



Totowa Public Schools

Mathematics (Pre-Algebra / Adv. Math)

Grade 7

Aligned to NJSL Standards

BOE Adopted: 8/31/2022

Revised 12/14/2022

Units of Study & Pacing Guide

<u>Unit of Study</u>	<u>Timeline</u>	<u>Notes</u>
Unit 1: Number System	8 Weeks	
Unit 2: Expressions and Equations	8 Weeks	
Unit 3: Ratios and Proportions	8 Weeks	
Unit 4: Geometry	8 Weeks	
Unit 5: Statistics & Probability	4 Weeks	

Title	The Number System
Unit Duration	8 Weeks
Unit Summary & Rationale	This unit builds on the students' understanding of rational numbers concepts presented in grade 6 to develop fluency with addition, subtraction, multiplication, and division of rational numbers and to use these skills in a problem solving context. Students will build upon their previous knowledge of absolute value and additive inverses. Rational numbers, in fraction form, and integers will be used in computations and problem solving. Students will learn to give contextual, real world examples of integer operations, write and solve equations for real-world problems and explain how the properties of operations apply. Finally, in this unit, students will convert a rational number to a decimal (terminating or repeating) using long division.
Unit Goals	
Essential Questions	<ul style="list-style-type: none"> • How can we use rational numbers to solve real world application problems? • How does subtraction of rational numbers relate to addition of rational numbers? • How do you determine the absolute value of a number on the number line? • How do you express rational numbers in fractional form as decimals? • Why is it important to be able to add, subtract, multiply, and divide rational numbers?
Enduring Understandings	<ul style="list-style-type: none"> • Previous understanding of operations of numbers can be directly applied to rational numbers. • Rational numbers can be used to solve real word problems. • Subtraction of rational numbers is the same as adding the additive inverse. • Students will be able to convert rational numbers to decimal form using long division. • A quantity can be represented numerically in various ways. Choosing the correct form of a number aids in the ability to solve a problem efficiently and effectively.

Learning Outcomes	<ul style="list-style-type: none"> • Be able to graph rational numbers on vertical or horizontal number lines. • Be able to solve problems containing positive and negative rational numbers (integers, fractions, and decimals) • Be able to write expressions containing rational numbers in various forms for word problems. • Be able to convert between rational numbers in their different forms. • Compare and order rational numbers in their different forms. • Use commutative, associative, additive inverse, and distributive properties to solve problems.
Assessment Evidence	
Formative	Collaborative Activities, Homework, Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Digital Personal Math Trainer, Games, Exit Slips, Pre-Assessments, Math Message – Warm up, Questioning, Teacher Made Pages, Learning Centers, LinkIt, Problem of the Day, Problem of the Week, Entrance Slips, Pre-Assessments, Interactive Notebooks
Summative	LinkIt Benchmark Assessments, Tests, Pre-Assessments, Quizzes, Written Responses
Alternative & Benchmark	<p>Alternative – Reteaching, One on One Conferencing, Learning Centers, Levels Homework, Higher Order Thinking Problems, Additional leveled practice</p> <p>Benchmark - LinkIt Benchmark Assessments, Totowa TPA, Teacher generated assessments (end of unit, etc.)</p> <p>Formative, Summative, Alternative and Benchmark Assessments</p>
Resources to Promote Learning	
Resources & Equipment Needed	Smartboard, Computers, iPads, websites and digital interactives/models, Multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Go Math! Resources, Assorted Manipulatives, Khan Academy, Crosswalk Coach for the Common Core Standards, Ready Common

Core Mathematics Instruction and Practice, Common Core Coach, Calculators, Whiteboards, [Approved Class Resource List](#)

Content & Interdisciplinary Standards

NJ 2020 SLS: Mathematics

NJSLS

Activity

7.NS.A.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

7.NS.A.1a. Describe situations in which opposite quantities combine to make 0.

7.NS.A.1b. 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.

7.NS.A.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.

7.NS.A.1d. Apply properties of operations as strategies to add and subtract rational numbers.

- Using number lines, students will add integers.
- Using examples, students will develop rule for “adding the opposite”
- Checking division solutions with multiplication to determine division by zero is impossible.
- Teacher driven modeling of multiplication by using repeated addition.
- Estimation to determine approximate answers then direct instruction. Students will classify as either terminating or repeating.
- Take notes- have students determine sign and approximate value of solution before starting calculation.
- Group work: Think, pair, share

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

7.NS.A.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.

7.NS.A.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, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

7.NS.A.2c. Apply properties of operations as strategies to multiply and divide rational numbers.

7.NS.A.2d. 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.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers.

Mathematical Practices

- MP.1. Make sense of problems and persevere in solving them.

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

NJ: 2016 SLS: English Language Arts

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics
- RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
- W.7.1. Write arguments to support claims with clear reasons and relevant evidence.
- W.7.2. Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. D. Use precise language and domain-specific vocabulary to inform about or explain the topic.
- SL.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others’ ideas and expressing their own clearly.
- L.7.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression

2020 SLS: Computer Science & Design Thinking

NJSLS Performance Expectations (By the end of 8th Grade)

- 8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

2020 SLS: Career Readiness, Life Literacies, and Key Skills

NJSLS Performance Expectations (By the end of 8th Grade)

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the

- Act as a responsible and contributing community members and employee.
- Attend to financial well-being.

<p>mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.</p>	<ul style="list-style-type: none"> • Consider the environmental, social and economic impacts of decisions • Demonstrate creativity and innovation. • 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
<ul style="list-style-type: none"> • 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest. • 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income. 	
Interdisciplinary Connections	
Science	<ul style="list-style-type: none"> • MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Title	Expression and Equations
Unit Duration	8 Weeks
Unit Summary & Rationale	Success with problem solving and developing fluency with rewriting linear expressions and solving linear equations presented in unit 2 will be dependent upon the completion of the work with rational numbers in unit 1.
Unit Goals	
Essential Questions	<ul style="list-style-type: none"> • What is an algebraic expression and when is it used? • What is the difference between expressions and equations? • What is the process of solving algebraic equations? • After solving inequalities, why is it important to be able to graph the solution(s)?
Enduring Understandings	<ul style="list-style-type: none"> • Write algebraic expressions, equations or inequalities for real life situations • Use inverse operations to solve multi-step equations and inequalities.

	<ul style="list-style-type: none"> • Representing the solution to an inequality graphically.
Learning Outcomes	<ul style="list-style-type: none"> • Be able to write and simplify expressions using number properties. • Be able to identify/represent equivalent expressions. • Be able to write and solve algebraic equations using inverse operations. • Be able to write, solve and graph algebraic inequalities.
Assessment Evidence	
Formative	Collaborative Activities, Homework, Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Digital Personal Math Trainer, Games, Exit Slips, Pre-Assessments, Math Message – Warm up, Questioning, Teacher Made Pages, Learning Centers, LinkIt, Problem of the Day, Problem of the Week, Entrance Slips, Pre-Assessments, Interactive Notebooks
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Resources to Promote Learning	
Resources & Equipment Needed	<p>Smartboard, Computers, iPads, websites and digital interactives/models, Multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Go Math! Resources, Assorted Manipulatives, Khan Academy, Crosswalk Coach for the Common Core Standards, Ready Common Core Mathematics Instruction and Practice, Common Core Coach, Calculators, Whiteboards</p> <p>Approved Class Resource List</p>
Content & Interdisciplinary Standards	

NJ 2020 SLS: Mathematics	
NJSLS	Activity
<p>7.EE.A.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p>7.EE.A.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related</p>	<ul style="list-style-type: none"> • Use Algebra Lab Gear to model and simplify expressions. •
<p>7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> <p>Show details</p> <p>7.EE.B.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p>7.EE.B.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</p>	<ul style="list-style-type: none"> • Teacher driven modeling –choosing equivalent values. • Explain the steps to wrapping and unwrapping a present to relate to solving an equation using inverse operations. • Group work-Using real world scenarios, students will solve algebraic equations.

forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

Show details

7.EE.B.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.

Show details

Mathematical Practices

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

NJ: 2016 SLS: English Language Arts

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics

- RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
- W.7.1. Write arguments to support claims with clear reasons and relevant evidence.
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- SL.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
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2020 SLS: Computer Science & Design Thinking

NJSLS Performance Expectations (By the end of 8th Grade)

- 8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

2020 SLS: Career Readiness, Life Literacies, and Key Skills

NJSLS Performance Expectations (By the end of 8th Grade)

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.

- Act as a responsible and contributing community members and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions
- Demonstrate creativity and innovation.
- 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

- 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.
- 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.

Interdisciplinary Connections

Science	<ul style="list-style-type: none">MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
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Title	Ratios and Proportions
Unit Duration	8 Weeks
Unit Summary & Rationale	The standards presented in unit 2 combine rational number arithmetic and linear expressions and equations concepts to build on the work from grade 6. These standards require the students to analyze proportional relationships and use them in problem solving. The geometry standards will provide opportunities for the students to use proportional reasoning in context.

Unit Goals

Essential Questions	<ul style="list-style-type: none">Where are unit rates useful in real life?How can proportions be used to determine side lengths of scale drawings?How can proportions be used to solve real life percent questions?How can you determine if two quantities are proportional?
Enduring Understandings	<ul style="list-style-type: none">Unit rates can involve ratios of rational numbers, which appear in real life situations such as a car's gas mileage and unit price.Use proportional reasoning and its applications to solve real life problems, such as: scale drawings, sales tax, tips, discounts, mark-ups , and percent of change.Understand that in a proportional relationship, there will be a constant of proportionality.
Learning Outcomes	<ul style="list-style-type: none">Be able to calculate and interpret unit rates of various quantities.Be able to determine if a proportional relationship exists between two quantities in different forms, ie. Tables, graphs,Be able to identify the constant of proportionality (unit rate) from tables, graphs, and equations.Be able to write and solve equations for proportional relationships.

- Be able to represent real world problems with proportions on a graph and describe how the graph can be used to explain the values of any point (x, y) on the graph including the points (0, 0) and (1, r), recognizing that r is the unit rate.
- Be able to solve multi-step ratio and percent problems using proportional relationships, including scale drawings of geometric figures, simple interest, tax, markups and markdowns, gratuities and commissions, and fees.

Assessment Evidence	
Formative	Collaborative Activities, Homework, Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Digital Personal Math Trainer, Games, Exit Slips, Pre-Assessments, Math Message – Warm up, Questioning, Teacher Made Pages, Learning Centers, LinkIt, Problem of the Day, Problem of the Week, Entrance Slips, Pre-Assessments, Interactive Notebooks
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Resources to Promote Learning	
Resources & Equipment Needed	Smartboard, Computers, iPads, websites and digital interactives/models, Multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Go Math! Resources, Assorted Manipulatives, Khan Academy, Crosswalk Coach for the Common Core Standards, Ready Common Core Mathematics Instruction and Practice, Common Core Coach, Calculators, Whiteboards Approved Class Resource List

Content & Interdisciplinary Standards**NJ 2020 SLS: Mathematics****NJSLS****Activity**

7.RP.A.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

Show details

7.RP.A.2. Recognize and represent proportional relationships between quantities.

7.RP.A.2a. 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.

7.RP.A.2b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

7.RP.A.2c. Represent proportional relationships by equations.

Show details

7.RP.A.2d. 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.

7.RP.A.3. Use proportional relationships to solve multistep ratio and percent problems.

Show details

- Teacher directed modeling - calculating unit rates.
- Charts- Have students observe a variety of charts and determine the rule that assigns a y value to each x . Does the rule hold true to create $(0,0)$? Is the relationship proportional?
- Graphs- Have students observe a variety of graphs and tables and determine the general relationship between the x and y values and identify it as the constant of proportionality.
- White boards-creating and solving proportions from word problems.
- Teacher driven instruction/class discussion-using graphs of proportional relationships students will interpret points on graph.

<p>7.G.A.1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</p> <p>7.G.A.2. Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.</p>	<ul style="list-style-type: none"> • Have students visit stations around the room to buy items for discounts, go to dinner with tax and tip, buy a house with commission and buy a car with interest. • Have students find the distance between two places using a scale on a map. Replicate a map drawing using a different scale than the one given. • Group work-Using real world examples, students will create and solve proportions for multiple step percent problems. • Constructions-Given conditions, students construct triangles with rulers and protractors.
Mathematical Practices	
<ul style="list-style-type: none"> • MP.1. Make sense of problems and persevere in solving them. • MP.2. Reason abstractly and quantitatively. • MP.3. Construct viable arguments and critique the reasoning of others. • MP.4. Model with mathematics. • MP.5. Use appropriate tools strategically. • MP.6. Attend to precision. • MP.7. Look for and make use of structure. • MP.8. Look for and express regularity in repeated reasoning. 	
NJ: 2016 SLS: English Language Arts	
<ul style="list-style-type: none"> • RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts. 	

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- Act as a responsible and contributing community members and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions
- Demonstrate creativity and innovation.
- 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

- 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.

- 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
- 9.1.8.CDM.3: Compare and contrast loan management strategies, including interest charges and total principal repayment costs.
- 9.1.8.CDM.4: Evaluate the application process for different types of loans (e.g., credit card, mortgage, student loans).
- 9.1.8.CP.1: Compare prices for the same goods or services.

Interdisciplinary Connections

Science	<ul style="list-style-type: none"> • MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
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Title	Geometry
Unit Duration	8 Weeks
Unit Summary & Rationale	The beginning of this unit provides students with the opportunity to review skills related to expressions and equations. Students will be able to solve real-life and mathematical problems using equations and inequalities. They will be able to apply the properties of operations in solving algebraic equations and inequalities. After the students revisit equations and inequalities, they move on to geometry. The students apply the formulas of area, volume, and surface area to solve real-world mathematical problems. They also use algebraic equations to find angle measures in supplementary, complementary, vertical, and adjacent angles. The students will also explore circles and how the circumference of a circle relates to the area of the circle. Students will be able to describe and identify what 2-dimensional figure is created when a 3-dimensional figure is sliced from multiple different angles.
Unit Goals	
Essential Questions	<ul style="list-style-type: none"> • How are geometric calculations such as area, volume, and surface area helpful in the real world? • How do geometric relationships help to solve problems and/or make sense of phenomena? • How can equations be used to solve geometric math problems?

	<ul style="list-style-type: none"> • How can equations be used to determine angle measurements for complementary, supplementary, and vertical angles? • What happens to a three-dimensional when it is sliced to a resulting two-dimensional figure?
Enduring Understandings	<ul style="list-style-type: none"> • Percents are used in real world problems. • Percent's can be applied to problems in different ways. • Geometric formulas are an efficient way to determine measurements, such as area and perimeter, and explain real world phenomena. • Three dimensional figures can be sliced to create faces that are two dimensional figures.
Learning Outcomes	<ul style="list-style-type: none"> • Be able to relate fractions, decimals, and percents to each other. • Be able to solve three different types of percent problems. • Be able to represent percent equations in an algebraic context. • Be able to apply percent of increase and percent of decrease when solving problems. • Be able to use their knowledge of percents to help them solve real world problems.
Assessment Evidence	
Formative	Collaborative Activities, Homework, Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Digital Personal Math Trainer, Games, Exit Slips, Pre-Assessments, Math Message – Warm up, Questioning, Teacher Made Pages, Learning Centers, LinkIt, Problem of the Day, Problem of the Week, Entrance Slips, Pre-Assessments, Interactive Notebooks
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[Formative, Summative, Alternative and Benchmark Assessments](#)

Resources to Promote Learning

Resources & Equipment Needed

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[Approved Class Resource List](#)

Content & Interdisciplinary Standards

NJ 2020 SLS: Mathematics

NJSLS

Activity

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

Show details

7.EE.B.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.EE.B.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

- Partner work- Solving real world problems of geometric measurement, money, tax, etc., which contain rational numbers in various forms.

<p>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. Show details</p> <p>7.EE.B.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. Show details</p>	
<p>7.G.B.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p>	<ul style="list-style-type: none"> • Students will bring in a 3-dimensional real-world object. They will work with a partner to measure the dimensions to calculate the surface area and volume of their object. • Using examples of three dimensional solids, either supplied by students or teacher, students will measure and calculate surface area.
<p>7.G.B.4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>7.G.B.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</p>	<ul style="list-style-type: none"> • Direct instruction-review solving equations using number properties and inverse operations. • Partner work on solving equations and inequalities using number properties and inverse operations. • Teacher directed activity - Using examples of figures, students will use protractors to determine special angle measurements. Next, have students suggest how algebraic equations can be created to determine special angle measurements and do several examples as class. Develop into defining variables and creating equations.

	<ul style="list-style-type: none"> • String Activity- What is Pi? • Students will measure diameters and circumferences of given circles and represent their ratio. Using results, develop concept of pi and derive formula for circumference.
<p>7.G.A.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</p>	<ul style="list-style-type: none"> • Teacher driven modeling- Teacher will show the various three dimensional shapes and discuss what shapes will show when there is a diagonal, horizontal or vertical cut made through it. • Direct instruction-Teacher will create 3d solids with play dough and use dental floss to cut them so that students can see the resulting cross sections.
Mathematical Practices	
<ul style="list-style-type: none"> • MP.1. Make sense of problems and persevere in solving them. • MP.2. Reason abstractly and quantitatively. • MP.3. Construct viable arguments and critique the reasoning of others. • MP.4. Model with mathematics. • MP.5. Use appropriate tools strategically. • MP.6. Attend to precision. • MP.7. Look for and make use of structure. • MP.8. Look for and express regularity in repeated reasoning. 	
NJ: 2016 SLS: English Language Arts	
<ul style="list-style-type: none"> • RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts. • RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics • RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently. • W.7.1. Write arguments to support claims with clear reasons and relevant evidence. 	

- W.7.2. Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. D. Use precise language and domain-specific vocabulary to inform about or explain the topic.
- SL.7.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
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2020 SLS: Computer Science & Design Thinking

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Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.

- Act as a responsible and contributing community members and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions
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- Utilize critical thinking to make sense of problems and persevere in solving them.
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- 9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.
- 9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.

Interdisciplinary Connections

Science	<ul style="list-style-type: none"> MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
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Title	Statistics and Probability
Unit Duration	4 Weeks
Unit Summary & Rationale	In this unit, students will continue to work on application of multiple step ratio and percent problems. Students will also focus on random sampling to draw inferences about a population, and drawing informal comparative inferences about two populations. Students will be able to investigate chance processes, and create and interpret probability models. They will learn how to use multiple representations for probability problems in a variety of contexts.
Unit Goals	
Essential Questions	<ul style="list-style-type: none"> How are percents used to help solve real world application problems? How do you create a random sampling process? How do you calculate the probability of simple and compound events? How can experimental and theoretical probabilities be used to make predictions or to draw conclusions?
Enduring Understandings	<ul style="list-style-type: none"> Proportional relationships can be used to solve multistep ratio and percent problems involving tax, interest, gratuity, markdowns or markups, etc. Collecting data can be used to study a population and make conclusions. Sampling should be random but representative of the group being analyzed. Probability is the likelihood of the occurrence of an event and ranges from impossible (0) to certain (1). Experimental probability is found by doing an experiment and recording the results. Theoretical probability is what you would expect to happen with equally likely events.

Learning Outcomes	<ul style="list-style-type: none"> • Be able to calculate multistep percent problems. • Be able to identify methods of random sampling. • Be able to calculate the probability of simple events. • Be able to calculate the probability of compound events. • Be able to use experimental probabilities to predict what is likely to occur. • Career Exploration – Students will examine careers in math and statistics.
Assessment Evidence	
Formative	Collaborative Activities, Homework, Classwork, Discussion, Independent Class Assignment, Informal Observations of Students, Digital Personal Math Trainer, Games, Exit Slips, Pre-Assessments, Math Message – Warm up, Questioning, Teacher Made Pages, Learning Centers, LinkIt, Problem of the Day, Problem of the Week, Entrance Slips, Pre-Assessments, Interactive Notebooks
Summative	LinkIt Benchmark Assessments, Tests, Pre-Assessments, Quizzes, Written Responses
Alternative and Benchmark	<p>Alternative – Reteaching, One on One Conferencing, Learning Centers, Levels Homework, Higher Order Thinking Problems, Additional leveled practice</p> <p>Benchmark - LinkIt Benchmark Assessments, Totowa TPA, Teacher generated assessments (end of unit, etc.)</p> <p>Formative, Summative, Alternative and Benchmark Assessments</p>
Resources to Promote Learning	
Resources & Equipment Needed	<p>Smartboard, Computers, iPads, websites and digital interactives/models, Multi-media presentations, video streaming, Brain Pop, Microsoft 365, Primary and Secondary Source Documents, Go Math! Resources, Assorted Manipulatives, Khan Academy, Crosswalk Coach for the Common Core Standards, Ready Common Core Mathematics Instruction and Practice, Common Core Coach, Calculators, Whiteboards</p> <p>Approved Class Resource List</p>
Content & Interdisciplinary Standards	

NJ 2020 SLS: Mathematics	
NJSLS	Activity
<p>7.RP.A.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.</p> <p>7.RP.A.3. Use proportional relationships to solve multistep ratio and percent problems.</p>	<ul style="list-style-type: none"> • Have students visit stations around the room to buy items for discounts, go to dinner with tax and tip, buy a house with commission and buy a car with interest. (covered in Unit 3) • Partner work-Real life problem solving with percent. • Have the students participate in a survey of their favorite restaurant in town. Assign each student a number and then use a random number table to choose the sample of students. Those students will share their results.
<p>7.SP.A.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p> <p>7.SP.A.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.</p>	<ul style="list-style-type: none"> • Class discussion about random sampling. Have students argue whether a sampling is random and a valid representation of a given population. • Discuss validity of results based on sample size. • Teacher driven modeling.
<p>7.SP.B.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities,</p>	<ul style="list-style-type: none"> • Students will roll a number cube 20 times and record the data. They will make predictions if they were rolling the number cube 100 times.

<p>measuring the difference between the centers by expressing it as a multiple of a measure of variability.</p> <p>Show details</p> <p>7.SP.B.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.</p> <p>Show details</p>	<ul style="list-style-type: none"> • Students will each bring in a novel with at least 200 pages in it to work with a partner. In pairs, the students will take a random sample of the amount of words on a page. Then they will calculate the mean to compare. • Test Score Analysis—Using test scores from different classes. Students will compute mean, and mean deviation to draw conclusions. • Cards- Using a deck of cards, students will answer theoretical probability questions.
<p>7.SP.C.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.</p> <p>7.SP.C.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.</p> <p>Show details</p> <p>7.SP.C.7. Develop a probability model and use it to find probabilities of events.</p>	<ul style="list-style-type: none"> • Students will roll a number cube 20 times and record the data. They will make predictions if they were rolling the number cube 100 times. • Have students predict/discuss the theoretical probability for rolling each number on a number cube. Then students will roll the number cube 20 times and record the data. They will then roll the number cube 40 times and record. They will discuss and compare the different experimental probability and the theoretical probability. • Have students spin a spinner with four colors and a number cube 10 times. They will keep track of their outcomes using an organized list. They will then calculate the probabilities of their outcomes. • Rolling number cube-Roll a number cube 20 times and record results. Using outcomes, students will use proportional reasoning to make predictions for how many times they would expect an event to happen for a different number of rolls.

Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

7.SP.C.7a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

Show details

7.SP.C.7b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

Show details

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

7.SP.C.8a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

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

- Predictions— Using calculator, students will use randomly generated number function to simulate rolling a number cube. Students will record results and discuss discrepancies between theoretical and experimental probability.
- Sample Space-Students will create list/table/ tree to show sample space for rolling number cube 2 times. Using their list/table/tree students will determine compound probability of certain events.

7.SP.C.8c. Design and use a simulation to generate frequencies for compound events.

Show details

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Accommodations & Modifications

Special Education Students, 504 students, English Language Learners, Students at-Risk Based on Students' Individual Needs

<p style="text-align: center;">Time/General</p> <ul style="list-style-type: none"> • Allow extra time • Repeat and clarify directions • Provide breaks in between tasks • Have student verbalize directions • Provide timelines/due dates for reports and projects 	<p style="text-align: center;">Processing</p> <ul style="list-style-type: none"> • Provide extra response time • Have student verbalize steps • Repeat directions • Provide small group instruction • Include partner work 	<p style="text-align: center;">Comprehension</p> <ul style="list-style-type: none"> • Provide reading material on student's level • Have student underline important points • Assist student on how to use context clues to identify words/phrases • Ensure short manageable tasks
<p style="text-align: center;">Tests/Quizzes/Grading</p> <ul style="list-style-type: none"> • Provide extended time • Provide study guides • Limit number of responses 	<p style="text-align: center;">Behavior/Attention</p> <ul style="list-style-type: none"> • Establish classroom rules • Write a contract with the student specifying expected behaviors • Provide preferential seating • Re-focus student as needed • Reinforce student for staying on task 	<p style="text-align: center;">Organization</p> <ul style="list-style-type: none"> • Monitor the student and provide reinforcement of directions • Verify the accurateness of homework assignments • Display a written agenda

ELL, Enrichment, Gifted & Talented Strategies

Accommodations Based on Students' Individual Needs

ELL Strategies

- Provide explicit, systematic instruction in vocabulary.
- Ensure that ELLs have ample opportunities to talk with both adults and peers and provide ongoing feedback and encouragement.
- Expose ELLs to rich language input.
- Scaffolding for ELLs language learning.

- Encourage continued L1 language development.
- Alphabet knowledge
- Phonological awareness
- Print awareness
- Design instruction that focuses on all of the foundational literacy skills.
- Recognize that many literacy skills can transfer across languages.
- English literacy development by helping ELLs make the connection between what they know in their first language and what they need to know in English.
- Graphic organizers
- Modified texts
- Modified assessments
- Written/audio instruction
- Shorter paragraph/essay length
- Homogeneously grouped by level

Accommodations Based on Students' Individual Needs:

Enrichment Strategies

- Evaluate vocabulary
- Elevate Text Complexity
- Incorporate inquiry based assignments and projects
- Extend curriculum
- Balance individual, small group and whole group instruction
- Provide tiered/multi-level activities
- Include purposeful learning centers
- Provide open-ended activities and projects
- Offer opportunities for heterogeneous grouping to work with age and social peers as well as homogeneous grouping to provide time to work with individual peers
- Provide pupils with experiences outside the 'regular' curriculum

- Alter the pace the student uses to cover regular curriculum in order to explore topics of interest in greater depth/breadth within their own grade level
- Require a higher quality of work than the norm for the given age group
- Promote higher level of thinking and making connections.
- Focus on process learning skills such as brainstorming, decision making and social skills
- Use supplementary materials in addition to the normal range of resources.
- Encourage peer to peer mentoring
- Integrate cross-curricular lessons
- Incorporate real-world problem solving activities
- Facilitate student-led questioning and discussions

Gifted & Talented Strategies

- More elaborate, complex, and in-depth study of major ideas, problems, and themes that integrate knowledge within and across systems of thought.
- Development and application of productive thinking skills to enable students to reconceptualize existing knowledge and/or generate new knowledge.
- Explore constantly changing knowledge and information and develop the attitude that knowledge is worth pursuing in an open world.
- Encourage exposure to, selection, and use of appropriate and specialized resources.
- Promote self-initiated and self-directed learning and growth.
- Provide for the development of self-understanding and the understanding of one's relationship to persons, societal institutions, nature, and culture.
- Flexible pacing
- Use of more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace. If they master a particular unit, they need to be provided with more advanced learning activities, not more of the same activity.
- Questions that require a higher level of response and/or open-ended questions that stimulate inquiry, active exploration, and discovery.
- Encourage students to think about subjects in more abstract and complex ways

- Activity selection based on student interests, that encourage self-directed learning
- Group interaction and simulations
- Guided self-management
- Encourage students to demonstrate what they have learned in a wide variety of forms that reflect both knowledge and the ability to manipulate ideas.
- Engage students in active problem-finding and problem-solving activities and research.
- Provide students opportunities for making connections within and across systems of knowledge by focusing on issues, themes, and ideas.