

# Grade 7 Math

Revised 7/2013

Topic: Unit 1					
<b>Ratios and Rates</b>					
Essential Questions: What makes quantities proportional? How can you identify a rate? What does it mean if two different ratios describe the same situation? How can being able to describe the situation in multiple ways help you solve problems?					
Performance Indicators	Guided Questions		Essential Knowledge and Skills	Classroom Ideas (Instructional Strategies)	Assessment Ideas (evidence of understanding)
<p><b>7.RP.1</b> - Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units</p> <p><b>7.RP.2</b> - Recognize and represent proportional relationships between quantities.</p> <p><b>7.RP.2a</b> - 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.</p> <p><b>7.RP.2b</b> - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p><b>7.RP.2c</b> - Represent proportional relationships by equations</p> <p><b>7.RP.2d</b> - Explain what a point <math>(x, y)</math> on the graph of a proportional relationship means in terms of the situation, with special attention to the points <math>(0, 0)</math> and <math>(1, r)</math> where <math>r</math> is the unit rate.</p> <p><b>7.G.1</b> - Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</p> <p><b>7.RP.3</b> - 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.</p>	<p>How do percents help you compare, predict, and make decisions?</p> <p>When are percent markups and percent markdowns used?</p> <p>What does it mean for two quantities to have a proportional relationship?</p> <p>How can you write a unit rate if at least one term is a fraction? How is this different from writing a unit rate where both terms are whole numbers?</p>		<p>Students will perform operations with fractions.</p> <p>Students will write fractions as decimals.</p> <p>Students will recognize equivalent ratios.</p>	<p>State Exam Questions</p> <p>Students will use menus to compare prices</p> <p>Explore graphs and its relationship to rate, unit rate, proportionality</p> <p>Rates Bingo.</p>	<p>Daily Warm-ups</p> <p>POD</p> <p>Homework</p> <p>STQ</p> <p>Quiz</p> <p>Test</p>
Connections to Text (Resources):					
Connections to Technology: iPad for computer homework					
Key Vocabulary: Ratio, rate, unit rate, proportion, proportional graph/table/equation, simple interest, markup, markdown, percent increase/decrease, scale, scale drawing.					
				Time: ~5 weeks	

# Grade 7 Math

Revised 7/2013

Topic: Unit 2

## Rational Numbers

Essential Questions:

What numbers are rational numbers?

What would the world be like without numbers?

Performance Indicators	Guided Questions	Essential Knowledge and Skills	Classroom Ideas (Instructional Strategies)	Assessment Ideas (evidence of understanding)
<p><b>7.NS.1</b> 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.</p> <p><b>7.NS.1a</b> Describe situations in which opposite quantities combine to make 0.</p> <p><b>7.NS.1b</b> Understand <math>p + q</math> as the number located a distance <math> q </math> from <math>p</math>, in the positive or negative direction depending on whether <math>q</math> 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.</p> <p><b>7.NS.1d</b> Apply properties of operations as strategies to add and subtract rational numbers.</p> <p><b>7.NS.1c</b> Understand subtraction of rational numbers as adding the additive inverse, <math>p - q = p + (-q)</math>. 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.</p> <p><b>7.EE.3</b> Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p> <p><b>7.NS.2</b> Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.</p> <p><b>7.NS.2c</b> Apply properties of operations as strategies to multiply and divide rational numbers.</p> <p><b>7.NS.2b</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 <math>p</math> and <math>q</math> are integers, then <math>- (p/q) = (-p)/q = p/(-q)</math>. Interpret quotients of rational numbers by describing real-world contexts.</p> <p><b>7.NS.3</b> Solve real-world and mathematical problems involving the four operations with rational numbers.</p> <p><b>7.NS.2d</b> 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.</p> <p><b>7.RP.3</b> 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.</p>	<p>How are percents helpful to describe and understand variability in data?</p> <p>Why are there different representations of rational numbers?</p> <p>What does it mean to have a fractional percent of something?</p> <p>How is multiplying rational numbers like multiplying fractions and multiplying decimals? How is it different?</p> <p>Subtraction is not commutative. In what situations does the order in which you subtract two numbers not matter?</p>	<p>Students will express percent as a decimal.</p> <p>Students will add, subtract, multiply, and divide integers.</p>	<p>Integer Bingo</p> <p>Integer Race</p>	<p>Daily Warm-up</p> <p>POD</p> <p>STQ</p> <p>Homework</p> <p>Quiz</p> <p>Test</p>

Connections to Text (Resources):

Time: ~5 weeks

Connections to Technology: iPads for computer homework

Key Vocabulary: Integer, Rational number, Simplify, Factor, Multiple, Altitude, Frequency, Terminating decimal,

# Grade 7 Math

Revised 7/2013

Topic: Unit 3

## Expressions, Equations and Inequalities

Essential Questions:

Why is order important?

What do the best problem solvers in the world do to get answers?

Why are procedures/formulas important?

Performance Indicators	Guided Questions	Essential Knowledge and Skills	Classroom Ideas (Instructional Strategies)	Assessment Ideas (evidence of understanding)
<p><b>7.EE.1</b> Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p><b>7.EE.2</b> Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.</p> <p><b>7.EE.4</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p><b>7.EE.4a</b> Solve word problems leading to equations of the form <math>px + q = r</math> and <math>p(x + q) = r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> 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.</p> <p><b>7.EE.4b</b> Solve word problems leading to inequalities of the form <math>px + q &gt; r</math> or <math>px + q &lt; r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.</p>	<p>In what order should the operations be done when simplifying an expression?</p> <p>What is the inverse of _____? (Addition, Subtraction, Multiplication, Division).</p> <p>When would you want to expand an algebraic expression? What operation would you use? What does expanding an expression help you do?</p> <p>How is solving a two-step equation similar to solving one-step equation?</p> <p>How is the solution to an inequality different from the solution to an equation?</p>	<p>Students will simplify expressions using order of operations.</p> <p>Students will solve equations and inequalities</p> <p>Students will graph solutions to inequalities on the number line.</p>	<p>Algebra Tiles</p>	<p>Daily Warm-ups</p> <p>POD</p> <p>STQ</p> <p>Homework</p> <p>Quiz</p> <p>Test</p>

Connections to Text (Resources):

Time: ~4 weeks

Connections to Technology: iPads for computer homework

Key Vocabulary: Algebraic expression, Algebraic equation, Inequality, Equation, Solution, Term, Variable expression, Like terms, Coefficient, Distributive property,

# Grade 7 Math

Revised 7/2013

Topic: Unit 4 <b>Sampling</b>					
Essential Questions: When is it useful to make a prediction?					
Performance Indicators	Guided Questions		Essential Knowledge and Skills	Classroom Ideas (Instructional Strategies)	Assessment Ideas (evidence of understanding)
<p><b>7.SP.1</b> Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p> <p><b>7.SP.2</b> Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.</p> <p><b>7.SP.4</b> Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.</p> <p><b>7.SP.3</b> 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.</p>	<p>When is it reasonable to use a small group to represent a larger group? When is it not reasonable?</p> <p>What are the advantages and disadvantages of convenient /systematic/simple random sampling?</p> <p>If you make a judgment about a population based on a sample, how accurate is that judgment? What determines how accurate that judgment is?</p>			Come up with sampling method for a given scenario	Daily Warm-ups POD STQ Homework Quiz Test
Connections to Text (Resources):					Time: ~2 weeks
Connections to Technology: iPad for computer homework					
Key Vocabulary: Sampling, Population, Convenience/Systematic/Simple random sampling, Mean, Median, Mode, Range, Measure of Variability					

# Grade 7 Math

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Topic: Unit 5

## Probability Concepts

Essential Questions:

What are effective ways to describe the likelihood of an event?

Performance Indicators	Guided Questions	Essential Knowledge and Skills	Classroom Ideas (Instructional Strategies)	Assessment Ideas (evidence of understanding)
<p><b>7.SP.5</b> Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.</p> <p><b>7.SP.6</b> Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.</p> <p><b>7.SP.7</b> 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.</p> <p><b>7.SP.7a</b> Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.</p> <p><b>7.SP.7b</b> Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.</p> <p><b>7.SP.8</b> Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p> <p><b>7.SP.8a</b> 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.</p> <p><b>7.SP.8b</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.</p> <p><b>7.SP.8c</b> Design and use a simulation to generate frequencies for compound events</p>	<p>What is the probability of having a probability greater than 1?</p> <p>What is the difference between an action and an event?</p>	<p>Students will understand and apply the concepts of probability.</p> <p>Students will design and predict the outcome of an experiment.</p>	<p>Conduct experiments with die, spinners, coins, etc.</p>	<p>Daily Warm-ups POD STQ Homework Quiz Test</p>

Connections to Text (Resources):

Time: ~ 2 weeks

Connections to Technology: iPad for computer homework

Key Vocabulary: Experiment, Prediction, Probability, Action, Event, Relative frequency, Theoretical probability, Compound probability, Independent/Dependent probability, Outcome, Fundamental counting principle.

# Grade 7 Math

Revised 7/2013

Topic: Unit 6

## Geometry

Essential Questions:

A whole is the sum of its parts. How can you apply this idea to angles?  
How are the areas of a circle and a parallelogram related?

Performance Indicators	Guided Questions	Essential Knowledge and Skills	Classroom Ideas (Instructional Strategies)	Assessment Ideas (evidence of understanding)
<p><b>7.EE.4</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p><b>7.G.4</b> Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p><b>7.G.2</b> 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.</p> <p><b>7.EE.4a</b> Solve word problems leading to equations of the form <math>px + q = r</math> and <math>p(x + q) = r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> 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.</p> <p><b>7.G.5</b> Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</p> <p><b>7.G.3</b> Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</p> <p><b>7.G.6</b> Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p>	<p>When do you use circumference to measure a circle? When do you use area?</p> <p>What information do you need to draw a unique triangle?</p> <p>How can you apply what you know about finding the volume of a right rectangular prism to finding the volume of any right prism?</p> <p>When do you use surface area to measure a three-dimensional figure? When do you use volume?</p>	<p>Students will recognize 2D shapes out of 3D objects</p>	<p>Clay figures of the 3D solids</p>	<p>Daily Warm-ups POD STQ Homework Quiz Test</p>

Connections to Text (Resources):

Time: ~ 6 weeks

Connections to Technology: iPad for computer homework

Key Vocabulary: Radius, Diameter, Circumference, Volume, Surface area, Cross section, Adjacent/Complementary/Supplementary/Vertical angles