.

Day 7: Amplify Desmos Lesson 1-5 Sub-Unit Quiz

Day 8: Amplify Desmos Lesson 6 "Floating in Groups" - Representing Multiplication

Day 9: Amplify Desmos Lesson 7 "Back in Time" - Position, Rate, and Time

Day 10: Amplify Desmos Lesson 8 "Speeding Turtles" - Dividing Integers

Day 11: Amplify Desmos Lesson 9 "Expressions" - Variable Expressions

Day 12: Mini Delta Quiz on all four operations.

Day 13: Amplify Desmos Lesson 10 "Integer Puzzles" - Practice with All Four Operations

Day 14: Amplify Desmos Lesson 11 "Temperatures Around the World" - Real-World Situations Involving Positive and Negative Numbers, Part 1

Day 15: Amplify Desmos Lesson 12 "Visiting the Arctic" - Real-World Situations Involving Positive and Negative Numbers, Part 2

Day 16: Amplify Desmos Lesson 13 "Solar Panels and More" - Real-World Situations Involving Positive and Negative Numbers, Part 3

Day 17: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1-13. Consider using this time to prepare for the upcoming assessment.

Day 18: Amplify Desmos 7.5 End of Unit Assessment

Pacing Considerations

Lesson 5: This lesson supports students in developing fluency in reasoning about the signs and values of expressions that include adding and subtracting with positive and negative numbers. If students show a strong understanding working with adding and subtracting positive and negative numbers in earlier lessons, this lesson may be omitted.

Lesson 10: This lesson supports students in developing fluency in reasoning about the signs and values of expressions that include all four operations with positive and negative numbers. If students show a strong understanding of this content in earlier lessons, this lesson may be omitted.

Lessons 11–13: These lessons give students an opportunity to apply what they've learned about all four operations involving positive and negative numbers to better understand our environment. There is no new content in these lessons, so one or two of these lessons may be omitted. If omitted, be sure to discuss how operations using positive and negative numbers can empower us to better understand our environment.

Activities for Unit 5: Lesson's 1-13*

Delta Math Skills for the Lesson
• Adding Integers on a Number Line (L1) • Plot and Find Distance (Integers on Number Line) • Subtraction of Integers (Distance on Number Line) • Subtraction of Signed Decimals (Distance on Number Line) • Subtraction as Adding the Opposite (Rewrite) • Subtraction as Adding the Opposite (L1) • Integer Multiplication in Context (– x +, – x –), Guided • Integer Multiplication in Context (+ x +, + x –), Guided • Multiplication/Division of Integers L1 • PEMDAS (Integers no Exponent) • PEMDAS (Integers with Exponents) • Evaluate Absolute Value Expressions L1 • Operations with Integers • Operations with Decimals (Positive and Negative)
Performance Task Adding Integers Subtracting Integers Multiplying & Dividing Integers More Operations with Integers Operations with Rational Numbers Operations with Decimals Enrichment

***NS.B.3 Climate Change Activity**

Lesson Plan Title:
"Data & Decisions: Understanding Climate Change through Math"

Grade Level:
7th Grade

CCSS Standard:
7.NS.B.3 – Solve real-world and mathematical problems involving the four operations with rational numbers.

Lesson Duration:
2 class periods (45 minutes each)

Lesson Objectives:
By the end of the lesson, students will be able to:

- Use rational numbers to analyze and interpret real climate data.
- Solve multi-step problems involving positive and negative rational numbers (including temperature changes, sea level rise, CO_2 concentrations).
- Explain how mathematical data supports understanding of climate change.

Materials Needed:

- Student worksheets (climate data tables)
- Graph paper or digital graphing tools
- Calculator
- Access to NOAA or NASA climate data (optional)

- Projector or whiteboard

Lesson Outline:
Day 1: Introduction to Climate Change Data

Warm-Up (5 min):
Quick review of rational numbers (positive, negative, decimals, fractions).

Hook (5 min):
Show a short video (1–2 minutes) on climate change trends (e.g., rising global temperatures).

Mini-Lesson (10 min):
Discuss examples of real-world data showing:
- Global temperature change over 100 years
- CO_2 concentration levels
- Sea level rise
- Highlight use of positive and negative numbers in tracking changes (e.g., temperature anomaly = +1.2°C).

Guided Practice (20 min):
Students receive a data table (e.g., yearly global temperature anomalies from 1900–2020).
Tasks:
- Find the difference in temperature between decades.
- Calculate the average temperature change per decade.
- Identify increases and decreases using signed numbers.

Exit Ticket (5 min):
One multi-step word problem involving calculating average annual change in temperature or CO_2 levels.

Day 2: Applying Math to Climate Problem Solving

Review (5 min):
Discuss yesterday's findings.

Group Activity (25 min):
In pairs or small groups, students solve a set of real-world problems using climate data. Examples:

- Calculate the rate of sea level rise over 30 years.
- Determine how much CO_2 emissions increased from 1960 to 2020.
- Create a number line showing temperature changes over time.

Graphing Task (10 min):
Students graph one dataset (e.g., temperature anomaly by decade).

Wrap-Up Discussion (5 min):
Reflect on how math helps us understand and explain climate change.
Prompt: "What does the data tell us about how the planet is changing?"

Assessment:
- Observation of group work and discussion
- Completed worksheet with rational number operations
- Accuracy of graph and calculations

Exit ticket performance

Extension (Optional):
Students write a short paragraph:
“Based on the data, what is one action you think society should take to address climate change?”

Assessment Evidence

Formative Assessments: Pre-Unit Check (optional), Sub-Unit Quiz 1, Sub-Unit Quiz 2, Show What You Know

Summative Assessments: End-of-Unit Assessment

Common Benchmark Assessments: Common Cumulative Assessments

Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials

Core Instructional Program: Amplify Desmos Math Online Platform

Desmos Materials by Lesson: • calculators (as needed) (Lessons 11–13) • coloring tools (as needed) (Lesson 9)

mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications:
Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:

Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

- Small group/One to one - Additional time - Review of directions - Student restates information - Space for movement or breaks - Extra visual and verbal cues and prompts - Preferential seating - Follow a routine/schedule - Rest breaks - Verbal and visual cues regarding directions and staying on task - Checklists - Immediate feedback Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Specific Strategies and Practices that Support English Language Learners

English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts - Personal Glossary - Extended Time - Simplified/Verbal Instructions - Frequent Breaks - Visual learning, including graphic organizers - Use of cognates to increase comprehension - Teacher modeling - Pairing students with beginning English language skills with students who have more advanced English language skills - Scaffolding - Word walls - Think-pair-share - Cooperative learning groups Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments - Opportunities for make-up work or reduce number of assignments - Provide access to extra help when possible

Students with 504 Plans

Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way. Students' accommodations are outlined in their individual 504 plan. -

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

-Homogenous Grouping - Small Group In-Depth Instruction - Differentiated Online Practice - Alternative Assessments - Pre-Assess to provide Differentiated Instruction to Accelerate Learning

-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 6

Desired Results

Unit 6 Title: Expressions, Equations, and Inequalities

Unit Summary: In this unit, students extend what they learned in Grade 6 about solving one-step equations to solve equations of the form px+q=r and p(x+q)=r, as well as equations that include expanding, factoring, or adding terms. Students also solve inequalities and graph their solutions on a number line.

Sub-Unit 1: Equations and Tape Diagrams (Lessons 1–4 + Practice Day + Quiz)

- Use tape diagrams to represent equations and situations in context and to determine unknown values.

Sub-Unit 2: Solving Equations (Lessons 5–12 + Practice Day + 2 Quizzes)

- Solve equations of the form px+q=r and p(x+q)=r in real-world and mathematical problems.
- Write equivalent expressions by adding, subtracting, expanding, and factoring.

Sub-Unit 3: Inequalities (Lessons 13–17 + Practice Day)

- Solve inequalities of the form px+q>r and px+q<r that represent real-world and mathematical problems.
- Create graphs that represent solutions to inequalities, including those with $\leq$ or $\geq$.

Learning Standards

NJSLS Math:

7.EE Expressions and Equations

A. Use properties of operations to generate equivalent expressions

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

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. For example,

$a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

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. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional

$\frac{1}{10}$ of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

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.

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. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

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. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Math Practices: MP1, MP2, MP3, MP5, MP6, MP7, MP8

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1).
9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Computer Science & Design Thinking (CS & DT**):**

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.
8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets

Unit Essential Questions:	**Unit Enduring Understandings:**

Which representations help you make sense of different mathematical situations? Which strategies for solving simple equations or inequalities can help you solve more complex ones? What are ways to increase efficiency when solving mathematical problems?	Different representations—such as tables, graphs, number lines, equations, and diagrams—help us understand and solve mathematical situations by making relationships and patterns more visible. Strategies used to solve simple equations and inequalities, such as using inverse operations and maintaining balance, build a foundation for solving more complex problems. Recognizing patterns, choosing appropriate strategies, and using efficient tools or representations can make solving mathematical problems quicker and more accurate.
Vocabulary: expand, factor, equivalent expressions, greater-than-or-equal-to, less-than-or-equal-to, solutions to an inequality	
Students will be able to: 1. **Determining Unknowns in Patterns*:** Make predictions and determine unknown values in the relationship between the stage number of a design and the number of toothpicks and tiles that border it. Building Toward 7.EE.B Building Toward 7.EE.B.4.A MP3 MP8 2. **Connecting Contexts and Tape Diagrams:** Revisit tape diagrams and surface strategies for using them to determine unknown values in situations. 7.EE.B.3 MP1 MP2 MP3 3. **Representing Contexts With Tape Diagrams and Equations:** Use knowledge about tape diagrams and situations to make sense of equations of non-proportional relationships. 7.EE.B.3 7.EE.B.4 MP1 MP2	

4. **Practice With Tape Diagrams and Equations:** Use structure to analyze and solve a question in context and interpret the meaning of its solution. 7.EE.B.3 7.EE.B.4 MP2 MP5 MP7
5. **Introduction to Balanced Hangers:** Develop strategies for determining an unknown weight by creating balanced hangers with fewer objects. 7.EE.B.3 MP3 MP6
6. **Solving Equations With Balanced Hangers:** Understand strategies for solving an equation and connect those to balanced moves on a hanger. 7.EE.B.4.A MP3
7. **Solving Equations:** Describe and use strategies for solving equations of the forms $px + q = r$ or $p(x + q) = r$ that involve positive and negative numbers. 7.EE.B.4.A MP7
8. **Options for Solving One Equation:** Rewrite expressions by factoring and expanding, and then solve equations in multiple ways and compare the results. 7.EE.A.1 7.EE.A.2 7.EE.B.4.A MP3 MP7 MP8
9. **Equivalent Expressions:** Understand that equivalent expressions have the same value for any value of the variable. 7.EE.A.1 MP3 MP6
10. **Adding Expressions:** Write expressions with fewer terms by adding, subtracting, and expanding terms.
11. **Solving Equations Multiple Ways:** Solve equations using a variety of strategies. 7.EE.A.1 MP7
12. **Using Equations to Solve Problems:** Represent and answer questions about situations in context. 7.EE.B.3 7.EE.B.4 7.EE.B.4.A MP1 MP2
13. **Inequalities on the Number Line:** Extend learning about graphing inequalities and use two new symbols, greater-than-or-equal-to ($\geq$) and less-than-or-equal-to ($\leq$) to describe situations. 7.EE.B.4 MP2 MP3 MP6
14. **Solutions to Inequalities:** Make sense of solving inequalities using hanger diagrams, a familiar representation. 7.EE.B.4 7.EE.B.4.B MP3
15. **Solving Inequalities in Context:** Write and solve inequalities related to situations about budgeting and spending money. 7.EE.B.4 7.EE.B.4.B MP1 MP3
16. **Solving Inequalities With Positive and Negative Numbers:** Solve inequalities with both positive and negative coefficients and connect the solutions of inequalities to their graphs. 7.EE.B.4.B MP3
17. **Modeling With Inequalities:** Write and solve inequalities and critically examine what the solutions to those inequalities mean in context. 7.EE.B.4 7.EE.B.4.B MP2

18. **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.

*Optional Lesson

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 2 "Smudged Receipts" - Connecting Contexts and Tape Diagrams

Day 2: Amplify Desmos Lesson 3 "Equations" - Representing Contexts With Tape Diagrams and Equations

Day 3: Amplify Desmos Lesson 4 "Seeing Structure" - Practice with Tape Diagrams and Equations

Day 4: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–4. Consider using this time to prepare for the upcoming quiz.

Day 5: Amplify Desmos Practice Day (Quiz Review): Amplify Desmos Lesson 1-4 Sub-Unit Quiz

Day 6: Amplify Desmos Lesson 5 "Balancing Moves" - Introduction to Balanced Hangers

Day 7: Amplify Desmos Lesson 6 "Balancing Equations" - Solving Equations With Balanced Hangers

Day 8: Amplify Desmos Lesson 7 "Keeping It True" - Solving Equations

Day 9: Practice Day: Activities are included in the table below*.

Day 10: Practice Day: Activities are included in the table below*.

Day 11: Lessons 5-7 Quiz on Delta

Day 12: Amplify Desmos Lesson 8 "Factoring and Expanding" - Options for Solving One Equation

Day 13: Amplify Desmos Lesson 9 "Always-Equal Machines" - Equivalent Expressions

Day 14: Practice Day: Activities are included in the table below*.

Day 15: Amplify Desmos Lesson 10 "Collect the Squares" - Adding Expressions

Day 16: Amplify Desmos Lesson 11 "Pass the Equation" - Solving Equations Multiple Ways

Day 17: Practice Day: Activities are included in the table below*.

Day 18: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 8–12. Consider using this time to prepare for the upcoming assessment.

Day 19: Unit 6 Test Part 1

Day 20: Amplify Desmos Lesson 13 "I Saw the Signs" - Inequalities on the Number Line

Day 21: Amplify Desmos Lesson 14 "Unbalanced Hangers" - Solutions to Inequalities

Day 22: Amplify Desmos Lesson 15 "Budgeting" - Solving Inequalities in Context

Day 23: Practice Day: Activities are included in the table below*.

Day 24: Amplify Desmos Lesson 16 "Shira the Sheep" - Solving Inequalities With Positive and Negative Numbers

Day 25: Amplify Desmos Lesson 17 "Write Them and Solve Them" - Modeling With Inequalities

Day 26: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–17. Consider using this time to prepare for the upcoming assessment.

Day 27: Amplify Desmos 7.6 End of Unit Assessment (Part 2) Then, 7.7.01 lesson summary with lesson practice #1-10 for homework after the quiz.

Pacing Considerations

Lesson 1 (Optional): This lesson may be omitted because it surfaces what students know about finding unknowns in proportional and non-proportional relationships, but these ideas will be addressed in more depth in upcoming lessons.
Lessons 2–3: These lessons may be condensed into one lesson if students show a strong understanding of

matching tape diagrams with expressions in the Pre-Unit Check.

Activities for Unit 6: Lesson's 1-17*

Delta Math Skills for the Lesson
• Two Step Equations • Two Step Equations with Decimals • Two Step Equations with Fractional Coefficients (L1) • Linear Equations w/ Distribution (Lev 1) • Linear Equations w/ Distribution (Lev 2) • Fractional Linear Equations • Value that Makes Equation True (Multiple Choice) • Tape Diagram Model - Linear Equations • Tape Diagram Model - Linear Equations (Multiple Choice) • Tape Diagram Model - Equations with Distributive Property • Tape Diagram Model - Equations with Distributive Property (MC) • Solve Equations in Context (Unwinding) • Equations in Context (MC) • Write and Solve Equations in Context • Values that Make an Inequality True (MC - L2) • Linear Inequality and Number Line (L1) • Solve Inequalities in Context (Unwinding) • Inequalities in Context (MC) • Write and Solve Inequalities in Context

Performance Task for Expressions
Adding Algebraic Terms Practice
Subtracting Algebraic Terms Practice
Simplifying Algebraic Terms Practice
Expanding Algebraic Terms Practice
Factoring Algebraic Terms Practice
Writing Algebraic Expressions Practice
Real World Algebraic Reasoning Practice

Performance Task for Equations & Inequalities
Understanding Equivalent Equations Practice
Solving Algebraic Equations Practice
Real World Algebraic Equation Practice Problems
Solving Algebraic Inequalities Practice
Equations and Inequalities Enrichment

***EE.B.3 Climate Change Activity:**
Lesson Title: "Carbon Footprints and Climate Change Math"
Grade Level: 7th Grade
Standards Addressed: 7.EE.B.3
Duration: 1 class period (45–60 minutes)
Objective:
Students will use positive and negative rational numbers (fractions, decimals, whole numbers) to solve multi-step, real-life problems related to climate change, such as carbon footprints, temperature changes, and emissions reductions.
Real-Life Context:
The average American has a carbon footprint of about 16 tons of CO_2 per year, while the global average is around 4

tons. Governments and individuals are working to reduce carbon emissions to slow global warming.

Warm-Up (5–10 minutes): Mental Math & Estimation:

Prompt:

The temperature of the Earth has increased by about 1.2°C since the late 1800s.

Estimate the increase in Fahrenheit.

(Hint: Use the formula: F = (9/5)C + 32, but just estimate the increase here.)

Estimation Strategy:

1.2 × 2 ≈ 2.4, so an estimate is about 2.2°F.

Activity: Multi-Step Problems (30–35 minutes)

Problem Set: "Tracking Emissions"

Problem 1:

A factory emitted 15.75 tons of CO_2 last month. They installed a cleaner energy system that reduced emissions by 3.5 tons this month.

How much CO_2 was emitted this month?

If this reduction continues for 4 more months, how much total CO_2 will be reduced?

Skills used: decimals, subtraction, multiplication

Problem 2:

An energy audit showed the school uses 2,500 kWh of energy per month. Switching to solar panels will reduce usage by 22.5%.

How many kWh will the school use with solar panels?

How many kWh are saved per month?

Skills used: decimals, percents, subtraction

Problem 3:

The average car emits 4.6 metric tons of CO_2 per year. If a family owns 2 cars, and cuts their driving in half by biking and carpooling:

What will their new total annual emissions be?

How much did they reduce?

Skills used: multiplication, division, subtraction
Problem 4:
Last year, a city's average winter temperature was -3.5°C. This year, it's 1.2°C.
What's the temperature difference?
Convert that difference into Fahrenheit.
Skills used: rational numbers, negative numbers, conversion formula
Class Discussion (5–10 minutes)
Reflection Questions:
How can math help us understand and solve climate-related problems?
Extension (Optional):
Research how your family or school can reduce emissions. Estimate potential savings using math.
Were your answers reasonable? How did you check?

Assessment Evidence

Formative Assessments: Pre-Unit Check (optional), Sub-Unit Quizzes, Show What You Know

Summative Assessments: End-of-Unit Assessment

Common Benchmark Assessments: Common Cumulative Assessments

Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials

Core Instructional Program: Amplify Desmos Math Online Platform
Desmos Materials by Lesson: • coloring tools (as needed) (Lesson 5–6, 8, 15) • concrete model of a hanger (optional) (Lesson 5) • graph paper (as needed) (Lesson 3)
mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications: Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:
Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

- Small group/One to one - Additional time - Review of directions - Student restates information - Space for movement or breaks - Extra visual and verbal cues and prompts - Preferential seating - Follow a routine/schedule - Rest breaks - Verbal and visual cues regarding directions and staying on task - Checklists - Immediate feedback Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

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English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts - Personal Glossary - Extended Time - Simplified/Verbal Instructions - Frequent Breaks - Visual learning, including graphic organizers - Use of cognates to increase comprehension -

Teacher modeling - Pairing students with beginning English language skills with students who have more advanced English language skills - Scaffolding - Word walls - Think-pair-share - Cooperative learning groups
Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice
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Students with 504 Plans

Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way. Students' accommodations are outlined in their individual 504 plan. -

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

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-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 7

Desired Results

Unit 7 Title: Angles, Triangles, and Prisms

Unit Summary: In this unit, students solve real-life and mathematical problems involving angle measures, volume, and surface area.

Sub-Unit 1: Angle Relationships (Lessons 1–4+ Practice Day + Quiz)

- Determine unknown angle measures using facts about complementary, supplementary, and vertical angles.
- Write and solve equations for unknown angles in a diagram.

Sub-Unit 2: Drawing Triangles (Lessons 5–8 + Practice Day + Quiz)

- Construct triangles given three measures of side lengths or angles.

Sub-Unit 3: Solid Geometry (Lessons 9–13 + Practice Day)

- Solve real-world and mathematical problems involving the volume and surface area of right prisms.

Learning Standards

NJSLS Math:

7.EE Expressions and Equations

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

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.

7.G Geometry

A. Draw, construct, and describe geometrical figures and describe the relationships between them

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.

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.

B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume

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.

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.

Math Practices: MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills (CLKS)**:**

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1–4, 6.1.8.CivicsDP.1).
9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).
9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.
9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Computer Science & Design Thinking (CS & DT**):**

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.
8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets

Unit Essential Questions:	**Unit Enduring Understandings:**
What strategies are helpful for determining unknown angle measures? How many unique polygons are possible with different sets of side lengths and angle measurements? What different shapes can you make by slicing through a three-dimensional figure?	We can determine unknown angle measures by using known relationships, such as complementary and supplementary angles, vertical angles, and the angle sums in triangles and other polygons. The number and types of unique polygons that can be formed depend on the lengths of their sides and the measures of their angles, which must follow specific geometric rules.

	Slicing through three-dimensional figures can produce a variety of two-dimensional shapes, depending on the angle and location of the cut. These cross-sections help us understand the structure of 3D objects.

Vocabulary: adjacent angles, complementary angles, cross section, identical copy, supplementary angles, surface area, vertical angles, volume

Students will be able to:

1. **Exploring Angles:** Reason about the measures of angles on a pinwheel. Building Toward 7.G.B.5 MP1 MP6 MP8
2. **Complementary and Supplementary Angles:** Describe complementary and supplementary angles. 7.EE.B.4 7.G.B.5 MP6 MP7
3. **Vertical Angles and Equations:** Write equations to represent complex diagrams and determine unknown angle measures. 7.EE.B.4 7.G.B.5 MP2 MP3 MP7
4. **Writing Equations and Solving Problems With Angle Relationships:** Use and apply angle relationships to solve multistep problems and determine unknown angle measures. 7.EE.B.4 7.G.B.5 MP1 MP6
5. **The Triangle Inequality:** Reason about the characteristics of segment lengths that do and do not create triangles. 7.G.A 7.G.A.2 MP1 MP8
6. **Building Polygons:** Given Side Lengths Make connections between segments and circles and use those circles to create triangles with specific side lengths. 7.G.A 7.G.A.2 MP3 MP5
7. **Building Triangles With Technology:** Make conjectures about whether triangles will be identical or non-identical when given certain measurements. 7.G.A 7.G.A.2 MP3 MP5
8. **Drawing Triangles With Rulers and Protractors:** Draw triangles using rulers and protractors given three measurements. 7.G.A 7.G.A.2 MP1 MP6 MP7
9. **Describing Cross Sections:** Explore and describe possible cross sections of solids. 7.G.A.3 MP3 MP6
10. **Using Base Area to Calculate Volume:** Expand knowledge of volume and use strategies to calculate the volumes of rectangular and triangular prisms. 7.G.B 7.G.B.6 MP3

11. **Calculating Volumes of Right Prisms:** Determine the volume of prisms with complex bases by using a variety of volume strategies. 7.G.B 7.G.B.6 MP1 MP3 MP7
12. **Surface Area of Right Prisms:** Apply different strategies to calculate surface areas of prisms with complex bases. 7.G.B 7.G.B.6 MP5
13. **Applying Volume and Surface Area:** Decide whether to use volume or surface area strategies in order to solve a real-world problem. 7.G.B 7.G.B.6 MP4

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 2 "Friendly Angles" - Complementary and Supplementary Angles

Day 2: Amplify Desmos Lesson 3 "Angle Diagrams" - Vertical Angles and Equations

Day 3: Amplify Desmos Lesson 5 "Can You Build It" - The Triangle Inequality

Day 4: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–5. Consider using this time to prepare for the upcoming quiz.

Day 5: Lesson 2-5 Sub-Unit Quiz on Google Forms. Then, introduce lesson 7.7.09.

Day 6: Amplify Desmos Lesson 11 "Complex Prisms" - Calculating Volumes of Right Prisms

Day 7: Amplify Desmos Lesson 12 "Surface Area Strategies" - Surface Area of Right Prisms

Day 8: Amplify Desmos Lesson 13 "Popcorn Possibilities" - Applying Volume and Surface Area

Day 9: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–13. Consider using this time to prepare for the upcoming assessment.

Day 10: Amplify Desmos 7.7 End of Unit Assessment

Pacing Considerations

Lesson 1 (Optional): This lesson can be omitted because it is a review of angles and how to estimate angle measures from Grade 4.

Lesson 10 (Optional): This lesson can be omitted because it is a review of calculating the volumes of rectangular prisms and triangular prisms from Grade 6.

Lesson 13: This lesson gives students an opportunity to apply their knowledge of surface area and volume to solve a complex problem. There is no new content introduced in this lesson.

Practice Day 2 (Optional): This practice day is optional because it addresses supporting or additional work.

Activities for Unit 7: Lesson's 1-13*

Delta Math Skills for the Lesson

- The Triangle Inequality
- Name Angles
- Drawing Angles Level 1
- Measuring Angles with a Protractor
- Identify Angles with Terminology
- Investigate Vertical Angles with a Protractor
- Vertical/Adjacent/Complementary Angles L1
- Vertical/Adjacent/Complementary Angles (Algebraic)
- Angle Terminology with Equations
- Surface Area of Rectangular Prisms
- Surface Area of Square Pyramids
- Surface Area of a Cylinder
- Volume of Rectangular Prism Visually
- Volume of Rectangular Prisms
- Identify Cross Sections of Solids

Performance Task Angles
Complementary, Supplementary & Adjacent Angles Practice
Angles that Share a Vertex Practice
Finding Missing Angles/ Complimentary Angles Practice
Interior Exterior Angles of Triangles Practice
Constructing Triangles Given Angles or Side Length Practice
Constructing Triangles Given Angles or Side Lengths Practice 2/ Reteach

Assessment Evidence
Formative Assessments: Pre-Unit Check (optional), Sub-Unit Quizzes, Show What You Know
Summative Assessments: End-of-Unit Assessment
Common Benchmark Assessments: Common Cumulative Assessments
Alternative Assessments: Modified Unit Assessments, Modified Projects, Other Modified Assessments

Core Instructional & Supplemental Materials
Core Instructional Program: Amplify Desmos Math Online Platform
Desmos Materials by Lesson: 8.5" by 11" paper (optional) (Lesson 13) • coloring tools (as needed) (Lesson 10) • compasses (Lesson 8) • linkage strips (optional) (Lesson 5) • pinwheel (optional) (Lesson 1) • protractors (Lessons 4, 6–8) • rulers (Lessons 4–8, 12) • three-dimensional figures (as needed) (Lesson 9) • tracing paper (Lessons 6–7)
mClass Diagnostic and Practice, Delta Math, LinkIt!

Accommodations and Modifications: Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:
Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

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English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts - Personal Glossary - Extended Time - Simplified/Verbal Instructions - Frequent Breaks - Visual learning, including graphic organizers - Use of cognates to increase comprehension - Teacher modeling - Pairing students with beginning English language skills with students who have more advanced English language skills - Scaffolding - Word walls - Think-pair-share - Cooperative learning groups Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments

Students at Risk of Failure

- Home/School Connection - Alternative Assessments - Learning Contracts - Homogenous Grouping - Supplemental Instruction - Think-Pair-Share by Readiness - Homework Options - Differentiated Online Practice - Leveled Rubrics - Tiered Level of Supports - Tiered Activities - Small Group Instruction - Work Alone Choice - Group Work Choice Alternate or reduced work within Digital Platforms such as Delta Math and Link It assignments - Opportunities for make-up work or reduce number of assignments - Provide access to extra help when possible

Students with 504 Plans
Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way. Students' accommodations are outlined in their individual 504 plan. -

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

-Homogenous Grouping - Small Group In-Depth Instruction - Differentiated Online Practice - Alternative Assessments - Pre-Assess to provide Differentiated Instruction to Accelerate Learning

-Enrichment/Extension Activities within Digital Platforms such as Delta Math and Link It assignments

Unit 8

Desired Results

Unit 8 Title: Probability and Sampling

Unit Summary: Students learn about probability as a way to describe the likelihood of unknown events and use simulations to estimate the probability of real-world situations. They use samples to draw conclusions about and compare populations.

Sub-Unit 1: Probability (Lessons 1–8 + Practice Day + Quiz)

- Compare the results of repeated experiments and the expected probability.
- Determine the probability of events by identifying the sample space or designing and using simulations.
- Interpret the results from repeated experiments to determine fairness, probability, and the likelihood of events.

Sub-Unit 2: Sampling (Lessons 9–15 + Practice Day)

- Use measures of center and measures of variability from random samples to draw conclusions about and compare populations.
- Explain the purpose of sampling which methods of obtaining a sample tend to produce representative samples.

Learning Standards

NJSLS Math:

7.EE Expressions and Equations

B. Solve real-life and mathematical problems using numerical and algebraic expressions and equations

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. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional

$\frac{1}{10}$ of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.RP Ratios and Proportional Relationships

A. Analyze proportional relationships and use them to solve real-world and mathematical problems

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks

$\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\left(\frac{1}{2}\right)/\left(\frac{1}{4}\right)$ miles per hour, equivalently 2 miles per hour.

2. Recognize and represent proportional relationships between quantities.

7.SP. Statistics and Probability

A. Use random sampling to draw inferences about a population

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.

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. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.

B. Draw informal comparative inferences about two populations

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. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.

4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.

C. Investigate chance processes and develop, use, & evaluate probability models

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 ½ indicates an event that is neither unlikely or likely, and a probability near 1

indicates a likely event.

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. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

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.

   a. Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

   b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

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.

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.

c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?
Math Practices: MP1, MP3, MP7
Interdisciplinary Connections
Career Readiness, Life Literacies, & Key Skills (CLKS)**:** **9.4.8.CT.2:** Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MSETS1-4, 6.1.8.CivicsDP.1). **9.4.8.DC.2:** Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8). **9.4.8.IML.2:** Identify specific examples of distortion, exaggeration, or misrepresentation of information. **9.4.8.TL.3:** Select appropriate tools to organize and present information digitally.
Computer Science & Design Thinking (CS & DT**):** 8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices. 8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Learning Targets	
Unit Essential Questions: How can we determine how likely an event is to happen?	**Unit Enduring Understandings:** The likelihood of an event can be determined by analyzing the ratio of favorable outcomes to the total

<table>
<tr>
<td>How can we simulate events in the world to make predictions?
When is a sample representative of a population? How might this affect our analysis?</td>
<td>number of possible outcomes, known as probability.

Simulations can model real-world events by mimicking randomness and variability, helping us make predictions and estimate probabilities when exact calculations are difficult.

A sample is representative of a population when it reflects the population's characteristics fairly and without bias.

If a sample is not representative, it can lead to inaccurate or misleading conclusions in data analysis and predictions.</td>
</tr>
<tr>
<td colspan="2">Vocabulary: compound (multistep) event, event, experiment, outcome, population, probability, random, relative frequency, representative (sample), sample, sample space, simulation, tree diagram</td>
</tr>
<tr>
<td colspan="2">Students will be able to:
1. Chance Experiments*: Use phrases such as "likely" and "equally likely as not" to describe the likelihood of different events. Building Toward: 7.SP.C.6 MP3
2. Intro to Probability: Connect likelihood with probability written in different forms and use sample spaces to help determine probabilities. 7.EE.B.3 7.SP.C.5 7.SP.C.7.A MP5
3. Predicting Sample Spaces: Use repeated experiments and proportionality to make predictions and recognize that the number of repeated experiments affects the accuracy of a prediction. 7.RP.A 7.SP.C.5 7.SP.C.6 MP1 MP3</td>
</tr>
</table>

4. **Repeated Experiments:** Recognize that the results of a repeated experiment will approach, but may not exactly match, the probability of the event. 7.SP.C.6 7.SP.C.7 7.SP.C.7.B MP1 MP3 MP8
5. **Comparing Probabilities and Experiments:** Decide whether an object is fair by comparing probabilities from a model to the results of a repeated experiment. 7.SP.C.6 7.SP.C.7 7.SP.C.7.B MP2 MP8
6. **Compound Events:** Use lists, tables, and tree diagrams to represent the sample space of events. Determine the probabilities of compound events and whether games are fair. 7.SP.C.8 7.SP.C.8.A 7.SP.C.8.B MP5
7. **Estimating Probabilities Using Simulation**: Use probability tools to simulate compound real-world events. 7.SP.C.8 7.SP.C.8.C MP2 MP3 MP4
8. **Designing Simulations*:** Design and perform simulations to estimate the probabilities of compound events. 7.SP.C.8 7.SP.C.8.C MP1 MP4
9. **Using Mean and MAD to Compare Groups:** Analyze and compare sets of data by calculating the mean and mean absolute deviation (MAD) to make a recommendation for a real-world situation. 7.SP.B 7.SP.B.4 MP2 MP3
10. **Sampling From Large Populations:** Explore the advantages and disadvantages of using samples to answer a question about a population. 7.SP.A.1 MP1 MP3 MP7
11. **Sampling Bias:** Explore techniques for gathering a sample and explain whether a given sampling method is likely to produce representative data. 7.SP.A.1 MP3
12. **Using Percentages to Predict Populations:** Use data from a sample to estimate the number of marigolds in a large flower garden using proportional relationships and percentages. 7.RP.A 7.SP.A.1 7.SP.A.2 MP1 MP3
13. **Using Median and IQR to Make Predictions:** Draw conclusions about a population using quantitative data and estimate a measure of center of a population based on one or more samples of the population. 7.SP.A.2 7.SP.B.3 7.SP.B.4 MP3 MP6
14. **Comparing Populations:** Compare two populations by comparing the difference between the centers of samples with a measure of variability. 7.SP.B.3 7.SP.B.4 MP1 MP6
15. **Putting It All Together*:** Analyze real data about air quality and generate random samples to compare the air quality of different places. 7.SP.A.1 7.SP.A.2 7.SP.B.4 MP1 MP2 MP4

*Optional Lessons

Learning Activities: Suggested or Potential Learning Activities

Each Desmos lesson is designed to take one full class period. Practice days will be added after every few lessons. The following activities will be used to supplement learning:

- DeltaMath practice based on each lesson. DeltaMath includes a variety of interactive features and student response types which enable teachers to effectively scaffold and differentiate concepts to meet the needs of all students.

Students will work in DeltaMath completing recommended skills from their teacher and based on their diagnostic results.

Day 1: Amplify Desmos Lesson 1 "How Likely (Optional)" - Chance Experiments

Day 2: Amplify Desmos Lesson 2 "Prob-bear-bilities" - Intro to Probability

Day 3: Amplify Desmos Lesson 3 "Mystery Bag" - Predicting Sample Spaces

Day 4: Amplify Lessons 1-3 Quiz

Day 5: Amplify Desmos Lesson 4 "Spin Class" - Repeated Experiments

Day 6: Amplify Desmos Lesson 5 "Is It Fair?" - Comparing Probabilities and Experiments

Day 7: Amplify Desmos Lesson 6 "Fair Games" - Compound Events

Day 8: Amplify Desmos Practice Day (Quiz Review): Practice the concepts and skills developed during Lessons 1–8. Consider using this time to prepare for the upcoming quiz.

Day 9: Amplify Lessons 4-6 Quiz.

Day 10: Amplify Desmos Lesson 7 "Weather or Not" - Estimating Probabilities Using Simulation

Day 11: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–8. Consider using this time to prepare for the upcoming test.

Day 12: Amplify Desmos Lesson 1-8 Sub-Unit Quiz. This will be counted as a test.

Day 13: Amplify Desmos Lesson 9 "Car, Bike, or Train?" - Using Mean and MAD to Compare Groups

Day 14: Amplify Desmos Lesson 10 "Crab Island" - Sampling from Large Populations

Day 15: Amplify Desmos Lesson 11 "Headlines" - Sampling Bias

Day 16: Practice Day: Activities are included in the table below*.

Day 17: Amplify Lessons 9-11 Quiz

Day 18: Amplify Desmos Lesson 12 "Flower Power" - Using Percentages to Predict Populations

Day 19: Amplify Desmos Lesson 13 "Plots and Samples" - Using Medians and IQR to Make Predictions

Day 20: Amplify Desmos Lesson 14 "School Newspaper" - Comparing Populations

Day 21: Practice Day: Activities are included in the table below*.

Day 22: Amplify Desmos Practice Day (Test Review): Practice the concepts and skills developed during Lessons 1–15. Consider using this time to prepare for the upcoming assessment.

Day 23: Amplify Desmos 7.8 End of Unit Assessment (Lessons 9-14)

Pacing Considerations

Lesson 1 (Optional): This lesson surfaces what students know about likelihood, which will be addressed further in upcoming lessons. If omitted, the vocabulary from this lesson should be defined during Lesson 2.

Lesson 8 (Optional): If students show a strong understanding of designing and performing their own simulations to estimate probabilities of real-world situations, this lesson may be omitted.

Lesson 15 (Optional): There is no new content in this lesson so it may be omitted. If omitted, be sure to discuss throughout the unit how probability and sampling can be empowering to better understand the environment in which we live.

Practice Days 1 and 2 (Optional): These Practice Days are optional because they address supporting or additional work.

Activities for Unit 8: Lesson's 1-15*

Delta Math Skills for the Lesson

- Probability Language (Level 1)
- Convert Fraction/Decimal/Percent
- Simple Probability (L1)
- Simple Probability (L2)
- Most/Least Likely
- Expected Value
- Fundamental Counting Principle
- Interpret Dot Plot
- Interpret Histograms / Bar Charts
- Interpret Box Plot
- Finding the Mean and Median
- Interpret Mixed Representations
- Center and Spread Visually
- Compare Representations of Data

Probability Performance Task
Defining Outcomes, Events and Sample Space Practice
Finding Probability of Simple Events Practice
Probability and Relative Frequency Practice
Developing Probability Models/Simulation Practice
Probability Enrichment
Interpreting Quartiles and Quartile Ranges Practice
Box Plots and Mean Absolute Deviation Practice
Understanding Random Sampling Methods Practice
Using Statistics to Make Inferences about Populations Practice

Performance Task for Statistics

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Summative Assessments: End-of-Unit Assessment Form A and B
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Core Instructional Program: Amplify Desmos Math Online Platform
Desmos Materials by Lesson: • calculators (as needed) (Lesson 12) • coins, two different types (Lessons 1–2, 5–8) • coloring tools (Lessons 2–4) • containers for paper letters (e.g., bag, bowl, or cup) (Lessons 1, 8) • number cubes, two different types (Lessons 1–2, 5, 7–8) • paper clips for spinners (Lessons 1–2, 4, 6–7)
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Grade 7 Content Emphases

Major, Supporting, and Additional Clusters

Emphases are given at the cluster level. Refer to the New Jersey Student Learning Standards for Mathematics for the specific standards that fall within each cluster.

Key: **M** — Major, **S** — Supporting Clusters, **A** — Additional Clusters

Grade 7: Major, Supporting, and Additional Clusters

Indicator	Type	Cluster Heading
7.RP.A	**M**	Analyze proportional relationships and use them to solve real-world and mathematical problems
7.NS.A	**M**	Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers
7.EE.A	**M**	Use properties of operations to generate equivalent expressions
7.EE.B	**M**	Solve real-life and mathematical problems using numerical and algebraic expressions and equations
7.G.A	**A**	Draw, construct and describe geometrical figures and describe the relationships between them
7.G.B	**A**	Solve real-life and mathematical problems involving angle measure, area, surface area and volume
7.SP.A	**S**	Use random sampling to draw inferences about a population
7.SP.B	**A**	Draw informal comparative inferences about two populations
7.SP.C	**S**	Investigate chance processes and develop, use, and evaluate probability models.

Required Fluencies in Grade 7

7.EE.B.4a Solve equations of the form $px + q = r$ and $p(x + q) = r$.