



Course I Mathematics Curriculum Guide

King George County Schools

2011

<p>Standard</p>	<p>MTH 6.1</p> <p>The student will describe and compare data, using ratios, and will use appropriate notations, such as $\frac{a}{b}$, <i>a to b</i>, and <i>a:b</i>.</p> <p>Timeframe:</p>	<p>Essential Understandings</p> <ul style="list-style-type: none"> • What is a ratio? A ratio is a comparison of any two quantities. A ratio is used to represent relationships within a set and between two sets. A ratio can be written using fraction form ($\frac{2}{3}$), a colon (2:3), or the word <i>to</i> (2 to 3).
<p>Strand</p>	<p>Number and Number Sense</p>	<p>Teacher Notes</p>
<p>Essential Knowledge and Skills</p>	<ul style="list-style-type: none"> a. Describe a relationship within a set by comparing part of the set to the entire set. b. Describe a relationship between two sets by comparing part of one set to a corresponding part of the other set. c. Describe a relationship between two sets by comparing all of one set to all of the other set. d. Describe a relationship within a set by comparing one part of the set to another part of the same set. e. Represent a relationship in words that makes a comparison by using the notations $\frac{a}{b}$, <i>a:b</i>, and <i>a to b</i>. f. Create a relationship in words for a given ratio expressed symbolically. 	<ul style="list-style-type: none"> • A ratio is a comparison of any two quantities. A ratio is used to represent relationships within and between sets. • A ratio can compare part of a set to the entire set (part-whole comparison). • A ratio can compare part of a set to another part of the same set (part-part comparison). • A ratio can compare part of a set to a corresponding part of another set (part-part comparison). • A ratio can compare all of a set to all of another set (whole-whole comparison). • The order of the quantities in a ratio is directly related to the order of the quantities expressed in the relationship. For example, if asked for the ratio of the number of cats to dogs in a park, the ratio must be expressed as the number of cats to the number of dogs, in that order. • A ratio is a multiplicative comparison of two

Resources	Resource Materials	Released Test Items	Individual Teacher Notes
	Section <ul style="list-style-type: none"> • 6.1 • 6.2 • 6.3 http://ttaconline.org		<p>numbers, measures, or quantities.</p> <ul style="list-style-type: none"> • All fractions are ratios and vice versa. • Ratios may or may not be written in simplest form. • Ratios can compare two parts of a whole. • Rates can be expressed as ratios. <p>Essential New Vocabulary</p> <ul style="list-style-type: none"> • ratio • part-whole comparison • part-part comparison • rates • fraction

<p>Standard</p>	<p>MTH 6.2</p> <p>The student will</p> <p>a) investigate and describe fractions, decimals and percents as ratios; b) identify a given fraction, decimal or percent from a representation; c) demonstrate equivalent relationships among fractions, decimals, and percents; and d) compare and order fractions, decimals, and percents.</p> <p>Timeframe:</p>	<p>Essential Understandings</p> <ul style="list-style-type: none"> What is the relationship among fractions, decimals and percents? Fractions, decimals, and percents are three different ways to express the same number. A ratio can be written using fraction form ($\frac{2}{3}$), a colon (2:3), or the word <i>to</i> (2 to 3). Any number that can be written as a fraction can be expressed as a terminating or repeating decimal or a percent.
<p>Strand</p>	<p>Number and Number Sense</p>	<p>Teacher Notes</p>
<p>Essential Knowledge and Skills</p>	<p>g. Identify the decimal and percent equivalents for numbers written in fraction form including repeating decimals.</p> <p>h. Represent fractions, decimals, and percents on a number line.</p> <p>i. Describe orally and in writing the equivalent relationships among decimals, percents, and fractions that have denominators that are factors of 100.</p> <p>j. Represent, by shading a grid, a fraction, decimal, and percent.</p> <p>k. Represent in fraction, decimal, and percent form a given shaded region of a grid.</p> <p>l. Compare two decimals through thousandths using manipulatives, pictorial representations, number lines, and symbols (<, ≤, ≥, >, =).</p> <p>m. Compare two fractions with denominators of 12 or less using manipulatives, pictorial representations, number lines, and symbols (<, ≤, ≥, >, =).</p> <p>n. Compare two percents using pictorial representations and symbols (<, ≤, ≥, >, =).</p> <p>o. Order no more than 3 fractions, decimals, and percents (decimals through thousandths, fractions with denominators of 12 or less), in ascending or descending order.</p>	<ul style="list-style-type: none"> <i>Percent</i> means “per 100” or how many “out of 100”; <i>percent</i> is another name for <i>hundredths</i>. A number followed by a percent symbol (%) is equivalent to that number with a denominator of 100 (e.g., $30\% = \frac{30}{100} = \frac{3}{10} = 0.3$). Percents can be expressed as fractions with a denominator of 100 (e.g., $75\% = \frac{75}{100} = \frac{3}{4}$). Percents can be expressed as decimal (e.g., $38\% = \frac{38}{100} = 0.38$). Some fractions can be rewritten as equivalent fractions with denominators of powers of 10, and can be represented as decimals or percents (e.g., $\frac{3}{5} = \frac{6}{10} = \frac{60}{100} = 0.60 = 60\%$). Decimals, fractions, and percents can be represented using concrete materials (e.g., Base-10 blocks,

Resources	Resource Materials	Released Test Items	Individual Teacher Notes
	Section <ul style="list-style-type: none"> • 3.1 • 3.7 • 3.8 • 4.1 • 5.1 • 5.2 • 5.3 • 5.5 http://ttaconline.org		<p>number lines, decimal squares, or grid paper).</p> <ul style="list-style-type: none"> • Percents can be represented by drawing shaded regions on grids or by finding a location on number lines. • Percents are used in real life for taxes, sales, data description, and data comparison. • Fractions, decimals and percents are equivalent forms representing a given number. • The decimal point is a symbol that separates the whole number part from the fractional part of a number. • The decimal point separates the whole number amount from the part of a number that is less than one. • The symbol • can be used in Grade 6 in place of “x” to indicate multiplication. • Strategies using 0, $\frac{1}{2}$ and 1 as benchmarks can be used to compare fractions. • When comparing two fractions, use $\frac{1}{2}$ as a benchmark. Example: Which is greater, $\frac{4}{7}$ or $\frac{3}{9}$? $\frac{4}{7}$ is greater than $\frac{1}{2}$ because 4, the numerator, represents more than half of 7, the denominator. The denominator tells the number of parts that make the whole. $\frac{3}{9}$ is less than $\frac{1}{2}$ because 3, the numerator, is less than half of 9, the denominator, which tells the number of parts that make the whole. Therefore, $\frac{4}{7} >$

Essential New Vocabulary

- percent
- equivalent
- bar notation
- repeating decimal
- terminating decimal
- benchmark

$$\frac{3}{9}$$

- When comparing two fractions close to 1, use distance from 1 as your benchmark. Example: Which is greater, $\frac{6}{7}$ or $\frac{8}{9}$? $\frac{6}{7}$ is $\frac{1}{7}$ away from 1 whole. $\frac{8}{9}$ is $\frac{1}{9}$ away from 1 whole. Since $\frac{1}{7} > \frac{1}{9}$, then $\frac{6}{7}$ is a greater distance away from 1 whole than $\frac{8}{9}$ so $\frac{8}{9} > \frac{6}{7}$.
- Students should have experience with fractions such as $\frac{1}{8}$, whose decimal representation is a terminating decimal (e. g., $\frac{1}{8} = 0.125$) and with fractions such as $\frac{2}{9}$, whose decimal representation does not end but continues to repeat (e. g., $\frac{2}{9} = 0.222\dots$). The repeating decimal can be written with ellipses (three dots) as in 0.222... or denoted with a bar above the digits that repeat as in $0.\overline{2}$.

Standard	MTH 6.3 The student will a) identify and represent integers; b) order and compare integers; and c) identify and describe absolute value of integers. Timeframe:			Essential Understandings <ul style="list-style-type: none"> • What role do negative integers play in practical situations? Some examples of the use of negative integers are found in temperature (below 0), finance (owing money), below sea level. There are many other examples. • How does the absolute value of an integer compare to the absolute value of its opposite? <ul style="list-style-type: none"> • They are the same because an integer and its opposite are the same distance from zero on a number line. Teacher Notes <ul style="list-style-type: none"> • Integers are the set of whole numbers, their opposites, and zero. • Positive integers are greater than zero. • Negative integers are less than zero. • Zero is an integer that is neither positive nor negative. • A negative integer is always less than a positive integer. • When comparing two negative integers, the negative integer that is closer to zero is greater. • An integer and its opposite are the same distance from zero on a number line. For example, the opposite of 3 is -3. • The absolute value of a number is the distance of a number from zero on the number line regardless of direction. Absolute value is represented as $-6 = 6$.
Strand	Number and Number Sense			
Essential Knowledge and Skills	a. Identify an integer represented by a point on a number line. b. Represent integers on a number line. c. Order and compare integers using a number line. d. Compare integers, using mathematical symbols ($<$, $>$, $=$). e. Identify and describe the absolute value of an integer.			
Resources	Resource Materials	Released Test Items	Individual Teacher Notes	
	Section <ul style="list-style-type: none"> • 9.1 • 9.2 • 9.3 http://ttaconline.org			

Essential New Vocabulary

- positive integers
- negative integers
- zero
- whole number
- absolute value

- On a conventional number line, a smaller number is always located to the left of a larger number (e.g., -7 lies to the left of -3 , thus $-7 < -3$; 5 lies to the left of 8 thus 5 is less than 8).

Standard	MTH 6.4 The student will demonstrate multiple representations of multiplication and division of fractions. Timeframe:			Essential Understandings <ul style="list-style-type: none"> When multiplying fractions, what is the meaning of the operation? When multiplying a whole by a fraction such as $3 \times \frac{1}{2}$, the meaning is the same as with multiplication of whole numbers: 3 groups the size of $\frac{1}{2}$ of the whole. When multiplying a fraction by a fraction such as $\frac{2}{3} \cdot \frac{3}{4}$, we are asking for part of a part. When multiplying a fraction by a whole number such as $\frac{1}{2} \times 6$, we are trying to find a part of the whole. What does it mean to divide with fractions? For measurement division, the divisor is the number of groups and the quotient will be the number of groups in the dividend. Division of fractions can be explained as how many of a given divisor are needed to equal the given dividend. In other words, for $\frac{1}{4} \div \frac{2}{3}$ the question is, "How many $\frac{2}{3}$ make $\frac{1}{4}$?" For partition division the divisor is the size of the group, so the quotient answers the question, "How much is the whole?" or "How much for one?" Teacher Notes <ul style="list-style-type: none"> Using manipulatives to build conceptual understanding and using pictures and sketches to link concrete examples to the symbolic enhance students' understanding of operations with fractions and help students connect the meaning of whole number computation to fraction
Strand	Number and Number Sense			
Essential Knowledge and Skills	f. Demonstrate multiplication and division of fractions using multiple representations. g. Model algorithms for multiplying and dividing with fractions using appropriate representations.			
Resources	Resource Materials	Released Test Items	Individual Teacher Notes	
	Section <ul style="list-style-type: none"> 3.2 3.3 3.4 3.5 3.6 http://ttaonline.org			

Essential New Vocabulary

- reciprocal

computation.

- Multiplication and division of fractions can be represented with arrays, paper folding, repeated addition, repeated subtraction, fraction strips, pattern blocks and area models.
- When multiplying a whole by a fraction such as $3 \times \frac{1}{2}$, the meaning is the same as with multiplication of whole numbers: 3 groups the size of $\frac{1}{2}$ of the whole.
- When multiplying a fraction by a fraction such as $\frac{2}{3} \cdot \frac{3}{4}$, we are asking for part of a part.
- When multiplying a fraction by a whole number such as $\frac{1}{2} \times 6$, we are trying to find a part of the whole.
- For measurement division, the divisor is the number of groups. You want to know how many are in each of those groups. Division of fractions can be explained as how many of a given divisor are needed to equal the given dividend. In other words, for $\frac{1}{4} \div \frac{2}{3}$, the question is, "How many $\frac{2}{3}$ make $\frac{1}{4}$?"
- For partition division the divisor is the size of the group, so the quotient answers the question, "How much is the whole?" or "How much for one?"

Standard	MTH 6.5 The student will investigate and describe concepts of positive exponents and perfect squares. Timeframe:			Essential Understandings <ul style="list-style-type: none"> • What does exponential form represent? Exponential form is a short way to write repeated multiplication of a common factor such as $5 \times 5 \times 5 \times 5 = 5^4$. • What is the relationship between perfect squares and a geometric square? <ul style="list-style-type: none"> • A perfect square is the area of a geometric square whose side length is a whole number. Teacher Notes <ul style="list-style-type: none"> • In exponential notation, the base is the number that is multiplied, and the exponent represents the number of times the base is used as a factor. In 8^3, 8 is the base and 3 is the exponent. • A power of a number represents repeated multiplication of the number by itself (e.g., $8^3 = 8 \times 8 \times 8$ and is read "8 to the third power"). • Any real number other than zero raised to the zero power is 1. Zero to the zero power (0) is undefined. • Perfect squares are the numbers that result from multiplying any whole number by itself (e.g., $36 = 6 \times 6 = 6^2$). • Perfect squares can be represented geometrically as the areas of squares the length of whose sides are whole numbers (e.g., 1×1, 2×2, or 3×3). This can be modeled with grid paper, tiles, geoboards and virtual manipulatives.
Strand	Number and Number Sense			
Essential Knowledge and Skills	h. Recognize and describe patterns with exponents that are natural numbers, by using a calculator. i. Recognize and describe patterns of perfect squares not to exceed 20^2 , by using grid paper, square tiles, tables, and calculators. j. Recognize powers of ten by examining patterns in a place value chart: $10^4 = 10,000$, $10^3 = 1000$, $10^2 = 100$, $10^1 = 10$, $10^0 = 1$.			
Resources	Resource Materials	Released Test Items	Individual Teacher Notes	
	Section <ul style="list-style-type: none"> • 1.1 http://ttaconline.org			

Essential New Vocabulary

- perfect square
- exponents
- exponential notation
- base
- power
- zero power

<p>Standard</p>	<p>MTH 6.6</p> <p>The student will</p> <p>a) multiply and divide fractions and mixed numbers; and</p> <p>b) estimate solutions and then solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of fractions.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • How are multiplication and division of fractions and multiplication and division of whole numbers alike? Fraction computation can be approached in the same way as whole number computation, applying those concepts to fractional parts. • What is the role of estimation in solving problems? Estimation helps determine the reasonableness of answers.
<p>Strand</p>	<p>Computation and Estimation</p>			<p>Teacher Notes</p>
<p>Essential Knowledge and Skills</p>	<p>a. Multiply and divide with fractions and mixed numbers. Answers are expressed in simplest form.</p> <p>b. Solve single-step and multistep practical problems that involve addition and subtraction with fractions and mixed numbers, with and without regrouping, that include like and unlike denominators of 12 or less. Answers are expressed in simplest form.</p> <p>c. Solve single-step and multistep practical problems that involve multiplication and division with fractions and mixed numbers that include denominators of 12 or less. Answers are expressed in simplest form.</p>			<ul style="list-style-type: none"> • Simplifying fractions to simplest form assists with uniformity of answers. • Addition and subtraction are inverse operations as are multiplication and division. • It is helpful to use estimation to develop computational strategies. For example, $2\frac{7}{8} \cdot \frac{3}{4}$ is about $\frac{3}{4}$ of 3, so the answer is between 2 and 3. • When multiplying a whole by a fraction such as $3 \cdot \frac{1}{2}$, the meaning is the same as with multiplication of whole numbers: 3 groups the size of $\frac{1}{2}$ of the whole. • When multiplying a fraction by a fraction such as $\frac{2}{3} \cdot \frac{3}{4}$, we are asking for part of a part. • When multiplying a fraction by a whole number such as $\frac{1}{2} \cdot 6$, we are trying to find a part of the whole.
<p>Resources</p>	<p>Resource Materials</p> <p>Section</p> <ul style="list-style-type: none"> • 3.2 • 3.3 • 3.4 • 3.5 • 3.6 <p>http://ttaconline.org</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	

Essential New Vocabulary

- mixed number
- simplest form

Standard	MTH 6.7 The student will solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of decimals. Timeframe:			Essential Understandings <ul style="list-style-type: none"> What is the role of estimation in solving problems? Estimation gives a reasonable solution to a problem when an exact answer is not required. If an exact answer is required, estimation allows you to know if the calculated answer is reasonable.
Strand	Computation and Estimation			Teacher Notes
Essential Knowledge and Skills	a. Solve single-step and multistep practical problems involving addition, subtraction, multiplication and division with decimals expressed to thousandths with no more than two operations.			<ul style="list-style-type: none"> Different strategies can be used to estimate the result of computations and judge the reasonableness of the result. For example: What is an approximate answer for $2.19 \div 0.8$? The answer is around 2 because $2 \div 1 = 2$. Understanding the placement of the decimal point is very important when finding quotients of decimals. Examining patterns with successive decimals provides meaning, such as dividing the dividend by 6, by 0.6, by 0.06, and by 0.006.
Resources	Resource Materials	Released Test Items	Individual Teacher Notes	<ul style="list-style-type: none"> Solving multistep problems in the context of real-life situations enhances interconnectedness and proficiency with estimation strategies. Examples of practical situations solved by using estimation strategies include shopping for groceries, buying school supplies, budgeting an allowance, deciding what time to leave for school or the movies, and sharing a pizza or the prize money from a contest Essential New Vocabulary <ul style="list-style-type: none"> quotient dividend divisor estimation
	Section <ul style="list-style-type: none"> 4.2 4.3 4.4 4.5 http://ttaonline.org			

Standard	<p>MTH 6.8</p> <p>The student will evaluate whole number numerical expressions, using the order of operations.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • What is the significance of the order of operations? The order of operations prescribes the order to use to simplify expressions containing more than one operation. It ensures that there is only one correct answer.
Strand	Computation and Estimation			<p>Teacher Notes</p>
Essential Knowledge and Skills	<p>b. Simplify expressions by using the order of operations in a demonstrated step-by-step approach. The expressions should be limited to positive values and not include braces { } or absolute value .</p> <p>c. Find the value of numerical expressions, using order of operations, mental mathematics, and appropriate tools. Exponents are limited to positive values.</p>			<ul style="list-style-type: none"> • The order of operations is a convention that defines the computation order to follow in simplifying an expression. • The order of operations is as follows: <ul style="list-style-type: none"> – First, complete all operations within grouping symbols*. If there are grouping symbols within other grouping symbols, do the innermost operation first. – Second, evaluate all exponential expressions. – Third, multiply and/or divide in order from left to right. – Fourth, add and/or subtract in order from left to right.
Resources	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	<p>* Parentheses (), brackets [], braces { }, and the division bar – as in $\frac{3+4}{5+6}$ should be treated as grouping symbols.</p> <ul style="list-style-type: none"> • The power of a number represents repeated multiplication of the number (e.g., $8^3 = 8 \cdot 8 \cdot 8$). The base is the number that is multiplied, and the exponent represents the number of times the base is used as a factor. In the example, 8 is the base, and 3 is the exponent. • Any number, except 0, raised to the zero power is 1. Zero to the zero power is undefined. <p>Essential New Vocabulary</p> <ul style="list-style-type: none"> • order of operations
	<p>Section</p> <ul style="list-style-type: none"> • 1.2 <p>http://ttaconline.org</p>			

<p>Standard</p>	<p>MTH 6.9</p> <p>The student will make ballpark comparisons between measurements in the U.S. Customary System of measurement and measurements in the metric system.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • What is the difference between weight and mass? Weight and mass are different. Mass is the amount of matter in an object. Weight is the pull of gravity on the mass of an object. The mass of an object remains the same regardless of its location. The weight of an object changes dependent on the gravitational pull at its location. • How do you determine which units to use at different times? • Units of measure are determined by the attributes of the object being measured. Measures of length are expressed in linear units, measures of area are expressed in square units, and measures of volume are expressed in cubic units. • Why are there two different measurement systems? Measurement systems are conventions invented by different cultures to meet their needs. The U.S. Customary System is the preferred method in the United States. The metric system is the preferred system worldwide. <p>Teacher Notes</p> <ul style="list-style-type: none"> • Making sense of various units of measure is an essential life skill, requiring reasonable estimates of what measurements mean, particularly in relation to other units of measure. <ul style="list-style-type: none"> – 1 inch is about 2.5 centimeters. – 1 foot is about 30 centimeters. – 1 meter is a little longer than a yard, or about 40 inches. – 1 mile is slightly farther than 1.5 kilometers. – 1 kilometer is slightly farther than half a mile.
<p>Strand</p>	<p>Measurement</p>			
<p>Essential Knowledge and Skills</p>	<p>a. Estimate the conversion of units of length, weight/mass, volume, and temperature between the U.S. Customary system and the metric system by using ballpark comparisons. Ex: 1 L \approx 1qt. Ex: 4L \approx 4 qts.</p> <p>b. Estimate measurements by comparing the object to be measured against a benchmark.</p>			
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	
<p>Section</p> <ul style="list-style-type: none"> • 6.4 <p>http://ttaconline.org</p>				

Essential New Vocabulary

- weight
- mass
- overestimate
- underestimate
- US customary system
- inch
- foot (feet)
- yard
- mile
- ounce
- pounds
- quart
- metric
- centimeters
- meter
- kilometer
- grams
- kilogram

- 1 ounce is about 28 grams.
- 1 nickel has the mass of about 5 grams.
- 1 kilogram is a little more than 2 pounds.
- 1 quart is a little less than 1 liter.
- 1 liter is a little more than 1 quart.
- Water freezes at 0°C and 32°F.
- Water boils at 100°C and 212°F.
- Normal body temperature is about 37°C and 98°F.
- Room temperature is about 20°C and 70°F.

- Mass is the amount of matter in an object. Weight is the pull of gravity on the mass of an object. The mass of an object remains the same regardless of its location. The weight of an object changes dependent on the gravitational pull at its location. In everyday life, most people are actually interested in determining an object's mass, although they use the term *weight*, as shown by the questions: "How much does it weigh?" versus "What is its mass?"
- The degree of accuracy of measurement required is determined by the situation.
- Whether to use an underestimate or an overestimate is determined by the situation.
- Physically measuring objects along with using visual and symbolic representations improves student understanding of both the concepts and processes of measurement.

<p>Standard</p>	<p>MTH 6.10</p> <p>The student will</p> <p>a) define pi (π) as the ratio of the circumference of a circle to its diameter; b) solve practical problems involving circumference and area of a circle, given the diameter or radius; c) solve practical problems involving area and perimeter; and d) describe and determine the volume and surface area of a rectangular prism.</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • What is the relationship between the circumference and diameter of a circle? The circumference of a circle is about 3 times the measure of the diameter. • What is the difference between area and perimeter? Perimeter is the distance around the outside of a figure while area is the measure of the amount of space enclosed by the perimeter. • What is the relationship between area and surface area? Surface area is calculated for a three-dimensional figure. It is the sum of the areas of the two-dimensional surfaces that make up the three-dimensional figure.
<p>Strand</p>	<p>Measurement</p>			
<p>Essential Knowledge and Skills</p>	<p>a. Derive an approximation for pi (3.14 or $\frac{22}{7}$) by gathering data and comparing the circumference to the diameter of various circles, using concrete materials or computer models.</p> <p>b. Find the circumference of a circle by substituting a value for the diameter or the radius into the formula $C = \pi d$ or $C = 2\pi r$.</p> <p>c. Find the area of a circle by using the formula $A = \pi r^2$.</p> <p>d. Apply formulas to solve practical problems involving area and perimeter of triangles and rectangles.</p> <p>e. Create and solve problems that involve finding the circumference and area of a circle when given the diameter or radius.</p> <p>f. Solve problems that require finding the surface area of a rectangular prism, given a diagram of the prism with the necessary dimensions labeled.</p> <p>g. Solve problems that require finding the volume of a rectangular prism given a diagram of the prism with the necessary dimensions labeled.</p>			<p>Teacher Notes</p> <ul style="list-style-type: none"> • Experiences in deriving the formulas for area, perimeter, and volume using manipulatives such as tiles, one-inch cubes, adding machine tape, graph paper, geoboards, or tracing paper, promote an understanding of the formulas and facility in their use.[†] • The perimeter of a polygon is the measure of the distance around the polygon. • Circumference is the distance around or perimeter of a circle. • The area of a closed curve is the number of nonoverlapping square units required to fill the region enclosed by the curve. • The perimeter of a square whose side measures s is 4 times s ($P = 4s$), and its area is side times side ($A = s^2$). • The perimeter of a rectangle is the sum of twice the
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	

	<p>Section</p> <ul style="list-style-type: none"> • 2.1 • 2.2 • 2.3 • 2.4 • 8.3 • 8.4 • 8.5 • 8.6 <p>http://ttaconline.org</p>			<p>length and twice the width [$P = 2l + 2w$, or $P = 2(l + w)$], and its area is the product of the length and the width ($A = lw$).</p> <ul style="list-style-type: none"> • The value of pi (π) is the ratio of the circumference of a circle to its diameter. • The ratio of the circumference to the diameter of a circle is a constant value, pi (π), which can be approximated by measuring various sizes of circles. • The fractional approximation of pi generally used is $\frac{22}{7}$. • The decimal approximation of pi generally used is 3.14. • The circumference of a circle is computed using $C = \pi d$ or $C = 2\pi r$, where d is the diameter and r is the radius of the circle. • The area of a circle is computed using the formula $A = \pi r^2$, where r is the radius of the circle. • The surface area of a rectangular prism is the sum of the areas of all six faces ($SA = 2lw + 2lh + 2wh$). • The volume of a rectangular prism is computed by multiplying the area of the base, B, (length x width) by the height of the prism ($V = lwh = Bh$).
<p>Essential New Vocabulary</p> <ul style="list-style-type: none"> • circumference • diameter • radius • perimeter • area • surface area • volume • pi • square units • cubic units • base height • rectangular prism 				<p style="text-align: right;">†Revised March 2011</p>

<p>Standard</p>	<p>MTH 6.11</p> <p>The student will</p> <p>a) identify the coordinates of a point in a coordinate plane; and</p> <p>b) graph ordered pairs in a coordinate plane.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • Can any given point be represented by more than one ordered pair? The coordinates of a point define its unique location in a coordinate plane. Any given point is defined by only one ordered pair. • In naming a point in the plane, does the order of the two coordinates matter? <ul style="list-style-type: none"> • Yes. The first coordinate tells the location of the point to the left or right of the y-axis and the second point tells the location of the point above or below the x-axis. Point (0, 0) is at the origin. <p>Teacher Notes</p> <ul style="list-style-type: none"> • In a coordinate plane, the coordinates of a point are typically represented by the ordered pair (x, y), where x is the first coordinate and y is the second coordinate. However, any letters may be used to label the axes and the corresponding ordered pairs. • The quadrants of a coordinate plane are the four regions created by the two intersecting perpendicular number lines. Quadrants are named in counterclockwise order. The signs on the ordered pairs for quadrant I are $(+, +)$; for quadrant II, $(-, +)$; for quadrant III, $(-, -)$; and for quadrant IV, $(+, -)$. • In a coordinate plane, the origin is the point at the intersection of the x-axis and y-axis; the coordinates of this point are $(0, 0)$. • For all points on the x-axis, the y-coordinate is 0. For all points on the y-axis, the x-coordinate is 0. • The coordinates may be used to name the point. (e.g.,
<p>Strand</p>	<p>Geometry</p>			
<p>Essential Knowledge and Skills</p>	<p>h. Identify and label the axes of a coordinate plane.</p> <p>i. Identify and label the quadrants of a coordinate plane.</p> <p>j. Identify the quadrant or the axis on which a point is positioned by examining the coordinates (ordered pair) of the point.</p> <p>k. Graph ordered pairs in the four quadrants and on the axes of a coordinate plane.</p> <p>l. Identify ordered pairs represented by points in the four quadrants and on the axes of the coordinate plane.</p> <p>m. Relate the coordinate of a point to the distance from each axis and relate the coordinates of a single point to another point on the same horizontal or vertical line.[†]</p>			
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	
	<p>Section</p> <ul style="list-style-type: none"> • 9.5 <p>http://ttaconline.org</p>			

the point (2,7)). It is not necessary to say “the point whose coordinates are (2,7)”.

Essential New Vocabulary

- coordinate plane
- axis
- ordered pair
- quadrants

Standard	MTH 6.12 The student will determine congruence of segments, angles, and polygons. Timeframe:			Essential Understandings <ul style="list-style-type: none"> Given two congruent figures, what inferences can be drawn about how the figures are related? The congruent figures will have exactly the same size and shape. Given two congruent polygons, what inferences can be drawn about how the polygons are related? Corresponding angles of congruent polygons will have the same measure. Corresponding sides of congruent polygons will have the same measure. Teacher Notes <ul style="list-style-type: none"> Congruent figures have exactly the same size and the same shape. Noncongruent figures may have the same shape but not the same size. The symbol for congruency is \cong. The corresponding angles of congruent polygons have the same measure, and the corresponding sides of congruent polygons have the same measure. The determination of the congruence or noncongruence of two figures can be accomplished by placing one figure on top of the other or by comparing the measurements of all sides and angles. Construction of congruent line segments, angles, and polygons helps students understand congruency.
Strand	Geometry			
Essential Knowledge and Skills	a. Characterize polygons as congruent and noncongruent according to the measures of their sides and angles. b. Determine the congruence of segments, angles, and polygons given their attributes. c. 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 practical and mathematical problems. [†]			
Resources	Resource Materials	Released Test Items	Individual Teacher Notes	
	Section <ul style="list-style-type: none"> 8.1 http://ttaconline.org			

	<p>Essential New Vocabulary</p> <ul style="list-style-type: none">• congruent• noncongruent• segment• angle• polygon	
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<p>Standard</p>	<p>MTH 6.13</p> <p>The student will describe and identify properties of quadrilaterals.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • Can a figure belong to more than one subset of quadrilaterals? • Any figure that has the attributes of more than one subset of quadrilaterals can belong to more than one subset. For example, rectangles have opposite sides of equal length. Squares have all 4 sides of equal length thereby meeting the attributes of both subsets. <p>Teacher Notes</p> <ul style="list-style-type: none"> • A quadrilateral is a closed planar (two-dimensional) figure with four sides that are line segments. • A parallelogram is a quadrilateral whose opposite sides are parallel and opposite angles are congruent. • A rectangle is a parallelogram with four right angles. • Rectangles have special characteristics (such as diagonals are bisectors) that are true for any rectangle. • To bisect means to divide into two equal parts. • A square is a rectangle with four congruent sides or a rhombus with four right angles. • A rhombus is a parallelogram with four congruent sides. • A trapezoid is a quadrilateral with exactly one pair of parallel sides. The parallel sides are called <i>bases</i>, and the nonparallel sides are called <i>legs</i>. If the legs have the same length, then the trapezoid is an isosceles trapezoid. • A kite is a quadrilateral with two pairs of adjacent congruent sides. One pair of opposite angles is congruent.
<p>Strand</p>	<p>Geometry</p>			
<p>Essential Knowledge and Skills</p>	<p>a. Sort and classify polygons as quadrilaterals, parallelograms, rectangles, trapezoids, kites, rhombi, and squares based on their properties. Properties include number of parallel sides, angle measures and number of congruent sides.</p> <p>b. Identify the sum of the measures of the angles of a quadrilateral as 360°.</p>			
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	
	<p>Section</p> <ul style="list-style-type: none"> • 8.2 <p>http://ttaconline.org</p>			

Essential New Vocabulary

- quadrilateral
- closed planar (two-dimensional) figure
- parallelogram
- rectangle
- bisect
- square
- rhombus
- trapezoid
- legs
- bases
- isosceles trapezoid
- kite

- Quadrilaterals can be sorted according to common attributes, using a variety of materials.
- Quadrilaterals can be classified by the number of parallel sides: a parallelogram, rectangle, rhombus, and square each have two pairs of parallel sides; a trapezoid has only one pair of parallel sides; other quadrilaterals have no parallel sides.
- Quadrilaterals can be classified by the measures of their angles: a rectangle has four 90° angles; a trapezoid may have zero or two 90° angles.
- Quadrilaterals can be classified by the number of congruent sides: a rhombus has four congruent sides; a square, which is a rhombus with four right angles, also has four congruent sides; a parallelogram and a rectangle each have two pairs of congruent sides.
- A square is a special type of both a rectangle and a rhombus, which are special types of parallelograms, which are special types of quadrilaterals.
- The sum of the measures of the angles of a quadrilateral is 360° .
- A chart, graphic organizer, or Venn Diagram can be made to organize quadrilaterals according to attributes such as sides and/or angles.

<p>Standard</p>	<p>MTH 6.14</p> <p>The student, given a problem situation, will</p> <p>a) construct circle graphs;</p> <p>b) draw conclusions and make predictions, using circle graphs; and</p> <p>c) compare and contrast graphs that present information from the same data set.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • What types of data are best presented in a circle graph? • Circle graphs are best used for data showing a relationship of the parts to the whole. <p>Teacher Notes</p>
<p>Strand</p>	<p>Probability and Statistics</p>			<ul style="list-style-type: none"> • To collect data for any problem situation, an experiment can be designed, a survey can be conducted, or other data-gathering strategies can be used. The data can be organized, displayed, analyzed, and interpreted to answer the problem.
<p>Essential Knowledge and Skills</p>	<p>a. Collect, organize and display data in circle graphs by depicting information as fractional.</p> <p>b. Draw conclusions and make predictions about data presented in a circle graph.</p> <p>c. Compare and contrast data presented in a circle graph with the same data represented in other graphical forms.</p>			<ul style="list-style-type: none"> • Different types of graphs are used to display different types of data. <ul style="list-style-type: none"> – Bar graphs use categorical (discrete) data (e.g., months or eye color). – Line graphs use continuous data (e.g., temperature and time). – Circle graphs show a relationship of the parts to a whole.
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	<ul style="list-style-type: none"> • All graphs include a title, and data categories should have labels. • A scale should be chosen that is appropriate for the data. • A key is essential to explain how to read the graph. • A title is essential to explain what the graph represents. • Data are analyzed by describing the various features and elements of a graph.
<p>Section</p> <ul style="list-style-type: none"> • 6.7 <p>http://ttaonline.org</p>				

Essential New Vocabulary

- circle graph
- bar graph
- categorical (discrete) data
- line graphs
- continuous data
- title
- data categories
- labels
- scale
- key

<p>Standard</p>	<p>MTH 6.15</p> <p>The student will</p> <p>a) describe mean as balance point; and</p> <p>b) decide which measure of center is appropriate for a given purpose.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • What does the phrase “measure of center” mean? • This is a collective term for the 3 types of averages for a set of data – mean, median, and mode. • What is meant by mean as balance point? • Mean can be defined as the point on a number line where the data distribution is balanced. This means that the sum of the distances from the mean of all the points above the mean is equal to the sum of the distances of all the data points below the mean. This is the concept of mean as the balance point. <p>Teacher Notes</p> <ul style="list-style-type: none"> • Measures of center are types of averages for a data set. They represent numbers that describe a data set. Mean, median, and mode are measures of center that are useful for describing the average for different situations. <ul style="list-style-type: none"> –Mean works well for sets of data with no very high or low numbers. –Median is a good choice when data sets have a couple of values much higher or lower than most of the others. –Mode is a good descriptor to use when the set of data has some identical values or when data are not conducive to computation of other measures of central tendency, as when working with data in a yes or no survey. • The mean is the numerical average of the data set and is found by adding the numbers in the data set together and dividing the sum by the number of data pieces in the set. • In grade 5 mathematics, mean is defined as fair- share.
<p>Strand</p>	<p>Probability and Statistics</p>			
<p>Essential Knowledge and Skills</p>	<p>a. Find the mean for a set of data.</p> <p>b. Describe the three measures of center and a situation in which each would best represent a set of data.</p> <p>c. Identify and draw a number line that demonstrates the concept of mean as balance point for a set of data.</p>			
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	
	<p>Section</p> <ul style="list-style-type: none"> • 6.5 • 6.6 <p>http://ttaconline.org</p>			

Essential New Vocabulary

- mean
- balance point
- measure of center
- median
- mode
- bimodal

- Mean can be defined as the point on a number line where the data distribution is balanced. This means that the sum of the distances from the mean of all the points above the mean is equal to the sum of the distances of all the data points below the mean. This is the concept of mean as the balance point.
- Defining mean as balance point is a prerequisite for understanding standard deviation.
- The median is the middle value of a data set in ranked order. If there are an odd number of pieces of data, the median is the middle value in ranked order. If there is an even number of pieces of data, the median is the numerical average of the two middle values.
- The mode is the piece of data that occurs most frequently. If no value occurs more often than any other, there is no mode. If there is more than one value that occurs most often, all these most-frequently-occurring values are modes. When there are exactly two modes, the data set is bimodal.

<p>Standard</p>	<p>MTH 6.16</p> <p>The student will</p> <p style="padding-left: 40px;">a) compare and contrast dependent and independent events; and</p> <p style="padding-left: 40px;">b) determine probabilities for dependent and independent events.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • How can you determine if a situation involves dependent or independent events? • Events are independent when the outcome of one has no effect on the outcome of the other. • Events are dependent when the outcome of one event is influenced by the outcome of the other.
<p>Strand</p>	<p>Probability and Statistics</p>			<p>Teacher Notes</p>
<p>Essential Knowledge and Skills</p>	<p>a. Determine whether two events are dependent or independent.</p> <p>b. Compare and contrast dependent and independent events.</p> <p>c. Determine the probability of two dependent events.</p> <p>d. Determine the probability of two independent events.</p>			<ul style="list-style-type: none"> • The probability of an event occurring is equal to the ratio of desired outcomes to the total number of possible outcomes (sample space). • The probability of an event occurring can be represented as a ratio or the equivalent fraction, decimal, or percent. • The probability of an event occurring is a ratio between 0 and 1. <ul style="list-style-type: none"> –A probability of 0 means the event will never occur. –A probability of 1 means the event will always occur. • A simple event is one event (e.g., pulling one sock out of a drawer and examining the probability of getting one color). • Events are independent when the outcome of one has no effect on the outcome of the other. For example, rolling a number cube and flipping a coin are independent events. • The probability of two independent events is found by using the following formula:
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	<p>$P(A \text{ and } B) = P(A) \cdot P(B)$</p>
<p>Section</p> <ul style="list-style-type: none"> • 10.1 • 10.2 • 10.3 <p>http://ttaconline.org</p>				

Essential New Vocabulary

- probability
- event simple event
- dependent events
- independent events
- sample space

Ex: When rolling two number cubes simultaneously, what is the probability of rolling a 3 on one cube and a 4 on the other?

$$P(3 \text{ and } 4) = P(3) \cdot P(4) = \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$$

- Events are dependent when the outcome of one event is influenced by the outcome of the other. For example, when drawing two marbles from a bag, *not* replacing the first after it is drawn affects the outcome of the second draw.
- The probability of two dependent events is found by using the following formula:

$$P(A \text{ and } B) = P(A) \cdot P(B \text{ after } A)$$

- Ex: You have a bag holding a blue ball, a red ball, and a yellow ball. What is the probability of picking a blue ball out of the bag on the first pick and then *without* replacing the blue ball in the bag, picking a red ball on the second pick?

$$P(\text{blue and red}) = P(\text{blue}) \cdot P(\text{red after blue}) = \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$$

Standard	MTH. 6.17 The student will identify and extend geometric and arithmetic sequences. Timeframe:			Essential Understandings <ul style="list-style-type: none"> • What is the difference between an arithmetic and a geometric sequence? • While both are numerical patterns, arithmetic sequences are additive and geometric sequences are multiplicative. 						
Strand	Patterns, Functions and Algebra									
Essential Knowledge and Skills	a. Investigate and apply strategies to recognize and describe the change between terms in arithmetic patterns. b. Investigate and apply strategies to recognize and describe geometric patterns. c. Describe verbally and in writing the relationships between consecutive terms in an arithmetic or geometric sequence. d. Extend and apply arithmetic and geometric sequences to similar situations. e. Extend arithmetic and geometric sequences in a table by using a given rule or mathematical relationship. f. Compare and contrast arithmetic and geometric sequences. g. Identify the common difference for a given arithmetic sequence. h. Identify the common ratio for a given geometric sequence.			Teacher Notes <ul style="list-style-type: none"> • Numerical patterns may include linear and exponential growth, perfect squares, triangular and other polygonal numbers, or Fibonacci numbers. • Arithmetic and geometric sequences are types of numerical patterns. • In the numerical pattern of an arithmetic sequence, students must determine the difference, called the <i>common difference</i>, between each succeeding number in order to determine what is added to each previous number to obtain the next number. Sample numerical patterns are 6, 9, 12, 15, 18, ...; and 5, 7, 9, 11, 13, ... • In geometric number patterns, students must determine what each number is multiplied by to obtain the next number in the geometric sequence. This multiplier is called the <i>common ratio</i>. Sample geometric number patterns include 2, 4, 8, 16, 32, ...; 1, 5, 25, 125, 625, ...; and 80, 20, 5, 1.25, ... • Strategies to recognize and describe the differences between terms in numerical patterns include, but are not limited to, examining the change between consecutive terms, and finding common factors. An example is the pattern 1, 2, 4, 7, 11, 16, ... 						
Resources	<table border="1"> <thead> <tr> <th data-bbox="327 1049 857 1170">Resource Materials</th> <th data-bbox="857 1049 1352 1170">Released Test Items</th> <th data-bbox="1352 1049 1669 1170">Individual Teacher Notes</th> </tr> </thead> <tbody> <tr> <td data-bbox="327 1170 857 1474"> Section <ul style="list-style-type: none"> • 9.6 • 9.7 http://ttaconline.org </td> <td data-bbox="857 1170 1352 1474"></td> <td data-bbox="1352 1170 1669 1474"></td> </tr> </tbody> </table>	Resource Materials	Released Test Items		Individual Teacher Notes	Section <ul style="list-style-type: none"> • 9.6 • 9.7 http://ttaconline.org				
Resource Materials	Released Test Items	Individual Teacher Notes								
Section <ul style="list-style-type: none"> • 9.6 • 9.7 http://ttaconline.org										

Essential New Vocabulary

- numerical patterns
- arithmetic sequence
- common difference
- geometric sequence
- common ratio

<p>Standard</p>	<p>MTH 6.18</p> <p>The student will solve one-step linear equations in one variable involving whole number coefficients and positive rational solutions.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> • When solving an equation, why is it necessary to perform the same operation on both sides of an equal sign? • To maintain equality, an operation performed on one side of an equation must be performed on the other side.
<p>Strand</p>	<p>Patterns, Functions and Algebra</p>			
<p>Essential Knowledge and Skills</p>	<p>a. Represent and solve a one-step equation, using a variety of concrete materials such as colored chips, algebra tiles, or weights on a balance scale.</p> <p>b. Solve a one-step equation by demonstrating the steps algebraically.</p> <p>c. Identify and use the following algebraic terms appropriately: <i>equation, variable, expression, term, and coefficient.</i></p>			<p>Teacher Notes</p> <ul style="list-style-type: none"> • A one-step linear equation is an equation that requires one operation to solve. • A mathematical expression contains a variable or a combination of variables, numbers, and/or operation symbols and represents a mathematical relationship. An expression cannot be solved.
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	<ul style="list-style-type: none"> • A term is a number, variable, product, or quotient in an expression of sums and/or differences. In $7x^2 + 5x - 3$, there are three terms, $7x^2$, $5x$, and 3. • A coefficient is the numerical factor in a term. For example, in the term $3xy^2$, 3 is the coefficient; in the term z, 1 is the coefficient. • Positive rational solutions are limited to whole numbers and positive fractions and decimals. • An equation is a mathematical sentence stating that two expressions are equal. • A variable is a symbol (placeholder) used to represent an unspecified member of a set.
	<p>Section</p> <ul style="list-style-type: none"> • 1.3 • 1.4 • 7.1 • 7.2 • 7.3 • 7.5 <p>http://ttaonline.org</p>			

Essential New Vocabulary

- equation
- term
- variable
- coefficient
- expression
- linear equation
- inverse operation

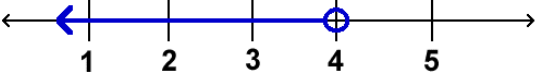
Standard	MTH.6.19 The student will investigate and recognize a) the identity properties for addition and multiplication; b) the multiplicative property of zero; and c) the inverse property for multiplication. Timeframe:			Essential Understandings <ul style="list-style-type: none"> • How are the identity properties for multiplication and addition the same? Different? • For each operation the identity elements are numbers that combine with other numbers without changing the value of the other numbers. The additive identity is zero (0). The multiplicative identity is one (1). • What is the result of multiplying any real number by zero? The product is always zero. • Do all real numbers have a multiplicative inverse? No. Zero has no multiplicative inverse because there is no real number that can be multiplied by zero resulting in a product of one.
Strand	Patterns, Functions and Algebra			
Essential Knowledge and Skills	a. Identify a real number equation that represents each property of operations with real numbers, when given several real number equations. b. Test the validity of properties by using examples of the properties of operations on real numbers. c. Identify the property of operations with real numbers that is illustrated by a real number equation. <i>NOTE: The commutative, associative and distributive properties are taught in previous grades.</i>			
Resources	Resource Materials	Released Test Items	Individual Teacher Notes	Teacher Notes <ul style="list-style-type: none"> • Identity elements are numbers that combine with other numbers without changing the other numbers. The additive identity is zero (0). The multiplicative identity is one (1). There are no identity elements for subtraction and division. • The additive identity property states that the sum of any real number and zero is equal to the given real number (e.g., $5 + 0 = 5$). • The multiplicative identity property states that the product of any real number and one is equal to the given real number (e.g., $8 \cdot 1 = 8$). • Inverses are numbers that combine with other numbers and result in identity elements. • The multiplicative inverse property states that the product of a number and its multiplicative inverse (or reciprocal)
	Section <ul style="list-style-type: none"> • 1.5 • 1.6 http://ttaconline.org			

Essential New Vocabulary

- additive identity
- multiplicative identity
- inverse
- multiplicative inverse
- reciprocal

always equals one (e.g., $4 \cdot \frac{1}{4} = 1$).

- Zero has no multiplicative inverse.
- The multiplicative property of zero states that the product of any real number and zero is zero.
- Division by zero is not a possible arithmetic operation.
- Division by zero is undefined.

<p>Standard</p>	<p>MTH 6.20</p> <p>The student will graph inequalities on a number line.</p> <p>Timeframe:</p>			<p>Essential Understandings</p> <ul style="list-style-type: none"> In an inequality, does the order of the elements matter? Yes, the order does matter. For example, $x > 5$ is not the same relationship as $5 > x$. However, $x > 5$ is the same relationship as $5 < x$.
<p>Strand</p>	<p>Patterns, Functions and Algebra</p>			<p>Teacher Notes:</p>
<p>Essential Knowledge and Skills</p>	<p>a. Given a simple inequality with integers, graph the relationship on a number line.</p> <p>b. Given the graph of a simple inequality with integers, represent the inequality two different ways using symbols ($<$, $>$, \leq, \geq).</p>			<ul style="list-style-type: none"> Inequalities using the $<$ or $>$ symbols are represented on a number line with an open circle on the number and a shaded line over the solution set. <p>Ex: $x < 4$</p>
<p>Resources</p>	<p>Resource Materials</p>	<p>Released Test Items</p>	<p>Individual Teacher Notes</p>	 <p>A number line with tick marks from 1 to 5. An open circle is drawn at the number 4. A blue shaded region starts at the open circle and extends to the left, ending with an arrowhead. This represents the inequality $x < 4$.</p> <ul style="list-style-type: none"> When graphing $x \leq 4$ fill in the circle above the 4 to indicate that the 4 is included. Inequalities using the \leq or \geq symbols are represented on a number line with a closed circle on the number and shaded line in the direction of the solution set. The solution set to an inequality is the set of all numbers that make the inequality true. It is important for students to see inequalities written with the variable before the inequality symbol and after. For example $x > -6$ and $7 > y$.

Essential New Vocabulary

- inequality
- solution set
- greater than or equal to
- less than or equal to

Additional Math Online Resources

[New York State Released Tests](#) (pdf format)

[VA DOE Training/Technical Assistance](#) (SOL related searches, King George is region 3)

[Making Connections to Content: Essential Vocabulary](#) (Dan Mulligan)

[Illuminations](#) (excellent lesson plans, interactive tools, NCTM standards)

[National Library of Virtual Manipulatives](#)

[Mathematics Activity Types](#) (technology integration with math, The College of William & Mary)

[Open Ended Assessment in Math](#)

[APEC Math Assessment Database](#)

[Math Dictionary for Kids](#)

[SOL Released Tests in Various Formats](#)

[Technology Tools for the 21st Century Classroom](#) (KGES portaportal, math tools)