

# 7<sup>th</sup> Grade Math

## Overview

**Course Description:** Seventh grade mathematics places a high emphasis on proportional reasoning and relationships. Students write and solve equations involving all rational numbers and all operations. The geometry portion includes types of angles and triangles as well as circles, prisms, and pyramids. Probability is introduced with an emphasis on analyzing data. Previous mastery of multiplication facts is essential.

**Prerequisite Class/Skill:** Successful completion of 6th grade math curriculum with the common core as a foundation is required to take this class.

**Other:** 3 Trimesters

## Units of Study

<u>Unit Title</u>	<u>Length of Study</u>
Ratios and Proportional Relationships Analyze proportional relationships and use them to solve real-world and mathematical problems.	9.5 weeks
The Number System Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	9 weeks
Expressions and Equations Use properties of operations to generate equivalent expressions. Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	9.5 weeks
Geometry Draw, construct and describe geometrical figures and describe the relationships between them. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	4 weeks
Statistics and Probability Use random sampling to draw inferences about a population. Draw informal comparative inferences about two populations. Investigate chance processes and develop, use, and evaluate probability models.	3 weeks

# Mathematics Core Units

Course Title: 7th Grade Math Unit Title: Ratios and Proportional Relationships Length of Unit 9.5 weeks

Grade Level: 7<sup>th</sup> grade Unit 1 of 8

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p><b>7RP1</b> Compute unit rates associated with ratios of fractions, including lengths, areas, and other quantities measured in like or different units.</p> <p><b>7RP2</b> Recognize and represent proportional relationships between quantities. a) Decide whether two quantities are in a proportional relationship b) identify the constant of proportionality in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p><b>7RP2</b> c) represent proportional relations by equations 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 (1,r) where r is the unit rate.</p> <p><b>7RP3</b> Use proportional relationships to solve multi-step ratio and percent problems.</p>	<p>I Can...</p> <p>...reduce ratios</p> <p>...write ratios in all 3 forms</p> <p>...decide if two ratios are equal</p> <p>...solve proportions for the missing variable</p> <p>...find the unit rate/price</p> <p>...recognize proportionality in a table/graph/verbal description</p> <p>...find and recognize the constant of proportionality</p> <p>...explain what (0,0) and (1, k) represent in a proportional graph</p> <p>...calculate sales, taxes and tips</p> <p>...calculate percent increase</p> <p>...calculate percent decrease</p> <p>...calculate percent of error.</p>	<p>Ratio</p> <p>Rate</p> <p>Unit rate</p> <p>Complex fraction</p> <p>Percent</p> <p>Discount</p> <p>Sales price</p> <p>Tax</p> <p>Percent of error</p>	<ol style="list-style-type: none"> <li>1. Daily Assignments</li> <li>2. Unit quizzes</li> <li>3. Trimester post test</li> <li>4. Fraction memory game</li> </ol>	<p><b>Print Material and Technology</b></p> <p>Common Core Clinics Grade 7 Ratios/Proportional Relationships and Expressions/Equations by Triumph Learning (free sample)</p> <p>Middle School Math Course 3 by Scottt Foresman-Addison Wesley (grade 8)</p> <p>Common Core Coach Grade 7 by Triumph Learning (free sample)</p> <p>Middle School Math Course 2 by Scott Foresman-Addison Wesley (grade 7)</p> <p>Teacher created worksheets</p> <p>Common Core Support Coach by Triumph Learning (free sample)</p> <p>Everyone’s a Genius Blog and Middle School Madness Blog</p> <p>Teacher Pay Teacher</p> <p>Basic/Not Boring Math Skills Problem Solving Grades 6-8 (purchased by teacher)</p> <p>Math inservice worksheets</p> <p>Curriculum crafter</p> <p>Notebook created in class.</p>

# Mathematics Core Units

Course Title: 7<sup>th</sup> Grade Math

Unit Title: The Number System

Length of Unit 9 weeks

Grade Level: 7<sup>th</sup> grade

Unit 2 of 8

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p><b>7NS1</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. a) Describe situations in which opposite quantities combine to make 0. 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. c) Understand subtraction of rational numbers as the adding of 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 to real-world contexts. d) Apply properties of operations as strategies to add subtract rational numbers.</p> <p><b>7NS2</b> Apply and extend previous understandings of multiplication and division 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 <math>(-1)(-1)=1</math> 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 <math>p</math> and <math>q</math> are rational integers, then <math>-(p/q)=(-p)/q= p/(-q)</math>. 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.</p> <p><b>7NS 3</b> Solve real world and mathematical problems involving the four operations with rational numbers.</p>	<p>I Can...</p> <p>...compare integers and their absolute value</p> <p>...find opposites and absolute values</p> <p>...add integers, fractions, and decimals with negatives</p> <p>...subtract (using scs) integers, fractions, and decimals with negatives</p> <p>...multiply positive and negative whole numbers</p> <p>...multiply positive and negative decimals</p> <p>...multiply positive and negative fractions</p> <p>...expand the distributive property</p> <p>...know that a numbers times its reciprocal is one</p> <p>...know the identity property of multiplication</p> <p>...know locations of dividend and divisor</p> <p>...divide negative whole numbers</p> <p>...divide negative decimals using long division</p> <p>...convert rational numbers to decimals using long division</p> <p>...divide negative fractions and mixed numbers</p> <p>...know a <math>\#/0=</math>undefined</p> <p>...distinguish between terminating and repeating.</p>	<p>Rational number</p> <p>Opposite</p> <p>Additive inverse</p> <p>Absolute value</p> <p>Integer</p> <p>Denominator</p> <p>Numerator</p> <p>Negative</p> <p>Positive</p> <p>Super-charged subtraction</p> <p>Reduce lowest terms</p> <p>Commutative property</p> <p>Associative Property</p> <p>Distributive Property</p> <p>Multiplicative inverse</p> <p>Reciprocal</p> <p>Multiplicative identity</p> <p>Quotient</p> <p>Dividend</p> <p>Divisor</p> <p>Repeat</p> <p>Terminate</p> <p>Mixed number</p> <p>Improper fraction</p>	<ol style="list-style-type: none"> <li>Daily Assignments</li> <li>Unit quizzes</li> <li>Trimester post test</li> <li>Integer product game</li> </ol>	<p><b>Print Material and Technology</b></p> <p>Common Core Clinics Grade 7 Number System by Triumph Learning (free sample)</p> <p>Middle School Math Course 3 by Scott Foresman-Addison Wesley (grade 8) and the practice workbook</p> <p>Middle School Math Course 2 by Scott Foresman-Addison Wesley (grade 7) and the practice workbook</p> <p>Teacher created worksheets</p> <p>The Outstanding Math Guide by Rhonda Davis, et al.</p>

# Mathematics Core Units

Course Title: 7<sup>th</sup> Grade

Unit Title: Expressions and Equations

Length of Unit 9.5 weeks

Grade Level: 7<sup>th</sup> grade

Unit 3 of 8

COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p><b>Use properties of operations to generate equivalent expressions.</b></p> <p><b>CCSS.Math.Content.7.EE.A.1</b> Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p><b>CCSS.Math.Content.7.EE.A.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. For example, <math>a + 0.05a = 1.05a</math> means that "increase by 5%" is the same as "multiply by 1.05."</p> <p><b>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</b></p> <p><b>CCSS.Math.Content.7.EE.B.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. 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.</p> <p><b>CCSS.Math.Content.7.EE.B.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>CCSS.Math.Content.7.EE.B.4.a</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</p>	<p>I Can...</p> <p>...distinguish between like and unlike terms</p> <p>...apply (expand) the distributive property across two or more terms</p> <p>...apply the distributive property to whole numbers, fractions, and decimals</p> <p>...combine like terms to create a simpler expression</p> <p>...combine like terms consisting of whole numbers, fractions, and decimals</p> <p>...factor the distributive property</p> <p>...solve and check one step equations</p> <p>...expand, combine, solve and check all in one problem.</p> <p>...solve 2 step equations with distributive property</p> <p>...solve 2 step equations without distributive property</p> <p>...check 2 step equations</p> <p>...write inequalities from a graph</p> <p>...graph inequalities</p> <p>...solve one step inequalities</p> <p>...graph one step inequalities using a checkpoint</p>	<p>Term</p> <p>Coefficient</p> <p>Like Terms</p> <p>Constant</p> <p>Unlike terms</p> <p>Undo</p> <p>Inverse operation</p> <p>Distributive property</p> <p>Substitute</p> <p>Order of operations</p> <p>Addition</p> <p>Subtraction</p> <p>Multiplication</p> <p>Division</p> <p>Inequality</p> <p>Inequality symbol</p> <p>Expression</p> <p>Equation</p> <p>Factor</p> <p>Solve</p> <p>Check</p> <p>Variable</p> <p>Greater than</p> <p>Greater than or equal to</p> <p>Less than</p> <p>Less than or equal to</p> <p>Isolate</p> <p>Solution(s)</p>	<ol style="list-style-type: none"> <li>Daily Assignments</li> <li>Unit quizzes</li> <li>Trimester post test</li> <li>Integer product game</li> <li>Tic-tac- toe inequality</li> <li>Stoplight reading</li> </ol>	<p><b>Print Material and Technology</b></p> <p>Middle School Math Course 3 by Scott Foresman-Addison Wesley (grade 8) and the practice workbook</p> <p>Middle School Math Course 2 by Scott Foresman-Addison Wesley (grade 7) and the practice workbook</p> <p>Teacher created worksheets</p> <p>The Outstanding Math Guide by Rhonda Davis, et al.</p> <p>Basic Not Boring Pre-Algebra Skills by Incentive Publications</p> <p>mathequalslove.blogspot.com</p> <p>www.helpingwithmath.com</p> <p>www.algebra-class.com</p> <p>www.teacherspayteachers.com</p> <p>multi-Language glossary at BigIdeasMath.com</p> <p>Chapter 4 Big Ideas Math Accelerated</p> <p>iplaymathgames.com</p>

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?

**CCSS.Math.Content.7.EE.B.4.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.

...solve 2 step inequalities with distributive property

...solve 2 step inequalities without distributive property

...graph 2 step inequalities using a checkpoint

# Mathematics Core Units

Course Title: 7<sup>th</sup> Grade

Unit Title: Geometry

Length of Unit 4 weeks

Grade Level: 7<sup>th</sup> grade

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COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p><b>Draw, construct, and describe geometrical figures and describe the relationships between them.</b></p> <p>1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</p> <p>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.</p> <p>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.</p> <p>4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</p> <p>6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p>	<p>I Can...</p> <p>...solve scale problems to find actual or map distances</p> <p>...use proportions to find missing side lengths in mathematically similar figures</p> <p>...recognize the features of mathematically similar figures</p> <p>...apply a scale factor to all dimensions</p> <p>....rescale and redraw a blueprint</p> <p>...classify a triangle by sides</p> <p>...classify a triangle by angles</p> <p>...know and use the side length inequality theorem</p> <p>...know and use the angle sum theorem</p> <p>...decide if measurements create a unique triangle, more than one triangle or no triangle at all</p> <p>...construct triangles with given measurements</p> <p>...define cross section</p> <p>...describe a two dimensional shape that occurs when a cross slicing a three dimensional shape</p> <p>...identify all parts of a circle</p>	<p>Scale drawings Maps Models Apply Dimension(s) Actual Scale factor Perimeter Area Corresponding Mathematically similar Equivalent ratio Congruent Base Height Perpendicular Proportions Scalene Isosceles Equilateral Right Acute Obtuse Side length theorem Cross section Triangle angle sum theorem Circle Plane Center Diameter Radius Circumference Pi Adjacent angles</p>	<ol style="list-style-type: none"> <li>Daily Assignments</li> <li>Unit quizzes</li> <li>Trimester post test</li> <li>Cross section of playdoh shapes</li> </ol>	<p><b>Print Material and Technology</b></p> <p>Common Core Clinics Grade 7 Geometry (free sample)</p> <p>Middle School Math Course 3 by Scott Foresman-Addison Wesley (grade 8) and the practice workbook</p> <p>Middle School Math Course 2 by Scott Foresman-Addison Wesley (grade 7) and the practice workbook</p> <p>Teacher created worksheets</p> <p>kuta software</p> <p><a href="http://www.mathworksheetsland.com">www.mathworksheetsland.com</a></p> <p><a href="http://everybodyisagenious.blogspot.com">everybodyisagenious.blogspot.com</a></p>

... write area and circumference of a circle formulas from memory

... from C, d, or r, calculate the other two measurements

... given C of a circle, find A

... tell the relationship that creates pi

... identify forms of pi

... label correctly for area and other measurements

... recognize all types of angles from my flashcards

... set up and solve equations from the angles on the flashcards

... find the area of triangles

... find the area of quadrilaterals

... find the area of trapezoids

... break a complex shape into other shapes to find area

... draw a net of a rectangular prism

... draw a net of a triangular prism

... find the surface area of a rectangular prism

... find the surface area of a triangular prism

... find the volume of 3d solids by arc of base times height

Parallel lines  
 Transversal  
 Complementary  
 Vertical  
 Alternate exterior  
 Supplementary  
 Alternate interior  
 Perpendicular  
 Net  
 Surface area  
 Polyhedron  
 Quadrilaterals  
 Trapezoids  
 Rectangular prism  
 Triangular prism

# Mathematics Core Units

Course Title: 7<sup>th</sup> Grade

Unit Title: Statistics and Probability

Length of Unit 3 weeks

Grade Level: 7<sup>th</sup> grade

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COMMON CORE STANDARDS COVERED	UNIT BENCHMARKS What do you want students to know, do, and be like?	KEY VOCABULARY	SUGGESTED ASSESSMENTS How will you know if benchmarks have been achieved?	POSSIBLE RESOURCES What possible instructional resources could be used?
<p><b>Use random sampling to draw inferences about a population.</b></p> <p>1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p>	<p>I Can...</p> <p>...determine random and not random samples identify a population</p> <p>...use unbiased samples to make predictions.</p> <p>...calculate the mean of a set of data</p> <p>...find the mean absolute deviation of a set of data</p> <p>...find the median of a set of data</p> <p>...create a box and whisker of a set of data</p> <p>...compare sets of data using mean, MAD, medians and quartiles</p> <p>...find the probability of an event</p> <p>...describe what a probability of zero means</p> <p>...describe what a probability of 1 means</p> <p>...create organized lists</p> <p>...create a tree diagram</p> <p>...multiply to find probabilities of compound events</p>	<p>Random sampling</p> <p>Population</p> <p>Inferences</p> <p>Simulate</p> <p>Mean</p> <p>Absolute deviation</p> <p>Measures of center</p> <p>Probability</p> <p>Likely</p> <p>Not likely</p> <p>Frequency</p> <p>Relative frequency</p> <p>List</p> <p>Tree diagram</p> <p>Compound events</p> <p>Data</p> <p>Box and whisker</p> <p>Range</p> <p>Median</p> <p>Quartiles</p> <p>Inner quartile range</p> <p>Variation</p> <p>Biased</p> <p>Representative</p>	<ol style="list-style-type: none"> <li>Daily Assignments</li> <li>Unit quizzes</li> <li>Trimester post test</li> </ol>	<p><b>Print Material and Technology</b></p> <p>Common Core Clinics Grade 7 Statistics and Probability (free sample)</p> <p>Middle School Math Course 3 by Scott Foresman-Addison Wesley (grade 8) and the practice workbook</p> <p>Middle School Math Course 2 by Scott Foresman-Addison Wesley (grade 7) and the practice workbook</p> <p>Teacher created worksheets</p>

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.