Grade Six Mathematics

Domain ***Ratios and Proportional Relationships***	
Cluster ***Understand ratio concepts and use ratio reasoning to solve problems.***	**Pacing** **2nd Quarter**

Standards

1. ***Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.***
   For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

   Learning Targets:
   - I can define the term ratio and demonstrate my understanding by giving various examples. (k)
   - I can write a ratio that describes a relationship between two quantities. (s)
   - I can explain the relationship a ratio represents. (r)

2. ***Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.***
   For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."

   Learning Targets:
   - I can define the term "unit rate" and demonstrate my understanding by giving various examples. (k)
   - I can recognize a ratio written as a unit rate, explain a unit rate, and give an example of a unit rate. (k)
   - I can describe the ratio relationship represented by a unit rate. (r)

3. ***Use ratio and rate reasoning to solve real-world and mathematical problems; e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.***
   a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

Use equivalent fractions as a strategy to add and subtract fractions.

1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
   For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)
2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators; e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
   For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.

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

values on the coordinate plane. Use tables to compare ratios.

b. Solve unit rate problems including those involving unit pricing and constant speed.
For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Learning Targets:

- I can solve real-world problems involving proportional reasoning by using various diagrams. (r)
- I can create a table of equivalent ratios. (s)
- I can use the proportional relationship to find missing values in a table of equivalent ratios. (r)
- I can compare ratios presented in various tables. (r)
- I can plot corresponding values from an equivalent ratio table on a coordinate grid. (s)
- I can use proportional reasoning to solve unit rate problems. (r)
- I can use visual representations (e.g., strip diagrams, percent bars, one-hundred grids) to model percents. (r)
- I can write a percent as a rate per one-hundred. (k)
- I can use proportional reasoning to find the percent of a given number. (r)
- I can use proportional reasoning to find the whole when given both the part and the percent. (r)
- I can use a ratio as a conversation factor when working with measurements of different units. (s)

3. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers; e.g., by using visual fraction models or equations to represent the problem.
For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
   a. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a x q ÷ b. *For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd).*
   b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
5. Interpret multiplication as scaling (resizing) by:
   a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
   b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n x a)/(n x b) to the effect of multiplying a/b by 1.
6. Solve real world problems involving multiplication of fractions and mixed numbers; e.g., by using visual fraction models or equations to represent the problem.
7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.
b. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions; e.g., by using visual fraction models and equations to represent the problem.
For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

Progressions to Seventh Grade

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

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(/1/4) miles per hour, equivalently 2 miles per hour.
2. Recognize and represent proportional relationships between quantities.
   a. Decide whether two quantities are in a proportional relationship; e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
   b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
   c. Represent proportional relationships by equations.
   For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.
   d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (l, r) where r is the unit rate.
3. Use proportional relationships to solve multistep ratio and percent

	problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*
Content Vocabulary • ratio • rate • unit rate • equivalent ratio • percent • coordinate plane • quantity • proportion • proportional relationship • unknown quantity • constant rate • ratio table • rate table • strip diagram • 100s grid • percent bars • conversion factor • cross products	**Academic Vocabulary** • define • demonstrate • describe • explain • reason • model • convert • plot • manipulate • transform • solve • create
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain ***The Number System***	
Cluster ***Apply and extend previous understandings of multiplication and division to divide fractions by fractions.***	**Pacing** **1st Quarter**
Standards 1. ***Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions; e.g., by using visual fraction models and equations to represent the problem.*** *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?* **Learning Targets:** • I can use a visual model to represent the division of a fraction by a fraction. (s) • I can divide fractions by fractions using an algorithm or mathematical reasoning. (s) • I can justify the quotient of a division problem by relating it to a multiplication program. • I can use mathematical reasoning to justify the standard algorithm for fraction division. (R) • I can solve real world problems involving the division of fractions and interpret the quotient in the context of the problem. (s) • I can create story contexts for problems involving the division of a fraction by a fraction. (p)	**Content Elaborations** **Standards of Mathematical Practice** ***Mathematically proficient students:*** 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. **From the K-8 Math Standards Progression.** **<u>Key Advances from Fifth Grade</u>** ***Apply and extend previous understandings of multiplication and division to multiply and divide fractions.*** 3. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers; e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* 4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a x q ÷ b.

	For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd.) b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. 5. Interpret multiplication as scaling (resizing) by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n x a)/(n x b) to the effect of multiplying a/b by 1. 6. Solve real world problems involving multiplication of fractions and mixed numbers; e.g., by using visual fraction models or equations to represent the problem. 7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.* b. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions; e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

	Progressions to Seventh Grade ***Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.*** 1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers. 2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

	3. Solve real-world and mathematical problems involving the four operations with rational numbers.
Content Vocabulary • quotient	**Academic Vocabulary** • justify • solve • model • apply • interpret • compute • represent • algorithm • standard algorithm
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain ***The Number System***	
Cluster ***Compute fluently with multi-digit numbers and find common factors and multiples.***	**Pacing** **1st Quarter**

Standards

2. Fluently divide multi-digit numbers using the standard algorithm.

Learning Targets:

- I can use the standard algorithm to fluently divide multi-digit numbers. (s)

3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Learning Targets:

- I can fluently add and subtract multi-digit decimals using the standard algorithm. (s)
- I can fluently multiply multi-digit decimals using the standard algorithm. (s)
- I can fluently divide multi-digit decimals using the standard algorithm. (s)

4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
For example, express 36 + 8 as 4 (9 + 2).

Learning Targets:

- I can find all factors of any given number, less than or equal to 100. (s)
- I can find the greatest common factor of any two numbers, less than or equal to 100. (s)
- I can create a list of multiples for any number less than or equal to 12. (s)
- I can find the least common multiple of any two numbers, less than or equal to 12. (s)

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

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

3. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers; e.g., by using visual fraction models or equations to represent the problem.
   For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
   a. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a x q ÷ b.

• I can use the distributive property to rewrite a simple addition problem when the addends have a common factor. (s)	*For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd.)* b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. 5. Interpret multiplication as scaling (resizing) by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n x a)/(n x b) to the effect of multiplying a/b by 1. 6. Solve real world problems involving multiplication of fractions and mixed numbers; e.g., by using visual fraction models or equations to represent the problem. 7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.* b. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions; e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

Progressions to Seventh Grade

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

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
   a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
   b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
   c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
   d. Apply properties of operations as strategies to add and subtract rational numbers.
2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
   a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
   b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts.
   c. Apply properties of operations as strategies to multiply and divide rational numbers.
   d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

	3. Solve real-world and mathematical problems involving the four operations with rational numbers.
Content Vocabulary • factor • multiple • greatest common factor • least common multiple • distributive property	**Academic Vocabulary** • compute
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain ***The Number System***	
Cluster ***Apply and extend previous understandings of numbers to the system of rational numbers.***	**Pacing** **1st Quarter**
Standards	**Content Elaborations**

5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

Learning Targets:

- I can describe and give examples of how positive or negative numbers are used to describe quantities having opposite directions or opposite values. (r)
- I can recognize that positive and negative signs represent opposite values and/or directions. (k)
- I can explain that the number zero is the point at which direction or value will change. (k)
- I can use positive and negative numbers along with zero to represent real world situations. (s)

6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself; e.g., -(-3) = 3; and that 0 is its own opposite.

b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

c. Find and position integers and other rational numbers on a horizontal

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

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

3. Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers; e.g., by using visual fraction models or equations to represent the problem.
   For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?
4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
   a. Interpret the product (a/b) x q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a x q ÷ b.

or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Learning Targets:

- I can show and explain why every rational number can be represented by a point on a number line. (r)
- I can plot a number and its opposite on a number line and recognize that they are equidistant from zero. (k)
- I can find the opposite of any given number including zero. (k)
- I can use the signs of the coordinates to determine the location of an ordered pair in the coordinate plane. (k)
- I can reason about the location of two ordered pairs that have the same values but different signs. (r)
- I can plot a point on a number line or coordinate plane. (s)
- I can read a point from a number line or a coordinate plane. (s)

7. Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right.

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
For example, write -3℃ > -7℃ to express the fact that -3℃ is warmer than -7℃.

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars.

d. Distinguish comparisons of absolute value from statements about order.
For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.

Learning Targets:

- I can describe the relative position of two numbers on a number line when given an inequality. (s)
- I can interpret a given inequality in terms of a real number situation. (s)

For example, use a visual fraction model to show (2/3) x 4 = 8/3, and create a story context for this equation. Do the same with (2/3) x (4/5) = 8/15. (In general, (a/b) x (c/d) = ac/bd.)

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5. Interpret multiplication as scaling (resizing) by:
   a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
   b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (n x a)/(n x b) to the effect of multiplying a/b by 1.
6. Solve real world problems involving multiplication of fractions and mixed numbers; e.g., by using visual fraction models or equations to represent the problem.
7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
   a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
   For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.
   b. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions; e.g., by using visual fraction models and equations to represent the problem.
   For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

- I can define absolute value as it applies to a number line. (k)
- I can describe absolute value as the magnitude of the number in a real world situation. (k)
- I can compare between using a signed number and using the absolute value of a signed number when referring to real world situations. (r)

8. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Learning Targets:

- I can graph points in any quadrant of the coordinate plane to solve real-world and mathematical problems. (s)
- I can use absolute values to find the distance between two points with the same x-coordinates or the same y-coordinates. (r)

Progressions to Seventh Grade

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

1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
   a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
   b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
   c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
   d. Apply properties of operations as strategies to add and subtract rational numbers.
2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
   a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
   b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts.
   c. Apply properties of operations as strategies to multiply and divide rational numbers.
   d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

	3. Solve real-world and mathematical problems involving the four operations with rational numbers.
Content Vocabulary • positive • negative • rational number • integer • opposite • coordinate plane • ordered pair • quadrant • reflection • absolute value • magnitude • inequality • x-coordinate • y-coordinate • x-axis • y-axis	**Academic Vocabulary** • apply • extend • recognize • interpret • distinguish • represent
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain	***Expressions and Equations***	
Cluster	***Apply and extend previous understandings of arithmetic to algebraic expressions.***	**Pacing** **2nd Quarter**

Standards

1. Write and evaluate numerical expressions involving whole-number exponents.

Learning Targets:

- I can explain the meaning of a number raised to a power. (K)
- I can write numerical expressions involving whole-number exponents. (S)
- I can evaluate numerical expressions involving whole-number exponents. (S)

2. Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers.
For example, express the calculation "Subtract y from 5" as 5 – y.

b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
For example, use the formulas V = s3 and A = 6 s2 to find the volume and surface area of a cube with sides of length s = 1/2.

Learning Targets:

- I can translate a relationship given in words into an algebraic expression. (S)
- I can identify parts of an algebraic expression by using correct

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

Analyze patterns and relationships.

3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice

mathematical terms. (K)
- I can recognize when an expression is representing a sum and/or difference of terms versus a product and/or quotient of terms (e.g., the expression 5(x+3) is representing a product of the terms 5 and (x+3) while the expression 5x+3 is representing a sum of the terms 5x and 3). (K)
- I can recognize an expression as both a single value and as two or more terms on which an operation is performed. (R)
- I can evaluate an algebraic expression for a given value. (S)
- I can substitute values in formulas to solve real-world problems. (S)
- I can apply the order of operations when evaluating both arithmetic and algebraic expressions. (S)

3. ***Apply the properties of operations to generate equivalent expressions.***
For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.

Learning Targets:
- I can create a visual model to show two expressions are equivalent (e.g., use algebra tiles to model that 3(2+x)=6+3x). (R)
- I can apply the properties of operations – especially the distributive property – to generate equivalent expressions. (S)

4. ***Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).***
For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.

Learning Targets:
- I can determine whether two expressions are equivalent by using the same value to evaluate both expressions. (S)
- I can use the properties of operations to justify that two expressions are equivalent. (S)

the corresponding terms in the other sequence. Explain informally why this is so.

Progressions to Seventh Grade

Use properties of operations to generate equivalent expressions.

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."

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

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 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 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
   a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
   For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
   b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the

	solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*
Content Vocabulary • base • exponent/power • sum • difference • term • product • factor • quotient • coefficient • arithmetic expression • algebraic expression • substitute • equivalent expressions • commutative property • associative property • distributive property • quantitative relationship • order of operations • variable • formula	**Academic Vocabulary** • evaluate • solve • substitute • solution • apply • extend • analyze • model • manipulate • translate
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain *Expressions and Equations*	
Cluster ***Reason about and solve one-variable equations and inequalities.***	**Pacing** **2nd Quarter**

Standards

5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Learning Targets:

- I can explain that solving an equation or inequality leads to finding the value or values of the variable that will make a true mathematical statement. (R)
- I can substitute a given value into an algebraic equation or inequality to determine whether it is part of the solution set. (S)

6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Learning Targets:

- I can use a variable to write an algebraic expression that represents a real-world situation when a specific number is unknown. (S)
- I can explain and give examples of how a variable can represent a single unknown number (e.g., x=9, or 5y=10) or can represent any number in a specified set (e.g., m<8 or n+6>10). (R)
- I can use a variable to write an expression that represents a consistent relationship in a particular pattern (e.g., use function tables to write an expression that would represent the output for any input). (S)

7. Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q, and x are all nonnegative rational numbers.

Learning Targets:

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
   For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

Analyze patterns and relationships.

3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
   For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice

- I can solve equations in the form of x + p = q where p and q are given numbers. (S)
- I can solve equations in the form of px=q where p and q are given numbers. (S)
- I can write and solve algebraic equations that represent real-world problems. (S)

8. Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Learning Targets:

- I can write a simple inequality to represent the constraints or conditions of numerical values in a real-world or mathematical problem. (S)
- I can explain what the solution set of an inequality represents. (R)
- I can show the solution set of an inequality by graphing it on a number line. (K)

the corresponding terms in the other sequence. Explain informally why this is so.

Progressions to Seventh Grade

Use properties of operations to generate equivalent expressions.

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
   For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."

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

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
   For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 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 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
   a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
      For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
   b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the

	solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*
Content Vocabulary • equation • inequality • substitute • solution • variable • constant • algebraic equation • inequality • solution set • input • output • function table • pattern • constraint • condition • infinite	**Academic Vocabulary** • evaluate • solve • substitute • solution • reason • simplify • analyze
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain	***Expressions and Equations***	
Cluster	***Represent and analyze quantitative relationships between dependent and independent variables.***	**Pacing** **2nd Quarter**

Standards

9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

Learning Targets:

- I can explain the difference between the independent variable and the dependent variable and give examples of both. (R)
- I can determine the independent and dependent variable in a relationship. (S)
- I can write an algebraic equation that represents the relationship between the two variables. (S)
- I can create a graph by plotting the dependent variable on the x-axis and the independent variable on the y-axis of a coordinate plane. (S)
- I can analyze the relationship between the dependent and independent variables by comparing the table, graph, and equation. (R)

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
   For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.

Analyze patterns and relationships.

3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
   For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice

the corresponding terms in the other sequence. Explain informally why this is so.

Progressions to Seventh Grade

Use properties of operations to generate equivalent expressions.

1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
   For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."

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

3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
   For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 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 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
   a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
      For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
   b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the

	solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*
Content Vocabulary • independent variable • dependent variable • coordinate plane • quantitative relationships • x-axis • y-axis	**Academic Vocabulary** • evaluate • solve • substitute • solution • analyze • relate
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain	***Geometry***	
Cluster	***Solve real-world and mathematical problems involving area, surface area, and volume.***	**Pacing** **3rd Quarter**

Standards

1. ***Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.***

   Learning Targets:
   - I can show how to find the area of a parallelogram by decomposing it and recomposing the parts to form a rectangle. (S)
   - I can show how to find the area of a right triangle by composing two of them into a rectangle. (S)
   - I can show how to find the area of a triangle by composing two of them into a parallelogram or rectangle or by decomposing the triangle and recomposing its parts to form a parallelogram or rectangle. (S)
   - I can show how to find the area of a trapezoid by composing two of them into a rectangle or parallelogram or decomposing the trapezoid into a rectangle and one or more triangles. (S)
   - I can show how to find the area of other polygons by decomposing them into simpler shapes such as triangles, rectangles, and parallelograms and combining the areas of those simple shapes. (S)
   - I can explain the relationship between the formulas for the area of rectangles, parallelograms, triangles, and trapezoids. (R)
   - I can solve real-world problems that involve finding the area of polygons. (S)

2. ***Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.***

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

<u>Key Advances from Fifth Grade</u>

Graph points on the coordinate plane to solve real-world and mathematical problems.

1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
2. Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Classify two-dimensional figures into categories based on their properties.

3. Understand that attributes belonging to a category of two dimensional

Learning Targets:

- I can find the volume of a right rectangular prism by reasoning about the number of unit cubes it takes to cover the first layer of the prism and the number of layers needed to fill the entire prism. (S)
- I can generalize finding the volume of a right rectangular prism to the equation V = l w h or V = b h. (R)
- I can solve real-world problems that involve finding the volume of right rectangular prisms. (S)

3. ***Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.***

Learning Targets:

- I can plot vertices in the coordinate plane to draw specific polygons. (S)
- I can use the coordinates of the vertices of a polygon to find the length of a specific side.
- I can plot points, draw figures, and find length on the coordinate plane to solve real-world problems.

4. ***Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.***

Learning Targets:

- I can match a net to the correct right rectangular prism, right triangular prism, right square pyramid, or right tetrahedron. (S)
- I can draw a net for a given rectangular prism, right triangular prism, right square pyramid, or right tetrahedron. (S)
- I can use a net to find the surface area of a given rectangular prism, right triangular prism, right pyramid, or right tetrahedron. (S)
- I can solve real-world problems that involve finding the surface area of a rectangular prism, right triangular prism, right square pyramid, or right tetrahedron. (S)

figures also belong to all subcategories of that category.
For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

4. Classify two-dimensional figures in a hierarchy based on properties.

Progressions to Seventh Grade

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

1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
2. Draw (freehand, with ruler and protractor, and with technology) 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.

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

4. Know the formulas for the area and circumference of a circle and use them to solve problems; given an informal derivation of the relationship between the circumference and area of a circle.
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.

<table>
<tr>
<td>Content Vocabulary
polygon
triangle
right triangle
quadrilateral
parallelogram
trapezoid
area
square unit
right rectangular prism
base
height
area
volume
cubic unit
vertex/vertices
coordinate
right rectangular prism
right triangular prism
right square pyramid
right tetrahedron
net
surface area
attributes
plane
properties</td>
<td>Academic Vocabulary
solve
reason
apply
support
decompose
recompose
explain
generalize
represent</td>
</tr>
<tr>
<td>Formative Assessments
performance tasks
pretests
interviews
quizzes</td>
<td>Summative Assessments
Teacher created assessments</td>
</tr>
<tr>
<td>Resources
Granite School</td>
<td>Enrichment Strategies</td>
</tr>
<tr>
<td>Integrations</td>
<td>Intervention Strategies</td>
</tr>
</table>

Grade Six Mathematics

Domain *Statistics and Probability*

Cluster ***Develop understanding of statistical variability.***

Pacing

4th Quarter

Standards

1. ***Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.***

   Learning Targets:
   - I can explain what makes a good statistical question. (R)
   - I can develop a question that can be used to collect statistical information. (S)

2. ***Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.***

   Learning Targets:
   - I can explain that there are three ways that the distribution of a set of data can be described: by its center, spread, or overall shape. (K)
   - I can describe the center of a set of statistical data in terms of the mean, median, and mode. (K)
   - I can describe the spread of a set of statistical data in terms of extremes, cluster, gaps, and outliers. (K)
   - I can describe the overall shape of the set of data in terms of its symmetry or skewness. (K)

3. ***Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.***

   Learning Targets:
   - I can define a measure of center as a single value that summarizes a data set. (K)

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

Key Advances from Fifth Grade

Convert like measurement units within a given measurement system.

1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.

Represent and interpret data.

2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.
   For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.

Progressions to Seventh Grade

Use random sampling to draw inferences about a population.

1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations

• I can find measures of center by calculating the mean, median, and mode of a set of numerical data. • I can define a measure of variation as the range of the data, relative to the measures of center. (K) • I can find measures of variation by calculating the interquartile range or the mean absolute deviation of a set of numerical data. (S)	about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. 2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.* ***Draw informal comparative inferences about two populations.*** 3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* 4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.* ***Investigate chance processes and develop, use, and evaluate probability models.*** 5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 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. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*

	7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* 8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
Content Vocabulary • variability • distribution • center • spread • shape of data • measure of center • mean • interquartile range • extremes • lower quartile (Q_1) • upper quartile (Q_3) • outlier • clusters • gaps	**Academic Vocabulary** • develop

• median (Q_2) • mode • measure of variation • range • mean absolute deviation • symmetry • skewness	
Formative Assessments • performance tasks • pretests • interviews • quizzes	**Summative Assessments** • Teacher created assessments • PARCC
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**

Grade Six Mathematics

Domain ***Statistics and Probability***

Cluster ***Summarize and describe distributions.***

Pacing

4th Quarter

Standards

4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Learning Targets:

- I can organize and display data as a line plot or dot plot. (S)
- I can organize and display data in a histogram. (S)
- I can organize and display data in a box plot. (S)
- I can determine the upper and lower extremes, median, and upper and lower quartiles of a set of data and use this information to display the data in a box plot. (S)
- I can identify the similarities and differences of representing the same data in a line plot, a histogram, or a box plot. (R)
- I can decide and explain which type of plot (dot plot, line plot, histogram, or box plot) is the best way to display my data depending on what I want to communicate about the data. (R)

5. Summarize numerical data sets in relation to their context, such as by:

a. Reporting the number of observations.
b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Learning Targets:

- I can write a data collection summary that includes the number of observations, what is being investigated, how it is measured, and the

Content Elaborations

Standards of Mathematical Practice

Mathematically proficient students:

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.

From the K-8 Math Standards Progression.

Key Advances from Fifth Grade

Represent and interpret data.

2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.

Progressions to Seventh Grade

Use random sampling to draw inferences about a population.

1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

units of measurement. (P) • I can determine the measures of center and measures of variability of the collected data. (S) • I can justify the use of a particular measure of center or measure of variability based on the shape of the data. (R) • I can use a measure of center and a measure of variation to draw inferences about the shape of the data distribution. (R) • I can describe overall patterns in the data and how they relate to the context of the problem. (R) • I can describe any deviations from the overall pattern and how they relate to the context of the problem. (R)	*For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.* ***Draw informal comparative inferences about two populations.*** 3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* 4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.* ***Investigate chance processes and develop, use, and evaluate probability models.*** 5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 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. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.* 7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will*

	be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* 8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
Content Vocabulary • measure of center • mean • median (Q_2) • mode • measure of variation • range • interquartile range • extremes • lower quartile (Q_1) • upper quartile (Q_3) • outlier • mean absolute deviation • line plot • dot plot • histogram • lower extreme • upper extreme • box plot • measure of variability	**Academic Vocabulary** • summarize • organize • display • critique • relate • justify • argue • construct
Formative Assessments • performance tasks • pretests	**Summative Assessments** • Teacher created assessments

• interviews • quizzes	
Resources • Granite School	**Enrichment Strategies**
Integrations	**Intervention Strategies**