

Mathematics Curriculum ~ Grade Six

Diocese of Cleveland



Unit 1: Understand the Rational Number System

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, The Number System

6.NS Apply and extend previous understandings of numbers to the system of rational numbers.

- 6.NS.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- 6.NS.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- 6.NS.6a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.
- 6.NS.6b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
- 6.NS.6c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- 6.NS.7. Understand ordering and absolute value of rational numbers.
- 6.NS.7a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
- 6.NS.7b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
- 6.NS.7c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
- 6.NS.7d. Distinguish comparisons of absolute value from statements about order.
- 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.

Essential Questions

- How do I use concrete, pictorial, and symbolic representation for integers?
- In what ways can rational numbers be useful?
- Why is it useful for me to know the absolute value of a number?
- How do I compare and order integers?
- How are opposites and absolute value related?
- What strategies are most useful in helping me develop algorithms for adding, subtracting, multiplying, and dividing positive and negative rational numbers?
- How can I use models to prove that opposites combine to 0?
- What real life situations combine to make 0?

Content

The students will know

1. Integers
2. Opposites
3. Rational numbers in real-world contexts
4. Ordered pairs involving positive and negative numbers
5. Graphing integers and rational numbers on a number line
6. Graphing ordered pairs on a coordinate plane in all quadrants
7. Absolute value
8. Ordering of numbers in real-world contexts
9. Distance between points with one coordinate the same

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Explain that positive and negative numbers are used together to describe quantities having opposite directions or values.
2. Use positive and negative numbers to represent quantities in real-world contexts.
3. Explain the meaning of 0 in the context of rational numbers.
4. Describe and illustrate a rational number as a point on the number line.
5. Distinguish opposite signs of numbers as indicating locations on opposite sides of zero on a number line.
6. Explain that the opposite of the opposite of a number is the number itself.
7. Identify zero (0) as its own opposite.
8. Recognize that signs of numbers in ordered pairs indicate locations in quadrants of a coordinate plane.
9. Explain that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
10. Graph ordered pairs on a coordinate plane taking into account the signs of each number in the ordered pair.
11. Explain the location of a point in relation to the signs in the ordered pair without graphing the point.
12. Describe and illustrate ordering and absolute value of rational numbers.
13. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
14. Calculate the distance between two points on the coordinate plane.
15. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
16. Explain the absolute value of a rational number as its distance from 0 on the number line.
17. Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
18. Distinguish comparisons of absolute value from statements about order.
19. Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

Reading/Writing Skills

1. Define, using context clues, specific vocabulary from the

	<p>Common Core and apply the terms and definitions to solve problems.</p> <ol style="list-style-type: none"> Justify solutions, either verbally or in written form. <ul style="list-style-type: none"> Explain step-by-step process. Summarize results using specific and appropriate vocabulary. Use technology to produce written explanations and justifications for real-life and mathematical problems.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> Integers Opposites Rational Number Ordered Pair Absolute Value Distance Negative numbers Positive numbers Compare 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> Zero Number Line Coordinate Plane Quadrants x- and y-axis Inequality Origin Reflection
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> Class activity/Online learning. Engage students in a review of positive and negative numbers using the four videos found on <i>Learn Zillion</i> site for standard 6.NS.5. (See Links.) As a follow-up to the review of positive and negative numbers, have students work with a partner to show their understanding of positives and negatives by translating among words, numbers and models. For example, given the words "7 degrees below zero," showing it on a thermometer and writing -7; given -4 on a number line, writing a real-life example and mathematically -4. Ask them to justify their solutions and share their justifications with the class. Have students use number lines to model absolute value as the distance from zero. Ask them to make simple comparisons, determine order and write it mathematically, and use absolute value to relate contextual problems to their meanings and solutions. Class activity/Online learning. Engage students in a discussion of rational numbers as a point on a number line, ordered pairs, and coordinate axes. Use videos found on the <i>Learn Zillion</i> site which address standards 6.NS.6a, b, and c. (See Links.) To reinforce understanding of all sections of Standard 6.NS.6 have students work with a partner to solve several problems by translating among words, numbers and models. Ask them to justify their solutions and share their justifications with the class. Have students order various types of numbers along a number line or on a coordinate plane. Have them explain their work. Working with a partner, have students use number lines to model negative numbers, prove the distance between opposites, and show an understanding of how the meaning of absolute value transfers to the creation and usage of four-quadrant coordinate grids. Ask them to justify their reasoning. Have students plot points on all four quadrants of a coordinate grid. Ask them to write a "story" based on the position of the points on the grid. Share their "stories" with the class. Class activity/Online learning. Engage students in a discussion of Standard 6.NS.7a, b, c, and d using the videos found on the <i>Learn Zillion</i> site. (See Links.) 	<p>Assessment (Suggested)</p> <p>Positive and Negative Rational Numbers Formative: Class Work</p> <p>Students will work with a partner to solve problems involving positive and negative rational numbers by translating among words, numbers and models. They will justify their solutions and share their justifications with the class.</p> <p>Using the Number Line to Model Absolute Zero Formative: Homework</p> <p>Students will use number lines to model absolute value as the distance from zero. They will make simple comparisons, determine order and write it mathematically, and use absolute value to relate contextual problems to their meanings and solutions.</p> <p>Homework Practice Formative: Homework</p> <p>Have students, on a regular basis engage in practice solving mathematical problems involving all concepts addressed in the unit. Homework should be demonstrated, explained, and discussed in order to check students' understanding of concepts.</p> <p>Ordering Numbers Formative: Class Work</p> <p>Students will order various types of numbers along a number line or on a coordinate plane and explain their work.</p> <p>Plotting Points in Four Quadrants Formative: Homework</p> <p>Students will plot points on all four quadrants of a coordinate grid. They will write a "story" based on the position of the points on the grid and</p>

10. Working in cooperative groups, have students show that the ordering of numbers and absolute values can be graphed on a number line. Provide students with a number of mathematical statements to graph on the number line. Ask them to write a one or two sentence explanation as to why they placed the points as they did. They should be sure to mention the location of the numbers on the number line and how the location relates to the inequality.
11. Online learning. Have students work in teams and have them engage in the *Battle Graph* activity outlined in the lesson in the Links. In doing the activity, teams will graph and read points on a coordinate and explain terminology associated with graphing on a coordinate plane.
12. Working with a partner, have students solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane including use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.



[Learn Zillion ~ Common Core Videos](#)



[About Mathematics and Real World Mathematics](#)

[Applications](#)



[Battle Graph Power Point Activity](#)

(Download the PowerPoint)

share their "stories" with the class.

Negative Numbers on the Number Line

Formative: Cooperative Group Work

Working with a partner, students will use number lines to model negative numbers, prove the distance between opposites, and show an understanding of how the meaning of absolute value transfers to the creation and usage of four-quadrant coordinate grids. They will justify their reasoning.

Graphing Ordered Numbers and Absolute Values

Homework

Given a number of mathematical statements to graph on the number line, students will show how the ordering of numbers and absolute values can be graphed. They will write one or two sentences explaining why they placed the points as they did. They should be sure to mention the location of the numbers on the number line and how the location relates to the inequality.

Battle Graph

Formative: Cooperative Group Work

Students will work in teams to engage in the Battle Graph activity. Teams will graph and read points on a coordinate and explain terminology associated with graphing on a coordinate plane.

Graphing Absolute Values on Number Line

Formative: Cooperative Group Work

Working in cooperative groups, students will show that the ordering of numbers and absolute values can be graphed on a number line. They will be provided with a number of mathematical statements to graph on the number line. After completing the graph, they will write a one or two sentence explanation as to why they placed the points as they did.

Solving Real-World Problems

Summative: Class Work

Students will solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. These problems will include the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Picture Graphing

Summative: Project

Students will plot points on a coordinate plane to create a picture, symbol, or word. They will give their creation a title and label the location of each point used. They will then write a story about their creation using mathematical references for their creation.

Resources (Suggested)

1. iPad Resources
2. Literature Connections
Anno's Magic Seeds by Mitsumasa Anno

Catholic Identity

Social Justice Teachings

-  Life And Dignity Of The Human Person
-  Call To Family, Community, And Participation

The 512 Ants on Sullivan Street by Carol A. Losi
A Million Fish . . . More or Less by Patricia C. McKissack
What's Smaller Than a Pygmy Shrew? by Robert E. Wells
Moja Means One Muriel Feelings by Tom Feelings
One...Two...Three...Sassafras! by Stuart J. Murphy and John Wallace

3. Internet Resources



[xP Math Games](#)



[Brain Pop](#)



[Learn Zillion ~ Common Core Videos](#)



[The National Library of Virtual Manipulatives](#)



[The Math Worksheet Site](#)



[iLearn Ohio](#)



[The Khan Academy](#)

- ✚ Rights And Responsibilities
- ✚ Solidarity

Rights of Children

- ✚ THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
- ✚ THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
- ✚ THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.
- ✚ THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
- ✚ THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

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Unit 2: Apply and Extend Fraction Understanding

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 6. Attend to precision.
- 7. Look for and make use of structure.
- 8. Look for and express regularity in repeated reasoning.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, The Number System

6.NS Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

- 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.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 a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

DOC: Mathematics, DOC: Grade 6, Numbers, Number Sense and Operations

A. Number and Number Systems

- 3. Find and use the prime factorization of composite numbers.

- a. Know the prime numbers to 100.
- b. Use prime factorization to recognize the greatest common factor (GCF) of two or more numbers.
- c. Use the prime factorization to recognize the least common multiple (LCM) of two or more numbers.
- d. Apply prime factorization to solve problems and explain solutions.
- c. Find the reciprocal of a number.
- 9. Explore Roman Numerals and compare with the base ten number system.

Essential Questions

- How do I compute fractions?
- How can I use models to compute fractions with like and unlike denominators?
- How do I apply our understanding of fractions to everyday life?
- How does using fractions contribute to the accuracy of your answer?
- How can I make a mathematical connection with the real world?
- How can the natural world and the real world systems be represented symbolically?

Content

The students will know

1. Operations with fractions
2. Greatest common factor
3. Least common multiple
4. Prime factorization
5. Reciprocal of a number
6. Roman Numerals
7. Inverse operations
8. Decimal fluency
9. Long division

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Interpret and compute quotients of fractions.
2. Solve word problems involving the division of fractions by fractions.
3. Draw a visual fraction model to illustrate the quotient of two fractions.
4. Apply the relationship between multiplication and division to justify your answer.
5. Create and describe mathematical rules (algorithms) for a wide variety of patterns involving fractions.
6. Fluently divide multi-digit numbers using the standard algorithm.
7. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
8. Compute the greatest common factor of two whole numbers less than or equal to 100.
9. Compute the least common multiple of two whole numbers less than or equal to 12.
10. Compute the greatest common factor of two whole numbers written as a sum.
11. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
12. Calculate the prime factorization of composite numbers to determine the GCF or LCM of two or more whole numbers up to 100.
13. Find and use prime factorization of composite numbers.
14. Use prime factorization to determine the greatest common factor (GCF) of two or more numbers and the least common multiple (LCM) of two or more numbers.
15. Apply concepts from prime factorization to solve problems and justify solutions.
16. Determine the reciprocal of a number.
17. Compare Roman Numerals with the base 10 number system.

Reading/Writing Skills

1. Define, using context clues, specific vocabulary from the Common Core and apply the terms and definitions to solve problems.

	<ol style="list-style-type: none"> 2. Justify solutions, either verbally or in written form. <ul style="list-style-type: none"> ▪ Explain step-by-step process. ▪ Summarize results using specific and appropriate vocabulary. 3. Use technology to produce written explanations and justifications for real-life and mathematical problems.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Reciprocal 2. Least Common Multiple 3. Greatest Common Factor 4. Distributive Property 5. Visual fraction model 6. Standard algorithm 7. Prime 8. Composite 9. Prime factorization 10. Roman numeral 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Fraction 2. Numerator 3. Denominator 4. Multiple 5. Factor 6. Quotient 7. Dividend 8. Divisor 9. Reasonableness of a solution
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity/Online learning. Using a technology device, work as a whole class and/or have students work with a partner to review their understanding of division of fractions using the lessons on <i>LearnZillion.com</i> for 6.NS.1. 2. As a follow-up to the class activity, have students work with a partner to solve problems involving division of fractions by fractions using visual fraction models and equations to represent the problem. Ask them to justify the reasoning they used in working the problem. 3. Challenge the students to demonstrate their understanding of division of multi-digit dividends by multi-digit divisors using the standard algorithm. Provide them with a number of problems involving multi-digits in both dividend and divisor. Ask them to solve the problems and, at the same time, write a sentence explaining what they did in each step. 4. Class activity/Online learning. Using a technology device, work as a whole class and/or have students work with a partner to review their ability to fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation using the <i>Learn Zillion</i> site addressing Common Core Standard 6.NS.3 found in the Links. 5. As a follow-up to the class activity, have students solve problems involving adding, subtracting, multiplying, and dividing multi-digit decimals using the standard algorithm for each operation. Ask them to justify the reasoning they used in working the problem. 6. Have students work in cooperative groups to: <ol style="list-style-type: none"> a. Compute the greatest common factor of several pairs of whole numbers less than or equal to 100. b. Compute the least common multiple of several pairs of whole numbers less than or equal to 12. c. Compute the greatest common factor of several pairs of whole numbers written as a sum. d. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. Have them justify the reasoning used in completing each of the required tasks. Share their reasoning with the class. 	<p>Assessment (Suggested)</p> <p>Division of Fractions by Fractions Formative: Class Work</p> <p>Students will work with a partner to solve problems involving division of fractions by fractions using visual fraction models and equations to represent the problem. They will justify the reasoning they used in working the problem.</p> <p>Division of Multi-Digit Numbers Formative: Homework</p> <p>Students will demonstrate their understanding of division of multi-digit dividends by multi-digit divisors using the standard algorithm. They will solve the problems and, at the same time, write a sentence explaining what they did in each step.</p> <p>Working with Multi-Digit Decimals Formative: Class Work</p> <p>Students will solve problems involving adding, subtracting, multiplying, and dividing multi-digit decimals using the standard algorithm for each operation. They will justify the reasoning they used in working the problem.</p> <p>GCF Formative: Homework</p> <p>Students will compute the greatest common factor of several pairs of whole numbers less than or equal to 100. They will justify the reasoning used in completing each of the required tasks. Share their reasoning with the class.</p> <p>LCM Formative: Homework</p> <p>Students will compute the least common multiple of several pairs of whole numbers less than or equal to 12. They will justify the reasoning used in completing each of the required</p>

7. Class activity/Online learning. Engage students in developing an understanding of prime factorization using the ODE lesson on prime factorization. (See Links)
8. Online learning. Have students use the *Sieve of Eratosthenes* to find the prime numbers from 1 to 100. (Create worksheets using the Link.)
9. As a follow-up to the lesson on prime factorization, have students work with a partner to do the following:
 - a. Find the prime factors of several composite numbers.
 - b. Use prime factorization to determine the greatest common factor of two or more numbers.
 - c. Use prime factorization to determine the least common multiple of two or more numbers.
 Have them justify the reasoning used in completing each of the required tasks. Share their reasoning with the class.
10. Working with a partner, have students explore the definition of a reciprocal and how it can be used to solve problems. Use the site listed in the Links.
11. Class activity/Online learning. Using a technology device, work as a whole class and/or have students work with a partner to learn the Roman Numerals and use them in various mathematical and real-life problems. (See Links)



[Games for All Areas ~ Roman Numerals](#)



[Decimals: Add, Subtract, Multiply, and Divide \(Common Core Standard 6.NS.3\)](#)



[ODE Lesson on Prime Factorization](#)



[Worksheets for Sieve of Erastosthenes](#)



[Reciprocal](#)

tasks. Share their reasoning with the class.

GCF of Several Pairs of Whole Numbers

Formative: Homework

Students will compute the greatest common factor of several pairs of whole numbers written as a sum.

They will justify the reasoning used in completing each of the required tasks. Share their reasoning with the class.

Using the Distributive Property

Formative: Class Work

Working with a partner, students will use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

They will justify the reasoning used in completing each of the required tasks. Share their reasoning with the class.

Prime Numbers

Formative: Homework

Students will use the Sieve of Eratosthenes to find the prime numbers from 1 to 100.

Prime Factorization Graphic Organizer

Summative: Graphic Organizer

Create a graphic organizer using concepts taught in this unit about prime factorization.

Prime Factorization

Formative: Cooperative Group Work

Students will work with a partner to do the following.

- a. Find the prime factors of several composite numbers.
- b. Use prime factorization to determine the greatest common factor of two or more numbers.
- c. Use prime factorization to determine the least common multiple of two or more numbers.

They will justify the reasoning used in completing each of the required tasks. Share their reasoning with the class.

Roman Numerals

Summative: Project

Using a technology device, students learn the Roman Numerals and use them in various mathematical and real-life problems.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
 - The Man Who Counted: A Collection of Mathematical Adventures* by Malba Tahan
 - Apple Fractions* by Jerry Pallotta and Rob Bolster
 - Full House: An Invitation to Fractions* by Dayle Ann Dodds and Abby Carter
 - Fraction Action* by Loreen Leedy

Catholic Identity

Social Justice Teachings

- Call To Family, Community, And Participation
- Rights And Responsibilities
- The Dignity Of Work And The Rights Of Workers
- Solidarity

Rights of Children

- THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to

Powers of Ten: A Flipbook by Charles Eames Ray Eames

3. Internet Resources



[IXL Math for Grade 6](#)



[The National Library of Virtual Manipulatives](#)



[Learn Zillion ~ Common Core Videos](#)



[The Math Worksheet Site](#)



[Brain Pop](#)



[The Khan Academy](#)



[iLearn Ohio](#)

Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.

- ✦ THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
- ✦ THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
- ✦ THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.
- ✦ THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
- ✦ THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.
- ✦ THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
- ✦ THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

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Unit 3: Understand Algebraic Expressions

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects

3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

- RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

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The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

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- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 6. Attend to precision.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Expressions & Equations

6.EE Apply and extend previous understandings of arithmetic to algebraic expressions.

- 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.
- 6.EE.2a. Write expressions that record operations with numbers and with letters standing for numbers.
- 6.EE.2b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
- 6.EE.2c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
- 6.EE.3. Apply the properties of operations to generate equivalent expressions.
- 6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

Essential Questions

- How is an equation like a balance scale?
- What is an unknown?
- Why are variables used?
- How would I describe the order of operations?
- When are algebraic and numeric expressions used?
- How can the natural world and real life systems be represented symbolically?

Content

The students will know

1. Numerical and algebraic expressions involving exponents
2. Operations with numbers and variables
3. Specific parts of an expression
4. Properties of operations
5. Equivalent expressions

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Write and evaluate numerical and algebraic expressions involving whole-number exponents.
2. Write, read, and evaluate expressions in which letters stand for numbers.
3. Write expressions that record operations with numbers and with letters standing for numbers.
4. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient).
5. Classify the parts of an expression using mathematical terms, including the variables in real-life situations.
6. Identify one or more parts of an expression as a single entity.
7. Evaluate expressions at specific values of the variables.
 - Order of Operations
 - Formulas
 - Involving whole-number exponents
8. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order.
9. Apply the properties of operations to generate equivalent expressions.
10. Identify when two expressions are equivalent.
11. Employ proper mathematical vocabulary when discussing terms, factors, coefficients, etc.

Reading/Writing Skills

1. Define, using context clues, specific vocabulary from the Common Core and apply the terms and definitions to solve problems.
2. Justify solutions, either verbally or in written form.
 - Explain step-by-step process.
 - Summarize results using specific and appropriate vocabulary.
3. Use technology to produce written explanations and justifications for real-life and mathematical problems.

Common Core Vocabulary

1. Numerical expression
2. Algebraic expression
3. Parts of an expression
 - sum
 - term
 - product
 - factor
 - quotient

Additional Vocabulary

1. Variable
2. Exponent
3. Order of Operations

<ul style="list-style-type: none"> ▪ coefficient <ol style="list-style-type: none"> 4. Properties 5. Equivalent 	
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity/discussion on exponential notation: Present several numeric expressions to the students such as $2 \times 2 \times 2 \times 2 \times 2$ and discuss the need to come up with a "shorthand" way of expressing the same number $\sim 2^5$ (2 to the fifth power). The 2 is the <i>base</i>, 5 is the <i>exponent</i>, and is called a <i>power</i>. The <i>base</i> is the number that is being multiplied by itself repeatedly. The <i>exponent</i> is the number of times that the base is being multiplied by itself. The <i>power</i> is the <i>exponential notation</i>. Repeat with several more examples and have students write the number in exponential notation and as an expression of repeated multiplication. 2. Following the class activity/discussion, have students write examples of repeated multiplication in exponential notation and record examples on the board. Discuss each example and have students determine whether or not each is written correctly in exponential notation. (Include examples of cubes and squares and introduce this vocabulary as well as examples with exponents higher than 3.) 3. Class activity/Online learning. Using a technology tool, have students work with a partner to explore and develop a working knowledge of each of the following standards: <ol style="list-style-type: none"> a. Write, read, and evaluate expressions in which letters stand for numbers. b. Write expressions that record operations with numbers and with letters standing for numbers. c. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. d. Evaluate expressions at specific values of their variables. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). Have students use the Common Core videos found in <i>LearnZillion.com</i>. (See Links) 4. Follow up the class activity by having students find the solution to a number of problems that reflect the topics in each of the standards studied. For each solution, have students justify the reasoning they used to find the answer and share their thinking with the class. 5. Have students write several expressions for numerical and real-world situations and have them write multiple statements that represent an algebraic expression such as $x - 10$ could be written as "ten less than a number," "a number minus ten," "the temperature fell ten degrees." Have students read their algebraic expressions in class. 6. Working with a partner, have students write equivalent expressions, both numerically and with variables. Examples might include: for $x + x + x + x + 4 \times 2$ students could write $2x + 2x + 8$ or the simplest form $4x + 8$. If possible, use hands-on materials to help students translate between concrete numerical expressions and abstract symbolic representations. (See the National Library of Virtual Manipulatives in the Links.) 7. Class activity. Provide students with expressions and formulas, along with values for the variables and ask the students to evaluate the expression using the order of operations with and 	<p>Assessment (Suggested)</p> <p>Exponential Notation Formative: Class Work</p> <p>Students will write examples of repeated multiplication in exponential notation. They will examine each example to determine whether or not it is written correctly in exponential notation.</p> <p>Finding Solutions Formative: Homework</p> <p>Ongoing assessment.</p> <p>Students will find the solution to a number of problems that reflect the topics in each of the standards studied. For each solution, students will justify the reasoning they used to find the answer and share their thinking with the class.</p> <p>Algebraic Expressions Formative: Homework</p> <p>Ongoing Assessment.</p> <p>Students will have homework problems that will provide them the opportunity to communicate mathematically while practicing the content.</p> <p>Writing and Reading Algebraic Expressions Formative: Class Work</p> <p>Students will write expressions for numerical and real-world situations and write multiple statements that represent an algebraic expression such as $x - 10$ could be written as "ten less than a number," "a number minus ten," "the temperature fell ten degrees." They will read their algebraic expressions in class.</p> <p>Properties of Operations Activity Formative: Cooperative Group Work</p> <p>Students will work in cooperative groups to identify and apply properties of operations to generate equivalent expressions.</p> <p>Order of Operations Formative: Class Work</p> <p>Students will work with expressions and formulas, along with values for the variables. They will evaluate the expressions using the order of operations with and without parentheses.</p> <p>Order of Operations PowerPoint/Rap or Song Summative: Technology Project</p> <p>Students will work in cooperative groups to create a PowerPoint presentation or a song/rap to explain the order of operations and how</p>

without parentheses. (Include whole-number exponents, fractions, decimals, etc.) Ask students to write the step-by-step thinking they used when simplifying an expression.

8. Online learning. As a culmination to this unit, engage the students in the online game *Late Delivery – An Algebra Game (Expression Solving)*. See Links. In the game they will help the mail carrier deliver five letters to houses with numbers such as $3(a + 2)$.



[Basic Rules and Properties of Algebra](#)



[Algebraic Properties of Real Numbers](#)



[Learn Zillion ~ Common Core Videos](#)



[The National Library of Virtual Manipulatives](#)



[Late Delivery - An Algebra Game \(Expression Solving\)](#)

they can be used in their lives.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
A Gebra Named Al: A Novel by Wendy Isdell
Kiss My Math: Showing Pre-Algebra Who's Boss by Danica McKellar
Do the Math: Secrets, Lies, and Algebra by Wendy Lichtman
The Great Number Rumble: A Story of Math in Surprising Places by Cora Lee, Gillian O'Reilly, and Virginia Gray
Mystery Math: A First Book of Algebra by David Adler
Math Curse by Jon Scieszka and Lane Smith
If You Hopped Like a Frog by David M. Schwartz
3. Internet Resources



[Free Online Games and Activities](#)



[Order of Operations](#)



[Free Math Worksheets](#)



[Learn Zillion ~ Common Core Videos](#)



[The Math Worksheet Site](#)



[The National Library of Virtual Manipulatives](#)



[Learn Ohio](#)

Catholic Identity

Social Justice Teachings

- Life And Dignity Of The Human Person
- Call To Family, Community, And Participation
- Rights And Responsibilities
- The Dignity Of Work And The Rights Of Workers
- Solidarity

Rights of Children

- THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.
- THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
- THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
- THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
- THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.
- THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
- THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.
- THE RIGHT TO GUIDANCE FROM THE CHURCH in their development as loving people.



The Khan Academy!

Mathematics Curriculum ~ Grade Six

Diocese of Cleveland



Unit 4: Solve One-Variable Equations and Inequalities

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

- RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 6. Attend to precision.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Expressions & Equations

6.EE Reason about and solve one-variable equations and inequalities.

- 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 equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- 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.
- 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 Represent and analyze quantitative relationships between dependent and independent variables.

- 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 terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.

Essential Questions

- What are the tools needed to solve linear equations and inequalities?
- How do I solve a linear equation by graphing?
- How can I manipulate numbers to solve problems using mathematical operations?
- How can the natural world and real life systems be represented symbolically?
- How can tables and graphs aid me in making everyday decisions?
- How can I apply my understanding of independent and dependent variables to real-life scenarios?

Content

The students will know

- Linear Equations
- Linear Inequalities
- Algebraic Expressions
- Line Diagrams
- Rate of Change
- Independent Variable
- Dependent Variable
- Constant Speed

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

- Determine which values make an equation or an inequality true.
- Use substitution to decide if a number makes an equation or an inequality true.
- Explain the differences between equations and inequalities.
- Use variables to represent numbers.
- Write expressions for real-world and mathematical problems.
- Explain how a variable can represent one number or a set of numbers.
- Solve real-world and mathematical problems by writing and solving equations.
- Model solutions for equations of the form $x + p = q$ and $px = q$ with manipulatives, diagrams or story contexts.
- Recognize that infinity refers to a set of numbers that has no end, but may not include all numbers.
- Recognize that a variable can stand for an infinite number of solutions when used in inequalities.
- Recognize that a constraint or a condition in an inequality refers to the boundary defined in the solution set. Write an inequality to represent a set of solutions for real-world and mathematical problems.
- Recognize that inequalities of the form $x > c$ and $x < c$ have an infinite number of solutions.
- Graph solution sets of an inequality on a number line.
- Construct algebraic equations representing real-life and mathematical problems that represent change.
- Use variables to represent two quantities that change in relationship to one another.
- Write an equation to describe one quantity in terms of the other quantity.
- Write an equation to describe how the dependent variable changes in terms of the independent variable.
- Analyze how dependent variables change in a table.
- Analyze how dependent variables change in a graph.
- Explain how a graph, table and an equation can all represent the same real-world problem.

	<p>21. Recognize when quantitative relationships between dependent and independent variables are linear.</p> <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define, using context clues, specific vocabulary from the Common Core and apply the terms and definitions to solve problems. 2. Justify solutions, either verbally or in written form. <ul style="list-style-type: none"> ▪ Explain step-by-step process. ▪ Summarize results using specific and appropriate vocabulary. 3. Use technology to produce written explanations and justifications for real-life and mathematical problems.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Linear Equation 2. Linear Inequality 3. Expression 4. Line Diagram 5. Solution 6. Solution Set 7. Substitution 8. Infinite Solutions 9. Rate of Change 10. Independent Variable 11. Dependent Variable 12. Constant Speed 13. Distance-Time Formula 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Variable 2. Order of Operations 3. Rational Number
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity. Present students with the statement $8 + \underline{\quad} = 17$. Ask students to determine a number that would make this statement false and have them explain why it is false. Ask them to determine what number would make the statement true. Now, relate this equation to the idea of a balance scale. Using the equation $4 + n = 12$, explain that $4+n$ is the left side of the scale and 12 is the right side of the scale. Ask them what number they would need to add to 4 to balance the scale. Stress the concept that in solving equations, the two sides must be "balanced." Show the students that there is another strategy, have the students work backwards to see that $12 - 4 = n$ (or 8). Use a number of examples to reinforce their understanding that solving an equation or inequality is a process of determining which values make the equation or inequality true. 2. Following the class activity, have students solve a number of equations. Ask them to explain their reasoning. 3. Have students work with a partner to determine the solution and at least three non-solutions to the statement $m/5 = 3$. Have them share their solutions and the strategies they used to determine the solutions. Then ask them to write a scenario (or story) that would represent this equation. Share with the class. 4. Cooperative group activity. Provide the students with various real-life situations that they will use as the foundation for writing problems that can be solved using equations $x + p = q$ and $px = q$. x, p, and q are non-negative, rational numbers. After students have completed their problems, have the groups exchange their problems and solve them describing the steps they used for 	<p>Assessment (Suggested)</p> <p>Solving Equations Formative: Homework</p> <p>Throughout the unit, students will solve several real-life equations and inequalities. In each case they will explain and justify their reasoning.</p> <p>Solving Inequalities Formative: Homework</p> <p>Throughout the unit, students will solve several real-life mathematical inequalities. In each case they will explain and justify their reasoning.</p> <p>Solving $x + p = q$ and $px = q$. Formative: Class Work</p> <p>Students will write two problems, one that can be solved using the equation $x + p = q$ and the other using the equation $px = q$. They will then present some of the problems to the class and the class will solve the problems. Students will describe the steps they used for solving the two equations.</p> <p>Graphing and Inequality Formative: Cooperative Group Work</p> <p>Students will work with a partner to solve and graph solution sets of</p>

solving the problems. Have students use the videos for 6.EE.7 found in *Learn Zillion* to complete this activity. (See Links.)

5. Have students write two problems, one that can be solved using the equation $x + p = q$ and the other using the equation $px = q$. Present some of the problems to the class and have the class solve the problem. Ask them to describe the steps they used for solving problems with the two equations.
6. Class activity. Explain that one-step inequalities (using the symbols $<$, $>$, \leq , \geq) are solved the same as one-step equations. Have students consider solving a number of inequality equations using the same steps they used in solving one-step equations. Show students that once inequalities are solved, the solution set can be graphed on a number line. For example, in the inequality $x < 4$, "x" could be any number less than 4. This not only includes integers, but decimals and fractions, too. Things to remember when graphing inequalities:
 - a. If the symbol in the inequality is $<$ or $>$, use an open circle above the number being graphed.
 - b. If the symbol in the inequality is \leq or \geq , use a closed circle above the number being graphed.
 - c. If the symbol in the inequality is $<$ or \leq , draw an arrow to the left to show "less than."
 - d. If the symbol in the inequality is $>$ or \geq , draw an arrow to the right to show "greater than."
7. Have students work with a partner to solve and graph solution sets of several inequality equations on a number line and provide a response to each of the following:
 - a. What is a solution set?
 - b. Construct an inequality with one solution and with infinite solutions
 - c. In what forms can these linear equations be written?
 - d. How can you write the relationship if you are given information about it?
8. In order to represent and analyze quantitative relationships between dependent and independent variables, have students work with a partner and have them analyze two variables provided them. Ask them to show the relationship in a table, graph, and equation. Have them present their work to the class and explain how they determined which variable was independent and which was dependent. In addition, have them discuss how they created the table, graph, and equation and how each represents the relationship between the two variables.
9. Cooperative group work. Have students use technology, including computer apps, and other hand-held technology to collect real-time data to create tables and charts to show that although real-world data often is not linear, a line sometimes can model the data. Ask them to share their findings and explain how they decided on the table and/or chart they created to represent the data.



[Learn Zillion ~ Common Core Videos for 6.EE.7](#)

several inequality equations on a number line and provide a response to each of the following:

- a. What is a solution set?
- b. Construct an inequality with one solution and with infinite solutions
- c. In what forms can these linear equations be written?
- d. How can you write the relationship if you are given information about it?

Independent and Dependent Variable Representations **Formative: Cooperative Group Work**

Students will work with a partner to analyze two variables provided them. They will show the relationship in a table, graph, and equation. Partners will present their work to the class and explain how they determined which variable was independent and which was dependent. In addition, they will discuss how they created the table, graph, and equation and how each represents the relationship between the two variables.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
The 512 Ants on Sullivan Street by Carol A. Losi
Harry Potter and the Sorcerer's Stone by J. K. Rowling

Catholic Identity

Social Justice Teachings

-  Life And Dignity Of The Human Person
-  Call To Family, Community, And Participation
-  Rights And Responsibilities

The King's Chessboard by David Birch
Math Curse by Jon Scieszka and Lane Smith
The Great Number Rumble: A Story of Math in Surprising Places by Cora Lee, Gillian O'Reilly and Virginia Gray
Do the Math: Secrets, Lies, and Algebra by Wendy Lichtman
Do the Math #2: The Writing on the Wall by Wendy Lichtman

3. Internet Resources



[Algebra Help for the Student!](#)



[Free Math Worksheets!](#)



[The National Library of Virtual Manipulatives!](#)



[The Math Worksheets Site!](#)



[Learn Zillion ~ Common Core Videos!](#)



[Brain Pop!](#)



[Solving Linear Inequalities!](#)



[The Khan Academy!](#)



[iLearn Ohio!](#)

 Care For God's Creation

Rights of Children

-  THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.
-  THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
-  THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
-  THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.
-  THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
-  THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.
-  THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.
-  THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
-  THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

Mathematics Curriculum ~ Grade Six

Diocese of Cleveland



Unit 5: Understand Ratio Concepts and Reasoning

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Ratios & Proportional Relationships

6.RP Understand ratio concepts and use ratio reasoning to solve problems.

- 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 $b \neq 0$, 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.
- 6.RP.3a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
- 6.RP.3b. Solve unit rate problems including those involving unit pricing and constant speed.
- 6.RP.3c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
- 6.RP.3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Essential Questions

- How can I model and represent rates, ratios, and proportions?
- How does comparing quantities describe the relationship between them?
- How is a ratio or rate used to compare two quantities or values? Where can examples of ratios and rates be found?
- To what extent do ratios and rates affect my daily life?
- When and why do I use proportional comparisons?

Content

The students will know

1. Ratio
2. Rate
3. Unit rate
4. Equations
5. Equivalent ratios
6. Ordered pairs
7. Plotting ordered pairs
8. Percent as a quantity
9. Percent one-step equations
10. Conversion of units

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Compare a relationship between two quantities with the same units.
2. Compare a relationship between two quantities with different units.
3. Differentiate the ways to write a ratio.
4. Demonstrate their understanding of the concept of a ratio by using ratio language to describe relationships between quantities.
5. Identify ratios as comparing part-to-part and fractions as comparing part-to-whole, where the quantities being compared have the same units.
6. Describe rates as the ratio of two quantities having different units.
7. Appreciate the importance of order when dealing with ratios
8. Find equivalent ratios.
9. Divide a number into a given ratio.
10. Recognize a proportion as a statement of equivalent ratios $5 : 2 = 10 : 4$ or set up a proportion to find x as in $5 : 2 = 8 : x$.
11. Distinguish between proportional and non-proportional situations recognizing the multiplicative relationship that exists between the quantities in proportional situations.
12. Apply concepts of ratio, rate, and unit rate to solve real world and mathematical problems.
13. Create tables of equivalent ratios relating to quantities of whole number measurements.
 - tables with missing values and compare ratios.
 - plot the ordered pairs on the coordinate grid.
14. Apply concepts of ratios and rates to determine a percent.
15. Apply concepts involving ratios and percents to determine the part of the whole or the whole of the part.
16. Apply ratio concepts to convert unit measurements.
17. Solve problems involving proportional reasoning in different contexts.

Reading/Writing Skills

1. Define, using context clues, specific vocabulary from the Common Core and apply the terms and definitions to solve problems.
2. Justify solutions, either verbally or in written form.
 - Explain step-by-step process.
 - Summarize results using specific and appropriate vocabulary.
3. Use technology to produce written explanations and justifications for real-life and mathematical problems.

Common Core Vocabulary

Additional Vocabulary

<ol style="list-style-type: none"> 1. Ratio 2. Rate 3. Unit Rate 4. Ordered Pair 5. Conversion 	<ol style="list-style-type: none"> 1. Percent 2. Equation
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Introductory class activity. Take 5-10 minutes to do a class survey. Ask the following questions and have the students record the information in a notebook. <ol style="list-style-type: none"> a. How many students in class have blue eyes compared to brown eyes? b. How many students in class have shoes with shoelaces compared to Velcro? c. How many students in class are wearing a top with long sleeves and short sleeves? <p>Discuss the results of the survey and explain that the results for each question can be expressed as a part-to-part ratio ~ a comparison of the relationship between two quantities. Examine and discuss the ratios written for each of the questions. Students should state the relationships with number ($a : b$) and with mathematical language (The ratio of a to b is $a : b$, because for every a there was b.)</p> 2. Working in cooperative groups, have students select a "real-world" topic and write ratios that compare numbers associated with their topic. (Provide examples of possible comparisons in a variety of topics.) Have students select topics such as transportation, cooking, sports, etc. Ask them to create a chart showing the ratios numerically and in a mathematical statement. Have groups share their work with the class. 3. Class activity/Online learning. Engage students in developing an understanding of the concept of a unit rate a/b associated with a ratio $a : b$ with b not equal to 0, and use rate language in the context of a ratio relationship by using the videos for 6.RP.2 found in the <i>Learn Zillion</i> site. 4. Follow up the class activity on rates and have students solve real-life problems involving two units of measure, such as miles per hour, ounces per gallon, students per bus, etc. Have students create ratio tables as a way of developing the concept of proportion when comparing equivalent ratios. 5. Have students work with a partner to solve real-life problems involving measurement units that need to be converted. Ask them to represent the measurement conversion with models such as ratio tables, t-charts or double number line diagrams. 6. Online learning. Using a technological device, have students work with a partner to study the videos related to 6.RP.3a-3d (see Links) to acquire skill in using 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. 7. Following the study and discussion of the videos explaining Standard 6.RP.3a-3d, have students work with their partner and do the following: <ol style="list-style-type: none"> a. Go to the gym or outside and walk or run 20 meters at least 5 times and record their times. b. Use the data to create a table and a graph and write an equation. <p>When this is completed, they will use each of their representations to compare their rate to the rates of the other</p> 	<p>Assessment (Suggested)</p> <p>Working with Ratios Formative: Cooperative Group Work</p> <p>Students will select a "real-world" topic such as transportation, cooking, sports, etc. and write ratios that compare numbers associated with their topic. They will create a chart showing the ratios numerically and in a mathematical statement and share their work with the class.</p> <p>Rates Formative: Class Work</p> <p>Students will solve real-life problems involving two units of measure, such as miles per hour, ounces per gallon, students per bus, etc. They will create ratio tables as a way of developing the concept of proportion when comparing equivalent ratios.</p> <p>Working with Measurements Formative: Class Work</p> <p>Students will work with a partner to solve real-life problems involving measurement units that need to be converted. They will represent the measurement conversion with models such as ratio tables, t-charts or double number line diagrams.</p> <p>Real-World Problem Summative: Class Work</p> <p>Students will work with their partner to demonstrate their skill in using 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. Specifically, the students will:</p> <ol style="list-style-type: none"> a. Go to the gym or outside and walk or run 20 meters at least 5 times and record their times. b. Use the data to create a table and a graph and write an equation. <p>When this is completed, they will use each of their representations to compare their rate to the rates of the other student pairs.</p> <p>Multiplicative Reasoning Formative: Homework</p> <p>Students will solve several real-world problems that will require them to use multiplicative reasoning. They will justify their reasoning and share their solutions with the class.</p> <p>How Many Noses Are in Your Arm? Summative: Project</p> <p>Students will apply the concept of ratio and proportion to determine the length of the Statue of Liberty's torch bearing arm using the project titled <i>How Many Noses Are in Your Arm?</i> found in the Links.</p>

student pairs.

- Class activity/Online learning. Explain that *multiplicative reasoning* is a mathematics skill that allows people to use proportions and basic reasoning to figure out a number that is not given. Use the video *Solving unit-rate problems at Learn Zillion* (6.RP.3b ~ see Links) to re-teach this concept. Have students solve several real-world problems that will require them to use multiplicative reasoning. Ask them to justify their reasoning and share their solutions with the class.
- Working in cooperative groups, have students apply the concept of ratio and proportion to determine the length of the Statue of Liberty's torch bearing arm. See the project titled *How Many Noses Are in Your Arm?* found in the Links.



[The Lost Redcoat Game!](#)



[Learn Zillion ~ Common Core Videos for 6.RP.2!](#)



[Learn Zillion ~ Common Core Videos for 6.RP.3a-3d!](#)



[How Many Noses Are in Your Arm?!](#)

Resources (Suggested)

- iPad Resources
- Literature Connection
If You Hopped Like A Frog by David Schwartz and James Warhol
Somethin' Fishy by Milly Smith, Tracie L. Smith and Robert R. Smith
Our New Car: Ratio and Proportions by Nola Quinlan
Pythagoras and the Ratios: A Math Adventure by Julie Ellis
On the Road: Ratios and Proportions by Nola Quinlan
- Internet Resources



[Convert Units of Measure!](#)



[Learn Zillion ~ Common Core Videos!](#)



[The Math Worksheets Site!](#)



[The National Library of Virtual Manipulatives!](#)



[Brain Pop!](#)



[Ohio Resource Center!](#)



[Mathematics Common Core Tool Kit!](#)

Catholic Identity

Social Justice Teachings

- Life And Dignity Of The Human Person
- Call To Family, Community, And Participation
- Rights And Responsibilities
- Solidarity
- Care For God's Creation

Rights of Children

- THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.
- THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
- THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
- THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.
- THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
- THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.
- THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
- THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.



[Learn Ohio!](#)



[The Khan Academy!](#)

Mathematics Curriculum ~ Grade Six

Diocese of Cleveland



Unit 6: Solve Geometrical and Real-life Problems

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Geometry

6.G Solve real-world and mathematical problems involving area, surface area, and volume.

- 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.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ 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.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.
- 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.

DOC: Mathematics, DOC: Grade 6, Measurement

A. Measurement Units

- 1. Understand and describe the difference between surface area and volume.
- 2. Use appropriate units of time, temperature, and money.

B. Measurement Techniques and Tools

- 1. Understand and recognize the customary and metric units of capacity, weight, temperature, and time.
- 7. Use a ruler and protractor for specific measurement tasks.

DOC: Mathematics, DOC: Grade 6, Geometry and Spatial Sense

A. Characteristics and Properties

- 1. Compare, contrast, and describe plane figures, two- and three-dimensional geometric figures and objects by using their properties; e.g., interior angle measures, perpendicular/parallel side, congruent angles/sides.
- 2. Use standard language to define geometric vocabulary: vertex, face, altitude, diagonal, isosceles, equilateral, acute, obtuse, and other vocabulary as appropriate.
- 4. Identify and define relationships between planes; i.e., parallel, perpendicular, and intersecting.

Essential Questions

- How can objects be represented and compared using geometric attributes?
- How can I identify and describe solid figures by describing the faces, edges, and sides?
- In what ways can I match solid geometric shapes to real-life objects?
- How can patterns be used to determine standard formulas for area and perimeter?
- How do I find perimeter, area, and volume of geometric figures?
- In what ways is geometry present in our everyday world?

Content

The students will know

- Area of Triangles, including Right Triangles
- Area of Special Quadrilaterals
- Area of Polygons
- Volume of Right Rectangular Prisms
- Three-Dimensional Figures using Nets
- Sum of the Interior Angle Measures of a Polygon
- Surface Area
- Units of Capacity, Time, Temperature, and Money
- Unit Conversion

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

- Compare, contrast, and describe plane figures, two- and three-dimensional geometric figures and objects by using their properties.
- Analyze two- and three-dimensional geometric figures using their properties in real-world and mathematical problems.
- Find the area of geometric figures by composing into rectangles or decomposing into triangles and other shapes.
- Find the volume of a right rectangular prism with fractional edge lengths.
- Apply the formulas $V = lw h$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
- Draw polygons in the coordinate plane given coordinates for the vertices.
- Apply the formulas to find the volume of three-dimensional figures.
- Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate.
- Represent three-dimensional figures using nets made up of rectangles and triangles.
- Use concepts of nets of three-dimensional figures to calculate surface area.
- Describe the difference between surface area and volume.
- Apply appropriate units of time, temperature, and money in solving real-world problems.
- Recognize the customary and metric units of capacity, weight,

	<p>temperature, and time.</p> <ol style="list-style-type: none"> 14. Convert units of measurement between the customary system and the metric system. 15. Use a ruler and protractor for specific measurement tasks. 16. Use standard language to define geometric vocabulary: vertex, face, altitude, diagonal, isosceles, equilateral, acute, obtuse, and other vocabulary as appropriate. 17. Identify and define relationships between planes; i.e., parallel, perpendicular, and intersecting. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define, using context clues, specific vocabulary from the Common Core and apply the terms and definitions to solve problems. 2. Justify solutions, either verbally or in written form. <ul style="list-style-type: none"> ▪ Explain step-by-step process. ▪ Summarize results using specific and appropriate vocabulary. 3. Use technology to produce written explanations and justifications for real-life and mathematical problems.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Right Triangle 2. Special Quadrilaterals 3. Interior Angle Measures 4. Altitude 5. Net 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Area 2. Triangle 3. Rectangle 4. Coordinate Plane 5. Distance/Length 6. Equilateral 7. Acute 8. Obtuse 9. Isosceles 10. Parallel 11. Perpendicular 12. Intersecting 13. Two-Dimensional 14. Three-Dimensional 15. Volume 16. Surface Area 17. Polygon 18. Vertices 19. Face 20. Customary Units of Measurement 21. Metric Units <ul style="list-style-type: none"> ▪ Capacity ▪ Weight ▪ Temperature ▪ Time 22. Protractor 23. Ruler
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity. Have students compare, contrast, and describe the properties of plane figures, two- and three-dimensional geometric figures and objects using tangrams, geoboards and drawings. 2. Have students make a geometry vocabulary/picture booklet using a digital camera or iPad. They should define the term, 	<p>Assessment (Suggested)</p> <p>Geometer's Sketchpad Diagnostic: Technology Project</p> <p>Students will use computer geometry programs to create right triangles, special quadrilaterals, polygons, and three-dimensional objects discovering the different properties associated with each figure. They will</p>

make drawings to represent the term, and write a brief description of the term or geometric figure. The booklet should include pictures from real-life showing surface area, volume, time and money.

3. Class activities and student activities. Develop an understanding of all standards being addressed in this unit using the collection of lessons found in the Math Common Core Standards section of the Ohio Resource Center (See Links.)
4. Working with a partner, have students 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. Ask them to explain the step-by-step process they used in solving the problem.
5. Class activity/Online learning. Engage students in developing an understanding of the concept presented in this unit by using the videos for Standard 6.G.1 in the *Learn Zillion* site. (See Links.)
6. As a follow up to video lessons have students solve several mathematical problems focusing on the concepts presented. Such as:
 - a. Have students determine the formula for finding the area of a right triangle by using the formula for finding the area of a rectangle. Ask them to write the formula for finding the area of a right triangle. ($A = 1/2 \times l \times w$)
 - b. Have students use the virtual geoboards found in *The National Library of Virtual Manipulatives* to create irregular polygons. Have them determine a way to find the area of the polygon by decomposing the figure into triangles and other shapes. Have them justify the reasoning they used in determining the area. Finally, have them respond to the question: How might this reasoning help me solve real-world problems?
7. Online learning. Working with a partner, have students study the concepts presented in the videos for 6.G.2 in the *Learn Zillion* site. Have students write out the solutions to the problems presented in the lesson and then ask them to create and solve three real-world problems finding the area of geometric figures by composing into rectangles or decomposing into triangles and other shapes. Ask them to explain their reasoning in finding the solutions.
8. Class activity/Online learning. Engage students in a discussion focusing on drawing a polygon in a coordinate plane. Use *Learn Zillion* site for Standard 6.G.3. (See Links.) To reinforce student understanding, have them do the following:
 - a. Draw your own map similar to the ones in the video. Choose a route where you create a square. What is the perimeter and area of the shape you created?
 - b. Draw your own map similar to the one in the video. Choose a route where you create an irregular shape. Find the perimeter and area of the shape you created.Share their maps and their findings with the class.



[Learn Zillion ~ Common Core Videos for 6.G.1-4](#)

then compare, contrast, and describe the properties of the geometric figures and objects.

Getting to Know the Content **Formative: Visual Arts Project**

Students will make a geometry vocabulary/picture booklet using a digital camera or iPad. They will define the term, make drawings to represent the term, and write a brief description of the term or geometric figure.

The booklet should include pictures from real-life showing surface area, volume, time and money.

Volume of Right Rectangular Prism **Formative: Homework**

Students will 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. They will explain the step-by-step process they used in solving the problem.

Finding Area of Right Triangle...in Real-Life Situations **Formative: Class Work**

As a follow up to the video lessons, students will solve several mathematical problems focusing on the concepts presented. Such as:

- a. Students will determine the formula for finding the area of a right triangle by using the formula for finding the area of a rectangle. They will write the formula for finding the area of a right triangle. ($A = 1/2 \times l \times w$)
- b. Students will use the virtual geoboards found in *The National Library of Virtual Manipulatives* to create irregular polygons. They will determine a way to find the area of the polygon by decomposing the figure into triangles and other shapes and justify the reasoning they used in determining the area. They will respond to the question: How might this reasoning help me solve real-world problems?

Composing and Decomposing Geometric Figures **Formative: Class Work**

Students will study the concepts presented in the videos for 6.G.2 in the *Learn Zillion* site. They will write out the solutions to the problems presented in the lessons and then create and solve three real-world problems finding the area of geometric figures by composing into rectangles or decomposing into triangles and other shapes. They will explain step-by-step the reasoning they used in finding the solutions.

Polygon in Coordinate Plane **Formative: Homework**

Following a discussion focusing on drawing a polygon in a coordinate plane using the *Learn Zillion* site for Standard 6.G.3. students will do the following:

- a. Draw your own map similar to the ones in the video. Choose a route where you create a square. What is the perimeter and area of the shape you created?
 - b. Draw your own map similar to the one in the video. Choose a route where you create an irregular shape. Find the perimeter and area of the shape you created.
- Share their maps and their findings with the class.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
Sir Cumference and the Great Knight of Angleland by Cindy Neuschwander and Wayne Geehan
Sir Cumference and the Sword in the Cone by Cindy Neuschwander and Wayne Geehan
Spaghetti and Meatballs for All! by Marilyn Burns and Debbie Tilley

3. Internet Resources



[6th Grade Math Practice](#)



[The National Library of Virtual Manipulatives](#)



[Ohio Resource Center](#)



[Learn Zillion ~ Common Core Videos for 6.G.1-4](#)



[The Khan Academy](#)



[iLearn Ohio](#)

Catholic Identity

Social Justice Teachings

- ✦ Life And Dignity Of The Human Person
- ✦ Call To Family, Community, And Participation
- ✦ Rights And Responsibilities
- ✦ Solidarity
- ✦ Care For God's Creation

Rights of Children

- ✦ THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.
- ✦ THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
- ✦ THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
- ✦ THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.
- ✦ THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
- ✦ THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.
- ✦ THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.
- ✦ THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
- ✦ THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

Mathematics Curriculum ~ Grade Six

Diocese of Cleveland



Unit 7: Develop Understanding of Statistics

Standards Assessed

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Reading: Science & Technical Subjects

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12, OH: CCSS: Grades 6-8, Writing

2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

- WHST.6-8.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- 1. Make sense of problems and persevere in solving them.
- 2. Reason abstractly and quantitatively.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 6. Attend to precision.

CCSS: Mathematics (2011), OH: CCSS: Grade 6, Statistics & Probability

6.SP Develop understanding of statistical variability.

- 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 Summarize and describe distributions.

- 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, such as by:
 - 6.SP.5a. Reporting the number of observations.
 - 6.SP.5b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
 - 6.SP.5c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation),

as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

- 6.SP.5d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Essential Questions

- What types of questions will result in statistical variability?
- In what ways does a graph's shape reveal information about the data?
- What do the measures of center (mean and median) reveal about data?
- Why is it sometimes more appropriate to use the median rather than the mean to describe data?
- What types of data are best displayed using a box plot, dot plot, or histogram?

Content

The students will know

1. Measures of Center
2. Measures of Spread
3. Frequency Distribution of a Set
4. Graphical Representations of Data
5. Units of Measurement

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Investigate a statistical question as one that anticipates variability in the data.
2. Distinguish between statistical and non-statistical questions.
3. Compare measures of center for a set of statistical data.
4. Articulate the likenesses and differences between the median and mean as measures of center.
5. Identify the spread and estimate a numerical measure of center for a graphic representation of data.
6. Employ more than one strategy to determine the mean for a set of data.
7. Determine the median for data sets having even or odd numbers of pieces of data.
8. Investigate data of a statistical question.
 - Center
 - Spread
 - Overall shape
9. Construct graphical representations of data.
 - Dot plots
 - Line plot
 - Histogram (bar graph)
 - Box Plot (box-and-whisker plot)
 - Frequency table
10. Collect, display, and describe observations.
11. Explain the choice of measures of center and variability.
12. Make sense of problems and persevere in solving them.
13. Construct viable arguments and critique the reasoning of others.
14. Model with mathematics.

Reading/Writing Skills

1. Define, using context clues, specific vocabulary from the Common Core and apply the terms and definitions to solve problems.
2. Justify solutions, either verbally or in written form.
 - Explain step-by-step process.
 - Summarize results using specific and appropriate vocabulary.
3. Use technology to produce written explanations and justifications for real-life and mathematical problems.

Common Core Vocabulary

1. Statistical Question
2. Center
3. Measures of Center
 - Mean
 - Median
 - Mode
 - Range
4. Spread
5. Numerical Data
6. Variation
7. Data Plot
8. Observations
9. Attribute
10. Quantitative Measure
11. Variability
12. Deviation
13. Range
14. Mean Absolute Deviation
15. Outlier

Additional Vocabulary

1. Dot Plot
2. Histogram
3. Box Plot (box-and-whisker plot)
4. Frequency Table

Learning Experiences (Suggested)

1. Class activity. Review the vocabulary that will be used in this unit. Have students make a vocabulary/picture booklet in which they define the term, make drawings to represent the term, and write a brief description of the term.
2. Class activity/Online learning. Engage students in a discussion of a statistical question as one that anticipates variability in data and help them distinguish between statistical (numerical) and non-statistical (categorical) questions. Use the video for 6.SP.1 found at the *Learn Zillion* site. (See Links)
3. As a follow up to the class activity/online learning, have students work with a partner to determine whether or not a set of questions could be answered with only a single data point (non-statistical) or if the answer could be any value in a range of numbers (statistical). Using a magazine picture for inspiration, the partners will generate their own example of a statistical question to share with the class.
4. Class activity/Online learning. Engage students in recognizing 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. Use the video for 6.SP.2 found at the *Learn Zillion* site. (See Links.)
5. Working with a partner, have students complete the following:
 - a. Formulate a statistical question that could be addressed with data based on a picture or category. Describe how they would go about collecting the data to answer the question.
 - b. Given a completed line plot of the number of minutes commercial advertisements are displayed during 20, 30-minute television shows, have the students use the shape of the data and informal analysis to decide and explain what is the typical number of commercials to expect during a 30-minute show. Have them share the reasoning used in doing the analysis with the class.
6. Online learning. Using a Think-Pair-Share activity, have students indicate what they already know about mean, median, mode, range, and outlier with reference to a set of data. Discuss the results of this activity to whether or not students know the terms or if there is a need to review the meaning of the terms.

Assessment (Suggested)

Categorical or Numerical Formative: Homework

Given a question such as **How many pets are owned by Mr. Smith's students?** Students will respond to the following:

- a. Is this question categorical or numerical?
- b. Create an imaginary set of data about the pets owned by Mr. Smith's students.
- c. Create a graphic representation of the data.
- d. Write a "story" telling what information can be gained from the data.

Collecting Data Formative: Homework

Students will formulate a statistical question that could be addressed with data based on a picture or category and describe how they would go about collecting the data to answer the question.

Center ~ Spread ~ Overall Shape Formative: Class Work

Given a completed line plot of the number of minutes commercial advertisements are displayed during 20, 30-minute television shows, students will use the shape of the data and informal analysis to decide and explain what is the typical number of commercials to expect during a 30-minute show. They will share the reasoning used in doing the analysis with the class.

Graphical Representations of Data Lab Summative: Lab Assignment

Use the videos on 6.SP.3 for this review. (See Links)

7. Engage students in an activity in which they will need to determine mean, median and mode by using the lesson *Candy Colors: Figuring the Mean, Median, and Mode* found in the Links.
8. Working in cooperative groups, have students construct graphical representations of a given set of data as follows:
 - a. Dot plots
 - b. Line plot
 - c. Histogram (bar graph)
 - d. Box Plot (box-and-whisker plot)
 - e. Frequency table
9. Class activity/Online learning. Engage students in seeing how they can summarize numerical data sets in relation to their contexts. Use the video for 6.SP.5a-c found at the Learn Zillion site. (See Links)
10. Have students work with a partner to address the following:
 - a. What measures of center and variability are most helpful when describing the distribution of data? Justify your answer.
 - b. How do outliers affect the mean and median of a given set of data? Explain your reasoning.
 - c. Listed below are the test results from two different math classes. Analyze the data and decide which class's performance is higher. Justify your decision.
 Class A = 65, 98, 54, 73, 81, 87, 90, 93, 94, 82, 85, 82, 80
 Class B = 75, 97, 56, 72, 86, 83, 92, 94, 94, 80, 85, 80, 78



[Measures of Center with Discrete Data](#)



[Probability: Can You Beat the Odds?](#)



[Learn Zillion ~ Common Core Videos](#)



[Education World ~ Candy Colors: Figuring the Mean, Median, and Mode](#)



[Box Plots](#)

Students, working in groups, will conduct a survey of their peers and will construct different graphical representations of their data.

- Dot plots
- Line plots
- Histograms
- Frequency tables
- Box-and-whisker plots

Groups will then present their findings and explain the measures of spread and variability in their data.

Mean, Median, Mode
Summative: Class Work

Assessment from *Candy Colors: Figuring the Mean, Median, and Mode* lesson.

Provide students with the test data for five fictional students shown below. The data shows how many answers each student got correct on a quiz of 10 questions. Ask students to find mean, median, and mode of this data collection.

NAME	SCORE
Chad	7
Karla	10
Maria	7
Steve	7
Thomas	9

After finding the mean, median, and mode students will a. Display the numerical data in plots on a number line, including dot plots, histograms, and box plots.

b. Write a "story" describing the results of their work.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
 - Picturing Math* by Carol Otis Hurst and Rebecca Otis
 - Anno's Magic Seeds* by Mitsumasa Anno
 - Anno's Hat Tricks* by Akihiro Nozaki
 - Factastic Book of 1,001 Lists* by Russell Ash
 - Harry Potter and the Sorcerer's Stone* by J. K. Rowling
 - The Phantom Tollbooth* by Norton Juster
 - Tikki Tikki Tembo* by Arlene Mosel
 - The Great Turkey Walk* by Kathleen Karr
 - 10 for Dinner* by Bogart
 - Nature Facts and Lists: Animal, Ocean, Bird* by Anita Ganeri and A. Ganeri
3. Internet Resources

Catholic Identity

Social Justice Teachings

- ✚ Life And Dignity Of The Human Person
- ✚ Call To Family, Community, And Participation
- ✚ Rights And Responsibilities
- ✚ Option For The Poor And Vulnerable
- ✚ The Dignity Of Work And The Rights Of Workers
- ✚ Solidarity

Rights of Children

- ✚ THE RIGHT TO A CATHOLIC COMMUNITY that witnesses to Christ and the Gospel by protecting them from child abuse, including sexual abuse and neglect.
- ✚ THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
- ✚ THE RIGHT TO BE RESPECTED AS INDIVIDUALS with



[Math Activities, Games, Etc.](#)



[Math Lessons, Activities, Games, Etc.](#)



[Box Plots](#)



[Ohio Resource Center ~ Lessons and More](#)



[The National Library of Virtual Manipulatives](#)



[The Math Worksheets Generator](#)



[iLearn Ohio](#)



[The Khan Academy](#)

human dignity.

- ✚ THE RIGHT TO WORK ACTIVELY TOWARD THEIR OWN EMPOWERMENT through the development of their gifts and talents.
- ✚ THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
- ✚ THE RIGHT TO DEVELOP POSITIVE, RESPONSIBLE AND CARING ATTITUDES AND BEHAVIORS TOWARD OTHERS and to recognize the rights of others to be safe and free from harassment and abuse.
- ✚ THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.
- ✚ THE RIGHT TO MAKE RESPONSIBLE DECISIONS founded on religious conviction.

PARENT GUIDE

GRADE SIX MATHEMATICS CURRICULUM

DIOCESE OF CLEVELAND

Below is a list of skills your child will be taught in Grade Six Mathematics.

As parents, you are encouraged to support the work of your child's teacher in helping your child acquire each of these skills.

RATIOS AND PROPORTIONAL RELATIONSHIPS	
UNDERSTAND RATIO CONCEPTS AND USE RATIO REASONING TO SOLVE PROBLEMS.	
	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
	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.
	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
	Solve unit rate problems including those involving unit pricing and constant speed.
	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.
	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
ANALYZE PATTERNS AND RELATIONSHIPS.	
	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
NUMBER SYSTEM	
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF MULTIPLICATION AND DIVISION TO DIVIDE FRACTIONS BY FRACTIONS.	
	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.
COMPUTE FLUENTLY WITH MULTI-DIGIT NUMBERS AND FIND COMMON FACTORS AND MULTIPLES.	
	Fluently divide multi-digit numbers using the standard algorithm.
	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF NUMBERS TO THE SYSTEM OF RATIONAL NUMBERS.	
	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.
	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

NUMBER SYSTEM CONTINUED	
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF NUMBERS TO THE SYSTEM OF RATIONAL NUMBERS CONTINUED.	
	Understand ordering and absolute value of rational numbers.
	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
	Write, interpret, and explain statements of order for rational numbers in real-world contexts.
	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
	Distinguish comparisons of absolute value from statements about order.
	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.
EXPRESSIONS AND EQUATIONS	
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF ARITHMETIC TO ALGEBRAIC EXPRESSIONS.	
	Write and evaluate numerical expressions involving whole-number exponents.
	Write, read, and evaluate expressions in which letters stand for numbers.
	Write expressions that record operations with numbers and with letters standing for numbers.
	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
	Apply the properties of operations to generate equivalent expressions.
	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
REASON ABOUT AND SOLVE ONE-VARIABLE EQUATIONS AND INEQUALITIES.	
	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
	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.
	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.
	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.
REPRESENT AND ANALYZE QUANTITATIVE RELATIONSHIPS BETWEEN DEPENDENT AND INDEPENDENT VARIABLES.	
	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time.

NOTES: _____

GEOMETRY	
SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS INVOLVING AREA, SURFACE AREA, AND VOLUME.	
	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.
	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
	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.
	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.
STATISTICS & PROBABILITY	
DEVELOP UNDERSTANDING OF STATISTICAL VARIABILITY.	
	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
	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.
	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.
SUMMARIZE AND DESCRIBE DISTRIBUTIONS.	
	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
	Summarize numerical data sets in relation to their context, such as by:
	Reporting the number of observations.
	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
DOC: Numbers, Number Sense & Operations	
NUMBER AND NUMBER SYSTEMS	
	Find and use the prime factorization of composite numbers.
	Know the prime numbers to 100.
	Use prime factorization to recognize the greatest common factor (GCF) of two or more numbers.
	Use the prime factorization to recognize the least common multiple (LCM) of two or more numbers.
	Apply prime factorization to solve problems and explain solutions.
	Find the reciprocal of a number.
	Explore Roman Numerals and compare with the base ten number system.
DOC: Measurement	
MEASUREMENT UNITS	
	Understand and describe the difference between surface area and volume.
	Use appropriate units of time, temperature, and money.

MATHEMATICS CURRICULUM

GRADE SIX

CHECKLIST FOR COMMON CORE STATE STANDARDS & DIOCESAN CURRICULUM

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RATIOS AND PROPORTIONAL RELATIONSHIPS	
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	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
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	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $30/100$ times the quantity); solve problems involving finding the whole, given a part and the percent.
	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
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	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
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DATE TAUGHT	
NUMBER SYSTEM CONTINUED	
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF NUMBERS TO THE SYSTEM OF RATIONAL NUMBERS CONTINUED.	
	Understand ordering and absolute value of rational numbers.
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DOC: Measurement	
MEASUREMENT UNITS	
	Understand and describe the difference between surface area and volume.
	Use appropriate units of time, temperature, and money.

