



PISCATAWAY TOWNSHIP SCHOOLS

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Accelerated Math 7

Content Area: Mathematics

Grade Span: 6-7

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7-12

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COURSE OVERVIEW

Description

Seventh-grade math centers on understanding and applying proportional relationships. Students start by studying scale drawings, which sets up the introduction of proportional relationships and then invites students to use proportional relationships to solve problems involving fractional quantities and percent change. Students then extend what they learned in sixth grade to add, subtract, multiply, and divide positive and negative numbers, which leads to work on expressions, equations, and inequalities. Geometry, probability, and statistics have students study angles, triangles, and prisms, and probability and sampling extend their thinking about data analysis.

Eighth grade builds on what students have learned about proportional and geometric relationships at the start of the year to develop several key concepts in algebra and geometry. Students learn about rigid transformations and congruence which ties into similarity and dilations. Students use what they know about similar triangles to explore slope as they study linear relationships. This work with linear relationships builds toward solving linear equations with variables on both sides of the equal sign, and systems of linear equations. Students will then build on the exponent work from sixth grade to explore the properties of exponents and scientific notation as a tool for representing very large and very small quantities. The Pythagorean theorem extends students' understanding by encountering square roots, cube roots, and irrational numbers for the first time.

Goals

In addition to the content standards, skills, and concepts set forth, this course also seeks to meet the Standards for Mathematical Practice. These practices include generally applied best practices for learning mathematics, such as understanding the nature of proof and having a productive disposition towards the subject, and are not tied to a particular set of content. These skills are applicable beyond a student's study of mathematics.

The eight Standards for Mathematical Practice are outlined below:

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.

Scope and Sequence

Unit	Topic	Length
Unit 1	Ratios and Proportional Relationships	25-28 days
Unit 2	The Number System	15-16 days
Unit 3	Expressions, Equations and Inequalities	21-22 days
Unit 4	Geometry and Measurement	34-36 days
Unit 5	Statistics and Probability	12-14 days
Unit 6	Real Numbers, Exponents, and Scientific Notation	17-18 days
Unit 7	Linear Relationships and Equations	27-29 days
Unit 8	Transformational Geometry	14-17 days

Resources

Core Text:

Desmos Classroom

Suggested Resources:

Delta Math,IXL

UNIT 1: Ratio and Proportional Relationships

Summary and Rationale	
<p>In this unit, students learn what a proportional relationship is, how it is represented, and what types of contexts can be modeled by proportional relationships. Students recognize proportional relationships represented in tables and calculate constants of proportionality using tables. This builds on students' work with equivalent ratios.. Students use what they know about the constant of proportionality to write and interpret equations describing proportional relationships. Students explore graphs of proportional relationships and use graphs to determine constants of proportionality. This work supports students with the study of slope. Students use all of the representations of proportional relationships to solve real-world and mathematical problems.</p>	
Recommended Pacing	
25-28 days	
State Standards	
Standard 7.NS Number System	
CPI #	Cumulative Progress Indicator (CPI)
2d	Convert a rational number to a decimal using long division. Know that the decimal form of a rational number terminates in zeros or eventually repeats.
Standard 7.RP Ratio and Proportion	
CPI #	Cumulative Progress Indicator (CPI)
1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
2	Recognize and represent proportional relationships between quantities.
2a	Decide whether two quantities are in a proportional relationship (e.g., by testing for equivalent ratios in a table or by graphing on a coordinate plane and observing whether the graph is a straight line through the origin).
2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
2c	Represent proportional relationships with equations.
2d	Explain what 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.
3	Use proportional relationships to solve multistep ratio and percent problems (e.g., simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, and percent error).
Standard 7.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
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.
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.
Instructional Focus	
Unit Enduring Understandings	

- Incorporating multiple techniques of computation is necessary to solve problems.
- Comparisons aid in solving problems.

Unit Essential Questions

- What is the best way to compute?
- When should comparisons be made?

Objectives

Students will know:

- Understand Ratios, Rates, Unit Rates, and Constants of Proportionality.
- Understand the equivalence of unit rates and constants of proportionality.
- Vocabulary related to percent.
- Values can be represented as percent, fractions, and decimals.

Vocabulary: equivalent ratio, proportional relationship, scaled copy, scaled factor, scale, scale drawing, constant of proportionality, reciprocal, origin, coordinate plane, percent increase, percent decrease, percent error

Students will be able to:

- Describe how scaling affects lengths, angles, and areas in scaled copies.
- Use scale factors to create and compare scaled copies.
- Represent distances in the real world using scales and scale drawings
- Use tables to recognize proportional relationships and calculate the constant of proportionality.
- Write and use equations to analyze proportional relationships.
- Use graphs to recognize and analyze proportional relationships.
- Model real-world situations using representations of proportional relationships.
- Determine missing measurements in proportional relationships involving fractional quantities or percentages.
- Represent proportional relationships using tape diagrams, tables, double number lines, and equations
- Interpret and solve problems about real-world situations involving proportional relationships and percent change.

Resources

Core Text:

Desmos Classroom

Unit 7.1 Lessons: 1, 2, 4, 6, 9

Unit 7.2 Lessons: 1, 2, 4, 8, 9, 10, 11

Unit 7.4 Lessons: 1, 2, 4, 5, 6, 7, 8

Suggested Resources:

Delta Math,IXL

UNIT 2: The Number System

Summary and Rationale	
<p>In this unit, students extend what they learned to add, subtract, multiply, and divide positive and negative numbers. Students use a variety of strategies and mental models to add and subtract negative numbers. Students extend what they learned in Section 1 to make sense of multiplying and dividing positive and negative numbers. Sections 1 and 2 prepare students to solve equations with positive and negative numbers. Students apply what they have learned to understand issues in society.</p>	
Recommended Pacing	
15-16 days	
State Standards	
Standard 7.NS Number System	
CPI #	Cumulative Progress Indicator (CPI)
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.
1a	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?
1b	<i>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</i>
1c	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.
1d	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.
2a	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.
2b	. 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, New Jersey Student Learning Standards for Mathematics 6 then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts.
2c	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
Standard 7.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
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 $1/10$ 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.

Instructional Focus

Unit Enduring Understandings

- Types of numbers are subsets within the real number system.
- One representation of a number may sometimes be more helpful than another.
- Multiple techniques of computation are necessary to solve problems.

Unit Essential Questions

- Is math a language?
- Why is it important to express numbers in more than one way?
- What is the best way to compute?

Objectives

Students will know:

- Operations and properties related to real numbers.
- The properties that apply to addition extend to include the addition of negative numbers.
- Vocabulary related to the real number system.
- The relative magnitude of numbers.
- Operations can be modeled using concrete, symbolic, and pictorial methods.
- Numbers can be represented in many ways and these equivalent forms facilitate computation.
- The subsets of the Real Number system.

Vocabulary: positive, negative, number line

Students will be able to:

- Perform all four operations with positive and negative numbers using a variety of strategies
- Apply all four operations with positive and negative numbers to analyze an issue in society.
- Use the order of operations to solve multi-step problems involving integers.
- Convert, Compare, and Order rational numbers.

Resources

Core Text:

[Desmos Classroom](#)

Unit 7.5 Lessons: 1, 2, 3, 4, 6, 9

Suggested Resources:

Delta Math,IXL

UNIT 3: Expressions, Equations, and Inequalities

Summary and Rationale	
<p>In this unit, students extend what they learned about solving one-step equations to solve equations of the form $px+q=r$ and $p(x+q)=r$, and equations that include expanding, factoring, or adding terms. Students also solve inequalities and graph their solutions on a number line. Students use tape diagrams to represent equations and situations in context and to determine unknown values. Students learn how to solve equations of the form $px+q=r$ and $p(x+q)=r$ in and out of context. They also rewrite expressions using fewer terms by adding, expanding, and factoring, which can help make complex equations look more familiar before solving. This section builds on work with solving one-step equations, which will support students when solving equations with variables on both sides. Students use what they have learned about solving equations to solve inequalities that represent situations in and out of context. They also create graphs that represent solutions to inequalities, including those with \leq or \geq. Students' work in this section will support them in making sense of inequalities in the coordinate plane in high school.</p>	
Recommended Pacing	
21-22 days	
State Standards	
Standard 7.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
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.
4a	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 fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
4b	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.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • There may not always be one solution to a problem. • Solutions can be expressed in various forms. • Mathematics provides many strategies that are tools to solve problems. 	
Unit Essential Questions	

- When is a solution not always the best answer?
- Are there different ways to communicate solutions?
- What is the most effective and efficient way to solve a problem?

Objectives

Students will know:

- Understand the difference between expressions and equations.
- Balance is a required condition for equations.
- The limitations of a solution.
- The properties related to expressions and equations.
- Properties related to inequalities.
- The limitation of a solution.
- The difference between equations and inequalities.

Vocabulary: equation, inequality, tape diagram, solution, expand, factor, equivalent expressions, term

Students will be able to:

- Use tape diagrams to represent equations and situations in context and to determine unknown values
- 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
- 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 \geq or \leq .

Resources

Core Text:

[Desmos Classroom](#)

Unit 7.6 Lessons: 2, 3, 4, 5,6,9,10,11,13,16

Unit 8.4 Lessons: 2,3,5

Suggested Resources:

Delta Math,IXL

UNIT 4: Geometry and Measurement

Summary and Rationale	
<p>In this unit, 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. Students solve real-life and mathematical problems involving angle measures, volume, and surface area. Students also explore whether it is possible to draw no triangles, one triangle, or more than one triangle given three measures of sides or angles. In the 8th grade portion, students investigate <i>translations</i>, <i>rotations</i>, and <i>reflections</i>, and use these transformations to make informal arguments about congruence. They also explore angle relationships on parallel lines and the triangle sum theorem.</p>	
Recommended Pacing	
34-36 days	
State Standards	
Standard 7.G Geometry	
CPI #	Cumulative Progress Indicator (CPI)
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.
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.
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.
Standard 7.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
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.
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.
Standard 8.G Geometry	
CPI #	Cumulative Progress Indicator (CPI)
9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • What we measure affects how we measure. • Geometric relationships are throughout our environment. 	
Unit Essential Questions	

- What is the best way to measure?
- Can geometric relationships explain phenomena?

Objectives

Students will know:

- The relationship between different types of angle pairs.
- The criteria for similar and congruent figures.
- The meaning of a scale factor.
- The equivalence of scale factor, constant of proportionality, and unit rate.
- The criteria to create two-dimensional shapes.
- The different parts of a circle and the relationship between them.
- Area formulas for different shapes.
- The relationship between the different methods for finding surface area.
- The sum of the measures of the interior angles of a triangle is 180 degrees.
- Vocabulary related to parallel lines that are cut by a transversal.
- The volume of a Cylinder can be found using $V=B(h)$ where B is the area of the base and h is the height.
- The volume of a cone is $\frac{1}{3}$ the volume of a cylinder with the same height and radius.
- The volume of a sphere is $\frac{2}{3}$ the volume of a cylinder with the same radius and the height of twice the radius.

Vocabulary: circle, diameter, radius, circumference, pi, right, angle, straight angle, adjacent angle, complementary angles, supplementary angles, vertical angles, corresponding, congruent, transversal, cross section, base, prism, pyramid, volume, surface area, cone, cylinder, radius, sphere,

Students will be able to:

- Use the relationships between radius, diameter, and circumference to calculate missing measurements.
- Explain and use the formula for the area of a circle to solve problems.
- Determine unknown angle measures using facts about complementary, supplementary, and vertical angles.
- Write and solve equations for unknown angles in a diagram.
- Draw triangles given three measures of side lengths or angles.
- Determine whether it is possible to draw a unique triangle, more than one triangle, or no triangle given a set of measurements.
- Describe, compare, and contrast cross-sections of prisms and pyramids.
- Solve real-world and mathematical problems involving the volume and surface area of right prisms
- Use transformations to determine missing angle measurements and discover new angle relationships
- Calculate and compare the volumes of cylinders, cones, and spheres.
- Use the relationships between height, radius, and volume to calculate missing dimensions.

Resources

Core Text:

Desmos Classroom

Unit 7.3 Lessons 2, 3, 4 5, 8

Unit 7.7 Lessons 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13

Unit 8.1 Lessons 10, 12, 13, 14

Unit 8.5 Lessons 11, 13, 14

Suggested Resources:

Delta Math,IXL

UNIT 5: Statistics and Probability

Summary and Rationale	
<p>In the first section of the unit, 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. In the second section, students use samples to draw conclusions about and compare populations.</p>	
Recommended Pacing	
12-14 days	
State Standards	
Standard 7.SP Statistics And Probability	
CPI #	Cumulative Progress Indicator (CPI)
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
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. F
4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
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.
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.
7a	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
7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
8a	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
8b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event
8c	Design and use a simulation to generate frequencies for compound events.

Standard 8.SP Statistics And Probability	
CPI #	Cumulative Progress Indicator (CPI)
1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line.
3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. F
4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables
Standard 8.G Geometry	
CPI #	Cumulative Progress Indicator (CPI)
6	Explain a proof of the Pythagorean Theorem and its converse.
7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in realworld and mathematical problems in two and three dimensions.
8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • The way that data is collected, organized, and displayed influences interpretation. • Presentation affects reaction. • Representation and analysis of data assists in making informed decisions. • Mathematics provides tools to weigh outcomes. 	
Unit Essential Questions	
<ul style="list-style-type: none"> • Why is data collected and analyzed? • How do people use data to influence others? • Does knowing an outcome affect the choices? 	
Objectives	
<p>Students will know:</p> <ul style="list-style-type: none"> • Vocabulary related to data analysis. • The difference between a population and a sample. • The difference between a random and non-random sample. • Probability is a value between zero and one that expresses the relative likelihood of an event occurring. • The difference between theoretical and experimental probability. <p>Vocabulary: experiment, event, outcome, random, probability, sample space, simulation, mean, mean absolute deviation, population, sample, representative, interquartile range, median</p> <p>Students will be able to:</p> <ul style="list-style-type: none"> • Determine the probability of unknown events, comparing the results of repeated experiments and the expected probability. 	

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

Resources

Core Text:

Desmos Classroom

Unit 7.8 Lessons 2, 3, 4, 5, 6, 8, 11, 12, 13

Suggested Resources:

Delta Math,IXL

UNIT 6: Real Numbers, Exponents, and Scientific Notation

Summary and Rationale	
<p>This unit provides the opportunity for consistent practice in the topics of integer exponents and scientific notation. Students identify and create equivalent expressions involving positive, negative, and zero exponents. This builds on students' work with expressions involving positive whole-number exponents. In future high school, students will investigate the properties of non-integer exponents. Students will work to understand and apply the rules of exponents and the magnitude of numbers with scientific notation.</p>	
Recommended Pacing	
17-18 days	
State Standards	
Standard 8.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. F
2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • Types of numbers are subsets within the real number system. • One representation of a number may sometimes be more helpful than another. • Multiple techniques of computation are necessary to solve problems. 	
Unit Essential Questions	
<ul style="list-style-type: none"> • Is math a language? • Why is it important to express numbers in more than one way? • What is the best way to compute? 	
Objectives	
<p>Students will know:</p> <ul style="list-style-type: none"> • The relationship between subsets of real numbers. • Square roots are the inverse of squaring. • Cube roots are the inverse of cubing. • The square root of a non-perfect square is an irrational number. • Every number has two square roots. • Numbers can be expressed in different forms and the different forms can be useful to answer questions in different contexts. • The properties of exponents. 	
<p>Vocabulary: exponent, base, power of ten, scientific notation, irrational number, Pythagorean Theorem, legs, hypotenuse, square root, cube root</p>	

Students will be able to:

- Identify and create equivalent expressions involving positive, negative, and zero exponents.
- Express, compare, order and perform operations with very large or very small quantities using powers of 10 and scientific notation.
- Convert between standard notation and scientific notation.
- Understand that square roots and cube roots represent the edge length of squares and cubes, and approximate their values.
- Determine fractions and decimal approximations for rational and irrational numbers.
- Express a rational number as a decimal.
- Approximate the value of an irrational number.
- Compare and order rational and irrational numbers.
- Use the Pythagorean theorem and its converse to reason about right triangles and find unknown measurements. (If time permits)

Resources**Core Text:**

[Desmos Classroom](#)

Unit 8.7 Lessons 1, 2, 3, 4, 5, 6, 10, 11, 12

Unit 8.8 Lessons 1, 2, 3, 5, 6, 8, 9, 10, 12, 13

Suggested Resources:

Delta Math,IXL

UNIT 7: Linear Relationships and Equations

Summary and Rationale	
<p>This unit provides the opportunity for consistent practice in the topics of solving equations and finding the solution to a system of linear equations through graphing, substitution, and elimination. Students solve linear equations with variables on both sides of the equation. This builds on prior work, where students solved equations with variables on only one side of the equation. Students investigate systems of linear equations in two variables. This builds on students' work in solving linear equations in the first section and graphing linear relationships. The work in this unit prepares students to solve systems of more than two equations and those involving nonlinear equations in high school.</p>	
Recommended Pacing	
27-29 days	
State Standards	
Standard 8.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
7	Solve linear equations in one variable.
7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
8	Analyze and solve pairs of simultaneous linear equations.
8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
8b	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.
8c	Solve real-world and mathematical problems leading to two linear equations in two variables.
Standard 8.F Functions	
CPI #	Cumulative Progress Indicator (CPI)
1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.1
2	Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
3	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear
4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
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Instructional Focus

Unit Enduring Understandings

- There may not always be one solution to a problem.
- Solutions may be expressed in various forms.
- Mathematics provides many strategies that are tools to solve problems.

Unit Essential Questions

- When is a solution not always the best answer?
- Are there different ways to communicate solutions?
- What is the most effective and efficient way to solve a problem?

Objectives

Students will know:

- The difference between proportional and non-proportional relationships.
- The equivalence of rate of change, constant of proportionality, unit rate, scale factor, and slope.
- Changes in slope and y-intercept affect the form of the graph.
- Equations can have no solutions, one solution, a limited number of solutions, or an infinite number of solutions.
- The properties related to expressions and equations.

Vocabulary: slope, rate of change, vertical intercepts, linear relationship, solution, term, constant term, system of equations

Students will be able to:

- Represent linear situations with tables, graphs, and equations.
- Use data from a table or a graph to determine the rate of change or slope and y-intercept in mathematical and real-world situations.
- Graph linear relationships interpreting the unit rate as the slope of the line that models the relationship.
- Model linear relationships in graphs, tables, and equations.
- Comparing unit rates using tables, graphs, and equations.
- Change a graph by changing slope and/or y-intercept.
- Create a graphs, equations, tables, and situations given any one as a starting point.
- Determine if a point is a solution to an equation using a graph, table, or equation.
- Represent linear situations with tables, graphs, and equations in slope-intercept form.
- Use data from a table or a graph to determine the rate of change or slope and y-intercept in mathematical and real-world situations.
- Distinguish between proportional and non-proportional situations using tables, graph, and equations.
- Change a graph by changing slope and/or y-intercept.
- Create a graphs, equations, tables, and situations given any one as a starting point.
- Determine if a point is a solution to an equation using a graph, table, or equation.
- Solve complex equations with variables on both sides and with rational number coefficients and constants using different methods and connect this solution to the intersection point of the corresponding linear graphs.
- Model equations using concrete, pictorial, and symbolic methods.

- Write complex equations given real-world situations or tables.

Resources

Core Text:

Desmos Classroom

Unit 8.2 Lessons 9, 10

Unit 8.3 Lessons 1, 2, 3, 5, 7, 8, 9, 10

Unit 8.4 Lessons 4, 6, 7, 8

Suggested Resources:

Delta Math,IXL

UNIT 8: Transformational Geometry

Summary and Rationale	
<p>This unit gives consistent practice in the topics of transformations, congruence, and angle relationships with triangles and parallel lines. Students will perform the transformations, use this understanding to define congruence, and then learn to apply congruence properties. Students learn and use the word <i>congruent</i> and come to understand how congruent figures are related to <i>rigid transformations</i>. This builds on work students did in sketching geometric shapes given specific conditions. In high school, students will prove shortcuts for determining congruent triangles. Students use transformations to discover new angle relationships. This builds on students' work with supplementary, complementary, vertical, and adjacent angles.</p>	
Recommended Pacing	
14-17 days	
State Standards	
Standard 8.G Geometry	
CPI #	Cumulative Progress Indicator (CPI)
1	Verify experimentally the properties of rotations, reflections, and translations:
1a	Lines are transformed to lines, and line segments to line segments of the same length.
1b	Angles are transformed to angles of the same measure.
1c	Parallel lines are transformed to parallel lines.
2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them
3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles
Standard 8.EE Expressions and Equations	
CPI #	Cumulative Progress Indicator (CPI)
6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b .
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> • What we measure affects how we measure. • Geometric relationships are throughout our environment. 	
Unit Essential Questions	

- What is the best way to measure?
- Can geometric relationships explain phenomena?

Objectives

Students will know:

- Properties of orientation and congruence of transformations in a coordinate plane.
- Transformations can be modeled using algebraic representations.
- The equivalence of scale factor, unit rate, slope, constant of proportionality, and rate of change.
- The relationship of the measures of angles and side lengths in similar figures.

Vocabulary: reflection, rotation, translation, clockwise, counterclockwise, image, transformation, congruent, dilation, center of dilation, similar figures, scale factor

Students will be able to:

- Model transformations using algebraic representations.
- Perform transformations in the coordinate plane.
- Write a series of transformations to create a given image from a pre-image.
- Compare and contrast the attributes of a shape and its dilation on a coordinate plane.
- Represent algebraically the effect of a scale factor applied to a two-dimensional figure on a coordinate plane with the origin as the center of dilation.
- Write a series of transformations including dilation to create a given image from a pre-image.
- Find missing measures in similar figures.
- Determine if two shapes are similar given a diagram, measurements, or an equation.
- Find scale factor.

Resources

Core Text:

[Desmos Classroom](#)

Unit 8.1 Lessons 1, 2

Unit 8.2 Lessons 1, 2, 3, 4, 5

Suggested Resources:

Delta Math,IXL