Randolph Township Schools
Randolph Middle School

Grade 6 Mathematics Curriculum

"A mind is a fire to be kindled, not a vessel to be filled."
- Plutarch

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EDUCATION EXHIBIT 7 – 8/16/16

Randolph Township Schools
Department of Mathematics
Grade 6 Mathematics

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Randolph Township Schools

Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Randolph Township Schools
Affirmative Action Statement

Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

RANDOLPH TOWNSHIP BOARD OF EDUCATION
EDUCATIONAL GOALS
VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

Randolph Township Schools
Department of Science, Technology, Engineering, and Mathematics
Introduction

Randolph Township Schools is committed to excellence. We believe that all children are entitled to an education that will equip them to become productive citizens of the 21st century. We believe that an education grounded in the fundamental principles of science, technology, engineering, and math (STEM) will provide students with the skills and content necessary to become future leaders and lifelong learners.

A sound STEM education is grounded in the principles of inquiry, rigor, and relevance. Students will be actively engaged in learning as they use real-world STEM skills to construct knowledge. They will have ample opportunities to manipulate materials and solve problems in ways that are developmentally appropriate to their age. They will work in an environment that encourages them to take risks, think critically, build models, observe patterns, and recognize anomalies in those patterns. Students will be encouraged to ask questions, not just the "how" and the "what" of observed phenomena, but also the "why". They will develop the ability, confidence, and motivation to succeed academically and personally.

STEM literacy requires understandings and habits of mind that enable students to make sense of how our world works. As described in Project 2061's *Benchmarks in Science Literacy, The Standards for Technological Literacy,* and *Professional Standards for Teaching Mathematics,* literacy in these subject areas enables people to think critically and independently. Scientifically and technologically literate citizens deal sensibly with problems that involve mathematics, evidence, patterns, logical arguments, uncertainty, and problem-solving.

Grade 6 Mathematics
Introduction

In Grade 6, the focus of instruction is on four critical areas. One is the study of ratios and rates and their use in problem solving in the real-world. An emphasis is also made to connect proportional reasoning to whole number multiplication and division. Making sense of the procedures for dividing fractions by understanding and explaining the relationship between multiplication and division is also an area of focus. Students will also extend their understanding of the rational number system by exploring negative rational numbers, in particular negative integers. The location of points in all four quadrants of the coordinate plane is included here. Another important area is writing, interpreting, and using expressions and equations. The use of properties of operations in simplifying expressions and solving equations is stressed. Students are mindful of the idea of maintaining equality on both sides of an equation as they solve one-step equations. The construction and analysis of tables are employed to solve real-world problems. The last area of study is that of statistics. Building upon their work in elementary school, sixth grade students determine which measure of center is most appropriate to use to describe a particular set of data by understanding the differences among them. Measures of variability – interquartile range and mean absolute deviation – are introduced and understood to be useful in comparing two sets of data with similar or equal measures of center. Students will learn to describe and summarize numerical data sets by their shape and to consider the context in which the data were collected.

These four core topics are accompanied by work with all operations with whole numbers, decimals and fractions as well as extending their knowledge of finding the area of two-dimensional figures to finding the surface area and volume of three-dimensional figures.

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
Grade 6 Mathematics

SUGGESTED TIME ALLOTMENT	UNIT NUMBER	CONTENT - UNIT OF STUDY
3 weeks	I	Positive Numbers and the Number Line
2 weeks	II	Negative Numbers and the Number Line
3 weeks	III	Multiplying and Dividing Fractions and Decimals
6 weeks	IV	Ratio and Rates
3 weeks	V	Percent
3 weeks	VI	Algebraic Expressions
3 weeks	VII	Equations and Inequalities
2 weeks	VIII	The Coordinate Plane
3 weeks	IX	Area of Polygons
3 weeks	X	Surface Area and Volume of Solids
5 weeks	XI	Statistics and Measures of Central Tendency

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT I: Positive Numbers and the Number Line

<table>
<tr><td rowspan="7">STANDARDS / GOALS:

<u>Mathematics</u>

6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express the sum of two whole numbers 1-100 with a common factor as a multiple of the sum of two whole numbers with no common factor.

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

6.NS.7 Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.

6.EE.1 Write and evaluate numerical expressions involving whole number exponents.

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

<u>Mathematical Practices</u></td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Computational fluency includes understanding the meaning and the appropriate and precise use of numerical operations.</td><td>• What makes a computational strategy both effective and efficient? How can precision affect an outcome?</td></tr>
<tr><td>A positive rational number can be represented on a number line.</td><td>• How do positive numbers relate to the real-world?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

A positive rational number can be represented as a point on a number line.

An inequality can be used to order and compare positive rational numbers on a number line.

The greatest common factor is the largest factor that two or more counting numbers have in common.

The least common multiple is the smallest multiple of two or more numbers.</td><td>Students will be able to:

Find and position positive rational numbers on a number line.

Interpret statements of inequalities about the position of two numbers on a number line (3.5< 5 and 5 is to the right of 3.5).

Find the greatest common factor of two whole numbers less than or equal to 100.

Find the least common multiple of two whole numbers less than or equal to 12.</td></tr>
</table>

MP1 Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 . **Tech Literacy** 8.1.8.A.3 8.1.8.A.4 8.1.8.A.5	The exponent of a whole number indicates how many times the base is used as a factor. When evaluating numerical expressions, the order of operations is necessary to ensure the correct value. **VOCABULARY:** base (of an exponent), common factor, common multiple, composite number, cube (of a number), cube root, exponent, factor (of a number) greatest common factor, inequality, least common multiple, multiple, number line, numerical expression, perfect cube, perfect square, positive number, prime factor, prime number, square (of a number), square root, whole number **KEY TERMS:** plot, rational numbers	Write and evaluate numerical expressions involving whole-numbered exponents. Evaluate expressions, including those involving whole number exponents using the order of operations when there are no parentheses.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit I: Positive Numbers and the Number Line

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit I: Positive Numbers and the Number Line** • Number Line • Prime Factorization • Greatest Common Factor • Least Common Multiple • Exponents	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.khanacademy.com www.aplusmath.com www.math-play.com/6th-grade-math-games.html www.aaamath.com http://guest.portaportal.com/math6th (Math Baseball- Good for reviewing all operation whole #s) www.funbrain.com "The Venn Factor" http://illuminations.nctm.org/Lessondetail.aspx

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT II: Negative Numbers and the Number Line

<table>
<tr><td rowspan="6">STANDARDS / GOALS:

<u>Mathematics</u>

6.NS.6 Understand that positive and negative numbers are used to describe quantities having opposite directions or values; use positive and negative numbers in real-world contexts, explaining the meaning of zero in each situation.

6.NS.7 Understand ordering and absolute value of rational numbers.

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.

MP6 Attend to precision.

MP7 Look for and make use of structure.

MP8 Look for and express regularity in repeated reasoning.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Absolute value is a number’s distance from zero, determined using the appropriate tool: a number line.</td><td>• What makes a computational strategy both effective and efficient? How can precision affect an outcome?</td></tr>
<tr><td>A rational number can be represented on a number line.</td><td>• How do positive numbers relate to the real-world?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Positive and negative numbers and zero are used to describe quantities.

A rational number can be represented as a point on a number line.

An inequality can be used to order and compare rational numbers on a number line.</td><td>Students will be able to:

Use positive and negative numbers in real-world contexts.

Explain the meaning of 0 in given situations.

Find and position rational numbers on a number line.

Interpret statements of inequalities about the position of two numbers on a number line (-3.5<</td></tr>
</table>

ELA-Literacy WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	The absolute value of a rational number is its distance from 0 on a number line. When two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. **VOCABULARY:** absolute value, negative number, opposite **KEY TERMS:** rational numbers	5 and 5 is to the right of -3.5). Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. Demonstrate that the opposite of the opposite of a number is the number itself, e.g. – (-3) = 3, and that 0 is its own opposite.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit II: Negative Numbers and the Number Line

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
2 Weeks	**Unit II: Negative Numbers and the Number Line** • Negative Numbers and the Number Line • Rational Numbers • Opposite Values • Absolute Value	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th Lesson to familiarize students with the Coordinate Plane http://www.shodor.org/interactivate/lessons/CartesianCoordinate/ Positive and Negative Numbers on a Volt Meter http://illuminations.nctm.org/ActivityDetail.aspx?ID=152

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT III: Multiplying and Dividing Fractions and Decimals

<table>
<tr><th>STANDARDS / GOALS:</th><th>ENDURING UNDERSTANDINGS</th><th>ESSENTIAL QUESTIONS</th></tr>
<tr><td rowspan="8"><u>Mathematics</u>

6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

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

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

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.

MP6 Attend to precision.

MP7 Look for and make use of structure.</td><td>Physical models are an authentic way to solve and explain real-world mathematical situations.</td><td>• How can we use physical models to explain mathematical relationships?</td></tr>
<tr><td>Division by fractions will result in a quotient larger than the dividend.</td><td>• Why are patterns important to use to make generalizations?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

The standard algorithms of all four operations with multi-digit whole numbers and decimals are the most efficient and reliable methods for computation.

Division of fractions by fractions is an extension of division of fractions by whole numbers and whole numbers by fractions.</td><td>Students will be able to:

Divide fluently with multi-digit whole numbers using the standard algorithm.

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

Interpret and compute quotients of fractions.

Solve multi-step word problems involving</td></tr>
</table>

MP8 Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	Decomposing a number into equal groups is represented by division. The exact quotient does not always answer the proposed question. **VOCABULARY:** reciprocals **KEY TERMS:** simplest form, vertical form	division of fractions by fractions. Create and manipulate a model to represent division of fractions. Interpret the quotient by checking for reasonableness within real-world problems.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Number System Project
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work
- Number System Assignment: Perfect 10
- Graphic organizer for algorithms of decimal and fraction operations

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit III: Computation of Fractions and Decimals

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit III: Computation of Fractions and Decimals** • Division of Multi-Digit Whole Numbers • Dividing Fractions • Operations with Decimals • Interpret Quotients • Fractions and Decimals - Word Problems • Models to Represent Division of Fractions	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com http://guest.portaportal.com/math6th

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT IV: Ratios and Rates

<table>
<tr><td rowspan="8">STANDARDS / GOALS:

<u>Mathematics</u>

6.NS.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

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

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

6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

6.RP.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.

6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

<u>Mathematical Practices</u>

MP1 Make sense of problems and</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Ratios and proportional relationships are used to express how quantities are related and how quantities change in relation to each other.</td><td>• When would it be important to find regularity or repeated reasoning between two quantities?</td></tr>
<tr><td>Proportional reasoning is used to solve real-world and mathematical problems.</td><td>• When it is appropriate to apply proportional thinking to solve real-world problems?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Ratios and rates are a comparison between two quantities.

A proportion is two equal ratios.</td><td>Students will be able to:

Formulate and justify a ratio from two quantities.

Make tables of equivalent ratios relating quantities with whole number measurements.

Find missing values in tables.

Use tables to compare ratios.

Solve proportions using cross-products.</td></tr>
</table>

persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	Unit measures may be converted into different units A unit rate *a/b* is associated with the ratio *a:b* with b not equal to 0. **VOCABULARY:** ratio, term, equivalent ratios, simplest form, rate, unit rate, speed, average speed **KEY TERMS:** proportions, cross product, unitary method, common factors	Use ratio reasoning to convert measurement units. Manipulate and transform units appropriately when multiplying or dividing quantities. Find and explain a unit rate. Solve unit rate problems including those involving unit pricing and constant speed.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work
- Group Work Task Cards

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit IV: Ratio and Rates

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
6 Weeks	**Unit II: Negative Numbers and the Number Line** • Negative Numbers and the Number Line • Rational Numbers • Opposite Values • Absolute Value	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th "Understanding Rational Numbers and Proportions" http://illuminations.nctm.org/LessonDetail.aspx?ID=L64 Ratios and Proportions http://www.homeschoolmath.net/teaching/proportions.php

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT V: Percent

<table>
<tr><td rowspan="4">STANDARDS / GOALS:

<u>Mathematics</u>

6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.

MP6 Attend to precision.

MP7 Look for and make use of structure.

MP8 Look for and express regularity in repeated reasoning.

<u>ELA-Literacy</u>
WHST.6-8.1
WHST.6-8.2
WHST.6-8.4</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Percent is a concept used to compare quantities expressed per hundred.</td><td>• How can models be used to represent situations? How can tools be used to model situations?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Percent is a ratio that compares a number to 100.

Rational numbers can be written in different forms while maintaining equivalent values.

Proportional reasoning can be used to solve percent problems.

A rational number is any real number that can be written as a fraction, where the denominator is not 0.

VOCABULARY: percent, base (of a percent), sales tax, commission, interest, interest rate

KEY TERMS: percent notation</td><td>Students will be able to:

Find a percent of a quantity as a rate per 100.

Write equivalent fractions, decimals, and percents.

Solve problems involving finding the whole, given a part and a percent.

Express a rational number written as a fraction and as a decimal that repeats or terminates.</td></tr>
</table>

WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **<u>Tech Literacy</u>** 8.1.8.A.3		

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Ratios and Proportional Reasoning Project
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work
- Ratios and Proportional Reasoning Assignment: Math Menu
- Graphic organizer for convert fractions, decimals, and percents

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit V: Percent

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit V: Percent** • Fractions, Decimals, and Percents • Percent of Quantity • Real-World Problems: Percent	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Students investigate the percent of each letter of the alphabet found in a box of Alphabets cereal. http://www.pbs.org/teachers/mathline/lessonplans/msmp/alphabits/...

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT VI: Algebraic Expressions

<table>
<tr><td rowspan="5">STANDARDS / GOALS:

<u>Mathematics</u>

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

6.EE.3 Apply the properties of operations to generate equivalent expressions.

6.EE.4 Identify when two expressions are equivalent (i.e., when two expressions name the same number regardless of which value is substituted into them).

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

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Expressions can be written to include an unknown quantity.</td><td>• How can algebraic expressions be used to model, analyze, and solve mathematical situations?</td></tr>
<tr><td>The order in which operations are performed will impact your final outcome.</td><td>• What are the implications if the Order of Operations is not properly followed?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Variables, represented by letters, are used in place of unknown numbers.

There are two types of expressions: numerical and algebraic.

Evaluating an expression means to use the order of operations to find the value of the expression.

There are key words that indicate specific operations.</td><td>Students will be able to:

Understand that a variable represents an unknown number.

Write expressions corresponding to a real-world or mathematical problem.

Evaluate expressions given specific values for variables.

Translate between written language phrases and mathematical symbolic expressions. Use the distributive property to express the sum of two whole numbers 1-100 with a common factor as a</td></tr>
</table>

MP5 Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	The Distributive Property is a property that relates multiplication to addition or subtraction. Mathematical properties are used to identify, simplify, and rewrite equivalent expressions. **VOCABULARY:** algebraic expression, coefficient, equivalent expressions, evaluate, expand, factor, simplify, substitute, like terms (of an expression), variable **KEY TERMS:** evaluate the expression, simplify the expression	multiple of a sum of two whole numbers with no common factor. Identify and label parts of an expression using mathematical terms (coefficient, variable, constant). Write one or more parts of an expression as a single entity by simplifying. Apply the properties of operations, specifically the distributive property, to generate equivalent expressions. Identify when two expressions are equivalent.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit VI: Algebraic Expressions

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit VI: Algebraic Expressions** • Writing Algebraic Expressions • Evaluating Algebraic Expressions • Simplifying Algebraic Expressions • Expanding and Factoring Algebraic Expressions • Variables • Order of Operations • Properties • Translate Between Words and Math • Real-World Problems	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th Algebraic Expressions Millionaire http://www.math-play.com/Algebraic-Expressions-Millionaire/algebraic-expressionsmillionaire.html Order of operations Bingo http://illuminations.nctm.org/LessonDetail.aspx?id=L730 Using Pan Balance for Numerical Expressions http://illuminations.nctm.org/ActivityDetail.aspx?ID=26 Interactive website where students can take a test and review concepts on LCM and other numerical expressions http://www.henryanker.com/Math/General_Math/6_Grade_Math/6_Math_1.swf

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT VII: Equations and Inequalities

<table>
<tr><th>STANDARDS / GOALS:</th><th>ENDURING UNDERSTANDINGS</th><th>ESSENTIAL QUESTIONS</th></tr>
<tr><td rowspan="5"><u>Mathematics</u>

6.EE.2 Write and evaluate numerical expression involving whole-number exponents.

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

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

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

6.EE.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in</td><td>Algebraic equations and inequalities are used to model real-world problems and represent quantitative relationships.</td><td>• How can we develop and use mathematical models to describe real-world relationships?</td></tr>
<tr><td>The quantitative relationships between two quantities that change can be illustrated and analyzed through algebraic equations and modeling.</td><td>• How can we create and use mathematical models when there is more than one solution?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Solving an equation involves applying the properties of operations and substituting values for the variable to check the validity of the solution(s).</td><td>Students will be able to:

Use substitution to determine whether given values for the variable are solutions by making an equation or inequality true.

Solve equations and inequalities and check the solution(s).

Use variables to represent numbers and write equations when solving a real-world or mathematical problems.</td></tr>
</table>

terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. **Mathematical Practices** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	An inequality is a comparison of two expressions which has an infinite solution set. That dependent variables change in direct relation to the independent variables. **VOCABULARY:** equation, solution, linear equation, independent variable, dependent variable, inequality **KEY TERMS:** evaluate the expression, simplify the expression, solve the expression, inverse operations, algebraic equation, greater than or equal to notation, less than or equal to notation	Write an inequality to represent a constraint or condition in a mathematical problem. Graph solutions of inequalities using number line diagrams. Use variables to represent numbers and write inequalities when solving a real-world problem. Use variables to represent two quantities in a real-world problem that change in relationship to one another. Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity thought of as the independent variable. Relate dependent and independent variables to the equation.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Expressions and Equations Project
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work
- Expressions and Equations Assignment: Tic-Tac-Toe

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RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit VII: Equations and Inequalities

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit VII: Equations and Inequalities** • Writing Equations with One Variable • Solving Equations with One Variable • Writing and Graphing Inequalities • Solving Inequalities • Independent and Dependent Relationships	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/cgi-bin/games/geomatho www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th Using Algebra Tiles to solve, substitute, expand, or factor http://illuminations.nctm.org/ActivityDetail.aspx?ID=216 Using Pan Balance to compare numerical and algebraic expressions http://illuminations.nctm.org/ActivityDetail.aspx?ID=10 Practice with balancing one step equations http://www.ixl.com/math/grade-6/solve-one-step-equations-with-whole-numbers Math Basketball (Solving one step equations including negatives) http://www.math-play.com/One-Step-Equation-Game.html

		Planet Blaster (solving one and two step equations) http://www.aplusmath.com/games/PlanetBlast/index.html

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT VIII: The Coordinate Plane

<table>
<tr><td rowspan="5">STANDARDS / GOALS:

<u>Mathematics</u>

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

6.NS.6 Understand that positive and negative numbers are used to describe quantities having opposite directions or values; use positive and negative numbers in real-world contexts, explaining the meaning of zero in each situation.

6.NS.7 Understand ordering and absolute value of rational numbers.

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

6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Ordered pairs on a coordinate plane can be used to visualize situations in everyday life.</td><td>• How does the use of structure affect situations?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

An ordered pair can be represented as a point on a coordinate plane where the values of the numbers indicate the locations in the quadrants of the coordinate plane.

Coordinate planes can model relationships between numbers.

Absolute value can be used to find distance between two points on a coordinate plane.</td><td>Students will be able to:

Find and position pairs of integers on a coordinate plane.

Draw and identify polygons on the coordinate plane.

Solve real-world and mathematical problems using the coordinate plane.

Find lengths of horizontal and vertical line segments on the coordinate plane.</td></tr>
</table>

6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. **Mathematical Practices** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	**VOCABULARY:** coordinates, coordinate plane, x-axis, y-axis, quadrants, linear graph **KEY TERMS:** plot, scale, line segment, tape models	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work
- Whole-Group Coordinate Plane People Search

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit VIII: The Coordinate Plane

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
2 Weeks	**Unit VIII: The Coordinate Plane** • Points on the Coordinate Plane • Length of Line Segments • Real-World Problems: Graphing	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th Lesson designed to familiarize students with the Coordinate Plane http://www.shodor.org/interactivate/lessons/CartesianCoordinate/ Positive and Negative Numbers on a Volt Meter http://illuminations.nctm.org/ActivityDetail.aspx?ID=152 Movie Clip on Absolute Value http://player.discoveryeducation.com/

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT IX: Area of Polygons

<table>
<tr><td rowspan="6">STANDARDS / GOALS:

<u>Mathematics</u>

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

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

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

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Geometric attributes provide descriptive information about an object’s properties and position in space and support visualization and problem solving.</td><td>• How does geometry help us describe and support our arguments relating to objects in the real-world?</td></tr>
<tr><td>Complex shapes can be broken down into simpler shapes to find the area of the whole figure.</td><td>• How can you determine the validity of a response?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Two-dimensional figures can be composed or decomposed into other shapes.

Values of numbers in ordered pairs indicate locations in quadrants of the coordinate plane.</td><td>Students will be able to:

Find the area of triangles.

Find the area of special quadrilaterals and polygons by composing into rectangles or decomposing into triangles and other shapes to solve real world or mathematical problems.

Draw polygons in a coordinate plane given coordinates for the vertices.

Use coordinates to find the horizontal or vertical length between two points on a coordinate plane.</td></tr>
</table>

MP4 Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	**VOCABULARY:** formula, height, base, regular polygon **KEY TERMS:** decomposing, perpendicular, vertex	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit IX: Area of Polygons

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit IX: Area of Polygons** • Area of Triangles • Area of Parallelograms • Area of Trapezoids and Other Polygons • Area of Composite Figures	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th Lesson designed to familiarize students with the Coordinate Plane http://www.shodor.org/interactivate/lessons/CartesianCoordinate/ "Decomposing and Composing 2D Shapes" http://illuminations.nctm.org/ActivityDetail.aspx?ID=35 Classifying 2D and 3D Shapes http://www.math-play.com/geometric-figures-game/geometric-figures-game.html

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT X: Surface Area and Volume

<table>
<tr><th>STANDARDS / GOALS:</th><th>ENDURING UNDERSTANDINGS</th><th>ESSENTIAL QUESTIONS</th></tr>
<tr><td rowspan="4"><u>Mathematics</u>

6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is th3e same as would be found by multiplying the edge lengths of the prism. Apply the formulas V= lwh and V= bh to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

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

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

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

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.</td><td>Geometric attributes provide descriptive information about an object’s properties and position in space and support visualization and problem solving.</td><td>• How does geometry help us describe objects in the real-world? Why is it important to persevere in solving problems?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

Volume is the measure of how much space is occupied by a three-dimensional object and can be found using formulas and investigations.

A missing dimension can be determined by substituting known quantities into the formula and solving the equation.

A net is a two-dimension representation that can be folded to make a three-dimensional figure. The surface area of a solid is equal to the area of its net.</td><td>Students will be able to:

Find the volume of a rectangular prism with fractional edge lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths of the prism.

Apply formulas V= lwh and V= Bh to find the volumes of rectangular prisms with fractional edge lengths.

Find the height of the prism given the volume and the area of its base.

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures.</td></tr>
</table>

MP2 Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3	**VOCABULARY:** net, pyramid, surface area, cross section **KEY TERMS:** formula, solids, prims, perpendicular, height	

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Geometry Project
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work

- Geometry Assignment: Area Puzzle

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit X: Surface Area and Volume of Solids

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit X: Surface Area and Volume of Solids** • Nets of Solids • Surface Area • Volume of Prisms • Real-World Problems: Surface Area and Volume	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/cgi-bin/games/geomatho www.math-play.com/6th-grade-math-games.html www.aaamath.com www.brainingcamp.com www.khanacademy.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th "Decomposing and Composing 2D Shapes" http://illuminations.nctm.org/ActivityDetail.aspx?ID=35 Classifying 2D and 3D Shapes http://www.math-play.com/geometric-figures-game/geometric-figures-game.html Exploring and Playing with Nets http://www.learner.org/interactives/geometry/3d_prisms.html Exploring with Volume of Rectangular Prisms Using Sugar Cubes http://www.learner.org/interactives/geometry/area_volume.html Surface Area of Rectangular Prisms http://www.learner.org/interactives/geometry/area_surface.html

		Cubes, a Volume Investigation http://illuminations.nctm.org/ActivityDetail.aspx?ID=6

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
UNIT XI: Statistics and Measure of Central Tendancy

<table>
<tr><td rowspan="7">STANDARDS / GOALS:

<u>Mathematics</u>

6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

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

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

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

6.SP.5 Summarize numerical data sets in relation to their context.

<u>Mathematical Practices</u>

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and</td><td>ENDURING UNDERSTANDINGS</td><td>ESSENTIAL QUESTIONS</td></tr>
<tr><td>Statistical data needs to be represented in an appropriate form to be useful.</td><td>• How can appropriate tools help organize and display data?</td></tr>
<tr><td>Interpret and draw conclusions from multiple data representations.</td><td>• How can data be biased?</td></tr>
<tr><td>KNOWLEDGE</td><td>SKILLS</td></tr>
<tr><td>Students will know:

A statistical question is one that anticipates variability in the data related to the question and accounts for it in the answers.

Box-and-whisker plots, dot plots, and histograms are ways to represent data and should be utilized when most appropriate for the given data set.

Numerical data sets can be analyzed to describe data in relation to its context (spread and overall shape of the distribution).</td><td>Students will be able to:

Recognize the difference between a statistical question and one that is not.

Construct a histogram and dot plot, displaying the frequency of the data.

Construct a box and whisker plot using 5-number summary (minimum, Q1, Q2, Q3, maximum).

Use strategies to calculate the measures of variation (inter-quartile range and/or mean absolute deviation).</td></tr>
</table>

critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **ELA-Literacy** WHST.6-8.1 WHST.6-8.2 WHST.6-8.4 WHST.6-8.9 RST.6-8.2 RST.6-8.3 RST.6-8.4 RST.6-8.5 RST.6-8.8 **Tech Literacy** 8.1.8.A.3 8.1.8.F.1	To skew data means to distort the overall pattern. A set of data collected to answer a statistical question has a distribution, which can be described by its center (mean, median, mode). **VOCABULARY:** frequency, dot plots, skewed, symmetrical, range, histogram, outlier, box plots **KEY TERMS:** data table, uniform, tally marks	Identify any outliers that skew/misrepresent the data. Find the mean, median and mode of a data set. Use measures of central tendency to solve real-world mathematical problems. Determine the best measure of center for the data set.

ASSESSMENT EVIDENCE: Students will show their learning by:

- Pre-assessments
- Math in Focus Chapter Assessments
- Quizzes
- Statistics and Probability Project
- Brain Scan/Exit Ticket

KEY LEARNING EVENTS AND INSTRUCTION:

- Brain@Work
- Statistics and Probability Assignment: Math Menu

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 6 Mathematics
Unit XI: Statistics and Measure of Central Tendency

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
5 Weeks	**Unit XI: Statistics and Measure of Central Tendency** • Collecting and Tabulating Data • Dot Plots • Histograms • Measures of Center (Mean, Median, Mode) • Measures of Variation • Mean Absolute Deviation • Stem and Leaf Plots • Shape of Distribution • Box and Whisker Plot	Math in Focus Singapore Math: Course 1A (online @ my.hrw.com) National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/grade_g_3.html www.ixl.com/math/grade6 www.funbrain.com/ www.aplusmath.com/ www.math-play.com/6th-grade-math-games.html www.khanacademy.com www.aaamath.com www.brainingcamp.com Various activities and games on a variety of math topics http://guest.portaportal.com/math6th

Appendix A

SAMPLE LESSON PLAN

Lesson 4.3 Real-World Problems: Ratios

Objective: *solve real-world problems involving ratios.*

Standards: 6.RP.3, MP1, MP2, MP6

Warm Up: The number of free throws Lee made was $\frac{2}{3}$ the number of free throws Brian made. What is the ratio of Lee's free throws to Brian's free throws? If Brian made 15 free throws, how many did Lee make?

Procedure:

Day 1

1. Students will draw models to solve problems involving ratios
    a. Teacher will model two examples (pg. 140), students will complete guided notes
    b. Students will work collaboratively with partner/group to complete Guided Practice problems (pg. 141)
        i. Teacher will circulate to assist struggling learners
2. Students will draw models to solve problems involving ratios of three quantities
    a. Teacher will model example (pg. 142), students will complete guided notes
    b. Students will work independently to complete Guided Practice problems (pg. 142-143)
        i. Teacher will circulate to check for understanding
3. Assign homework: page 148 #'s 1 – 3

Day 2

4. Students will draw models to solve problems involving two sets of ratios
    a. Teacher will model example (pg. 144), students will complete guided notes
    b. Students will work with partner/group to complete Guided Practice problems (pg. 145)
5. Students will draw models to solve before-and-after problems
    a. Teacher will model example (pg. 146), students will complete guided notes

b. Students will work independently to complete Guided Practice problems (pg. 147)
    i. Teacher will circulate to check for understanding
6. Assign homework: page 148 #'s 4 – 10 (11 – 15* challenge problems)

Brain Scan: A number of baseball cards were shared among Ray, Serge, and Tony in the ratio 2 : 4 : 9, respectively. If Serge got 55 fewer cards than Tony, how many cards did Tony get? Explain how to solve this problem.

Assessments: Observe/question students, Brain Scan, homework

Extensions: Challenge problems, homogeneous groupings

Modifications: Guided questioning, homogeneous groupings, paper strips, blocks, or post-its for bar modeling

SAMPLE LESSON PLAN

(Handout)

Name: _____ Date: _____ Period: _____

Lesson 4.3 Guided Notes, Day 1

Lesson Objectives

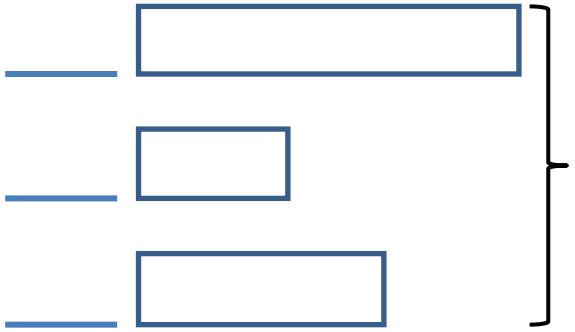
- Draw models to solve problems using ratios
- Draw models to solve real-world problems with ratios involving 3 quantities
- Solve real-world problems involving ratios

Draw models to solve problems using ratios

Megan prepares a fruit punch using apple juice and orange juice in the ratio of 4 : 3. a) If the total volume of the fruit punch is 630 milliliters, find the volume of the apple juice Megan uses. 	Total number of units = ____ + ____ = ____ Total amount _____ ÷ unit _____ One Unit = _____ Apple Juice = _____ Units x _____mL Volume of the apple juice _____ Orange juice = _____ Units x _____mL Volume of the orange juice _____

1. A box contains baseball and football cards. The number of baseball cards to the number of football cards is 5 : 1. If the total number of cards is 1,380, find the number of each type of cards.

Draw models to solve problems involving ratios of three quantities.

Jenny prepares a ceramic glaze mixture of feldspar, red iron and silica in the ratio 5 : 2 : 3. The mass of the mixture is 1 kg 200g. Find the mass of each ingredient used to prepare the mixture. 	1. Convert mass to grams 1 kg 200g = _____ 2. Find the total number of units _____ + _____ + _____ = _____ 3. Divide mass into each unit _____ ÷ _____ = _____ per unit 4. Find the mass of each ingredient Feldspar _____ x _____ = _____ Iron Oxide _____ x _____ = _____ Silica _____ x _____ = _____

Practice

A school raised 18,000 at a charity event. The money raised was shared among three charities, A, B, and C, in the ratio 1 : 2 : 3. How much money did each charity receive?

Name: _____ Date: _____ Period: _____

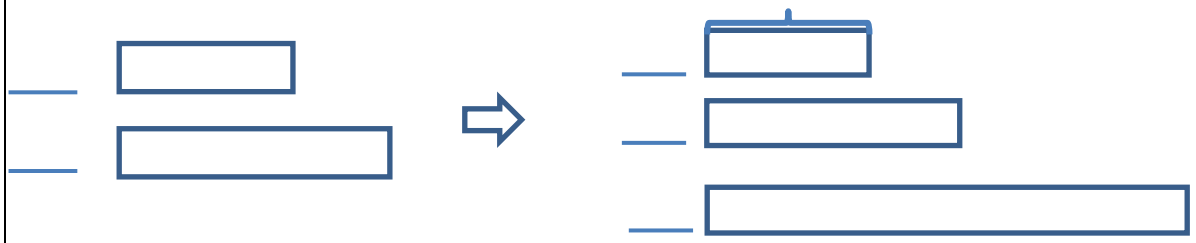
Lesson 4.3 Guided Notes, Day 2

Lesson Objectives

- Draw models to solve problems involving 2 sets of ratios.
- Draw models to solve before-and-after problems

Draw models to solve problems involving 2 sets of ratios.

The ratio of the number of CDs Brad has to the number of CDs Keith has is 2 : 3. The ratio of the number of CDs Keith has to the number of CDs Simone has is 6 : 11. Brad has 24 CDs. How many CDs do Keith and Simone have together?



Brad to Keith _____ Keith to Simone _____

Brad : Keith : Simone _____

Multiply Brad to Keith by _____ Now Keith is the same number in both ratios. (Use the _____)

_____CDs ÷ _____ Units 1 Unit = _____CDs

Keith = _____ Units x _____CDs per unit = _____ CDs

Simone = _____ Units x _____CDs per unit = _____CDs

Keith + Simone = _____ + _____ = _____CDs

At Stacey's middle school, students either ride bikes to school, walk, or take the bus. The ratio of the number of students who ride bikes to the number who walk is 3 : 4. The ratio of the number of students who walk to the number who take the bus is 12 : 7. There are 560 students in all. Find the number of students who ride bikes to school.

Draw models to solve before and after problems.

Sam had some U.S. and foreign stamps. The ratio of the number of U.S. stamps to the number of foreign stamps was 3 : 4. He bought 21 more U.S. stamps and the ratio became 9 : 8. How many foreign stamps did Sam have?  What term in ratio did not increase? _____ The _____ of the _____ did not increase but the number of _____. Now _____ _____units to the U.S. stamps. _____ units = _____stamps, so 1 Unit = _____stamps. Foreign stamps = _____units x _____ per unit = _____stamps	Step 1: Mark important information of word problem Step 2: Write labels for bar model Step 3: Model "before" ratio. Step 4 : Check to see which term in the ratio did not increase and change all the units to match this number. Step 5: Add the "after" units to the model. Step 6: Find the quantity for each unit. Step 6: Answer question. Step 7: Reflect on answer.

Claire keeps some green and red plates in a cabinet. The ratio of the number of green plates to red plates in 2 : 1. She adds 18 more plates in the cabinet and the ratio becomes 4 : 5. How many green plates are there in the cabinet?

Appendix B - Resources:

Math in Focus Singapore Math Course 1A, ISBN: 978-0-547-56100-4 Marshall Cavendish 2014
Math in Focus Singapore Math Course 1B, ISBN: 978-0-547-56096-0 Marshall Cavendish 2014
Math in Focus Singapore Math Course 1 Transition Guide, ISBN: 978-0-547-57909-2 Marshall Cavendish 2014
Math in Focus Singapore Online Resources
Math in Focus Singapore Exam View
Math in Focus Singapore Activity Book
Math in Focus Singapore Brain @ Work
Math in Focus Singapore Enrichment
Math in Focus Singapore Activity Book
Math in Focus Singapore Vocabulary Review
Math in Focus Singapore Reteach
Math in Focus Singapore Spanish Edition
Holt Mathematics Course 1, ISBN: 0-03-092896-6 Holt, Rinehart and Winston 2007
Holt Mathematics Course 2, ISBN: 0-03-092921-0 Holt, Rinehart and Winston 2007
Study Island
Holt Reteach Supplements
Holt Reading Strategies Supplements
Holt Problem Solving Supplements
Holt Power Point Presentations
Holt IDEA Works
Holt Challenge Supplements
Holt – Questioning Strategies
Connected Math Resources