

Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 1: Operations with Whole Numbers - Ongoing Unit

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text 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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, 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.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Operations & Algebraic Thinking

5.OA Write and interpret numerical expressions.

- 5.OA.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Number & Operations in Base Ten

5.NBT Perform operations with multi-digit whole numbers and with decimals to hundredths.

- 5.NBT.5. Fluently multiply multi-digit whole numbers using the standard algorithm.
- 5.NBT.6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Essential Questions

- What strategies can I use to efficiently solve division problems?
- What strategies can I use to efficiently solve multiplication problems?
- Why is it important to follow an order of operations?
- How can I use equations, rectangular arrays, and/or area models to illustrate and explain my calculations?
- In what ways is multiplication used in beautifying a football field?

Content

The students will know

1. How to write and solve expressions including parentheses and brackets
2. The rules for order of operations to solve problems
3. The properties of multiplication
4. How to solve word problems involving the multiplication of 3- or

Skills

Bloom's Taxonomy
DOK Links

The students will be able to

1. Explain steps taken in solving mathematical problems containing parentheses and brackets.
2. Use the four whole number operations efficiently, including the

<p>4- digit multiplicand by a 2- or 3-digit multiplier</p> <p>5. How to solve problems involving the division of 3- or 4- digit dividends by 2-digit divisors</p>	<p>application of order of operations.</p> <ol style="list-style-type: none"> Write and evaluate mathematical expressions with and without using symbols. Apply strategies for multiplying a 2- or 3-digit number by a 2-digit number. Develop paper-and-pencil multiplication algorithms (not limited to the traditional algorithm) for a 3- or 4-digit number multiplied by a 2- or 3-digit number. Fluently multiply multi-digit whole numbers using the standard algorithm. Fluently multiply multi-digit whole numbers using the properties of multiplication (commutative, associative, and distributive). Apply paper-and-pencil algorithms for division. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors Solve problems involving multiplication and division. Illustrate and explain calculations by using equations, rectangular arrays, and/or area models. Recite from memory the multiplication and division facts. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> Define specific vocabulary from the Common Core and apply it to solve problems. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> Quotient Algorithm Product Equation Rectangular array Area model 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> Commutative property Associative property Distributive property Identity property Zero property
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> Class activity. Provide students with a number of numerical expressions and ask them to solve the expressions containing parentheses and brackets. When they have finished solving the problems, ask for their answers and have them justify their answers and their use of parentheses and brackets. For Example: <i>Evaluate the expression $2\{5[12 + 5(500 - 100) + 399]\}$</i> <ol style="list-style-type: none"> Students should have experiences working with the order of first evaluating terms in parentheses, then brackets, and then braces. The first step would be to subtract $500 - 100 = 400$. Then multiply 400 by 5 = 2,000. Inside the bracket, there is now $[12 + 2,000 + 399]$. That equals 2,411. Next multiply by the 5 outside of the bracket. $2,411 \times 5 = 12,055$. Next multiply by the 2 outside of the braces. $12,055 \times 2 = 24,110$. As a follow-up, have students work with a partner to find the solution to a number of numerical expressions containing brackets and parentheses. For each solution, have them write an explanation of the process they used to determine their 	<p>Assessment (Suggested)</p> <p>Parentheses and Brackets in Mathematical Expressions Formative: Class Work</p> <p>Students will be given a number of numerical expressions containing parentheses and brackets to solve. When they have finished solving the problems, they need to justify their answers and how the use of parentheses and brackets helped them find the solution.</p> <p>Order of Operations Formative: Cooperative Group Work</p> <p>Students will work with a partner to find the solution to a number of numerical expressions containing brackets and parentheses. For each solution, they will write an explanation of the process they used to determine their answer and how their process relates to the <i>order of operations</i>. Partners will share their work with the class.</p> <p>Solving Multiplication Problems Formative: Class Work</p> <p>Students will work with a partner to find the solution to multiplication</p>

answer and how their process relates to the *order of operations*. Ask the partners to share their work with the class.

3. Have students work with a partner to find the solution to multiplication problems that involve multiplying 2- or 3-digit factors by a 2-digit factor. Ask them to explain and justify the process they used in solving the problems.
4. Extend the above work, by having students work with a different partner to find the solution to multiplication problems that involve multiplying 3- and 4-digit factors by 2- or 3-digit factors. They will use equations, rectangular arrays, and/or area models to explain their calculations.
5. Class activity. Examine the processes students used in solving the multiplication problems with 2-, 3- and 4-digit factors by 2- or 3-digit factors. How were their processes alike? How were they different? Did one process seem to work better? Is there a *standard algorithm*? How does it compare with the processes students used?
Present several different multiplication problems where multi-digit factors are multiplied by a multi-digit factor and ask the students to fluently apply the *standard algorithm* in solving each problem.
6. Have students create multiplication problems involving multi-digit factors where application of the properties (commutative, associative, distributive) is required. They will share their problems with another student who will solve the problems and write a justification of the steps used. The two students will then come together and discuss each other's work.
7. Class activity. Students will be presented with a number of division problems where they are to find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.
8. Have students work with a partner to solve a number of division problems where they are to find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. They will use equations, rectangular arrays, and/or area models to explain their calculations.
9. Cooperative group activity. Challenge the groups to find the most cost effective way to complete this task:
The Westside Recreation Center Booster Club is considering replacing the existing grass football field with a new type that is softer that provides better traction. Visiting teams have been complaining about the large number of injuries from inadvertent slips on the slippery sod. Local fans have agreed to volunteer labor and equipment. The Booster Club is concerned only with the cost of the sod for the field. They are looking for the best buy for their money. Below are price quotes from various local nurseries:
6' x 2' roll \$1.00
6' x 6' roll \$4.00
8' x 3' roll \$2.00
6' x 3' roll \$3.00
The field dimensions are 120ft x 160ft.
Which is the best buy?
How many rolls of sod will be needed?
What will be the total cost of the sod?
Students should use equations, rectangular arrays, and/or area models to explain their calculations.



Virtual Manipulatives base block

problems that involve multiplying 2- or 3-digit factor by 2-digit factor. They will explain and justify the process used in solving the problems.

Using the Properties

Formative: Cooperative Group Work

Students will create multiplication problems involving multi-digit factors where application of the properties (commutative, associative, distributive) is required. They will share their problems with another student who will solve the problems and write a justification of the steps used. The two students will then come together and discuss each others work.

Working with Division

Formative: Class Work

Students will work with a partner to solve number of division problems where they are to find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. They will use equations, rectangular arrays, and/or area models to explain their calculations.

Beautifying the Football Field

Summative: Project

Cooperative groups will be challenged to find the most cost effective way of replacing existing grass at a football field with a new type that is softer and provides better traction. They should look for the best buy for their money. The price quotes for sod from various local nurseries are:

6' x 2' roll \$1.00

6' x 6' roll \$4.00

8' x 3' roll \$2.00

6' x 3' roll \$3.00

The field dimensions are 120ft x 160ft.

Groups will need to answer the following questions:

Which is the best buy?

How many rolls of sod will be needed?

What will be the total cost of the sod?

Groups should use equations, rectangular arrays, and/or area models to explain their calculations.



[Properties lesson plan](#)

[Watch, Know, Learn ~ Free Educational Videos](#)

[Math Word Problems](#)

Resources (Suggested)

1. iPad Resources
2. Literature Connection
 - Annabelle Swift, Kindergartner* by Amy Schwartz
 - Anno's Magic Seeds* by Mitsumasa Anno
 - Bananas* by Jacqueline Farmer
 - Counting on Frank* by Rod Clement
 - Each Orange Had 8 Slices: A Counting Book* by Paul Giganti Jr.
 - Esio Trot* by Roald Dahl
 - In the Next Three Seconds . . . Predictions for the Millennium* by Comp. Rowland Morgan
 - The King's Chessboard* by David Birch
 - Math Curse* by Jon Scieszka and Lane Smith
 - On the Day You Were Born* by Debra Frasier
 - One Tiny Turtle* by Nicola Davies
 - A Remainder of One* by Elinor J. Pinczes
 - Ten Times Better* by Richard Michelson
3. Internet Resources



[Common Core resources](#)



[Activboard flip charts](#)



[Resources for Smartboards](#)



[Virtual Manipulatives](#)



[The Math Worksheet Site](#)



[Brain Pop](#)



[Learn Zillion ~ Common Core Videos](#)



[Learn Ohio](#)



[The Khan Academy](#)

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 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.

Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 2: Numerical Expressions ~ Ongoing Unit

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Pre-Kindergarten, Reading: Literature 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.

- 4. Ask and answer questions about unknown words in a text.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, 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.
- 3. Construct viable arguments and critique the reasoning of others.
- 6. Attend to precision.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Operations & Algebraic Thinking

5.OA Write and interpret numerical expressions.

- 5.OA.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
- 5.OA.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.

Essential Questions

- How are parentheses, brackets, and braces used in numerical expressions?
- Why must numerical expressions be evaluated following the order of operations?
- How can using the order of operations with precision impact daily life?
- How can real-world problems be recorded as numerical expressions?

Content

The students will know

1. Numerical expressions
2. Order of operations
3. Numerical expression phrases

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Analyze and evaluate numerical expressions with regard to order of operations.
2. Construct, analyze, and justify numerical phrases based on order of operations.
3. Make sense of problems found in everyday situations and persevere in solving them precisely using order of operations.

Reading/Writing Skills

1. Define specific vocabulary from the Common Core and apply it

- to solve problems.
- 2. Justify solutions verbally or in written form to explain processes and summarize results.

Common Core Vocabulary

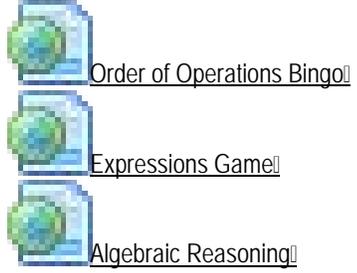
- 1. Expressions
- 2. Calculations
- 3. Order of operations
- 4. Evaluate

Additional Vocabulary

- 1. Simplify

Learning Experiences (Suggested)

- 1. Class activity. Review the order of operations and use the Link (order of operations bingo) to reinforce understanding of the concept.
Order of Operations:
 - a. Do operations within grouping symbols.
 - b. Evaluate exponents.
 - c. Multiply and divide from left to right.
 - d. Add and subtract from left to right.
- 2. Have students analyze and evaluate simple mathematical expressions using mixed operations. See Links



Assessment (Suggested)

Order of Operations
Formative: Observation

Students will demonstrate understanding of the order of operations as they solve problems and play *Order of Operations Bingo*.

Algebraic Expressions Game
Formative: Class Discussion

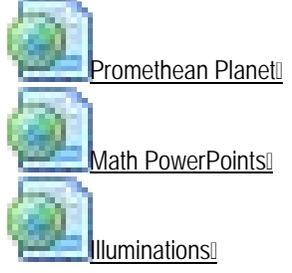
Students will play the online algebraic expressions game in small cooperative groups. They will write their guesses in their math journals and explain the reasoning used to solve the problem.

Working with Mathematical Expressions
Formative: Class Work

Students will work alone and with a partner on different occasions to analyze and evaluate simple mathematical expressions using mixed operations.

Resources (Suggested)

- 1. iPad Resources
- 2. Literature Connection
 - Annabelle Swift, Kindergartner* by Amy Schwartz
 - Anno's Magic Seeds* by Mitsumasa Anno
 - Counting on Frank* by Rod Clement
 - Each Orange Had 8 Slices: A Counting Book* by Paul Giganti Jr.
 - Esio Trot* by Roald Dahl
 - In the Next Three Seconds . . . Predictions for the Millennium* by Rowland Morgan
 - The King's Chessboard* by David Birch
 - Math Curse* by Jon Scieszka and Lane Smith
- 3. Internet Resources



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 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



[Expressions Game](#)



[Algebraic Reasoning](#)



[Common Core Resources](#)



[The Khan Academy](#)



[Learn Ohio](#)

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.

Mathematics Curriculum ~ Grade Five Diocese of Cleveland



Unit 3: Place Value System and Decimals

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text 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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 6. Attend to precision.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Number & Operations in Base Ten

5.NBT Understand the place value system.

- 5.NBT.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $1/10$ of what it represents in the place to its left.
- 5.NBT.2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
- 5.NBT.3. Read, write, and compare decimals to thousandths.
- 5.NBT.3a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
- 5.NBT.3b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
- 5.NBT.4. Use place value understanding to round decimals to any place.

DOC: Mathematics, DOC: Grade 5, Numbers, Number Sense and Operations

A. Number and Number Systems

- a. Read and write large numbers to billions.

Essential Questions

- How does the location of digit in the number affect the size of a number?
- How is place value different from digit value?
- Why does placement or position of a number matter?
- Why is place value important when adding whole numbers and decimal numbers?
- Why is place value important when subtracting whole numbers and decimal numbers?
- In what ways can I use different methods to represent numbers? (e.g., expanded form, exponents)

Content

Skills

Bloom's Taxonomy

<p>The students will know</p> <ol style="list-style-type: none"> 1. Number values based on place value 2. Number sense 3. Place value of whole numbers 4. Whole numbers and decimal computation 5. Addition and subtraction of whole numbers 6. Representations of fractions 7. Expressing fractions as decimal numbers 8. Using a number line with decimals 9. Patterns of multiplication and division with powers of 10 with whole numbers and decimals 10. Whole-number exponents 11. $>$, $=$, and $<$ symbols 	<p><u>DOK Links</u></p> <p>The students will be able to</p> <ol style="list-style-type: none"> 1. Represent, write, and state the value of numbers based on place value including decimals. 2. Identify how many pennies, dimes, dollars and ten dollars, etc. are in a given value. 3. Analyze situations that require the comparison of the cost of two items to determine the lower or higher priced item. 4. Read, write, and compare decimals to the thousandths place using base-ten numerals, number names, and expanded form. 5. Read, write, and compare whole numbers to the billions place as $>$, $=$, or $<$. 6. Round decimals and whole numbers to any place. 7. Recite from memory the multiplication and division facts. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define specific vocabulary from the Common Core and apply it to solve problems. 2. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Decimal 2. Fraction 3. Decimal Point 4. Hundred thousands 5. Hundreds 6. Hundredths 7. Millions 8. Ones 9. Place value 10. Ten thousands 11. Tens 12. Tenths 13. Thousands 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Billion 2. Inequalities 3. Scientific notation
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Write various one- and two-digit numbers on the board. Have students work with a partner, to do the following: <ol style="list-style-type: none"> a. Represent the numbers using various manipulatives b. For each number, record on place-value charts the number of ones and tens. c. Ask students to read the number and then ask them to display, record, and read the number that is one more, one less, ten more, and ten less. (They should include at least two examples of each.) d. Have them compare the pairs of numbers and identify the place or places where a digit changed. 2. Have students work in cooperative groups to identify how many pennies, dimes, dollars and ten dollars, etc. are in several given values. Then ask them to analyze situations that require the comparison of the cost of two items to determine the lower or higher priced item and justify, in writing, their comparisons. 3. Class activity/Online learning. Have students use a virtual manipulative website and/or base ten blocks to 	<p>Assessment (Suggested)</p> <p>Knowing Your Numbers Formative: Cooperative Group Work</p> <p>Given various one- and two-digit numbers on the board, students will work with a partner to do the following:</p> <ol style="list-style-type: none"> a. represent the numbers using various manipulatives b. for each number, record on place-value charts the number of ones and tens. c. read the number and then display, record, and read the number that is one more, one less, ten more, and ten less. (They should include at least two examples of each.) d. compare the pairs of numbers and identify the place or places where a digit changed. <p>Decimal Relationships Formative: Response Journal</p>

<p>demonstrate decimal relationships. (See Link)</p> <p>4. Computer work/Online learning. Have students work with a partner to compare decimals by playing <i>Decimal War</i> as outlined in the attached lesson plan. (See Link for lesson plan.)</p> <p> Base Ten Blocks!</p> <p> Decimal Lesson Plan!</p>	<p>Students will use base ten blocks to demonstrate decimal relationships and round numbers with accuracy. They will draw and write explanations of the relationships they find in their math journals.</p> <p>Using Money to Compare Decimals Formative: Comparative Study</p> <p>To compare decimals with money, students use flyers/ads/shopping websites to find the lowest prices for certain items. They will explain their findings in writing, stating where the prices were found and which price is lower.</p> <p>Decimal War Formative: Teacher Observation</p> <p>Students will play "Decimal War." The teacher observes students' responses to determine which students appear to understand the concept and which students need remediation.</p>
<p>Resources (Suggested)</p> <ol style="list-style-type: none"> iPad Resources Literature Connection <i>How Much is That Guinea Pig in the Window?</i> by Joanne Rocklin and Meredith Johnson <i>Sluggers' Car Wash</i> by Stuart J. Murphy and Barney Saltzberg <i>A Grain of Rice</i> by Helena Clare Pittman <i>Powers of Ten: A Flipbook</i> by Charles Eames and Ray Eames <i>The Toothpaste Millionaire</i> by Jean Merrill <i>If you made a million</i> by David M. Schwartz and Steven Kellogg <i>Piece = Part = Portion</i> by Scott Gifford and Shmuel Thaler <i>Fractured Fairy Tales: Fractions & Decimals: 25 Tales With Computation and Word Problems to Reinforce Key Skills</i> by Dan Greenberg Internet Resources <ul style="list-style-type: none">  Activboard Flip Charts!  Power Points!  Base Ten Blocks!  Decimal Lesson Plan!  Common Core Resources!  Place Value!  Learn Zillion ~ Common Core Videos!  Learn Ohio! 	<p>Catholic Identity</p> <p>Social Justice Teachings</p> <ul style="list-style-type: none">  Life And Dignity Of The Human Person  Call To Family, Community, And Participation  Rights And Responsibilities  Solidarity  Care For God's Creation <p>Rights of Children</p> <ul style="list-style-type: none">  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 Khan Academy!](https://www.khanacademy.org/)

Mathematics Curriculum ~ Grade Five Diocese of Cleveland



Unit 4: Operations with Decimals

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text
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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 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.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Number & Operations in Base Ten

5.NBT Perform operations with multi-digit whole numbers and with decimals to hundredths.

- 5.NBT.7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

DOC: Mathematics, DOC: Grade 5, Numbers, Number Sense and Operations

C. Computation and Estimation

- a. Add and subtract decimals to thousandths.

Essential Questions

- How can models be used to add, subtract, multiply, and divide decimals to thousandths?
- How do the rules of multiplying whole numbers relate to multiplying decimals?
- How can we efficiently solve multiplication and division problems with decimals?
- How can we multiply and divide decimals fluently?
- To what degree can written and spoken explanations help me better understand how to solve problems with decimals?
- How does decimal placement impact solutions to math operations in real-world situations?

Content

The students will know

1. A decimal represents a part of 10
2. Standard algorithms for all operations when using decimals

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

<ol style="list-style-type: none"> 3. Properties of operations as applied to decimals 4. The relationship between addition and subtraction 	<ol style="list-style-type: none"> 1. Write decimal fractions with denominators of 10 and 100 using decimal notation. 2. Locate decimals to hundredths on a number line. 3. Compare two decimals to hundredths. 4. Explain the reasoning for decimal comparisons and express their relationship using the symbols, $>$, $<$, or $=$. 5. Justify comparisons using visual models. 6. Explain that comparisons are valid only when the two decimals refer to the same whole. 7. Fluently add, subtract, multiply, and divide decimals to thousandths. 8. Construct concrete models or drawings and strategies based on place value to add, subtract, multiply or divide decimals. 9. Formulate a written explanation to explain the reasoning used in adding, subtracting, multiplying or dividing decimals. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define specific vocabulary from the Common Core and apply it to solve problems. 2. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Algorithm 2. Equation 3. Decimal 4. Decimal fraction 5. Decimal point 6. Equivalent sets 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Inverse operations (addition and subtraction) 2. Tenths 3. Hundredths 4. Thousandths
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity. Using computers or iPads, have students work with a partner to manipulate <i>Base Ten Blocks Decimals</i> (see Link) to concretely show adding and subtracting of decimals. 2. Working in cooperative groups, have students plan an imaginary party for which they need to order food. Give them the guidelines of how much money they have and either how many people there are or how much of each type of food they need to order (i.e. 2 pizzas, 3 salads, 2 desserts). Have the student groups order the correct amount of food and come as close to the limit of their budget without going over. Encourage them to try different scenarios to see if they can order more food for the same amount of money. When all the groups are finished, come back together as a class and discuss. Have each group present what they ordered and how close they came to the total. 3. Have students work with a partner to compare several pairs of decimals to hundredths. Ask them to explain the reasoning for decimal comparisons and express their relationship using the symbols, $>$, $<$, or $=$. Finally, have them justify their comparisons using visual models and explain that comparisons 	<p>Assessment (Suggested)</p> <p>Adding and Subtracting Decimals Formative: Class Work</p> <p>Students will work with a partner to manipulate <i>Base Ten Blocks Decimals</i> (see Link) to concretely show adding and subtracting of decimals.</p> <p>Planning a Pizza Party Formative: Cooperative Group Work</p> <p>Working in cooperative groups, students will plan an imaginary party for which they need to order food. They will order the correct amount of food and come as close to the limit of their budget without going over. Encourage them to try different scenarios to see if they can order more food for the same amount of money. When all the groups are finished, they will come back together as a class to discuss their work. Each group will present what they ordered and how close they came to the total.</p> <p>Place of Place Value in Working with Decimals Formative: Homework</p>

- are valid only when the two decimals refer to the same whole.
4. **Class activity.** Construct concrete models or drawings and strategies to add, subtract, multiply or divide decimals based on place value. Work with the students to formulate a written explanation to explain the reasoning used in adding, subtracting, multiplying or dividing decimals.
 5. Follow-up the class activity by having students construct concrete models or drawings and strategies to add, subtract, multiply or divide several decimal examples based on place. Ask them to formulate a written explanation to explain the reasoning used in adding, subtracting, multiplying or dividing the decimals.
 6. Have students use a decimal place value chart and/or grid paper to fluently add, subtract, multiply, and divide numbers containing decimals. Ask them to justify their solutions.



[Base Ten Blocks virtual manipulatives!](#)



[More Decimal Ideas!](#)

Students will construct concrete models or drawings and strategies to add, subtract, multiply or divide several decimal examples based on place. they will formulate a written explanation to explain the reasoning used in adding, subtracting, multiplying or dividing the decimals.

Comparing Decimals
Formative: Class Work

Students will work with a partner to compare several pairs of decimals to hundredths. They will explain the reasoning for decimal comparisons and express their relationship using the symbols, >, <, or =. Finally, they will justify their comparisons using visual models and explain that comparisons are valid only when the two decimals refer to the same whole.

Working with Decimals in the Real World
Summative: Cooperative Group Work

Students will work with a partner to develop math word problems involving the addition, subtraction, multiplication, and division of numbers with decimals to the thousandths. Partners will exchange the word problems and work to solve the word problems of other groups.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
Piece = Part = Portion: Fractions = Decimals = Percents by Scott Gifford
Fractions, Decimals, and Percents by David A. Adler
Let's Take a Hike!: Converting Fractions to Decimals by Holly Cefrey
3. Internet Resources



[Flip charts!](#)



[Power Points!](#)



[Common Core Resources!](#)



[Virtual Manipulatives!](#)



[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 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.

Mathematics Curriculum ~ Grade Five Diocese of Cleveland



Unit 5: Using Fractions to Display Data

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text
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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Measurement & Data

5.MD Represent and interpret data.

- 5.MD.2. Make a line plot to display a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$). Use operations on fractions for this grade to solve problems involving information presented in line plots.

DOC: Mathematics, DOC: Grade 5, Numbers, Number Sense and Operations

A. Number and Number Systems

- 4. Develop an understanding of fractions:
- c. Use fractions to show division of whole numbers

Essential Questions

- How can line plots be used to display measurement data?
- How can I create and solve real-world problems based on measurement information presented in line plots?
- How do fractions show division of whole numbers?

Content

The students will know

1. Fractions show division of whole numbers
2. A fraction is a part of a whole
3. Line plots are used to display data

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Manipulate and illustrate fractions.
2. Create, interpret, and explain a line plot that displays a data set of measurements in fractions of a unit ($1/2$, $1/4$, $1/8$).
3. Solve problems involving information presented in line plots.
4. Explain fractions in terms of parts and wholes.

- 5. Recite from memory the multiplication and division facts.
- Reading/Writing Skills**
- 1. Define specific vocabulary from the Common Core and apply it to solve problems.
 - 2. Justify solutions verbally or in written form to explain processes and summarize results.

Common Core Vocabulary

- 1. Line Plot

Additional Vocabulary

- 1. Denominator
- 2. Numerator
- 3. Part-to-whole

Learning Experiences (Suggested)

- 1. Class activity/Online learning. Use fraction bars to show division of whole numbers. (See link)
- 2. Have students work with a partner to create problems demonstrating an understanding of operations and use number lines as a visual to help solve multi-digit multiplication and division problems. Justify the process used in solving the problems.
- 3. Class activity/Online learning. Create problems involving information presented in line plots and have students solve them. Ask them to explain the reasoning they used in solving the problems. (See Link)
- 4. Have students work with a partner to create, interpret, and explain a line plot that displays a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). (See link) Ask them to write an explanation of the steps taken in completing the task.



[Line Plot](#)



[Fraction Bars](#)

Assessment (Suggested)

Fractions and Line Plots

Diagnostic: Class Discussion

Students will engage in a class discussion about line plots and fractions.

Line Plots and Fractions

Formative: Cooperative Group Work

Students will work together to create line plots to display fractional data.

Word Problems with Line Plots and Fractional Data

Formative: Writing Assignment

Students will work with a partner to create word problems about sets of fractional data displayed on line plots.

Creating Problems to Show Understanding

Formative: Class Work

Students will work with a partner to create problems demonstrating an understanding of operations and use number lines as a visual to help solve multi-digit multiplication and division problems. They will write a justification for the process used in solving the problems.

Create, Interpret, and Explain Line Plots

Summative: Written Assessment

Students will work with a partner to create, interpret, and explain a line plot that displays a data set of measurements in fractions of a unit (1/2, 1/4, 1/8) and write an explanation of the steps taken in completing the task.

Resources (Suggested)

- 1. iPad Resources
- 2. Literature Connection
 - Fraction fun* by David A. Adler and Nancy Tobin
 - Full House: An Invitation to Fractions* by Dayle Ann Dodds and Abby Carter
 - Icebergs and Glaciers* by Seymour Simon

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

The Man Who Counted: A Collection of Mathematical Adventures by Malba Tahan

One Riddle, One Answer by Lauren Thompson

3. Internet Resources



[Common Core Resources](#)



[ActivBoard Flipcharts](#)



[PowerPoints](#)



[Fraction Bars](#)



[Learn Ohio](#)



[The Khan Academy](#)

Rights of Children

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-  THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
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Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 6: Factorization

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text
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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

- RI.5.8. Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, 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.
- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 7. Look for and make use of structure.

DOC: Mathematics, DOC: Grade 5, Numbers, Number Sense and Operations

A. Number and Number Systems

- 8. Identify and represent factors and multiples of whole numbers through 100, and classify numbers;
 - a. Identify prime and composite numbers to 50.
 - b. Find the prime factors of a number.
 - c. Express prime factorizations using exponents.
 - d. Find the greatest common factor (GCF) and least common multiples (LCM).
 - e. Find the least common denominator (LCD) for two or more fractions.

C. Computation and Estimation

- f. Apply the divisibility rules for 2, 5, and 10.

Essential Questions

- How do I classify numbers based on their factors and multiples?
- How can multiples be used to solve problems?
- How can a number be broken down into its smallest factors?
- How do I find the prime factors and multiples of a number?
- Why is the ability to solve problems the heart of mathematics?

Content

Skills

<p>The students will know</p> <ol style="list-style-type: none"> 1. That a specific list of factors is finite 2. That a specific list of multiples is infinite 3. That one is a factor of every number 4. Every number is a factor of itself 5. 1 is neither prime nor composite 6. 2 is the only even prime number 7. Square numbers have an odd number of factors 8. Know that every number can be written as a unique product of prime numbers 9. That there is exactly one LCM and GCF for every set of whole numbers 10. The relationship between a rectangle with a given area and the factors of that number 11. Divisibility rules for 2, 5, and 10 12. Least common denominator (LCD) 	<p><u>Bloom's Taxonomy</u> <u>DOK Links</u></p> <p>The students will be able to</p> <ol style="list-style-type: none"> 1. Investigate prime and composite numbers to 100. 2. Apply concepts of prime factorization using exponents. 3. Identify factors of numbers less than 100. 4. Generate a finite list of multiples of a number and understand the list is infinite. 5. Classify numbers as prime, composite, square, even, and odd. 6. Use factors and multiples to solve problems and explain facts of everyday life. 7. Write any number as the product of prime numbers. 8. Use mathematical language accurately to express whole number relationships. 9. Identify the GCF and LCM for a given set of whole numbers. 10. Apply GCF and LCM to solve problems and explain facts of everyday life. 11. Apply the relationship between factors and dimensions/areas of a rectangle. 12. Compare and contrast characteristics of whole numbers. 13. Use visual representations to demonstrate understandings of factors and multiples. 14. Develop strategies for finding common multiples. 15. Observe patterns in common multiples of numbers and use the patterns to reason about and predict future occurrences and solve problems. 16. Apply divisibility rules. 17. Find the least common denominator (LCD) for two or more fractions. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define specific vocabulary from the Common Core and apply it to solve problems. 2. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Factors 2. Multiples 3. Prime numbers 4. Composite numbers 5. Least common multiple (LCM) 6. Greatest Common Factor (GCF) 7. Divisibility 8. Exponent 9. Prime Factorization 10. Least Common Denominator (LCD) 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Factor tree
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. GCF. Using graph paper and color tiles, have students build, sketch and label two rectangles: One using 6 units, the other using 9 units so that the rectangles have the same number of rows. Discuss all the options. What is the greatest number of rows these two rectangles could have in common? Build two 	<p>Assessment (Suggested)</p> <p>Factor Trees Formative: Homework</p> <p>Students will create factor trees for several given numbers. For each, they</p>

more rectangles, one using 6 units, the other using 12 units so that they have the greatest number of rows in common. Connect this to greatest common factor. Have students build and sketch two more rectangles, one using 18 units, the other using 21 units so that they have the greatest number of rows in common. The Greatest Common Factor can be represented as two rectangles with greatest common width.

2. LCM. Have students build one rectangle in which groups of 4 tiles or groups of 6 tiles can be identified and circled. Discuss what their rectangles look like. *Question:* Could you have built a rectangle using 24 tiles? 36 tiles? 48 tiles? What is the smallest rectangle that would work for 4 and for 6? Have them do the same for 5 and 3, this time trying to use the least number of tiles possible in their rectangle. Emphasize that the rectangle must have the least number of tiles possible. Connect this to the LCM for two numbers.
3. Class activity. Have students complete a Frayer Model for the GCF and LCM including ideas for examples and non-examples.
4. Using content vocabulary and several given numbers, have students work with partner to generate a list of factors for each number. Have them write sentences about the relationships amongst each of the given numbers and its factors. Share with the class.
5. Class activity. Have students model factors of given numbers with rectangular models. Using the rectangular models, have students work with a partner to find the odd, even, square, composite, prime numbers.
6. Class activity. Compare and contrast the characteristics of whole numbers using Venn Diagrams.
7. Working in cooperative groups, have students examine a variety of problems to decide if they are LCM or GCF problems. Ask groups to solve two of the given problems and then write a unique problem for each category.
8. Class activity/Online learning. Use the video *What are divisibility rules?* (See Link) to teach the rules of divisibility. Have students work with several given numbers to determine which rule can be applied to divide the number.
9. Class activity/Online learning. Use the video *Prime Numbers: The Sieve of Eratosthenes* (see Link) to provide students with an understanding of prime numbers and how they are determined.
10. Class activity/Online learning. Use the video *Least Common Multiple* (see Link) to demonstrate the relationship between LCM and the LCD. Extend the lesson by having students solve several addition and subtraction problems with fractions containing unlike denominators. Have them show their work and explain the process used to find the answers.



[Information on Primes](#)



[Factor Trees](#)



[LCM for Kids](#)



[Frayer Model](#)

will write an explanation of each step taken to form the factor tree.

Factors of a Number

Formative: Cooperative Group Work

Using content vocabulary and several given numbers, students will work with a partner to generate a list of factors for each number. They will write sentences about the relationships amongst each of the given numbers and its factors.

Divisibility Rules and Prime Numbers

Formative: Cooperative Group Work

Students will work together in small groups to develop a list of divisibility rules and prime numbers to 100. Each group's list should be displayed in a creative manner, such as a PowerPoint or poster with illustrations.

Divisibility

Summative: Homework

After viewing the video *What are divisibility rules?*, students will work with several given numbers to determine which rule can be applied to divide the number.

Frayer Model for GCF and LCM

Formative: Class Work

Students will complete a Frayer Model for the GCF and LCM including ideas for examples and non-examples.

LCM → LCD

Summative: Homework

Students will solve several addition and subtraction problems with fractions containing unlike denominators. They will show their work and explain how finding the least common multiple helped them to determine the least common denominator.



[Free Divisibility Rules Charts](#)



[What are Divisibility Rules?](#)



[Prime Numbers - The Sieve of Eratosthenes](#)



[Least Common Multiple](#)

Resources (Suggested)

1. iPad Resources
2. Literature Connection
A Grain of Rice by Helena Clare Pittman
Uno's Garden by Graeme Base
Anno's Mysterious Multiplying Jar by Mitsumasa Anno
The Cryptoclub: Using Mathematics to Make and Break Secret Codes by Janet Beissinger and Vera Pless
3. Internet Resources



[Activboard Flipcharts](#)



[Common Core Resources](#)



[SmartBoard Resources](#)



[PowerPoints](#)



[Sieve](#)



[Factor Trees](#)



[Learn Zillion ~ Common Core Videos](#)



[The Khan Academy](#)



[iLearn Ohio](#)

Catholic Identity

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- ✦ THE RIGHT TO A LEARNING ENVIRONMENT THAT VALUES COOPERATION, and challenges its members to critical and reflective thinking in their search for truth.
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Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 7: Add and Subtract Fractions

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text

2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

- RI.5.2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, 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.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Number & Operations—Fractions

5.NF Use equivalent fractions as a strategy to add and subtract fractions.

- 5.NF.1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
- 5.NF.2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

Essential Questions

- How do we add and subtract fractions?
- How can we use fraction equivalency to add and subtract mixed numbers and fractions with unlike denominators?
- How can modeling be used to represent, analyze, compare, and order fractions?
- What is the purpose of using benchmark fractions?

Content

The students will know

1. Addition and subtraction of fractions including mixed numbers
2. Solve word problems involving addition and subtraction of fractions
3. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Add fractions with unlike denominators (including mixed numbers).
2. Subtract fractions with unlike denominators (including mixed numbers).

	<ol style="list-style-type: none"> Simplify fraction solutions. Rewrite two fractions with unlike denominators to have common denominators in order to add or subtract fractions. Solve word problems involving addition and subtraction of fractions of unlike denominators referring to the same whole. Justify the reasonableness of a solution using estimation and benchmark fractions ($\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and often $\frac{1}{10}$). Define a fraction as division of the numerator by its denominator. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> Define specific vocabulary from the Common Core and apply it to solve problems. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> Simplify Common denominators Unlike denominators Equivalent fractions Benchmark fractions ($\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and often $\frac{1}{10}$) Estimation 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> Difference Sum Factors
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> Class activity. Have students add and subtract fractions with like and unlike denominators (including mixed numbers) using different strategies such as number lines, area models, fraction bars or strips. Have them share their strategies and discuss commonalities in them. Have students work with a partner to rewrite fractions with unlike denominators to have common denominators in order to add or subtract the fractions. Have them explain the process they used. Class activity. Use the equivalent fractions learning experience found in the Links to reinforce student understanding of equivalent fractions. Then have them write the equivalent fractions for a number of given fractions. As necessary review LCM, GCF, and LCD. Working in cooperative groups, have students choose one of the following problems. They are to solve the problem and write a step-by-step explanation of their thinking as they worked out the solution. <p>Problem 1. Working together to complete a job. Andrew can cover the roof of a house in 3 days. Bill can do this job in 6 days. How long will it take Andrew and Bill to complete the job working together? (<i>Solution: Working together, Andrew and Bill can complete the job in 2 days.</i>)</p> <p>Problem 2. Installing solar panels. One team of workers can install solar panels on the roof of a house in 15 days by covering the entire roof area. The second team of workers can complete this job in 10 days. How long will it take for two teams to complete the job working together? (<i>Solution: Working together, two teams of workers can complete the job in 6 days.</i>)</p> 	<p>Assessment (Suggested)</p> <p>Adding and Subtracting Fractions Formative: Class Discussion</p> <p>In a class activity, students will add and subtract fractions with like and unlike denominators (including mixed numbers) using different strategies such as number lines, area models, fraction bars or strips. They will share their strategies and discuss commonalities in them.</p> <p>Rewriting Fractions Formative: Class Work</p> <p>Students will work with a partner to rewrite fractions with unlike denominators to have common denominators in order to add or subtract the fractions. They will explain the process they used.</p> <p>Equivalent Fractions Formative: Homework</p> <p>Student will write the equivalent fractions for a number of given fractions.</p> <p>How Did You Solve the Problem? Summative: Cooperative Group Work</p> <p>Working in cooperative groups, students choose and solve a sample word problem. They will write a step-by-step explanation of their thinking as they worked out the solution.</p> <p>Equivalent Fractions Formative: Response Journal</p>

Problem 3: Filling a reservoir with water.

One tube can fill the reservoir with the water in 12 hours. The second tube can fill the reservoir with the water in 36 hours, if working separately. How long will it take to fill the reservoir, if the two tubes work simultaneously? (*Solution: It will take 9 hours to fill the reservoir if the two tubes work simultaneously.*)

Problem 4: Emptying a reservoir.

An elephant can drink all the water from a reservoir in 4 days. The rhinoceros can drink all the water from the same reservoir in 12 days, if drinking alone. How long will it take to empty the reservoir, if the elephant and the rhinoceros drink together? (*Solution: The reservoir will be emptied in 3 days, if the elephant and the rhinoceros drink together.*)

- 5. Class activity. Using benchmark fractions and number sense of fractions have students estimate mentally the solution to several examples of adding and subtracting fractions and assess, or justify the reasonableness of answers.
- 6. Online learning. Working in cooperative groups, have students use the *Thinking Blocks* site to practice solving fraction word problems. (See Link.)



[Virtual Manipulatives](#)



[Thinking Blocks](#)



[Equivalent fractions](#)



[Adding and Subtracting Fractions ~ Videos](#)

Students will explore equivalent fractions through online media, hands-on activities, and discussions, and write down key information about equivalent fractions.

Using Benchmark Fractions

Formative: Class Work

Using benchmark fractions and number sense of fractions students will estimate mentally the solution to several examples of adding and subtracting fractions and assess, or justify the reasonableness of answers.

Thinking Blocks

Formative: Cooperative Group Work

Students will work together to solve addition and subtraction problems with "Thinking Blocks" site.

Resources (Suggested)

- 1. iPad Resources
- 2. Literature Connection
 - Fraction Fun* by David A. Adler and Nancy Tobin
 - Full House: An Invitation to Fractions* by Dayle Ann Dodds and Abby Carter
 - Icebergs and Glaciers* by Seymour Simon
 - The Man Who Counted: A Collection of Mathematical Adventures* by Malba Tahan
 - One Riddle, One Answer* by Lauren Thompson
- 3. Internet Resources



[Common Core Resources](#)



[Activ Board Flipcharts](#)



[Power Points](#)



[Thinking Blocks](#)

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 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



[Equivalent Fractions!](#)



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



[iLearn Ohio!](#)



[The Khan Academy!](#)

by identifying safe and unsafe situations.
✚ THE RIGHT TO LEARN RESPONSIBILITY for themselves and their actions.

Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 8: Multiply and Divide Fractions

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text
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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

- W.5.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

CCSS: Mathematics (2011), OH: CCSS: Grade 5, 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.
- 7. Look for and make use of structure.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Number & Operations—Fractions

5.NF Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

- 5.NF.3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
- 5.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
- 5.NF.4a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.
- 5.NF.4b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
- 5.NF.5. Interpret multiplication as scaling (resizing), by:
 - 5.NF.5a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
 - 5.NF.5b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
- 5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
- 5.NF.7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

- 5.NF.7a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
- 5.NF.7b. Interpret division of a whole number by a unit fraction, and compute such quotients.
- 5.NF.7c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.

Essential Questions

- What strategies can I use to multiply and divide fractions?
- How can I use models and equations to represent and solve real-world multiplication and division problems with fractions?
- What are the properties of fractions that can be discovered by multiplying and dividing fractions?
- How can I use fraction equivalency to multiply and divide mixed numbers and fractions with unlike denominators?
- How is computation with rational numbers similar and different to whole number computation?
- How does finding the common characteristics among similar problems help me to be a more efficient problem solver?

Content

The students will know

1. A fraction is a division of the numerator by the denominator
2. Properties of fractions
3. Unit fraction
4. Non-zero whole number
5. Multiplying fractions is partitioning into equal parts
6. Multiplication and division of fractions is resizing
7. Concepts of multiplying and dividing fractions
8. Area of a rectangle

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

1. Define a fraction as division of the numerator by its denominator.
2. Solve word problems involving the division of two whole numbers where the solution is a fraction or mixed number.
3. Draw a fraction model to illustrate a product of a fraction by a whole number and a fraction by a fraction.
4. Relate multiplying by a fraction as taking "part of" a whole number.
5. Compute the area of a rectangle with fractional side lengths.
6. Prove through tiling the equivalence of multiplication and area.
7. Describe the size of a product in terms of how many times larger one factor is to another without multiplying.
8. Explain and show why multiplying by a fraction less than one will result in a product less than the greater number.
9. Explain and show why multiplying by an improper/mixed number will result in a product greater than the given number.
10. Explain and show why multiplying by a fraction equal to 1 will result in an equivalent fraction.
11. Explain and show why multiplying by a fraction less than one will result in a product less than the greater number.
12. Explain and show why multiplying by an improper/mixed number will result in a product greater than the given number.
13. Rewrite the number 1 as an equivalent fraction i.e., $\frac{2}{2}$, $\frac{3}{3}$, $\frac{4}{4}$, etc.
14. Solve word problems involving multiplication of fractions and mixed numbers.
15. Represent the product of fractions in simplest form.
16. Write equations to represent word problems involving multiplication of fractions.
17. Draw/show multiplication of fractions through visual models.
18. Define a unit fraction as fraction with a numerator of 1.
19. Divide a unit fraction by a whole number.
20. Draw/show division of a unit fraction by a whole number as dividing the unit fraction into smaller parts.
21. Create a story in which division of a unit fraction by a whole number is used.
22. Explain the effects of dividing a unit fraction by a whole number.
23. Justify the reasonableness of the answer in the context of a problem.
24. Simplify/reduce quotients to lowest terms. 5.NF.7a

- Define a unit fraction as a fraction with a numerator of 1.
- 25. Divide a whole number by a unit fraction. 5.NF.7b
- 26. Create a story in which division of a whole number by a unit fraction is used.
- 27. Explain the effects of dividing a whole number by a unit fraction.
- 28. Define the reciprocal of a unit fraction for the purpose of division.
- 29. Justify the reasonableness of answer in the context of a problem.
- 30. Divide a whole number by a unit fraction (vice versa) in the context of word problems.
- 31. Solve a story/word problem in which division of a whole number by a unit fraction (vice versa) is used.
- 32. Explain the effects of dividing a whole number by a unit fraction (vice versa) in the context of a word problem.
- 33. Justify the reasonableness of answer in terms of the context of the problem.
- 34. Simplify/reduce quotients to lowest terms.

Reading/Writing Skills

- 1. Define specific vocabulary from the Common Core and apply it to solve problems.
- 2. Justify solutions verbally or in written form to explain processes and summarize results.

Common Core Vocabulary

- 1. Area
- 2. Tiling
- 3. Unit fraction
- 4. Unit square
- 5. Equivalence
- 6. Product
- 7. Factor
- 8. Improper fraction
- 9. Mixed number
- 10. Equivalent fraction
- 11. Visual models
- 12. Estimation
- 13. Lowest terms
- 14. Quotients

Additional Vocabulary

Learning Experiences (Suggested)

- 1. Class activity. Connect the meaning of multiplication and division of fractions with whole-number multiplication and division. Consider area models of multiplication and both sharing and measuring models for division. Ask questions such as, "What does 2×3 mean?" and "What does $12 \div 3$ mean?" Then, follow with questions for multiplication with fractions, such as, "What does 34×13 mean?" "What does 34×7 mean?" (7 sets of 34) and What does 7×34 mean?" (34 of a set of 7)
The meaning of $4 \div 12$ (how many 12 are in 4) and $12 \div 4$ (how many groups of 4 are in 12) also should be illustrated with models or drawings. (Source: *Instructional Strategies ~ Mathematics Model Curriculum Ohio Department of Education, Page 13.*)
- 2. Working in cooperative groups, have students use models

Assessment (Suggested)

Understanding Multiplication and Division
Formative: Response Journal

Following the class activity, have students reflect on their understanding of the connection between the meaning of multiplication and division of fractions with whole-number multiplication and division and describe their understanding using models and drawings in their math journals.

Multiplying and Dividing Fractions
Formative: Cooperative Group Work

Students will use models (rectangles or squares, fraction strips/bars and sets of counters) or drawings to multiply or divide with fractions.

(rectangles or squares, fraction strips/bars and sets of counters) or drawings to multiply or divide with fractions. They should begin with modeling multiplication and division with whole numbers and explain how they used the model or drawing to arrive at the solution. Move on to multiplication and division of fractions.

3. Class activity. Use calculators or models to explain what happens to the result of multiplying a whole number by a fraction [3×12 , 4×12 , 5×12 ...and 4×12 , 4×13 , 4×14 , ...] and when multiplying a fraction by a number greater than 1. (Source: *Instructional Strategies ~ Mathematics Model Curriculum Ohio Department of Education, Page 13.*)
4. Class activity. Use calculators or models to explain what happens to the result when dividing a unit fraction by a non-zero whole number [$18 \div 4$, $18 \div 8$, $18 \div 16$,...] and what happens to the result when dividing a whole number by a unit fraction [$4 \div 14$, $8 \div 14$, $12 \div 14$, ...]. (Source: *Instructional Strategies ~ Mathematics Model Curriculum Ohio Department of Education, Page 13.*)
5. Working with a partner, have students use calculators or models to
 - a. multiply a whole number by a fraction
 - b. multiply a fraction by a number greater than 1
 - c. divide a unit fraction by a non-zero whole number
 - d. divide a whole number by a unit fraction
 Students should justify the reasonableness of their answers.
6. Class activity. To enhance student understanding of multiplication and division of fractions, problem situations will be presented and students will use models and equations to solve the problem.
7. Class activity/Online learning. Use the lesson presented in the *Dividing Fractions* Link to help students build a conceptual understanding of the division of fractions through division of whole numbers and modeling of division of fractional parts.
8. Online learning. Working in cooperative groups, have students experience working with fractions in an everyday life experience. Have them work with the recipe problem found in *Fractions in Everyday Life* in the Links. Have them explain their work in converting the recipe as needed in the problem situation.



[Fractions-Rectangle Multiplication](#)



[Dividing Fractions](#)



[Fractions in Everyday Life](#)

Modeling the Division of Fractions

Formative: Writing Assignment

Students will write a story problem for each kind of situation (sharing and grouping), solve the problem showing justification, and explain why it is a sharing or grouping problem.

Cooking with Fractions

Formative: Project

Students will apply concepts about the multiplication and division of fractions to change the sizes of recipes.

More on Fractions

Formative: Cooperative Group Work

Working with a partner, students will use calculators or models to

- a. multiply a whole number by a fraction
- b. multiply a fraction by a number greater than 1
- c. divide a unit fraction by a non-zero whole number
- d. divide a whole number by a unit fraction

They will justify the reasonableness of their answers.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
 - The Doorbell Rang* by Pat Hutchins
 - Polar Bear Math: Learning about Fractions from Klondike and Snow* by Ann Whitehead Nagda
 - Fraction Fun* by David A. Adler
 - Full House: An Invitation to Fractions* by Dayle Ann Dodds and Abby Carter

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

Little House in the Big Woods by Laura Ingalls Wilder and Garth Williams

Fraction Action by Loreen Leedy

3. Internet Resources



[Common Core Resources](#)



[Rectangle Multiplication](#)



[Flipcharts](#)



[Real World Fractions](#)



[Learn Zillion ~ Common Core Videos](#)



[The Khan Academy](#)



[iLearn Ohio](#)

- ✚ THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
- ✚ THE RIGHT TO BE RESPECTED AS INDIVIDUALS with human dignity.
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Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 9: Convert Like Measurements

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text

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

- RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 4. Model with mathematics.
- 5. Use appropriate tools strategically.
- 6. Attend to precision.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Measurement & Data

5.MD Convert like measurement units within a given measurement system.

- 5.MD.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

DOC: Mathematics, DOC: Grade 5, Measurement

B. Measurement Techniques and Tools

- 5. Estimate measurements of physical objects by comparing the objects to benchmarks.

Essential Questions

- How are the units of measure within a standard system related?
- How can I use measurement conversions to solve real-world problems?
- How can walking off and rough comparisons help me predict or estimate measurement?
- How do I measure accurately to the nearest inch? Nearest centimeter?
- How do I estimate and measure?
- Why is the ability to solve problems the heart of mathematics?

Content

The students will know

1. Standard/customary measurement units

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

<ol style="list-style-type: none"> 2. Metric measurement units 3. Estimation as a measurement technique 4. Object-based measurement benchmarks 	<ol style="list-style-type: none"> 1. Recognize what types of measurement fall into what categories. 2. Recognize when to multiply and when to divide when using measurements. 3. Compute real numbers, fractions, and decimals when converting units. 4. Identify the appropriate unit of measure for familiar objects and distances. 5. Make conversions between units of measure in metric units. 6. Relate units of measurement to each other. 7. Apply rules of conversion to different problems. 8. Simplify units of measurement. 9. Compare and convert a given measurement to another unit within the same measurement system. 10. Make conversions within the same measurement system while performing computations. 11. Convert among different-sized standard measurement units <u>within</u> a given measurement system (standard/customary, metric). 12. Experiment with different amounts of water to discover the conversion factors dealing with volume in the customary system. 13. Convert volumes in the customary system. 14. Use measurement conversions to solve multi-step, real world problems. 15. Estimate measurements of physical objects by comparing the objects to benchmarks. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define specific vocabulary from the Common Core and apply it to solve problems. 2. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Conversion 2. Standard/customary measurement system 3. Metric measurement system 4. Estimation 5. Measurement benchmark 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Various measurement units for standard/customary and metric measurements (e.g. inch, centimeter, etc.)
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity. Have students brainstorm a list of all the terms they know that relate to measurement. Record their answers in list form on a chart and have students write each term on a separate index card. Then, working with a partner, have the students label (classify) the terms that the class has just brainstormed in order to make connections among the various categories of terms. Have the class reach a consensus on the major categories in which the terms can be grouped, and record these categories on a chart. Then ask students to group terms that have common attributes. 2. Class activity. Engage students in converting customary units using all components of the <i>Gallon Man</i> lesson found in the Links. 3. Have students work with a partner to convert volume measures 	<p>Assessment (Suggested)</p> <p>What Do I Know About Measures Diagnostic: Class Work</p> <p>Students will brainstorm a list of all the terms they know that relate to measurement and record their answers in list form on a chart and on separate index cards. Then, working with a partner students will label (classify) the terms that the class has just brainstormed in order to make connections among the various categories of terms. Finally, students will group terms that have common attributes.</p> <p>Benchmarks Assessment Formative: Posters</p> <p>In small groups, students will create posters displaying benchmark</p>

<p>given in a number of real-world problems. Have them write an explanation of the process used in making the conversion.</p> <ol style="list-style-type: none"> Class activity. Engage students in learning the basics of the metric system. Have them identify which units of measurement are used to measure specific objects, and learn to convert between units within the same system. (Use all components of the Metric Lesson found in the Links to teach this lesson.) Have students work with a partner to solve the following problems. <ol style="list-style-type: none"> Measure the length in cm of ten Base 10 logs placed end to end. Measure the length a second time in mm. Measure the length a third time using a meter ruler. Repeat 5 times using different numbers of Base 10 logs. Record all measurements in a table with the headings below: No. of Base 10 Logs -- m -- cm -- mm Ask them to describe any patterns or relationships that they find among the three metric units used. Working in cooperative groups, have students solve the following real-world problems. Have them justify their solutions. <ol style="list-style-type: none"> Julie has a gallon of milk. A neighbor has come over to borrow a pint of milk for her cereal. How many cups of milk will Julie have left after giving her neighbor a pint of milk? (<i>Julie will have 14 cups of milk left.</i>) Keri is providing the beverage for the skating party. She bought 6 bottles of soda. Each bottle contains 16 ounces of soda. If she and 10 of her friends want a cup of soda, will she have enough soda? (<i>Keri has enough soda since there are 96 ounces of soda in the 6 bottles and 10 cups is 80 ounces.</i>) Have students estimate the measurements of physical objects around the room by comparing the objects to benchmarks. Class activity/project. Have students demonstrate their understanding of units of measure, measure conversion and estimation by engaging them in the <i>Mini Metric Olympics</i> project. (See Link)  Gallon Man  Metric System  Master for Making the Gallon Man  Estimating Length Worksheet  Mini Metric Olympics Lesson	<p>objects (of their choosing) that represent approximate measures for both standard/customary and metric systems of measurement.</p> <p>Standards Conversion Presentation Formative: Visual Arts Project</p> <p>After completing the Gallon-man activity and metric conversion activities, students will work independently or with partners to create a similar visual arts presentation that depicts the conversions within the metric system.</p> <p>Measurement Conversions Formative: Class Work</p> <p>Students will work with a partner to convert volume measures given in a number of real-world problems. They will write an explanation of the process used in making the conversion.</p> <p>Using the Metric System of Measures Formative: Homework</p> <p>Students will solve real-world problems in which they will have to convert measures within the metric system.</p> <p>Working With Real-Life Problems Summative: Cooperative Group Work</p> <p>Students will work in cooperative groups to solve the real-world problems involving various metric measures. They will write a justification for their solutions.</p> <p>Estimation Summative: Class Work</p> <p>Students will estimate the measurements of physical objects around the room by comparing the objects to benchmarks.</p>
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Resources (Suggested)

- iPad Resources
- Literature Connection
The Great Pyramid of Giza: Measuring Length, Area, Volume, and Angles by Janey Levy
Famous Bridges Of The World: Measuring Length, Weight, And Volume by Yolonda Maxwell
Perimeter, Area, and Volume by David A. Adler and Edward Miller
A Fly on the Ceiling by Julie Glass and Richard Walz

- 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**

3. Internet Resources



[Fifth grade lesson plans](#)



[Common Core Resources](#)



[Flipcharts](#)



[Gallon Man](#)



[Metric](#)



[Estimating Measures](#)



[Math Activities, Lessons and More](#)



[iLearn Ohio](#)



[The Khan Academy](#)

- ✚ THE RIGHT TO A SAFE ENVIRONMENT that promotes care, protection and security.
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- ✚ 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.
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Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 10: Classify Two/Three-Dimensional Figures

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text

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

- RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Writing

Text Types and Purposes

1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

- W.5.1b. Provide logically ordered reasons that are supported by facts and details.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 3. Construct viable arguments and critique the reasoning of others.
- 4. Model with mathematics.
- 8. Look for and express regularity in repeated reasoning.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Geometry

5.G Classify two-dimensional figures into categories based on their properties.

- 5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 5.G.4. Classify two-dimensional figures in a hierarchy based on properties.

DOC: Mathematics, DOC: Grade 5, Geometry and Spatial Sense

A. Characteristics and Properties

- 1. Identify, compare, analyze and classify two and three-dimensional shapes;
- 2. Draw circles, identify, and determine relationships among the radius, diameter, center, and circumference; e.g., radius is half the diameter, the ratio of the circumference of a circle to its diameter is an approximation of π .

Essential Questions

- In what ways do tools help me draw two-dimensional shapes?
- How can I use models to understand shapes and the relationships among their attributes?
- How can I use two- and three-dimensional shapes and attributes to describe real-world solids and solve problems?
- How can the knowledge of shapes and their attributes help certain professionals solve problems? (e.g., architects, engineers, builders)

Content

The students will know

Skills

Bloom's Taxonomy

DOK Links

<ol style="list-style-type: none"> 1. Properties and attributes of two- and three-dimensional figures 2. Categories of figures 3. Polygons with up to 10 sides 4. Properties and attributes of circles 5. Types of angles 	<p>The students will be able to</p> <ol style="list-style-type: none"> 1. Classify two- and three-dimensional figures into categories and subcategories. 2. Classify two-dimensional figures in a hierarchy based on properties. 3. Measure angles between 0 and 360 degrees. 4. Draw and label 2-dimensional figures given specific attributes including angle measure and side length. 5. Analyze characteristics and attributes of two-dimensional geometric shapes. 6. Identify and describe attributes of quadrilaterals. 7. Label and classify quadrilaterals based on attributes. 8. Compare attributes of 2-dimensional figures with 3-dimensional figures by drawing and constructing models. 9. Draw circles, identify, and determine relationships among the radius, diameter, center, and circumference. 10. Solve problems involving the area of 2-dimensional figures by using the properties of parallelograms and triangles. 11. Solve problems involving area and perimeter of regular and irregular polygons using re-allotment of square units. 12. Identify two-dimensional and three-dimensional shapes in real life architectures. 13. Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define specific vocabulary from the Common Core and apply it to solve problems. 2. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Quadrilateral 2. Parallelogram 3. Square 4. Rectangle 5. Trapezoid 6. Rhombus 7. Congruent 8. Attributes 9. Polygon 10. Angles 11. Right Angle 12. Acute Angle 13. Obtuse Angle 14. Regular Polygon 	<p>Additional Vocabulary</p> <ol style="list-style-type: none"> 1. Radius 2. Diameter 3. Circumference 4. Ratio 5. Scalene 6. Isosceles 7. Equilateral 8. Chord 9. Semicircle 10. Quadrilateral 11. Polygon 12. Plane
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity/Online learning. Engage students in the examination of the attributes belonging to a category of two-dimensional figures using the Common Core videos for 5.G.3 at the Learn Zillion link. 2. Following the class activity/online learning, have students use a graphic organizer to compare and contrast the attributes of geometric figures. Have students create a T-chart with a shape 	<p>Assessment (Suggested)</p> <p>Sorting Shapes by Attributes Formative: Graphic Organizer</p> <p>Students will use a graphic organizer to compare and contrast the attributes of geometric figures. They will create a T-chart with a shape on each side and list attributes of the shapes, such as number of side,</p>

on each side. Have them list attributes of the shapes, such as number of side, number and type of angles, types of lines, etc. In making the comparisons, they need to determine what is alike or different about the two shapes to get a larger classification for the shapes. They will need to justify their comparisons for the class.

3. Have students work with a partner to engage in activity Polygon Capture, in order to precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties, create and critique inductive arguments concerning geometric ideas and relationships, and progress from description of geometric shapes to analysis of those shapes and their properties. (See Links.)
4. Cooperative group activity: Investigate the relationships between attributes of circles, including radius, diameter, area, and circumference. Present groups with a real-world problem and ask them to find the solution.
 - a. **Consider this:** *John's father wants to create a circular pond in his backyard and place a fountain in the center of the pond. How would John's father determine where the center of the pond is located?* Have groups discuss strategies they would use for locating the center of the pond. Provide students with plastic lids and some string to build models or grid paper to draw visual representations of the problem. Have students share their strategies and have them identify what relationships may be evident among the parts of the circle from solving this problem.
 - b. **Now consider this:** *John's father also wants to place a small decorative fence around the outside of the pond. He knows the distance across the pond is 24 feet. He decides to order 48 feet of fence. Does John's father order enough fence? Is that reasonable? How do you know?* Allow time for students to make a prediction and discuss with their group. Have students share their prediction and the reasoning they used to make their prediction.
5. Follow-up the cooperative group work and class instruction on the relationships between attributes of circles, including radius, diameter, area, and circumference by having students solve a number of "real-world" type problems in which they work with the attributes of circles ~ radius, diameter, area and circumference. Students individually solve the problems and generate appropriate statements describing the relationships between the radius, diameter and circumference of the circle.
6. Cooperative group project/Online learning. Using the four lessons outlined in the *Junior Architect Unit* (see Links), have students create a two-dimensional blueprint for a clubhouse and then have them create a three-dimensional model of their clubhouse. After students finish with the clubhouse, engage them in several open-ended tasks involving area, perimeter, and money concepts. Students will need to make decisions about decorating their own clubhouse. In one of the tasks, students will be asked to compare prices from three different paint stores and determine which store gives them the best bargain on paint. In other tasks, they will determine the perimeter of the doors and windows of their clubhouse.



[Venn Diagram shape sorter](#)

[Polygon Capture](#)

number and type of angles, types of lines, etc. In making the comparisons, they will need to determine what is alike or different about the two shapes to get a larger classification for the shapes. Finally, they will need to justify their comparisons.

Formative: Cooperative Group Work

Working in cooperative groups, students will investigate the relationships between attributes of circles, including radius, diameter, area, and circumference with a real-world problem they will be asked to solve.

Working with Circles

Summative: Class Work

Students will solve a number of "real-world" type problems in which they work with the attributes of circles ~ radius, diameter, area and circumference. They will individually solve the problems and generate appropriate statements describing the relationships between the radius, diameter and circumference of the circle.

Building a Clubhouse

Summative: Cooperative Group Work

Students will create a two-dimensional blueprint for a clubhouse and then create a three-dimensional model of their clubhouse. After students finish with the clubhouse, they will address several open-ended tasks involving area, perimeter, and money concepts.



[Geometric Investigation!](#)



[Junior Architect Unit/Lessons!](#)



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

Resources (Suggested)

1. iPad Resources
2. Literature Connection
Ed Emberley's Picture Pie: A Circle Drawing Book by Ed Emberley
Grandfather Tang's Story by Ann Tompert
Marvelous Math: A Book of Poems by Lee Bennett Hopkins
Sam Johnson and the Blue Ribbon Quilt by Lisa Campbell Ernst
The Warlord's Puzzle by Virginia Walton Pilegard
What's Your Angle, Pythagoras? by Julie Ellis (Author), Phyllis Hornung
Sir Cumference and the Dragon of Pi by Wayne Geehan and Cindy Neuschwander
Round Table Geometry: Sir Cumference Classroom Activities by Don Robb, Elena Dworkin Wright and Susan Shapero
3. Internet Resources



[Fifth grade websites/lesson plans!](#)



[Common Core Resources!](#)



[Flipcharts!](#)



[Polygons!](#)



[Math Games and Worksheets!](#)



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



[The Math Worksheets Site!](#)



[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 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.

Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 11: Geometry-Volume

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text
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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, 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.

- W.5.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

- W.5.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 2. Reason abstractly and quantitatively.
- 4. Model with mathematics.
- 5. Use appropriate tools strategically.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Measurement & Data

5.MD Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

- 5.MD.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
- 5.MD.3a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
- 5.MD.3b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
- 5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
- 5.MD.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
- 5.MD.5a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
- 5.MD.5b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
- 5.MD.5c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Essential Questions

- How do I choose the appropriate tool and unit when measuring?
- How do I estimate and measure?
- How is volume related to surface area?
- How can algorithms for finding volume be represented by symbols or letters?
- How is volume related to addition and multiplication?

- How can knowledge of volume formulas be used to solve real-world problems?

Content

The students will know

- Attributes of solid figures
- Volume
- Volume measurement tools
- Area of a rectangle
- Perimeter of a rectangle
- Attributes of rectangular prism
- Volume formulas for right rectangular prisms
- Relationship of volume to the operations of multiplication and addition
- Volume is additive

Skills

Bloom's Taxonomy

DOK Links

The students will be able to

- Review the names and properties of geometric solids.
- Provide experience comparing the properties of geometric solids.
- Describes and illustrate the attributes of surface area and volume.
- Recognize volume as an attribute of solid figures.
- Measure volume by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
- Relate volume to the operations of multiplication and addition.
- Determine the relationships between the length and width of a rectangle and its area and perimeter, and generalize to develop the formulas [i.e., Area = length x width] and Perimeter = (2 x length) + (2 x width)].
- Determine the relationship between the height, the area of the base, and the volume of a rectangular prism, and generalize to develop the formula (i.e., Volume = area of base x height).
- Create a variety of rectangular prisms using connecting cubes. For each rectangular prism, record the area of the base, the height, and the volume on a chart. Identify relationships.
- Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
- Find total volume of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts.
- Apply the formula for the volume of a rectangular prism in solving real world and mathematical problems.

Reading/Writing Skills

- Define specific vocabulary from the Common Core and apply it to solve problems.
- Justify solutions verbally or in written form to explain processes and summarize results.

Common Core Vocabulary

- Unit cube
- Cubic units
- Solid figure
- Attributes of solid figures
- Attributes of a rectangular prism
- Right rectangular prism

Additional Vocabulary

- Area of a rectangle
- Perimeter of a rectangle
- Names of geometric solids

Learning Experiences (Suggested)

- Class activity. Introduce the unit by reviewing what is already known about using the formula for finding the perimeter and area of a two-dimensional figure. Have students determine the solution for several problems involving perimeter and area.

Assessment (Suggested)

Perimeter and Area Formulas Diagnostic: Class Work

Have students determine the solution for several problems using the

2. Class activity with students working with a partner. Give each pair of students one block (a 1- or 2- cubic centimeter or cubic-inch cube), a ruler with the appropriate measure based on the type of cube, and a small rectangular box. Ask them to determine the number of cubes needed to fill the box. Have them share their strategies with the class using words, drawings or numbers. Allow them to confirm the volume of the box by filling the box with cubes of the same size. (See the Illuminations Lesson in the Links.)
3. Working in cooperative groups, have students determine the relationships between the length and width of a rectangle and its area and perimeter using the formulas [Area = length x width] and [Perimeter = (2 x length) + (2 x width)]. Have them explain their reasoning to the class.
4. Class activity/Online learning. Using the video *Find the volume of a rectangular prism by developing a formula* (see Link) engage students in finding the volume of a rectangular prism using the formula.
5. Have students work with a partner to find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Ask them to justify their solution.
6. Have students work with a partner to find total volume of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts. Have them show their work and explain the steps they took to solve the problems.
7. Have students work in cooperative groups to solve real world and mathematical problems involving volume. To investigate the formula for the volume of a rectangular prism students will construct two origami boxes and use centimeter cubes to measure and compare the volume of the boxes. They will also analyze how changing the dimensions of the prism affects its volume. (See Illuminations Lesson in the Links.)
8. Class activity. Using the lesson estimating volume found in the Links, students will read the book *Counting on Frank* and use the information in the book to make estimates involving volume. In particular, students will explore the size of humpback whales.



[Fill Box With Cubes](#)



[Finding the Volume of Rectangular Prism by Determining the Formula](#)



[Fill 'Er Up](#)



[Estimating Volume ~ Counting on Frank](#)

formula for finding the perimeter and the area of two-dimensional figures.

Principles of Volume

Formative: Response Journal

Following the learning experience with unit cubes and volume, students will use words, drawings and/or numbers to explain the process they used on working through the task. They will share their journal entries with the class.

How Are We Related? (Length, Width, Area)

Formative: Cooperative Group Work

Working in cooperative groups, students will determine the relationships between the length and width of a rectangle and its area and perimeter using the formulas [Area = length x width] and [Perimeter = (2 x length) + (2 x width)]. They will explain their reasoning to the class.

Volume of a Rectangular Prism

Formative: Cooperative Group Work

Students will work with a partner to find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. They will justify their solution in writing and share with the class.

Volume of Non-Overlapping Solids

Formative: Class Work

Students will work with a partner to find total volume of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts. They will show their work and explain the steps they took to solve the problems.

Real World Volume Problems

Summative: Cooperative Group Work

Students will construct two origami boxes and use centimeter cubes to measure and compare the volume of the boxes. They will analyze how changing the dimensions of the prism affects its volume. They will share their findings with the class.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
Counting on Frank by Rod Clement

Catholic Identity

Social Justice Teachings

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

Brown Paper School book: Book of Think: Or How to Solve a Problem Twice Your Size by Marilyn Burns
The Light Princess by George Macdonald and Maurice Sendak
Zachary Zormer: Shape Transformer by Joanne A. Reisberg and David Hohn

3. Internet Resources



[Fifth Grade Lessons](#)



[The National Library of Virtual Manipulatives](#)



[The Math Worksheet Site](#)



[Learn Zillion ~ Common Core Videos](#)



[Brain Pop](#)



[The Khan Academy](#)



[iLearn Ohio](#)

✚ Rights And Responsibilities

✚ Solidarity

✚ Care For God's Creation

Rights of Children

- ✚ 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.
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- ✚ THE RIGHT TO LEARN THE SKILL OF SELF PROTECTION by identifying safe and unsafe situations.
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Mathematics Curriculum ~ Grade Five

Diocese of Cleveland



Unit 12: Graph Points on the Coordinate Plane

Standards Assessed

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Reading: Informational Text

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

- RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

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.

- RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS: ELA & Literacy in History/Social Studies, Science, & Technical Subjects K-5, OH: CCSS: Grade 5, Speaking and Listening

5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

- SL.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Mathematical Practice

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

- 4. Model with mathematics.
- 6. Attend to precision.
- 8. Look for and express regularity in repeated reasoning.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Operations & Algebraic Thinking

5.OA Analyze patterns and relationships.

- 5.OA.3. 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.

CCSS: Mathematics (2011), OH: CCSS: Grade 5, Geometry

5.G Graph points on the coordinate plane to solve real-world and mathematical problems.

- 5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
- 5.G.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Essential Questions

- How is the location of a point on a grid described? How is this useful?
- How can patterns and rules be used to solve problems within a coordinate system?
- How can plotting points on a coordinate plane help me determine specific locations in real life?
- What strategies can I use to identify missing numbers in a series of ordered pairs with corresponding terms?
- Why is the ability to solve problems the heart of mathematics?

<p>Content</p> <p>The students will know</p> <ol style="list-style-type: none"> 1. Perpendicular number lines 2. Coordinate planes 3. Coordinate systems 4. x and y axes 5. Quadrants 6. Graphing ordered pairs 7. Numerical patterns 	<p>Skills</p> <p><u>Bloom's Taxonomy</u> <u>DOK Links</u></p> <p>The students will be able to</p> <ol style="list-style-type: none"> 1. Generate patterns using given rules. 2. Identify relationships between terms. 3. Form ordered pairs consisting of corresponding terms from the two patterns. 4. Graph ordered pairs on the first quadrant of the coordinate plane. 5. Generate line graphs to represent patterns. 6. Create a coordinate grid. 7. Name and write ordered pairs. 8. Articulate directions as students plot points. 9. Interpret coordinate values of points in the context of situations. 10. Graph points on the coordinate plane to solve real-world problems. <p>Reading/Writing Skills</p> <ol style="list-style-type: none"> 1. Define specific vocabulary from the Common Core and apply it to solve problems. 2. Justify solutions verbally or in written form to explain processes and summarize results.
<p>Common Core Vocabulary</p> <ol style="list-style-type: none"> 1. Axis/Axes 2. Origin 3. Point 4. Rule 5. Coordinates 6. Coordinate plane 7. Coordinate system 8. Ordered pairs 9. Line 10. Intersection of lines 11. Graphing 12. First quadrant 13. Horizontal 14. Vertical 15. Patterns 16. Perpendicular 17. x-axis 18. x-coordinate 19. y-axis 20. y-coordinate 	<p>Additional Vocabulary</p>
<p>Learning Experiences (Suggested)</p> <ol style="list-style-type: none"> 1. Class activity/Online learning. Introduce students to graphing on a coordinate graph using <i>Welcome to Graph Mole</i> (see Links). This site will take the students through the steps of graphing on the x-axis and the y-axis. 2. Class activity on learning the terms. Have students create a "definition card" for each of the key terms of this unit. Then have them work with a partner to review and drill the terms. 	<p>Assessment (Suggested)</p> <p>Patterns and Rules Formative: Graphic Organizer</p> <p>Using 2 x 5 chart, students will create a numeric pattern based on given rules. Given a completed chart with pairs of corresponding terms, students will write and illustrate a description of the rules guiding the</p>

3. Working with a partner, ask students to generate 12 random numbers between 0 and 10 ~ (__,__) (__,__) (__,__) (__,__) (__,__) (__,__). Have them plot their unique points and connect them in order from left to right with line segments on graph paper. Have them give their graph a title and label the x and y axes of the graph accordingly. Finally, have them write a story to describe what is happening in the graph.
4. Class activity. Extend the above learning experience by asking students to respond to the following questions.
 - a. How do the coordinates of the point locate that point on the coordinate grid? [The first coordinate moves from the origin to the right because it is positive and the second coordinate move up because it is also positive.]
 - b. How do the coordinates of the points link to the story that you wrote? [The coordinates of the points should directly link to a specific event in the story.]
 - c. What portion of the coordinate plane are we working in? [All of our stories take place in the first quadrant because we are only dealing with positive numbers.]
5. After listening to the story *The Fly on the Ceiling* by Julie Glass have the students work with a partner to draw a simple picture that can be formed with straight lines connecting points on a coordinate grid. They should use at least 8 points but no more than 15 points. Record the ordered pairs they plotted in the order in which they connected them. Challenge the students to do the following:
 - a. double only the first number of each original ordered pair...what happens?
 - b. double only the second number of each original ordered pair...what happens?
 (Source: K-5MathTeachingResources.com)
6. Online learning. Given real-world problems from *Real World Graphing Problems* and coordinate grids, have students form ordered pairs and graph points on the coordinate plane only using first quadrant. (See Link)
7. Have students work in cooperative groups to locate a number of given cities on a map and determine the coordinate points for each. Using the coordinates between two cities, have students calculate the distance between the two cities. Ask groups to explain the steps taken to locate the cities and calculate distances.



[Graphing Ordered Pairs](#)



[Real World Graphing Problems](#)



[Welcome to the Graphing Mole](#)

numerical pattern.

Tell Me About Your Graph

Formative: Cooperative Group Work

Working with a partner, students will generate 12 random numbers between 0 and 10 ~ (__,__) (__,__) (__,__) (__,__) (__,__) (__,__). They will plot their unique points and connect them in order from left to right with line segments on graph paper. They will give their graph a title and label the x and y axes of the graph accordingly. Finally, they will write a story to describe what is happening in the graph.

Plotting Points

Formative: Class Work

After listening to the story *The Fly on the Ceiling* by Julie Glass students will work with a partner to draw a simple picture that can be formed with straight lines connecting points on a coordinate grid. They should use at least 8 points but no more than 15 points. Record the ordered pairs they plotted in the order in which they connected them.

Ordered Pairs

Formative: Class Work

Given real-world problems from *Real World Graphing Problems* and coordinate grids, students will form ordered pairs and graph points on the coordinate plane only using first quadrant. They will write explanations to describe the relationship between the coordinates on the grid.

Resources (Suggested)

1. iPad Resources
2. Literature Connection
 - The Fly on the Ceiling* by Dr. Julie Glass
 - Sir Cumference and the Viking's Map* by Cindy Neuschwander
 - Millions of People* by John Dunworth and Thomas Drysdale
 - Berries, Nuts, and Seeds* by Diane L. Burns
 - Grandfather Tang's Story* by Ann Tompert

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

Tiger Math: Learning to Graph from a Baby Tiger by Ann W. Nagda and Cindy Bickel

3. Internet Resources



[Promethean Planet](#)



[5th Grade Graphing Activities](#)



[5th Grade Math Skill Builders](#)



[The National Library of Virtual manipulatives](#)



[The Math Worksheet Site](#)



[Learn Zillion ~ Common Core Videos](#)



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- ✚ 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.

PARENT GUIDE

GRADE FIVE MATHEMATICS CURRICULUM

DIOCESE OF CLEVELAND

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

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

OPERATIONS AND ALGEBRAIC THINKING	
WRITE AND INTERPRET NUMERICAL EXPRESSIONS.	
	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
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 AND OPERATIONS IN BASE TEN	
UNDERSTAND THE PLACE VALUE SYSTEM.	
	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left..
	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
	Read, write, and compare decimals to thousandths.
	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
	Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
	Use place value understanding to round decimals to any place.
PERFORM OPERATIONS WITH MULTI-DIGIT WHOLE NUMBERS AND WITH DECIMALS TO HUNDREDTHS.	
	Fluently multiply multi-digit whole numbers using the standard algorithm.
	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Classify two-dimensional figures in a hierarchy based on properties.
NUMBER AND OPERATIONS ~ FRACTIONS	
USE EQUIVALENT FRACTIONS AS A STRATEGY TO ADD AND SUBTRACT FRACTIONS.	
	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

NUMBER AND OPERATIONS ~ FRACTIONS CONTINUED	
APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF MULTIPLICATION AND DIVISION.	
	Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
	Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$.
	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
	Interpret multiplication as scaling (resizing), by:
	Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
	Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.
	Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.
	Interpret division of a whole number by a unit fraction, and compute such quotients.
	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.
MEASUREMENT AND DATA	
CONVERT LIKE MEASUREMENT UNITS WITHIN A GIVEN MEASUREMENT SYSTEM.	
	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
REPRESENT AND INTERPRET DATA.	
	Make a line plot to display a data set of measurements in fractions of a unit ($1/2, 1/4, 1/8$). Use operations on fractions for this grade to solve problems involving information presented in line plots.
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF VOLUME.	
	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
	A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

MEASUREMENT AND DATA CONTINUED	
GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF VOLUME CONTINUED.	
	Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.
GEOMETRY	
GRAPH POINTS ON THE COORDINATE PLANE TO SOLVE REAL-WORLD AND MATHEMATICAL PROBLEMS.	
	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.
CLASSIFY TWO-DIMENSIONAL FIGURES INTO CATEGORIES BASED ON THEIR PROPERTIES.	
	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
	Classify two-dimensional figures in a hierarchy based on properties.
DOC: Numbers, Number Sense and Operations	
NUMBER AND NUMBER SYSTEMS	
	Compare and order numbers to millions.
	Develop an understanding of fractions.
	Use fractions to show division of whole numbers.
COMPUTATION AND ESTIMATION	
	Add and subtract decimals to thousandths.
	Apply the divisibility rules for 2, 5, and 10.
DOC: Measurement	
MEASUREMENT TECHNIQUES AND TOOLS	
	Estimate measurements of physical objects by comparing the objects to benchmarks.
DOC: Geometry and Spatial Sense	
CHARACTERISTICS AND PROPERTIES	
	Identify, compare, analyze and classify two and three-dimensional shapes.
	Draw circles, identify, and determine relationships among the radius, diameter, center, and circumference; e.g., radius is half the diameter, the ratio of the circumference of a circle to its diameter is an approximation of π .
OH: CCSS: Literacy: Reading: Informational Text	
KEY IDEAS AND DETAILS	
	Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
CRAFT AND STRUCTURE	
	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

MATHEMATICS CURRICULUM

GRADE FIVE

CHECKLIST FOR COMMON CORE STATE STANDARDS & DIOCESAN CURRICULUM

DATE TAUGHT	
OPERATIONS AND ALGEBRAIC THINKING	
WRITE AND INTERPRET NUMERICAL EXPRESSIONS.	
	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
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 AND OPERATIONS IN BASE TEN	
UNDERSTAND THE PLACE VALUE SYSTEM.	
	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
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