Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 6
Unit 1: Place Value Purpose: Use place value to write, compare, add, and subtract whole numbers.	

Essential Questions:

- How is math used to compare, represent, and model numbers?
- How are relationships represented using math?
- What does it mean to estimate a number, and when is it appropriate to use estimation?

Standards:

4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.
4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number sense, and expanded form.
4.NBT.3 Compare two multi-digit numbers based on meaning of the digits in each place, using <, >, and = symbols to record the results of the comparison.
4.NBT.4 Use place value understanding to round multi-digit whole numbers to any place.
4.NBT.5 Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Standards Reinforced:

3.NBT.1 Identify, recognize, and write numbers through the hundred thousand place value.
3.NBT.2 Record whole numbers using words.
3.NBT.3 Compare and order whole numbers.
3.NBT.4 Use place value understanding to round whole numbers to the nearest 10 or 100.
3.NBT.5 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Vocabulary:		
algorithm	equations	mental math
associative property of addition	expanded form	millions
commutative property of addition	greater than >	period
conjecture	identity property	place value
counting on	inverse operations	rounding
	less than symbol <	variable

Authentic Performance Assessment:

- Model, using base ten blocks or drawing, given one - six-digit number.
- Create real world problems using addition and subtraction.
- Draw/model how to round a given number.
- Name the value of the underlined digit.

- Ongoing self-evaluation: exit slips (These could be a review question from the lesson or a pre-assessment on the next day's lesson) or lesson rubrics/self-evaluation rubric. Several exit slips can be found at LeAnn Nickelson's free resources page.
- Students will choose from a variety of career choices as they explore the careers available that involve place value and the relationship of numbers and the many complexities within their chosen field(s). Fields such as:

For example, if the students chose the transportation field, the student could do the following to show mastery of the standard:

- Create a travel log/itinerary to different locations in the world/country/universe. Choose several locations and compare the distance between them by using the knowledge of both place value and/or subtraction skills.
- Create a travel itinerary visiting multiple destinations and order the distance with the closest and farthest away.
- Create a travel itinerary with multiple destinations and create a travel log of total number of miles traveled. Use the real distance traveled versus the estimated number of miles traveled.
- To assess the standard of students being able to read and write multi-digit numbers, students could pretend to write out a check. This link has a lesson that contains the lesson plan and material for writing a check.
- Become real estate agents and use the local newspaper or a website like zillow.com to do things like:
    - compare the prices of houses using place value and/or subtraction skills to find the difference.
    - compare and order prices of different houses from greatest to smallest in value.
    - round the price of a property/house to a certain place value.

Computation Skills:

Addition
Subtraction
Comparing
Rounding
Mental Math

Thinking and Reasoning Skills:

- What ways can we classify numbers? (Based on place value, rounding, digit value, etc.)
- What ways can I represent this number? (ex. 3 thousand is the same as 30 hundreds or standard, written, & expanded form)
- In what ways can I manipulate this number to give it a greater value or less value? (Patterns and relationship of numbers)
- How can we compare numbers? (<, >, = be able to state how much more or less a number is compared to another)
- When is it appropriate to use estimation/rounding?

Mathematical Task Analysis Guide:

- Level 1: Memorization Tasks - Involves producing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae, or definitions to memory
- Level 2: Procedures with connections - Are focused on producing correct answers
- Level 3: Procedures with Connections Task - focus students' attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical concepts and ideas
- Level 4: Doing Mathematics Tasks - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships

Real World Problems & Application/Catholic Identity:

Real World: Career Seeking – www.pacareerzone.org

How will I use place value, number relationships, and estimation in the real world? For example:

- Career Seeking – www.pacareerzone.org- Students can use this site to research about different careers. For this unit, students could use the site to compare the wages from one occupation to the average wage. Students could also compare the number of employed people in different fields. Through this process, students could engage in higher order thinking skills when thinking about why some careers would earn a higher income or why certain career fields require a higher number of workers.
- Home Connection - Grocery Shopping/Budgeting: Students can use local grocery and store advertisements in several ways. Students could be given a budget and then use both real and rounded numbers to buy items. Students could also do price comparisons to use subtraction skills within a real-world context.
- Geography/States Skills: Students could compare populations of cities within Pennsylvania. While researching, students could also round data (city population, land area, etc). Students could also compare the elevation of two different locations.
- Science Connection: Students can compare distances or depths. For example, depths of oceans, rivers; solar system - compare distances between the Earth and the Sun or the Earth and the moon etc.

Catholic Identity: Relate the idea of value. Discuss how each person was created by God with unique talents and abilities. Discuss how our value comes from being a child of God who has created us in His own image (Genesis 1:27). God even refers to use being His handiwork (Ephesians 2:10) and that we were created to use the gifts He has given us.

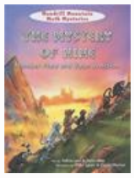
- What gifts and talents do I have that are valuable to others?
- How can I use my gifts and talents in my classroom, school, parish, community that are valuable to others?
- How does knowing that I am valued by God change the way I think and act?
- How does knowing that each person has immeasurable worth change the way I view and treat others?
- The issue of money and tithing can also be integrated into this unit.
- Discussions such as charitable giving could be integrated into the unit.

Reading and Writing in Math:

Reading: The following list contains books that could be used in multiple ways. The books could be used as a direct, whole group read aloud, within a small group, or placed in an area for independent reading. An additional resource you can access to find these books is called ***Epic!***

How Much Is a Million?

Schwartz, David M.
AR Quiz No. 17319 EN Nonfiction
IL: **LG** - BL: **3.4** - AR Pts: **0.5**
AR Quiz Types: **RP**, **RV**
Rating: ★★★½
Examples from Marvelosissimo the Magician explain the concepts a million, a billion, and a trillion.

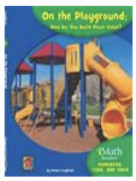


The Mystery of Nine: Number Place and Value in Action

Law, Felicia
AR Quiz No. 136917 EN Fiction
IL: **LG** - BL: **3.7** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★★
This book illustrates the number place and value through a mystery in which castaways befriend a spider monkey after he promises to give them information about the hidden rulers of the island on which they are stranded. The coauthor is Steve Way.

Math at the Bank: Place Value and Properties of Operations

Mahaney, Ian F.
AR Quiz No. 159785 EN Nonfiction
IL: **LG** - BL: **4.8** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★☆
Readers will learn about place value, properties of operations, base-ten, fact families, and more, all while exploring problems related to the bank.



On the Playground: How Do You Build Place Value?

Loughran, Donna
AR Quiz No. 157281 EN Nonfiction
IL: **LG** - BL: **3.1** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Mathematical concepts of "greater than" and "lesser than" are introduced through a story about building a playground. Different methods of determining place value, such as place-value blocks and linking cubes, are used.

Reading Skills: Because this unit addresses place value concepts, students could also use information and data from reading materials such as Scholastic News, social studies textbooks, etc. and be able to see numbers within context. Students could compare dates and/or distances. Students could answer and research to address questions like... Where do we see numbers that are estimated? When do I see numbers that are in the millions place, and what are they used for?

Journal Writing Ideas:

- Vocabulary foldables allow students a quick guide to access and study new math terms. Additionally, it encourages note taking skills, and also provides flashcards for studying purposes.
- Provide students with pictures (base ten models) and/or charts (place value) to glue into their journals as visual aides to help show/explain the difference between place values and what is happening between the place values.
- Explain (in writing with words and/or pictures) the process for rounding or estimating.
- Write a six-digit number, and then label the place of each digit and identify the value of each digit (standard, written (word), expanded form).

- Compare two numbers and explain how the comparison was made. Students could write or draw the model.
- Cross curricular comparison work can also be housed in the student journals.

Questions/Discussion Strategies:

- Students will work together, throughout the unit, to explore and share their reasoning and train of thought through pair share and/or peer tutoring opportunities. To do this engage students in conversations that will promote classroom discussion. Ways to start productive conversations are asking students questions like:
- Who can say what Johnny said in their own words? Who can add to that?
- Students can also be encouraged to use sentence starters like…
- Another strategy I can use is…
- I can prove that by…
- I disagree/agree because…
- My first step was…

For discussion strategies, the following Kagan strategies could be used…

- Numbered Heads Together: Students are put into groups. Each student is given a number within the group. The teacher poses a question. Each student individually writes his or her answer. The group discusses the answer and must come to a consensus about what answer/solution is the best answer. The teacher then calls a number. The selected students solve a similar problem to the one completed. For this unit, this could be used in multiple ways: rounding numbers, writing a number in an expanded form, finding the place value of a number, choosing to round or use real value, etc.
- Instant Star is similar to Numbered Heads Together except that the teacher poses a question and then calls on a "star" to share to his or her group. If the group agrees with the person's answer, the students cheer. If they do not agree, the group "coaches" the individual to the correct answer. For this unit, this could be used in multiple ways: rounding numbers, writing a number in an expanded form, finding the place value of a number, choosing to round or estimate a number, etc.
- Talking Chips: This strategy could be used for more in depth questions such as the ones in the Thinking/Reasoning section. Each student is given the same number of chips. Every time a student talks, he or she must place a chip into the middle of the table. Once all of your chips are used, you are only allowed to listen. When everyone has used their talking chips, the students would start again. More information on Talking Chips.

Technology/Manipulatives:

General Practice Games: Khan Academy, SumDog Games, Hoodamath, Brainpop, Scholastic Study Jams, Frontrow, IXL

Technology for Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a given area and students complete the quiz. Most of these sites work best as multiple-choice quizzes.

- Padlet - Teachers create questions in which the students must respond using multiple choice cards. The teacher uses a smart device to scan the students' cards to receive their answers.
- Various Place Value Activities

Technology Games for practice or enrichment

- Brainpop: https://www.brainpop.com/math/ Brainpop, requires a membership, and is an educational website that provides videos to reinforce skills in this unit.
- Hoodamath: http://www.hoodamath.com/games/fourth-grade.html Hoodamath is a free website that provides an array of mathematical games for students to practice a variety of skills.
- Sheppardsoftware: http://www.sheppardsoftware.com/math.htm Sheppardsoftware is a free website that provides a wide variety of mathematical games to reinforce skills and concepts
- Scholastic Study Jams - http://studyjams.scholastic.com/studyjams/jams/math/index.htm - Scholastic Study Jams contains free animalted video for students. The site contains math and science videos. For this unit, there are videos that address multiplication, factors, and distributive property.
- Khan Academy: https://www.khanacademy.org/math/k-8-grades/cc-fourth-grade-math Khan Academy provides free video tutorials and assessments for mathematical standards that are adressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
- Freckle: https://www.freckle.com/ - Freckle offers a free account for teachers and students. The site provides practice to build on fact fluency as well as skills within the different math domains. For this unit, students would work within the Base 10 and Operations and Algebraic Thinking Domains. Students take a pre-assessment, and the program uses that data to provide learning that is individualized for the student's abilities.
- ABCya: http://www.abcya.com/fourth_grade_computers.htm ABCya is a free website and has educational math games for grades PreK-5.
- IXL: https://www.ixl.com IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30 day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions.

Manipulatives:

- base 10 blocks
- graph paper
- place value charts
- place value chips
- number lines
- vocabulary foldables (for interactive notebooks)
- new vocabulary words for word wall

Accommodations/Acceleration/Differentiation:

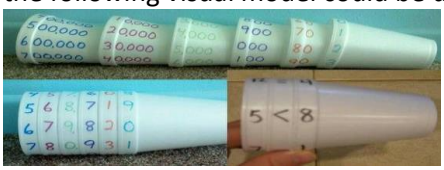
Adaptations:

- Divide students into groups by ability to provide differentiated instruction: collect data throughout the unit to determine individual student needs - then group by ability (1) guided practice with place value and reteach along the way (2) base ten block practice (3) independent project
- Provide 1:1 time for explicit instruction and then practice

- Collaborate with Act 89 Teacher
- Vary number of items in self–evaluation check rubric(s) for assistance with creating rubrics you can visit this site.
- For students who are struggling, use blocks likes Duplo blocks to show the expanded form

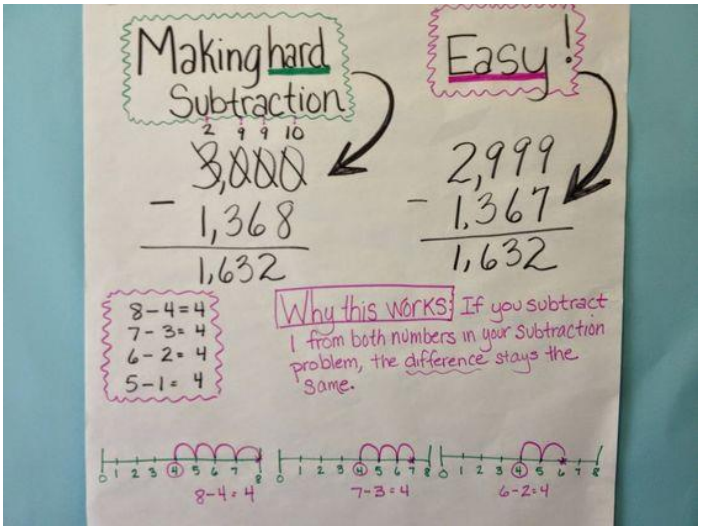
.

- For students who are struggling with writing larger numbers or converting to expanded form, the following visual model could be used to compose or decompose a number.



- For students who are struggling, place value "discs" could be used to show the value of each place. For example, 300 is the same as 100+100+100

- For students who are struggling with regrouping zeros, the following methods could be used.



- The following link provides another method to teach subtraction across zeros.

Extensions:

- Prepare center games (for ex. using task cards) OR daily entrance activity for students to extend and apply place value understanding. Example
- Games that are found in the technology section

Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 8
Unit 2: Exploring Multiplication Purpose: Use factors and multiplication to solve algorithmic and real-world problems.	

Essential Questions:

- How is mathematics used to quantify, compare, represent, and model numbers?
- How are relationships represented mathematically?
- How can patterns be used to describe relationships in mathematical situations?
- How can you use arrays to represent all factors of a given number?
- What's the difference between a prime number and a composite number?
- How can we use equations and variables to solve real life word problems?
- How can a person tell if an answer is reasonable?

Standards:

4.OA.1 Interpret a multiplication equation as a comparison.
4.OA.2 Represent verbal statements of multiplicative comparisons as multiplication equations.
4.OA.3 Multiply or divide to solve word problems involving multiplicative comparison, e.g. by using drawings and equations with a symbol for the unknown number to represent the problems, distinguishing multiplicative comparison from additive comparisons.
4.OA.5 Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
4.OA.6 Find all factor pairs for a whole number in the range 1 – 100.
4.OA.7 Recognize that a whole number is a multiple for each of its factors.
4.OA.8 Determine whether a given while number in the range of 1-100 is a multiple of a given one-digit number. (Rules of divisibility)
4.OA.9 Determine whether a given whole number in the range 1-100 is prime or composite.
4.OA.10 Generate a number or shape pattern that follows a given rule.
4.OA.11 Identify apparent features of the pattern that were not explicit in the rule itself.
4.NBT.6 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays and/or area models.

Standards Reinforced:

3.OA.1 Interpret products of whole numbers.
3.OA.5 Apply properties of operations as strategies to multiply or divide.
3.OA.6 Know the formal names of the properties of multiplication and division.
3.OA.9 By the end of Grade 3, know from memory all products of two one-digit numbers.
3.OA.10 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity.
3.OA.11 As the reasonableness of answers using mental computation and estimation strategies including rounding.

3.MD.11c Use tiling to show in a concrete case that the area of a rectangle with whole number side lengths a and b + c is the sum of a x b and a x c. Use area models to represent the distributive property in mathematical reasoning.

Vocabulary: algorithm array associative property of multiplication breaking apart commutative property of multiplication compatible numbers compensation	composite numbers distributive property of multiplication divisibility rules estimate factor factor pairs generalize	inverse operations mental math multiple numerical expression partial products prime numbers product rounding variable

Authentic Performance Assessment:

- The students pick from a variety of different professions and choose related activities. For example, if choosing manufacturing, students will create a product and manufacture that product using multiplication to show productivity and packing of the product. Students could then apply the knowledge of factors to determine how the item could be packaged (i.e. groups of 2, 3, 5, etc.). The project could easily be integrated with social studies concepts dealing with economics.www.pacareerzone.org.
- Students could also be event planners. They could be given a certain budget and must work within that budget for a certain number of people (15, 20, 50, etc.) ... Students could choose a theme and then buy decorations for the event. The students must keep track of the items bought using both multiplication and addition skills during this task. Students could also determine the seating arrangement (Tables of 4, 8, etc.) to assess their knowledge of factors.
- Have students create multi digit by two-digit problems and correctly solve them.
- Student created input output problems. Be sure they state the rule.
- Students sort numbers as either being prime or composite.

Computation Skills:

addition
multiplication
repeat a pattern
create a pattern
state the rule of a given pattern
create a rule(s) for a self-created pattern

Thinking and Reasoning Skills:

- What ways can we classify numbers? (Based on place value, rounding, digit value)
- What ways can I represent numbers using arrays? (Students should apply commutative properties of multiplication)
- In what ways can I manipulate this number to give it a greater value or less value? (Patterns and relationship of numbers)
- What can I use to help me determine if a number is prime or composite? (Students should be able to use divisibility rules to answer this question)

- What are some different ways that I can find the product when I am given two different factors?
- What tools can I use to help determine the answers? (i.e. number line, number chart, drawing, etc.).
- When is it appropriate to multiply instead of add?

Suggested learning activities:

- Provide basic fact practice for the times table 0 - 12. Display progress in memorizing facts by building a paper ice cream cone and when they have mastered all 12 tables treat them to an ice cream cone or other prize.
- Reinforce place value concepts by breaking apart multi-digit numbers to solve three digits by one- and two-digit numbers. Students can use the area model, box method, compensation, or partial product.
- Use counters to show how numbers can be broken apart to solve.
- Catholic Schools Week: Students could contribute in a part of the planning process. They could be given a certain budget and must work within that budget for a certain number of people (15, 20, 50, etc). Students could choose a theme and then buy decorations for the event. The students must keep track of the items bought using both multiplication and addition skills during this task.
- Students could determine the seating arrangement (Tables of 4, 8, etc.) to assess their knowledge of factors. For example, if they had 150 people coming to their Thanksgiving Dinner how could they arrange their tables.
- Have students create multi digit by two-digit problems then pair students up to solve each other's. Students could use number cubes to create problems.
- Students can draw models to show the factors of a product..i.e. arrays
- Play games with multiplication to explore the properties...i.e. how is it I can rearrange the numbers when I multiply and still come up with the same answer.
- Use various items (counting chips, dice, beads, Swedish fish, pipe cleaners, straws, smarties etc.) and have students create and extend patterns.
- Student created input output monsters. Practice with rules by creating a paper “monster” which can be used to input a number and once the monster eats it a different (certain) number comes out.
- Extend pattern thinking to introduce divisibility rules to help determine if a number is prime or composite.
- Students sort numbers using a “color code” to sort (identify) numbers 1-100 as being prime and composite numbers on a 100’s chart.
- Use paper tree cut outs to help students with finding factor pairs.
- Relate variables to playing games...you’re trying to reveal what the unknown number is.
- Use cookies (or whatever else your students will like) to explore the distributive property
- Have students represent numbers on a number line - the number line would be “drawn”on the floor with masking tape to explore rounding with numbers and using compatible numbers to make numbers (multiplication) easier to work with. This reinforces those basic facts.

Mathematical Task Analysis Guide:

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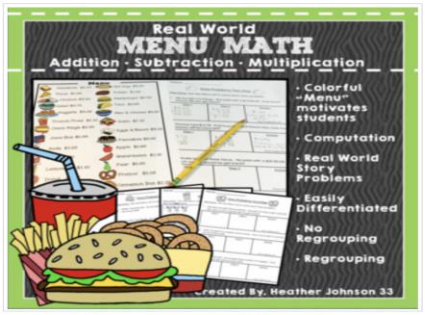
- **Level 2: Procedures with connections -** Are focused on producing correct answers

- **Level 3: Procedures with Connections Task -** focus students' attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical concepts and ideas
- **Level 4: Doing Mathematics Tasks** - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships

Real World Problems & Application/Catholic Identity:
Real World Problems & Application:

- Have students create a menu for their favorite restaurant (real or made up) then create a variety of ordering options. If you are taking three friends to dinner, calculate what the total amount would be for dinner.
- We've collected products to make care packages for our troops overseas. I've created an array of 6 by 9 with all the shampoo bottles that were donated. How many bottles of shampoo were donated?
- Students can create a game board (group or individual...whatever makes the most sense for your class size) in which they demonstrate their mastery of the unit. A rubric should be used of this PBL.
- Student created real- world word problems
- The following link to Teachers Pay Teachers takes you to purchasable resources that offer more ideas for applying real world problems to help guide students as they explore and come to answer the essential questions for this unit.

Menu Math Add, Subtract, Multiply: Money: Real-World Word Prob



Subject
Basic Operations, Word Problems, Decimals

Grade Levels
2nd, 3rd, 4th, 5th

Resource Type
Worksheets, Fun Stuff, Math Centers

Product Rating
4.0 • 68 Ratings

File Type
PDF (Acrobat) Document File
Be sure that you have an application to open this file type before downloading and/or purchasing.

5 MB | 68 pages

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- **Catholic Identity:** A great way to pull in the Catholic Identity piece for this unit is to provide a meal for a local church dinner in combination with religion class. It could also serve as one of your yearly service projects. The project listed shows how serving others grows our faith as well as shows God's love to people.

The Meal Planning Project

By Jessi Olmsted

This project is designed to help your students practice their multiplication facts. They will also review adding multiple two and three digit numbers in a row. This project can also be ...

- Students are respectfully working cooperatively in a Christ-like manner, while working in small groups.
- Teachers could make Biblical connections to the numbers being used.
- Catholic Teachings are associated with the Mathematical Practice Standards.
- Example: #1 Students can solve problems without giving up, as Catholics; we connect to our Theological virtue of hope. #2 Students can think of numbers in many ways, students can think about God in many ways, *My Father, *My Redeemer, * My Counselor.
- During the multiplication unit, students could discuss what "factors" build their faith and how we can develop and grow in these areas. Discuss how these practices can be practiced in our homes. classroom, parish, and community. The idea of sharing our faith (i.e. the Great Commission) to show how the growth of the body of Christ can grow in number could also be addressed in this unit.

Reading and Writing in Math:

Reading: The following list contains books that could be used in multiple ways. The books could be used as a direct, whole group read aloud, within a small group, or placed in an area for independent reading. An additional resource you can access to find these books is called ***Epic!***

Amazing Animals: Multiplying Multidigit Numbers by One-Digit Numbers with Regrouping

Zuravicky, Orli
AR Quiz No. 70507 EN Nonfiction
IL: **MG** - BL: **4.5** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book gives facts about familiar animals, such as how often a snake sheds its skin and how many pounds a baby blue whale gains in a week, and shows how to use multiplication to determine further information.

Fun with Numbers

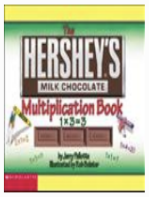
World Book Editors
AR Quiz No. 148842 EN Nonfiction
IL: **MG** - BL: **4.8** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★☆
This activity-based book introduces such mathematical concepts as addition, subtraction, multiplication, division, fractions, and statistics.

If You Were a Times Sign

Shaskan, Trisha Speed
AR Quiz No. 127918 EN Nonfiction
IL: **LG** - BL: **3.4** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Primary math concepts about the multiplication sign are introduced using creative examples, easy-to-understand text, and illustrations.

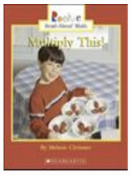
Multiply on the Fly

Slade, Suzanne
AR Quiz No. 145727 EN Nonfiction
IL: **LG** - BL: **2.0** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This rhythmic book teaches multiplication using a variety of insects, including daring dragonflies, hungry honeybees, and stealthy walking sticks.



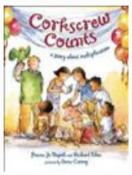
The Hershey's Milk Chocolate Multiplication Book

Pallotta, Jerry
AR Quiz No. 71688 EN Nonfiction
IL: **LG** - BL: **3.8** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
With large squares of Hershey's chocolate front and center, students write out the times tables.



Multiply This!

Chrismer, Melanie
AR Quiz No. 103564 EN Nonfiction
IL: **LG** - BL: **2.2** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This brief introduction to multiplication, with simple text and illustrations, provides examples of ways to perform the basic concepts of multiplication.

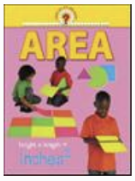


Corkscrew Counts: A Story About Multiplication

Napoli, Donna Jo
AR Quiz No. 126773 EN Fiction
IL: **LG** - BL: **2.3** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
It is Corkscrew the pig's birthday celebration, and when his owners and their friends do not include Corkscrew and his friend Pirate the parrot in the party games, they make it clear they want to join in the fun. The coauthor is Richard Tchen.

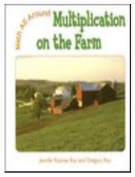
The Fishy Fountain: A Mystery with Multiplication and Division

Thielbar, Melinda
AR Quiz No. 138998 EN Fiction
IL: **MG** - BL: **3.2** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
After a prank is pulled that put dangerous chemicals in the fountain at Stacy's new science magnet school, four friends from Sifu Faiza's Kung Fu School use multiplication and division to help figure out who did it and how. Book #6



Area

Woodford, Chris
AR Quiz No. 101095 EN Nonfiction
IL: **MG** - BL: **5.1** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★☆
In clear text and colorful images, this book discovers the measurement of area, including small- and large-scale measurements as well as going beyond to discuss what area can tell about such things as how the Earth is changing.



Multiplication on the Farm

Roy, Jennifer Rozines
AR Quiz No. 111822 EN Nonfiction
IL: **LG** - BL: **3.0** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book reinforces both multiplication and reading skills, stimulates critical thinking, and provides students with an understanding of math in the real world. The coauthor is Gregory Roy.

Journal writing ideas:

- Vocabulary foldables (all new vocabulary) for study purposes, and note taking
- Explain the difference between prime and composite.
- Students can complete a multiplication chart.
- Complete a color coded prime & composite 100's chart.
- Student created word problems
- Self-read one of the books and write a summary or draw a picture that tells what the story was about.

Questions/Discussion Strategies:

- How can we use what we know about arrays to help us better understand what is happening when we use the standard algorithm?
- Prompt students to share their thinking and then encourage others to restate what was said in their own words.

- As an opening task before class begins write a multi-digit by two-digit problem on the board with a purposeful mistake in the arithmetic somewhere. As students enter class, they are to solve the problem themselves then encourage students to make a conjecture as to who is right.
- What's the difference between prime and composite? How do you know that?
- Students can also be encouraged to use sentence starters like…
- Another strategy I can use is…
- I can prove that by…
- I disagree/agree because…
- My first step was…

For discussion strategies, the following Kagan strategies could be used…

- **Numbered Heads Together:** Students are put into groups. Each student is given a number within the group. The teacher poses a question. Each student individually writes his or her answer. The group discusses the answer and must come to a consensus about what answer/solution is the best answer. The teacher then calls a number. The selected students solve a similar problem to the one completed. For this unit, this could be used in multiple ways: Instant Star is similar to Numbered Heads Together except that the teacher poses a question and then calls on a "star" to share to his or her group. If the group agrees with the person's answer, the students cheer. If they do not agree, the group "coaches" the individual to the correct answer. For this unit, this could be used in multiple ways: multiplication problems, listing factors of a number, or sorting prime or composite numbers.
- **Talking Chips:** This strategy could be used for more in depth questions such as the ones in the Thinking/Reasoning section. Each student is given the same number of chips. Every time a student talks, he or she must place a chip into the middle of the table. Once all of your chips are used, you are only allowed to listen. When everyone has used their talking chips, the students would start again.

Technology/Manipulatives:

Technology for Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a given area and students complete the quiz. Most of these sites work best as multiple-choice quizzes.
- Padlet - Teachers create questions in which the students must respond using multiple choice cards. The teacher uses a smart device to scan the students' cards to receive their answers.
- Various Place Value Activities - http://pickettsmill.typepad.com/files/place-value-activity-pack.pdf

Technology for practice or enrichment:

- Brainpop: https://www.brainpop.com/math/ Brainpop, requires a membership, and is an educational website that provides videos to reinforce skill in this unit.

- Hoodamath: http://www.hoodamath.com/games/fourth-grade.html Hoodamath, is a free website, that provides an array of mathematical games for students to practice a variety of skills.
- Sheppardsoftware: http://www.sheppardsoftware.com/math.htm Sheppardsoftware Sheppardsoftware is a free website that provides a wide variety of mathematical games to reinforce unit skills and concepts.
- Scholastic Study Jams - http://studyjams.scholastic.com/studyjams/jams/math/index.htm - Scholastic Study Jams contains free animalted video for students. The site contains math and science videos. For this unit, there are videos that address prime and composite numbers, multiplication, and patterns.
- Khan Academy: https://www.khanacademy.org/math/k-8-grades/cc-fourth-grade-math Khan Academy provides free video tutorials and assessments for mathematical standards that are adressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
- Freckle: https://www.freckle.com/ - Freckle offers a free account for teachers and students. The site provides practice to build on fact fluency as well as skills within the different math domains. For this unit, students would work within the Base 10 and Operations and Algebraic Thinking Domains. Students take a pre-assessment, and the program uses that data to provide learning that is individualized for the student's abilities.
- ABCya: http://www.abcya.com/fourth_grade_computers.htm ABCya is a free website and has educational math games for grades PreK-5.
- IXL: https://www.ixl.com IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30 day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions. This program really allows you to target differentiated instruction

Manipulatives:

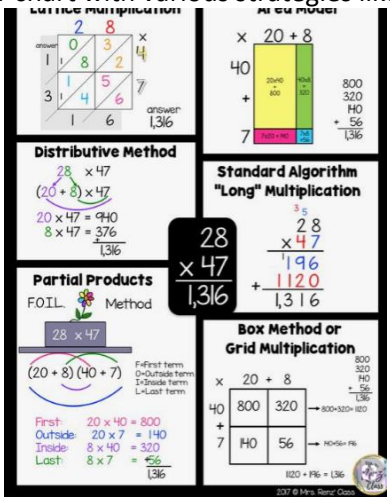
- base ten blocks
- whiteboards
- graph paper
- whiteboards with grids
- dry erase markers
- counters
- masking tape
- multiplication & division flash cards
- multiplication wraps

Accommodations/Acceleration/Differentiation:

Adaptations:

- Divide students into groups by ability to provide differentiated instruction: collect data throughout the unit to determine individual student needs - then group by ability (1) guided practice with repeated addition and reteach along the way (2) array practice (3) independent project .
- Provide 1:1 time for explicit instruction and then practice.
- Collaborate with Act 89 Teacher.

- Vary number of items in self–evaluation check rubric(s) for assistance with creating rubrics you can visit this link.
- For students who struggle with spatial sense, use graph paper to help align problems.
- Provide Base 10 blocks for students to create the multiplication problem using a visual representation. This allows for the students to see the problem and to break it into shorter steps. For example, the students could make the problem 14 x 12 and see that there are 12 groups of 4 (48) and 12 groups with 1 ten in each of them (120). The two groups are added together to find the product.
- Display an anchor chart with various strategies like the image below.



- The following video shows a brief overview of the area array model for double digit multiplication. This method can help students break the problem into smaller section. https://bit.ly/2bE0SoH
- The following video shows a method for students who are struggling with two digit by two-digit multiplication. It shows how students can use the traditional model of multiplying with guidance. https://bit.ly/2MDQuCY

Extensions:

- Prepare center games (for ex. using task cards) for students to extend and apply multiplication in various ways and contexts.
- Create a resort project allows students another opportunity to apply what they've learned about multiplication and patterns to a real-world problem - designing a resort!
- Extend the concept of multi-digit by two-digit multiplication to include multi-digit by three - digit multiplication.
- Provide more challenging patterns for these students to extend.
- These students could combine all operations for their input output monsters.
- Incorporate Challenge 24 cards into center work.
- Kakooma Cards - To help develop fact fluency, student can use purchased or teacher created cards. Each card has a 3x3 grid with numbers in each. The students must find two factors and their corresponding product. The following link has many resources. You must scroll down the page to find the Kakooma Cards for Multiplication.

Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 6
Unit 3: Perimeter, Area, Division & Data Purpose: Fluently calculate perimeter and area of rectangles. Use multiplication and division to solve real-world problems.	

Essential Questions:

- When is it is appropriate to estimate versus calculate?
- How can data be organized and represented to provide insight into the relationship between quantities (numbers)?
- How does the type of data influence the choice of display?
- How can recognizing repetition help us solve problems faster?
- How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?

Standards:

4.MD.4 Apply the area and perimeter formulas for rectangles in real- world and mathematical problems.
4.NBT. 7 Find a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays and/or area models.
4.OA.10 Generate a number or shape pattern that follows a given rule.
4.OA.11 Identify apparent features of the pattern that were not explicitly in the rule itself.
4.OA.3 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
4.OA.4 Solve multi-step word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity.
4.OA.5 Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Standards Reinforced:

3.MD.9 Recognize area as an attribute of plane figures and understand concepts of area measurement.
3.MD.9a A square with side length 1 unit, called “a unit square”, as said to have “one square unit” of area, and can be used to measure area.
3.MD.9b A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
3.MD.10 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
3.MD.11 Relate area to the operations of multiplication and addition.
3.MD.11a Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths.
3.MD.11b Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems.

3.MD.11d Recognizes area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.
3.OA.2 Interpret whole-number quotients of whole numbers.
3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays and measurement quantities.
3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.
3.OA.7 Understand division as an unknown -factor problem.
3.OA.8 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division.
3.OA.10 Solve multi-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity.

Vocabulary: area associative property of multiplication commutative property of multiplication compare comparisons compatible numbers data	distributive property of multiplication divisible division equations even number inverse operations line plot mental math odd number	outlier partial quotient perimeter remainder repeating pattern round rule scale variable

Authentic Performance Assessment:

- Begin the unit with a pre-assessment, so you know where to target instruction. Collect formative assessments throughout the unit by observing, giving pop quizzes (to check for understanding), playing games (during center work) or practice these skills by visiting the website(s) provided in the technology section.
- An end of unit project could be a school garden. It would help to pull in all the skills in this unit: perimeter, area, division, & data. If your school can't build a real garden, then create a virtual one. You can visit lifelab, which is a great resource to help you (and your school) get started.
- Students could also create a playground, amusement park, restaurant while applying the principles of area and perimeter to determine the layout and different areas/items needed. For example, the students could create a dream playground for the school. Using graph paper, students could create different areas for different types of play equipment and find the area needed for each. Students could then extend by creating budgets to correlate with their plan to apply multiplication/division skills while also reviewing addition and subtraction concepts. If doing a playground, students could purchase items and keep a log of items purchased for the playground using multiplication, division, and addition skills.
- Students could also plan a field trip using authentic data to determine costs. Students would have to use multiplication and division skills to determine things like cost per student, total cost of an event, dividing and allocating money for meals, etc.

- Students could connect art to math by creating the following project. Students must create three different quadrilaterals. The students are given the area and/or perimeter and must determine the dimensions.

Computation Skills:
add
estimate
mental math
multiply
divide
interpret data
collect data

Thinking and Reasoning Skills:

- If we want to lay carpet in our classroom, how would I know how much to buy?
- How can we determine the size of this room?
- When is it appropriate to use division?
- Why is it helpful to collect data and how can we use that data once we have collected it?
- What mental math strategies can I use to help me determine the solution?
- When should I use area? When should I use perimeter?
- Can area and perimeter ever the same? Explain.
- How can area and perimeter help me in the real world?
- What is the difference between multiplication and division, and how do I know which one to use?
- How could I solve this problem (multiplication/division) problem in a different way?

Mathematical Task Analysis Guide:

- **Level 1: Memorization Tasks** - Involves producing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae, or definitions to memory
- **Level 2: Procedures with connections** - Are focused on producing correct answers
- **Level 3: Procedures with Connections Task** - Focus students' attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical concepts and ideas
- **Level 4: Doing Mathematics Tasks** - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships

Real World Problems & Application/Catholic Identity:

Real World Problems:

- Students can help in the planning of a school garden (a real garden or a virtual garden): what will you plant, how far apart will you plant them, how much area will you need, how much fence will you need to protect the garden.
- Students can practice perimeter and area by measuring any room in your building.
- Students could recreate their dream bedroom layouts using the idea of area to help determine which items could be placed in the room.
- The Internet for Classrooms link provides more ideas for student data collection activities

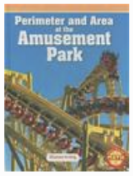
Catholic Identity:

- The garden could also serve as a service project, any food harvested from the garden can be given to a local food bank.
- With part of the focus being on division, the students could discuss the idea of how things divide us and break us apart. For example, the class could have the discussion about what things can cause division within a group and how believers should face these issues. How do we act towards others when there is division and fighting between us? Scripture can be used to reinforce the idea that although there are differences, we need to be unified.

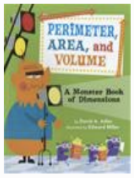
Reading and Writing in Math:

Reading: Students will be given access to books exploring the different topics addressed in the unit. The books suggested below could be used for students to individually read or to use as a read aloud in math. The books could also be used as an intervention for students who are both below, at, or above grade level depending on the difficulty of the text.

Landscape by Design: Perimeter and Area
Dugan, Christine
AR Quiz No. 168235 EN Nonfiction
IL: **MG** - BL: **5.0** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★☆
This books describes landscape architecture and design while encouraging readers to practice their geometric measurements, such as perimeter, area, diameter, radius, and angles.



Perimeter and Area at the Amusement Park
Irving, Dianne
AR Quiz No. 142098 EN Nonfiction
IL: **MG** - BL: **4.4** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
A variety of real-life situations associated with amusement parks present problem-solving opportunities and show readers how they can put math to work in their day-to-day activities.



Perimeter, Area, and Volume: A Monster Book of Dimensions

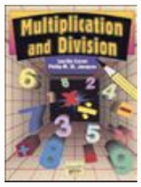
Adler, David A.
AR Quiz No. 149749 EN Nonfiction
IL: **LG** - BL: **4.3** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Monsters guide readers through the use of various math skills in a movie theater, demonstrating how to calculate the perimeter of the set, the area of the movie screen, and the volume of a popcorn box.

Pools to Ponds: Area, Perimeter, and Capacity

Perritano, John
AR Quiz No. 157305 EN Nonfiction
IL: **LG** - BL: **4.2** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
The mathematical concepts of perimeter, area, and volume are introduced as a child constructs ponds for fish and ducks.

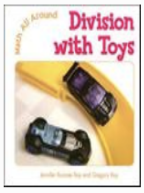
A Sense of Art: Perimeter and Area

Dugan, Christine
AR Quiz No. 168226 EN Nonfiction
IL: **MG** - BL: **5.4** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book uses elements of art to help readers learn about perimeter and area.



Multiplication and Division

Caron, Lucille
AR Quiz No. 50031 EN Nonfiction
IL: **MG** - BL: **5.7** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★☆
This book helps unravel the mystery of multiplication and division. The coauthor is Philip M. St. Jacques.



Division with Toys

Roy, Jennifer Rozines
AR Quiz No. 111818 EN Nonfiction
IL: **LG** - BL: **3.0** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book applies division skills to playtime, stimulates critical thinking, and provides students with an understanding of math in the real world. The coauthor is Gregory Roy.

Journal writing ideas:

- Vocabulary foldables (all new vocabulary) for study purposes, and note taking
- Explain the difference between prime and composite.
- Students can create questions to take a survey and then chart their data.
- Write an expository essay to explain the process of collecting and charting data.

- Create a one-digit- by three-digit division problem, solve the problem, then label all the parts of a long division problem. (For ex. Divide, Multiply, Subtract, Bring Down or students may also use partial quotient)
- Students can create real life problems using either multiplication or division to solve.
- Students can explain how to solve a problem using different methods of multiplication and division.
- Students can self-reflect and monitor their progress through journaling. Questions for this would look like… What do I understand about the lesson? Is there anything that I still do not understand?
- Explain the difference between prime and composite.

Questions/Discussion Strategies:

- Students will work together, throughout the unit, to explore and share their reasoning and train of thought through pair share and/or peer tutoring opportunities. To do this engage students in conversations that will promote classroom discussion. Ways to start productive conversations are asking students questions like:
- Who can say what Johnny said in their own words? Who can add to that? How do you know that? Can you think of an example of this? Who can draw to show/share their thinking? How can we apply this to something else?
- Students can also be encouraged to use sentence starters like…
- Another strategy I can use is…
- I can prove that by…
- I disagree/agree because…
- My first step was…

For discussion strategies, the following Kagan strategies could be used…

- Numbered Heads Together: Students are put into groups. Each student is given a number within the group. The teacher poses a question. Each student individually writes his or her answer. The group discusses the answer and must come to a consensus about what answer/solution is the best answer. The teacher then calls a number. The selected students solve a similar problem to the one completed. For this unit, this could be used in multiple ways: Instant Star is similar to Numbered Heads Together except that the teacher poses a question and then calls on a "star" to share to his or her group. If the group agrees with the person's answer, the students cheer. If they do not agree, the group "coaches" the individual to the correct answer. For this unit, this could be used in multiple ways: multiplication and division problems, area and perimeter problems, identifying and continuing patterns.
- Talking Chips: This strategy could be used for more in depth questions such as the ones in the Thinking/Reasoning section. Each student is given the same number of chips. Every time a student talks, he or she must place a chip into the middle of the table. Once all of your chips are used, you are only allowed to listen. When everyone has used their talking chips, the students would start again.
- More detailed information regarding Kagan strategies can be found here.

Technology/Manipulatives:

Technology to Help with Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a given area and students complete the quiz. Most of these sites work best as multiple choice quizzes.
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Technology: Practice math facts or enrich

- Brainpop: https://www.brainpop.com/math/ Brainpop, requires a membership, and is an educational website that provides videos to reinforce skill in this unit.
- Hoodamath: http://www.hoodamath.com/games/fourth-grade.html Hoodamath, is a free website, that provides an array of mathematical games for students to practice a variety of skills.
- Sheppardsoftware: http://www.sheppardsoftware.com/math.htm Sheppardsoftware Sheppardsoftware is a free website that provides a wide variety of mathematical games to reinforce unit skills and concepts.
- Scholastic Study Jams - http://studyjams.scholastic.com/studyjams/jams/math/index.htm - Scholastic Study Jams contains free animalted video for students. The site contains math and science videos. For this unit, there are videos that address prime and composite numbers, multiplication, and patterns.
- Khan Academy: https://www.khanacademy.org/math/k-8-grades/cc-fourth-grade-math Khan Academy provides free video tutorials and assessments for mathematical standards that are adressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
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- ABCya: http://www.abcya.com/fourth_grade_computers.htm ABCya is a free website and has educational math games for grades PreK-5.
- IXL: https://www.ixl.com IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30 day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions. This program really allows you to target differentiated instruction.
- SplashMath: provides various games for practicing perimeter and area https://www.splashmath.com/area-and-perimeter-games-for-4th-graders

Manipulatives:

- counters

- whiteboards
- graph paper
- grid whiteboards
- legos (for area or perimeter lessons)
- rulers/tape measures
- linking cubes

Accommodations/Acceleration/Differentiation:

Adaptations:

- Divide students into groups by ability to provide differentiated instruction: collect data throughout the unit to determine individual student needs - then group by ability (1) guided practice with using the standard algorithm for multiplication or division; reteach along the way (2) array practice and basic multiplication facts - provide multiplication chart if necessary (3) independent project
- Provide 1:1 time for explicit instruction and then practice with the following link https://www.khanacademy.org/math/cc-fourth-grade-math/cc-4th-mult-div-topic
- Collaborate with Act 89 Teacher.
- Vary number of items in self–evaluation check rubric(s) for assistance with creating rubrics you can visit https://www.exemplars.com/resources/rubrics/student-rubrics
- Keep practicing multiplication facts.
- One method for teaching long division is called the Box Method. The following video link provides and explanation of the model. https://bit.ly/2ny4JNe
- Another method for long division is called the "Big 7" method. The following link provides an explanation of the model. https://bit.ly/2xN32NC

Extensions:

- Prepare center games (for ex. using task cards or Boom Cards) for students to extend and apply multiplication in various ways and contexts.
- Have these students play games that are found in the technology section of this unit.
- Provide opportunities for students to extend the concepts (interpreting data, solving perimeter and area word problems or have them write word problems using perimeter and area, extend division to two digit by three digit).
- Students could also apply the concept of area and perimeter to the video game Minecraft. The following link offers ideas that reinforce these skills. https://education.minecraft.net/lessons/area-perimeter-tasks/
- Students plan for a video game day and determine what platform students will be able to play on what each unit would cost, how many units they would need to purchase. You could even provide the total price and number of platforms bought and the students need to determine the price of each. A game day packet can be purchased on Teachers Pay Teachers.

Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 6
Unit 4: Fractions Purpose: Fluently add and subtract fractions with like denominators. Develop number sense and fluently compare fractions with unlike denominators.	

Essential Questions:

- How is mathematics used to quantify, compare, represent, and model numbers?
- How can mathematics support effective communication?
- What are some ways to name the same part of a whole?
- Why are fractions useful, and what would the world be like without fractions?

Standards:

4.NF.1 Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.
4.NF.2 Use the above principle to recognize and generate equivalent fractions.
4.NF.3 Compare two fractions with different numerators and different denominators. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of the comparisons with symbols <, >, and =, and justify the conclusions, e.g., by using a visual fraction model.
4.NF.4a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
4.NF.4b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation.
4.NF.4c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
4.NF.4d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.

Standards Reinforced:

3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.
3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.
3.NF.2a Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.
3.NF.2b Represent a fraction a/b on a number line diagram by marking off “a” lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
3.NF.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.

3NF.3d Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparison with the symbols <, =, >. Justify the conclusions, e.g., by using a visual fraction model.

Vocabulary: area model benchmark fraction common factor comparison	compose decompose denominator equivalent fraction fraction lowest terms	mixed number number lines numerator unit fraction simplest form whole number

Authentic Performance Assessment:

- Exhibit an understanding of fractions within cooking. Follow a recipe which includes fractions. Tell what cooks could do if they did not have enough measuring cups to measure each ingredient separately (adding fractions within one cup), or had a limited type of measuring cups, for example quarter cups (adjusting fractions so that each measurement has the same denominator). Adjust a recipe by doubling or tripling, etc. the recipe for a larger group or halving the recipe for a smaller group. Students could then share the food made with others such as shut-ins in the parish, a local nursing home, a local parish ministry or with another class.
- Use benchmark fractions to compare fractions.
- Write real world word problems using fractions.
- Use fraction strips to find equivalent fractions.
- Roll a Fraction: Using a 12-sided number cube, students would create fractions using the numbers rolled. For example, if they roll a 5 and 11, the first fraction would be 5/11. Students must then compare the fraction using written, verbal, or pictures to explain/justify their understandings.
- Classroom Fractions: Students could group together to show different ways to "decompose" a fraction. For example, if a class has 18 students, the students could separate by age. The students would then record the decomposed fraction (ex. 6/18 are 9; 12/18 are 10. 6/18 + 12/18= 18/18). Students could create their own ways to group people to show different ways to decompose a fraction.
- Comparing Fractions: Fraction Buckets - A full plan provided by PDESAS to engage students in "Mathematical Goals: This lesson is intended to help you assess how well students compare fractions with different numerators and different denominators by comparing them to benchmarks of 0, ½ and 1. Students will also be able to explain their reasoning and strategies used in comparing fractions" (PDESAS, 2019). Follow the link below for the full lesson plan PA-MDC Grade 4 MATH Fraction Buckets.
- End of Unit Assessment: The following link will take you to the Engage NY site. The assessment has students partition fractions and then using a number line to explain comprehension, comparing fractions using a variety of strategies, and using authentic data comparing the length of butterflies' wingspans. EngageNY - End of Module Assessment

Computation Skills:
add
subtract

multiply
divide
mental math
reduce/simplify

Thinking and Reasoning Skills:

- Why is it important to learn how to read & write fractions?
- When could we use fractions in real life?
- What is a fraction, and how do I represent that fraction?
- How do we know a fraction is equivalent, and why do we need to know equivalent fractions?
- How do fractions fit on a number line? (students should demonstrate how to
- Why is it important to identify fractions (thirds, sixths, eighths, tenths) as representations of equal parts of a whole or of a set?
- Why is important to label fractions (thirds, sixths, eighths, tenths) as representations of equal parts of a whole or of a set?
- Why is it important to compare fractions (thirds, sixths, eighths, tenths) as representations of equal parts of a whole or of a set?
- What do the parts of a fraction tell about its' numerator and denominator?
- If you have 2 fractions, how do you know which is greater or has more value?
- How do you know how many fractional parts make a whole?
- Why is it possible to compare fraction with either a common denominator or common numerator?
- Bill and Sue both have half of a pizza. Do they both have the same amount of pizza? Use what you know about fractions being part of a whole to answer the question. What did you assume and what should you assume when you answer this question? (e.g. size of pizza? C.f. 4.NF.3)

Mathematical Task Analysis Guide:

- **Level 1: Memorization Tasks -** Involve producing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae, or definitions to memory
- **Level 2: Procedures with connections -** Are focused on producing correct answers
- **Level 3: Procedures with Connections Task -** focus students' attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical concepts and ideas
- **Level 4: Doing Mathematics Tasks** - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships

Real World Problems & Application/Catholic Identity:

Real World:

- Create real- world addition and subtraction fraction problems (then have students pair share to solve each other's work).
- Use fraction tiles to show a given (stated) fraction.
- Use Self-Evaluations (exit slips) to help student share their progress with fractions.
- Have students research spiders and how they use their senses. (Some spiders have up to eight eyes.) Have students draw a picture of a spider with the eyes they use shaded and then write three equivalent fractions (taken from EnVision Math 2.0).
- Scholastic has several ideas for providing authentic fraction lessons and make connections to the real world. Lessons that are especially helpful:
    - Fractions around the Year
    - Compute by Attribute
    - Fur, Feathers, and Fins

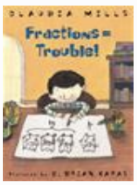
Catholic Identity:

- One of the concepts that could be discussed could be the idea that we as believers are part of one body, the body of Christ. During the unit, the focus could be on the different parts of our faith that make us strong in our faith. In a more practical way, students could use the recipe task to create items to share with others in the parish and community.
- Liturgical Calendar Study: Photo copy the calendar you have on display in your classroom and create multiple fractions that represent how many days are spent in lent, advent, Easter, Christmas, and ordinary time.http://www.romcal.net/output/2019.htm
- Saints: Explore and study more about the Saint(s) that follow the religion class schedule or using the Saint of the Day calendar provided through the following link. Students could research how many saints are from a particular geographical area, era, male vs. female, martyred vs. not martyred https://www.franciscanmedia.org/sod-calendar/
- First and Last Name Fractions: Use the First and Last Name Fractions activity with saint names and/or titles.

Reading and Writing in Math:

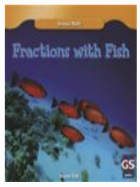
Reading: The following list contains books that could be used in multiple ways. The books could be used as a direct, whole group read aloud, within a small group, or placed in an area for independent reading. An additional resource you can access to find these books is called ***Epic!***

Reading skills could include finding when fractions are used in text and the purpose that they serve within the text. Look for common trends of when fractions are used. The reading skill of compare/contrast could also be emphasized in this unit.



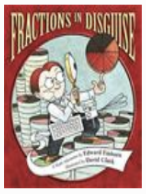
Fractions = Trouble!
Mills, Claudia
AR Quiz No. 146532 EN Fiction
IL: **LG** - BL: **4.7** - AR Pts: **2.0**
AR Quiz Types: **RP**
Rating: ★★★½
While trying to decide on a science fair project, third-grader Wilson struggles with fractions and, much to his embarrassment, his parents sign him up to work with a math tutor.

Fractions (Mighty Math)
Pistoia, Sara
AR Quiz No. 61715 EN Nonfiction
IL: **LG** - BL: **2.4** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book explains fractions, what they are, and how to use them.



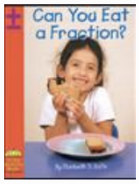
Fractions with Fish

Sisk, Maeve
AR Quiz No. 183765 EN Nonfiction
IL: **LG** - BL: **1.5** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Through photographs and text about fish, this book explains the concept of fractions.



Fractions in Disguise: A Math Adventure

Einhorn, Edward
AR Quiz No. 166760 EN Nonfiction
IL: **LG** - BL: **4.3** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
George Cornelius Factor invents a Reducer, a tool that reduces fractions and reveals their true form.



Can You Eat a Fraction?

Jaffe, Elizabeth D.
AR Quiz No. 41240 EN Nonfiction
IL: **LG** - BL: **2.4** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book shows children how they can "eat" fractions all the time.

Civil War Recipes: Adding and Subtracting Simple Fractions

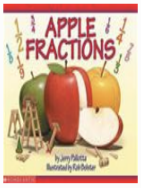
George, Lynn
AR Quiz No. 70509 EN Nonfiction
IL: **MG** - BL: **4.8** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★☆
This book gives several examples of recipes used during the Civil War, such as gingerbread, groundnut soup, gumbo, and hardtack, and shows how to add and subtract fractions to double or halve the ingredients.

Fractions, Decimals, and Percents

Adler, David A.
AR Quiz No. 135584 EN Nonfiction
IL: **LG** - BL: **3.6** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book introduces fractions, decimals, and percents through descriptions of things found at a county fair.

Fractions: Making Fair Shares

Koomen, Michele
AR Quiz No. 43994 EN Nonfiction
IL: **LG** - BL: **2.3** - AR Pts: **0.5**
AR Quiz Types: **RP**, **VP**
Rating: ★★★½
This book uses simple text, photographs, and illustrations to introduce fractions by showing children dividing various items into fair shares.



Apple Fractions
Pallotta, Jerry
AR Quiz No. 119065 EN Nonfiction
IL: **LG** - BL: **3.3** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book describes a variety of apples and uses them to introduce fractions.

Breakfast Around the World: Fractions
Kim, Ye-shil
AR Quiz No. 181212 EN Fiction
IL: **LG** - BL: **3.7** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Learn about fractions by traveling around the world and seeing what people eat for breakfast in different countries.

Journal writing ideas:

- Vocabulary foldables (all new vocabulary) for study purposes, and note taking
- *Explain the difference between prime and composite.*
- Explain the difference between a numerator and a denominator.
- Journal different ways to represent a fraction - number line, picture, word form, etc.
- Create a fraction and label its parts (numerator, denominator, fraction bar).
- Write a fraction word problem.
- Use sentence starters like… What would the world be like without fractions? Why are fractions useful?
- Write about fractions within your own classroom/school.
- Compare/Contrast two different fractions. Explain how you know which one is larger.

Questions/Discussion Strategies:

- Students will work together, throughout the unit, to explore and share their reasoning and train of thought through pair share and/or peer tutoring opportunities. To do this engage students in conversations that will promote classroom discussion. Ways to start productive conversations are asking students questions like:
- Who can say what Johnny said in their own words? Who can add to that? How do you know that? Can you think of an example of this? Who can draw to show/share their thinking? How can we apply this to something else?
- Students can also be encouraged to use sentence starters like…
  - Another strategy I can use is…
  - I can prove that by…
  - I disagree/agree because…
  - My first step was…
- Use Kagan strategies from previous units.

Technology/Manipulatives:

Technology for Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a

given area and students complete the quiz. Most of these sites work best as multiple-choice quizzes.
- Padlet - Teachers create questions in which the students must respond using multiple choice cards. The teacher uses a smart device to scan the students' cards to receive their answers.
- Various Place Value Activities - http://pickettsmill.typepad.com/files/place-value-activity-pack.pdf

Technology Games for Practice or Enrichment

- Brainpop: https://www.brainpop.com/math/ Brainpop, requires a membership, and is an educational website that provides videos to reinforce skill in this unit.
- Hoodamath: http://www.hoodamath.com/games/fourth-grade.html Hoodamath, is a free website, that provides an array of mathematical games for students to practice a variety of skills.
- Sheppardsoftware: http://www.sheppardsoftware.com/math.htm Sheppardsoftware Sheppardsoftware is a free website that provides a wide variety of mathematical games to reinforce unit skills and concepts.
- Scholastic Study Jams - http://studyjams.scholastic.com/studyjams/jams/math/index.htm - Scholastic Study Jams contains free animalted video for students. The site contains math and science videos. For this unit, there are videos that address prime and composite numbers, multiplication, and patterns.
- Khan Academy: https://www.khanacademy.org/math/k-8-grades/cc-fourth-grade-math Khan Academy provides free video tutorials and assessments for mathematical standards that are adressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
- Freckle: https://www.freckle.com/ - Freckle offers a free account for teachers and students. The site provides practice to build on fact fluency as well as skills within the different math domains. For this unit, students would work within the Base 10 and Operations and Algebraic Thinking Domains. Students take a pre-assessment, and the program uses that data to provide learning that is individualized for the student's abilities.
- ABCya: http://www.abcya.com/fourth_grade_computers.htm ABCya is a free website and has educational math games for grades PreK-5.
- IXL: https://www.ixl.com IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30 day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions. This program really allows you to target differentiated instruction.
- Math Antics: https://mathantics.com/ Math Antics provides free videos over a range of mathematical concepts. The videos are free and engaging, but the activities require a paid subscription. **Manipulative:** counters, whiteboards, graph paper, grid whiteboards, fraction strips, number lines, fraction tiles, fraction balance, clothes pins to create fraction number lines, math journals

Accommodations/Acceleration/Differentiation:

Adaptations:

- Divide students into groups by ability - this could be done using center games: Below Level: review multiples then practice finding equivalent fractions with tools e.g. fraction strips, number lines.

- Provided 1:1 practice to aid students understanding how to use the tools, maybe they need help “seeing” what is happening with the fractions.
- Collaborate with Act 89 Teacher to ensure targeted practice where needed
- Vary number of items in self–evaluation check rubric(s) and independent work. For assistance with creating rubrics, click here.
- Guided practice within unit topics - use manipulatives to help show fractions
- Keep practicing multiplication facts - especially important for finding equivalent fractions and simplifying fractions.
- Use the Big 7 strategy for division

Extensions:

- Prepare center games (for ex. using task cards or Boom Cards) for students to extend and apply concepts in n various ways and contexts with fractions.
- Have these students play games that are found in the technology section of this unit.
- Provide opportunities for students to extend the concepts (have students write word problems for fractions using all four operations).

Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 5
Unit 5: Fractions & Decimals Purpose: Multiply fractions by whole numbers. Recognize the relationship between fractions with denominators of 10 and 100 and their decimal equivalents and use them in real world problems and comparisons.	

Essential Questions:

- How is mathematics used to quantify, compare, represent, and model numbers?
- Why do we use different forms of numbers to represent equivalent values?
- How can we model fractions and decimals?
- How can we use fractions in our world?
- How can you tell when it is most appropriate to use a fraction or a decimal?

Standards:

4.NF.5 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
4.NF.5a. Understand a fraction a/b as a multiple of 1/b.
4.NF.5b. Understand a multiple of a/b as a multiple of 1/b and use this understanding to multiply a fraction by a whole number.
4.NF.5c. Solve word problems involving multiplication of a fraction by a whole number.
4.NF.6 Express a fraction with denominator 10 as an equivalent fraction with denominator 100 and use this technique to add two fractions with respective denominators 10 and 100.
4.NF.7 Use decimal notation for fractions with denominators 10 or 100.
4.NF.8 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols <, >, and =.

Standards Reinforced:

3.NF.3 Explain equivalence of fractions in special cases and compare fractions by reasoning about their size.
3.NF.3a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
3.NF.3b Recognize and generate simple equivalent fractions. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
3.NF.3c Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers.

Vocabulary:		
decimal	fractions	place value
decimal point	mixed number	standard form
expanded form	hundredths	tenths
	number lines	

Authentic Performance Assessment:

- Students could become sports analyst as they use data and statistics to prove the best and

worst goalies in a certain hockey franchise. The students will look at data like goals allowed per game (ex. Jean-Sébastien Aubin allowed 2.92 goals per game) and winning percentage (ex. Aubin had a 0.38 winning percentage). Students could research various goalies to determine what goalie is the "best" by using data to support their answers.

- Students could become sports analyst as they use data and statistics to prove the best players in the NBA. Using the link, the students could research and use real data to determine things like… points per game, rebounds per game, blocks per game, etc. Students would have to explain and defend why they might choose a certain player using their understanding of decimals to explain their reasoning.
- Stained Glass Window Assessment: Students use pattern blocks to create a "Stained Glass Window" for two different locations. Students would then find the fractional value for each shape as well as find the fraction for each color used. The data could be converted from fraction to decimal. The following link contains that assessment idea. Stained Glass Window - Fraction
- Students could also be political analysts and use authentic data from the presidential elections outcomes in the state. Students could research data using the two main parties (Republican and Democrat) to find trends in data. Students would have to compare decimals to determine trends and predict possible outcomes for future elections based on data. Census.gov data
- Decimal Game: A fun and engaging game (with a deck of cards) for students to compare decimal amounts. Click the link for a PDF that explains how to play the game.

Computation Skills:
addition
subtraction
multiplication
simplifying
comparing
division

Thinking and Reasoning Skills:

- How will my understanding of whole numbers and fractions help me understand and use decimals when solving problems?
- How can we use decimals to compare and compute fractional values?
- What are the characteristics of a decimal fraction?
- What patterns occur on a number line made up of decimal fractions?
- How can we use multiplication and/or division to find equivalent fractions?
- How can you name the same amount on a number line using equivalent fractions?
- What tools can you use to add fractions? (fractions strips, area models)
- What makes a tool and/or strategy appropriate for a given task?
- Why is it important to understand the relationship between fractions and decimals?
- How can we use decimals to compare and compute fractional values?
- How does my understanding of whole number operations help me develop my understanding of decimal operations?
- How do we show a fraction as a decimal and/or a decimal as a fraction?

Mathematical Task Analysis Guide:

- **Level 1: Memorization Tasks -** Involves producing previously learned facts, rules, formulae, or

definitions OR committing facts, rules, formulae, or definitions to memory
- **Level 2: Procedures with connections -** Are focused on producing correct answers
- **Level 3: Procedures with Connections Task - F**ocus students attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical concepts and ideas
- **Level 4: Doing Mathematics Tasks** - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships

Real World Problems & Application/Catholic Identity:

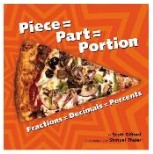
- **Foot-Long Fractions:** Students record measurements in fraction form and simplify. Scholastic link to Foot Long Fractions
- **Money in Fractions:** Students record money amounts in fraction and decimal form. Scholastic link to Money in Fractions
- Amusement Parks per State Activity: Students use authentic data to compare fractions. Students will predict how many amusement parks are in their state and analyze data on how many amusement parks are in all 50 states in 2016. Then students will write numbers as fractions and create a visual model of the data. Although not included in the link, students could then be asked to convert the fractions (all with a denominator of 50) to be converted into decimal form.
- Decimal, Fractions, and Money - This activity requires students to identify money in fraction, word, and decimal form.
- The following Scholastic link is to a PDF that contains word problems about food for more fraction practice.

Catholic Identity:

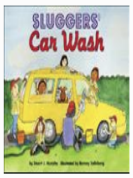
- Stained glass window activity in the assessment portion of this lesson could also be used here and focus on the beatitudes. Students can create a picture that reflects one of the beatitudes or any other concept that they are learning (i.e. a specific Bible story, a saint, Lent, etc.).
- With the emphasis being on decimals this unit, the idea of a tenth will be established. The concept of tithing could be discussed in this unit. The emphasis does not just have to be with tithing money but could also be "tithing" our time and resources. The overall idea, however, could be Christ should be not just one part of our lives but should be the center from which everything else comes. Students could then reflect on how this concept would transform the way we act and think. The teacher could use the illustration of a piece of pie versus a wheel. Christ should not be like a piece of pie only taking up a part of our lives but should be like the hub of a bicycle wheel. The hub is not only the center but the part that everything else depends on.

Reading and Writing in Math:

Reading: The following list contains books that could be used in multiple ways. The books could be used as a direct, whole group read aloud, within a small group, or placed in an area for independent reading. An additional resource you can access to find these books is called Epic!

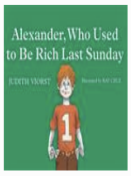


Piece=Part=Portion. Fractions=Decimals=Percents
Scott, Gifford
This book has straightforward text and photographs from everyday life.



Sluggers' Car Wash

Murphy, Stuart J.
AR Quiz No. 63332 EN Nonfiction
IL: **LG** - BL: **3.0** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
When the 21st Street Sluggers, a baseball team, have a car wash to raise money, they learn to keep careful track of their dollars and cents.

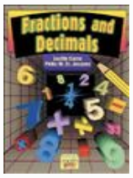


Alexander, Who Used to Be Rich Last Sunday

Viorst, Judith
AR Quiz No. 7301 EN Fiction
IL: **LG** - BL: **3.4** - AR Pts: **0.5**
AR Quiz Types: **RP**, **RV**, **VP**
Rating: ★★★½
Alexander has problems holding on to his money. A charming book that demonstrates how easy it is to spend and how difficult it is to save.

Fractions, Decimals, and Percents

Adler, David A.
AR Quiz No. 135584 EN Nonfiction
IL: **LG** - BL: **3.6** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book introduces fractions, decimals, and percents through descriptions of things found at a county fair.



Fractions and Decimals

Caron, Lucille
AR Quiz No. 50016 EN Nonfiction
IL: **MG** - BL: **6.5** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★☆
This book explains how to add, subtract, multiply, and divide fractions and decimals. The coauthor is Philip M. St. Jacques.

Journaling:

- Write an expository essay to explain the process of collecting and charting data.
- Draw models to represent the place values - tenths and hundredths.
- Compare two fractions/decimals. Explain your results using a model or written explanation.
- Create a t-chart to compare when we use fractions and when we use decimals.
- Make a list of places where you frequently see decimals used (food packaging, sports statistics, weight, etc).
- Write and record vocabulary words.
- Provide students with a blank place value chart. Students will identify and label the different place values. Students could then use this chart to “break-apart” numbers and place each digit in the correct place value.

Questions/Discussion Strategies:

- Students will work together, throughout the unit, to explore and share their reasoning and train of thought through pair share and/or peer tutoring opportunities. To do this engage students in conversations that will promote classroom discussion. Ways to start productive conversations are asking students questions like:
- Who can say what Johnny said in their own words? Who can add to that? How do you know that? Can you think of an example of this? Who can draw to show/share their thinking? How can we apply this to something else?
- Students can also be encouraged to use sentence starters like…
- Another strategy I can use is…
- I can prove that by…
- I disagree/agree because…
- My first step was…

For discussion strategies, use Kagan strategies from previous units. Additionally:

- Find the Fiction: Students would write down two facts that are true and one fact that is false. They would exchange with partners. Their partners must then identify the facts that are true and the one that is false. The students must then explain why that fact is not true. For this unit, students could be given a fraction. They must write the fraction in two correct ways and one incorrect way (For example, if given 7/10, the two correct answers could be .70 or seven-tenths. The incorrect answer could be 0.07). Students could also be given a fraction and/or decimal and must write fractions that are greater than or less than the fraction and/or decimal.
- Inside/Outside Circles: Students form two concentric circles. The students in the outside circle face the students in the inside circle. The teacher poses a question and students discuss with that partner. The questions from the Thinking/Reasoning Section could be used for this strategy. The following link provides more information and a video showing how this strategy was used.

Technology/Manipulatives:

Technology for Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a given area and students complete the quiz. Most of these sites work best as multiple choice quizzes.
- Padlet - Teachers create questions in which the students must respond using multiple choice cards. The teacher uses a smart device to scan the students' cards to receive their answers.
- Various Place Value Activities

Technology Games for Practice or Enrichment

- Brainpop: https://www.brainpop.com/math/ Brainpop, requires a membership, and is an educational website that provides videos to reinforce skill in this unit.
- Hoodamath: http://www.hoodamath.com/games/fourth-grade.html Hoodamath, is a free website, that provides an array of mathematical games for students to practice a variety of skills.
- Sheppardsoftware: http://www.sheppardsoftware.com/math.htm Sheppardsoftware Sheppardsoftware is a free website that provides a wide variety of mathematical games to

reinforce unit skills and concepts.

- Scholastic Study Jams - http://studyjams.scholastic.com/studyjams/jams/math/index.htm - Scholastic Study Jams contains free animalted video for students. The site contains math and science videos. For this unit, there are videos that address prime and composite numbers, multiplication, and patterns.
- Khan Academy: https://www.khanacademy.org/math/k-8-grades/cc-fourth-grade-math Khan Academy provides free video tutorials and assessments for mathematical standards that are addressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
- Freckle: https://www.freckle.com/ - Freckle offers a free account for teachers and students. The site provides practice to build on fact fluency as well as skills within the different math domains. For this unit, students would work within the Base 10 and Operations and Algebraic Thinking Domains. Students take a pre-assessment, and the program uses that data to provide learning that is individualized for the student's abilities.
- ABCya: http://www.abcya.com/fourth_grade_computers.htm ABCya is a free website and has educational math games for grades PreK-5.
- IXL: https://www.ixl.com IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30 day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions. This program really allows you to target differentiated instruction.
- Math Antics: https://mathantics.com/ Math Antics provides free videos over a range of mathematical concepts. The videos are free and engaging, but the activities require a paid subscription.
- Time for Learning
- Visual Fractions for fraction identification practice

Manipulatives:

- base 10 blocks
- decimal cubes
- Fraction/Decimal Balance
- fraction strips
- graphing paper
- clothespins/string/index cards for a number line

Accommodations/Acceleration/Differentiation:

- Divide students into groups by ability to provide differentiated instruction: collect data throughout the unit to determine individual student needs - then group by ability (1) guided practice with parts of a fraction and modeling a representation of a fraction - place value with a decimal then working to the right of the decimal model those place values as well reteach along the way (2) place value practice (3) independent project - https://www.weareteachers.com/fun-with-fractions-7-tactile-and-kinesthetic-games/
- Provide manipulatives for students who need the visual representations
- Provide 1:1 time for explicit instruction (where needed) https://www.khanacademy.org/math/arithmetic/fraction-arithmetic
- Collaborate with Act 89 Teacher
- Vary number of items in self–evaluation check rubric(s) for assistance with creating rubrics you can visit https://www.exemplars.com/resources/rubrics/student-rubrics

- Keep practicing multiplication facts
- For students having trouble with rounding, here is a catchy rap song about rounding….be aware that the video may teach rounding differently than you do in your classroom...watch it first to ensure it aligns with your instruction. https://www.youtube.com/watch?v=3afU6JQG15I
- Grade level "decimal rounding" practice worksheets can be found at education.com or by clicking on the following link: https://www.education.com/resources/rounding+decimals/

Extensions:

- Prepare center games (for ex. using task cards) for students to extend and apply addition & subtraction of like denominator fractions in various ways.
- Have these students play games that are found in the technology section of this unit.
- Provide opportunities for students to extend the concepts (have students write word problems for fractions using addition & subtraction).
- Students performing above grade level could be introduced to the thousandths place and explore this concept with real world things, such as, using baseball percentages (batting, on base, etc.).
- Students could "bowl" using a plastic or inflatable set. The students could track their pins down each frame and record as both a decimal and/or fraction. At the end of the tenth frame, students can write the number of pins knocked down after all ten frames. Students could then make predictions, find patterns, etc. based on the date. Students could also correlate their scores to percentages.

Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 2
Unit 6: Measurement (Unit Conversions) Purpose: Convert units within a system of measurement. Solve real world problems concerning distance, area, mass, volume, time and money that include fractions or decimals.	

Essential Questions:

- What makes a tool and/or strategy appropriate for a given task?
- Why does "what" we measure influence "how" we measure?
- How precise do measurements and calculations need to be?
- In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted?
- How do we use measurement in the world?
- How do we compare different measurements?

Standards:

4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm, kg, g, lb, l, ml, hr, min, sec.
4.MD.2 Within a single system of measurement, express measurements in a larger unit in terms of a small unit. Record measurement equivalents in a two -column table.
4.MD.3 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.
4.MD.4 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Standards Reinforced:

3.MD.3 Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
3.MD.4 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).
3.MD.5 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings to represent the problem.

Vocabulary:		
analogue clock	fluid ounce	meter
customary units of measure	foot/feet	mile
digital clock	gallon	minute
metric units of measure	gram	ounce
capacity	hour	pint
centimeter	inches	pounds
millimeter	length	quart
milliliter	liter	ruler
convert	kilogram	ton

cup elapsed time	kilometer mass	weight yard

Authentic Performance Assessment:

- This unit could be taught in collaboration with physical science. Solve science problems that include determining the mass of an object using grams and converting to kilograms.
- Students could measure items found around the classroom or school click the link for a worksheet that provides practice with measuring lines to the nearest ¼ in. M-4-1-1_Measuring Lines and KEY.doc
- Constructing number lines: Teach students how the ruler is divided into different units of length by click on the link to access a labeled ruler M-4-1-1_Inch Ruler.doc and a blank ruler. M-4-1-1_Blank Ruler.doc
- Have students create measurement word problems.
- Students will decide what units of measure to use. M-4-1-1_Attribute Pictures.doc
- Have students create real world time word problems.
- Observations and self-evaluation (exit slips). Find a sample exit slip by clicking the link M-4-1-1_Exit Ticket and KEY.doc

Computation Skills:

addition
subtraction
division
multiplication
constructing number lines

Thinking and Reasoning Skills:

- When would we use measurement?
- How can we convert from one unit to another?
- How many pounds are in 3 ½ tons?
- Johnny has 2 ½ gallons of juice. How many 1-pint containers can he fill?
- How can you convert from unit of capacity to another?
- How can you convert from one unit of weight to another?
- What would be a good example of elapsed time?
- What tools would you use to measure the length of a marker?

Activities:

- Observations and self-evaluation (exit slips). Find a sample exit slip by clicking the link M-4-1-1_Exit Ticket and KEY.doc
- Venn Diagram to compare & contrast
- Practice customary equivalence by playing a memory game by following the link http://www.quia.com/cc/65838.html
- Practice conversions for linear measure at M-4-1-1_Linear Measure Conversions and KEY.doc

Mathematical Task Analysis Guide:

- **Level 1: Memorization Tasks -** Involves producing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae, or definitions to memory
- **Level 2: Procedures with connections -** Are focused on producing correct answers
- **Level 3: Procedures with Connections Task - Fo**cus students' attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical

concepts and ideas
- **Level 4: Doing Mathematics Tasks** - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships

Real World Problems & Application/Catholic Identity:

Real World: Taken from CICI-online.org

- Often riders need to be 54 inches tall to get on large theme park rides. Chris is 4 feet and 3 inches tall. Is Chris tall enough? Are you?
- Did mom buy enough material for my costume?
- Multiple real world questions from CICI Unit on Measurement and Data under Activities/Timeline.
- Student created word problems.
- Create a house in a box (include a checklist and rubric) Write an essay to explain your reasoning to present how you created your model.

Catholic Identity: Taken from CICI-online.org

- Multiple real-world questions from CICI Unit on Measurement and Data under "Activities/Timeline" including figuring out whether a donated altar cloth will work at your church, whether or not Jesus could ride *this* colt, and whether or not the new priest should use a stool.
- Have students convert Hebrew measurements for Noah's Ark to customary units of measure. Visit this website for more information The Ark Encounter.
- Discuss the conversion of the St. Paul. What does conversion mean in the Biblical sense? How did St. Paul change? Discuss how God's love and power can change even the "coldest" of hearts. This could also lead into discussions and prayers for those who are and were martyred for their faith.
- Students will explore the relationship of various measures to their bodies, increasing their understanding and appreciation of the temple God has created for them. Students can also solve problems (examples below) that relate to situations in church. Follow the link to access the lesson.

Reading and Writing in Math:

Reading: The following list contains books that could be used in multiple ways. The books could be used as a direct, whole group read aloud, within a small group, or placed in an area for independent reading. An additional resource you can access to find these books is called ***Epic!***

The Secret Ghost: A Mystery with Distance and Measurement

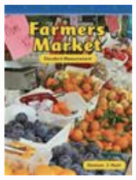
Thielbar, Melinda
AR Quiz No. 131131 EN Fiction
IL: **MG** - BL: **3.2** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Sam and his friends at the kung fu school use their understanding of width, length, circumference, and volume to uncover the secret of the noises behind the walls of a big Victorian house. Book #3

World Markets: Standard Measurement

Johnson, Sara A.
AR Quiz No. 168242 EN Nonfiction
IL: **LG** - BL: **3.4** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
In this book, readers learn how to weigh and measure various items while exploring markets from around the world.

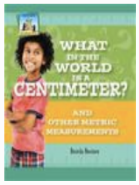
Measuring

Patilla, Peter
AR Quiz No. 2161 EN Nonfiction
IL: **LG** - BL: **3.6** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
This book explores basic concepts of measurement, including linear measurement, weight, volume, as well as the units used to express them,



Farmers Market: Standard Measurement

Hunt, Dawson J.
AR Quiz No. 168232 EN Nonfiction
IL: **LG** - BL: **2.6** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
In this book, readers learn how to weigh and measure various things while exploring a farmers' market and the crops it sells at different times of the year.



What in the World Is a Centimeter? And Other Metric Measurements

Bussiere, Desirée
AR Quiz No. 157527 EN Nonfiction
IL: **LG** - BL: **2.6** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
From grams to liters to kilometers, this easy-to-read book offers engaging pictures and simple sentences to illustrate fully each type of measurement.

What in the World Is a Mile? And Other Distance Measurements
Bussiere, Desirée
AR Quiz No. 157529 EN Nonfiction
IL: **LG** - BL: **2.7** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
From yards to miles to leagues, this easy-to-read book offers engaging pictures and simple sentences to illustrate fully each type of distance measurement.

What in the World Is a Ton? And Other Weight & Volume Measurements
Bussiere, Desirée
AR Quiz No. 157530 EN Nonfiction
IL: **LG** - BL: **2.7** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
From ounces to tons to pints, this easy-to-read book offers engaging pictures and simple sentences to illustrate fully each type of weight and volume measurement.

Journaling:

- Have students write a summary of one of the read alouds provided above.
- Write a how to of the self-created poster or conversion flip book.
- Write about how to use hidden questions to answer conversion questions.
- Create/draw visual images that correlate with a measurement unit.
- Writing prompts such as: What could I do with a meter of fabric? What could I fit into a four-yard space?

Questions/Discussion Strategies:

- Engage students in classroom discussions by asking students to add on to what _____ said, can you put what _____ said in your own words? What if I added 2 more inches to the 10-inch mark? Now I can call it a _____?
- You have friends coming over to help you create a virtual garden. What kind of math do you think you'll use to build your garden?
- Questioning and discussion strategies from previous units.

Technology/Manipulatives:

Technology to Help with Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a given area and students complete the quiz. Most of these sites work best as multiple-choice quizzes.
- Padlet - Teachers create questions in which the students must respond using multiple choice cards. The teacher uses a smart device to scan the students' cards to receive their answers.
- Various Place Value Activities - http://pickettsmill.typepad.com/files/place-value-activity-pack.pdf

Technology Games for Practice or Enrichment

- Brainpop: https://www.brainpop.com/math/ Brainpop, requires a membership, and is an educational website that provides videos to reinforce skill in this unit.
- Hoodamath: http://www.hoodamath.com/games/fourth-grade.html Hoodamath, is a free website, that provides an array of mathematical games for students to practice a variety of skills.

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- Khan Academy: https://www.khanacademy.org/math/k-8-grades/cc-fourth-grade-math Khan Academy provides free video tutorials and assessments for mathematical standards that are adressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
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- IXL: https://www.ixl.com IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30 day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions. This program really allows you to target differentiated instruction.
- Math Antics: https://mathantics.com/ Math Antics provides free videos over a range of mathematical concepts. The videos are free and engaging, but the activities require a paid subscription.

Manipulatives:

- student created conversion poster or flip book
- rulers – metric and yardsticks
- visual aids
- measurement strips
- graduated cylinders
- examples of the following: pint, cup, gallon, liter, etc.

Accommodations/Acceleration/Differentiation:

- Divide students into groups by ability to provide differentiated instruction: collect data throughout the unit to determine individual student needs - then group by ability (1) guided practice with measuring and reteach along the way (2) number line sense practice (3) independent practice.
- Provide manipulatives for students who need the visual representations - have pictures of what a gallon looks like, a liter, etc.
- Provide 1:1 time for explicit instruction (where needed) - use the various technology resource to help reteach.
- Collaborate with Act 89 Teacher.
- Vary number of items in self–evaluation check rubric(s) and/or in independent work assigned; for assistance with creating rubrics you can visit

https://www.exemplars.com/resources/rubrics/student-rubrics

- Guided practice within unit topics
- Keep practicing multiplication facts.
- Have students work with a partner drawing lines, measuring their length, and checking each other's work. Designate classroom items to be measured to the nearest inch, then half inch, then quarter inch as students become more proficient. If students are ready, they can continue to learn about converting inches to feet or yards.
- Color code rules for students who are struggling with finding the nearest quarter inch, half inch, ¾ of an inch, etc.

Extensions:

- Prepare center games (for ex. using task cards) for students to extend and apply addition & subtraction of like denominator fractions in various ways.
- Have these students play games that are found in the technology section of this unit.
- Provide opportunities for students to extend the concepts (have students write word problems for fractions using addition & subtraction).
- Introduce the concept of density to students and correlate back to physical science unit. Have students find the mass and volume to determine the density. The candy bar science activity is one way for students to work with things like centimeters and millimeters. First, students would use a balance to determine the mass of the candy bar using grams. Next, students measure the candy bar using a metric ruler finding the length, width, and height using centimeters. The students would then divide the mass divided by the volume to determine the density. Based on their calculations, they must predict if the candy bar will sink or float. Students would then place the candy bar in water to determine if their predictions were accurate.
- Energy could also be explored in this unit in correlation with these units. Students could work on the concepts of kinetic and potential energy and build "roller coasters." Students could address such issues as comparing times (review with decimals) and making predictions about length (What will happen if I shorten and/or extend the length?). The following link has examples of pictures to a provide a basis/starting point. https://www.instructables.com/id/Marble-Roller-Coaster/

Diocese of Erie
Mathematics
Fourth Grade

Unit of Study	**Weeks:** 4
Unit 7: Geometry Purpose: Understand the concept angle formation and measurement to the whole degree. Recognize and classify two dimensional figures created by line segments, rays, or lines.	

Essential Questions:

- How can patterns be used to describe relationships in mathematical situations?
- How can recognizing repetition or regularity assist in solving problems more efficiently?
- How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?
- How is visualization essential to the study of geometry?
- How does geometry explain or describe the structure of our world?

Standards:

4.MD.6 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement.
4.MD.6a An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
4.MD.6b An angle that turns through none-degree angles is said to have an angle measure of n degrees.
4.MD.7 Measure angles in whole-number degrees using a protractor. Sketch angles of specified angles.
4.MD.8 Recognize angle measures as additive. When an angle is decomposed into non-overlapping parts, the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems.
4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specifies size. Recognize right triangles as a category and identify right triangles.
4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Standards Reinforced:

3.G.1 Understand that shapes in different categories (e.g., rhombus, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category.
3.G.2 Recognize rhombus, rectangles, and squares as examples of quadrilaterals that do not belong to any of these subcategories.
3.G.3 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.

Vocabulary: acute angle equilateral triangle line line segment obtuse angle point ray right angle	angle intersecting lines line parallel lines perpendicular lines plane right angle right triangle straight angle	acute triangle degree isosceles triangle obtuse triangle polygon protractor quadrilateral triangle vertex

Authentic Performance Assessment:

- Use a protractor to measure angles of various given shapes.
- Provide an example of a real-world object that represents each angle taught.
- Farmer Fred's Field
- Attributes of Great Shapes Transparency: Exploring attributes of great shapes worksheet
- Pattern blocks: determining shapes

Computation Skills:

solve for degrees
classify attributes of shapes
addition
comparing
subtraction

Thinking and Reasoning Skills:

- How do we describe, sort, and classify shapes?
- What are the characteristics and applications of symmetry?
- How can 2-dimensional and 3-dimensional shapes be described?
- How are geometric figures constructed?
- What strategies can be used to verify symmetry and congruency?
- What are the characteristics and applications of symmetry?
- How are shapes related to each other?
- How does geometry explain or describe the structure of our world?
- How are angles measured?
- How are angles classified?
- Can you name characteristics that belong to specific geometric shapes?

Mathematical Task Analysis Guide:

- **Level 1: Memorization Tasks -** Involves producing previously learned facts, rules, formulae, or definitions OR committing facts, rules, formulae, or definitions to memory
- **Level 2: Procedures with connections -** Are focused on producing correct answers
- **Level 3: Procedures with Connections Task - F**ocus students' attention on the use of procedures for the purposes of developing deeper levels of understanding of mathematical concepts and ideas
- **Level 4: Doing Mathematics Tasks** - Requires student to explore and to understand the nature of mathematical concepts, processes, or relationships.

Real World Problems & Application/Catholic Identity:

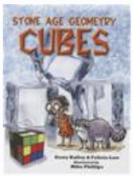
- Identify geometry in nature
- Students will use an iPad to complete this Angles Everywhere assignment. Follow the link to see the rubric Angles Everywhere Rubric.docx
- Applications of geometry in the real world include computer-aided design for construction blueprints, the design of assembly systems in manufacturing, nanotechnology, computer graphics, visual graphs, video game programming and virtual reality creation. Geometry also plays a role in global positioning systems, cartography, astronomy, and geometry even helps robots see things. https://www.smartdraw.com/floor-plan/blueprint-maker.htm is a website that provides students an opportunity to create a blueprint - floorplan.
- Before a contractor builds a structure, someone must design the building's shape and create blueprints. A computer outfitted with computer-aided design software contains the math to render the visual images on the screen. Some CAD programs can also create a simulation that allows you to see what the finished space looks like in a simulated walk-through. Visit https://www.tinkercad.com/ for some interactive 3-d Fun for your students.
- Geometry plays a significant role in global positioning systems which require three coordinates to calculate location. A satellite equipped with a GPS system uses a form of geometry not unlike that used to calculate a right triangle. It involves the position of the satellite in the sky, the location of the GPS position on Earth identified by longitude and latitude, and the distance from that location to the place on Earth that equates to the satellite's position in the sky. Visit https://www.google.com/earth/ to practice with latitude and longitude. To learn more about GPS you can visit https://conservationtools.org/guides/43-global-positioning-system-gps
- Geometry plays a role in calculating the location of galaxies, solar systems, planets, stars and other moving bodies in space. Geometry calculations between coordinates also help to chart a trajectory for a space vehicle's journey and its entry point into a planet's atmosphere. NASA scientists use geometry to compute the journey of a vehicle sent to Mars. They calculate the elliptical orbits and the correct angle to enter a planet's atmosphere and land on the surface.

Catholic Identity: Ideas are from CICI-online.org

- Shapes include a cross with right angles. Discussion relates to how Jesus is the missing piece to the full puzzle in our lives providing us with enlightenment and guidance.
- Students record and analyze angles located in churches. As cooperative group work is essential in this lesson, students are expected to demonstrate the Beatitudes of "Blessed are the merciful, "and "Blessed are the peacemakers," as they respectfully discuss and collaborate to identify and analyze angles in a real-world religious setting. For entire lesson plan visit Grade-4-Geomertry-shapes
- Shapes include a cross with right angles. Discussion relates to how Jesus is the missing piece to the full puzzle in our lives providing us with enlightenment and guidance. For entire lesson plan visit Grade-4-Geometry-angles

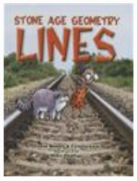
Reading and Writing in Math:

Reading: Teaching geometry with literature; here a few examples of books you could have on display in your classroom library.



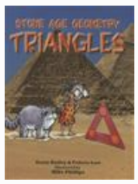
Stone Age Geometry: Cubes

Bailey, Gerry
AR Quiz No. 166608 EN Nonfiction
IL: **MG** - BL: **4.3** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★½
Leo shows Pallas how amazingly useful cubes are in the world. His inventive projects unfold the features of the cube, highlighting its six square faces, equal-sized edges, and right angles. The coauthor is Felicia Law.



Stone Age Geometry: Lines

Bailey, Gerry
AR Quiz No. 166609 EN Nonfiction
IL: **MG** - BL: **4.4** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★½
Leo teaches Pallas all about lines. His inventive projects help explain the basics of how points make up line segments. The coauthor is Felicia Law.



Stone Age Geometry: Triangles

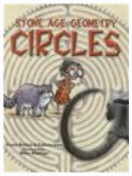
Bailey, Gerry
AR Quiz No. 166612 EN Nonfiction
IL: **MG** - BL: **4.3** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★½
Leo introduces Pallas to the magical world of triangles. Through his inventive projects, Leo shows his cat how three lines meet in triangles with different angles, edges, and names. The coauthor is Felicia Law.

Mummy Math: An Adventure in Geometry

Neuschwander, Cindy
AR Quiz No. 102958 EN Nonfiction
IL: **LG** - BL: **3.3** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
Matt and Bibi accompany their scientist parents to Egypt to search for the mummy of an ancient pharaoh. After becoming lost in the pyramid, they must use their geometry skills to decipher the clues encoded in the hieroglyphics to find their way out.

Start the Game: Geometry in Sports

Perritano, John
AR Quiz No. 157308 EN Nonfiction
IL: **LG** - BL: **3.9** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
The mathematical concept of identifying shapes based upon their attributes is introduced as readers learn about plane shapes in different sports.



Stone Age Geometry: Circles

Bailey, Gerry
AR Quiz No. 166607 EN Nonfiction
IL: **MG** - BL: **4.3** - AR Pts: **1.0**
AR Quiz Types: **RP**
Rating: ★★★½
Leo teaches Pallas about circles and finds some inventive ways to put this great rolling tool to work. The coauthor is Felicia Law.

The Book Bandit: A Mystery with Geometry
Thielbar, Melinda
AR Quiz No. 140180 EN Fiction
IL: **MG** - BL: **3.5** - AR Pts: **0.5**
AR Quiz Types: **RP**
Rating: ★★★½
When the public library offers a prize for figuring out how a "book bandit" sculpture was fit in through a small window in their Reader's Corner, the students of Sifu Faiza's Kung Fu School use geometry to solve the mystery. Book #7

Journaling:

- Have students write a summary of one of the read alouds provided above.
- Write about self-created posters or conversion flip book.
- Write about how to use hidden questions to answer conversion questions.
- Glue Angle Foldable.docx and provide students with shapes to complete

Questions/Discussion Strategies:

- Students will work together, throughout the unit, to explore and share their reasoning and train of thought through pair share and/or peer tutoring opportunities. To do this engage students in conversations that will promote classroom discussion. Ways to start productive conversations are asking students questions like:
- Who can say what Johnny said in their own words? Who can add to that? How do you know that? Can you think of an example of this? Who can draw to show/share their thinking? How can we apply this to something else?
  - Students can also be encouraged to use sentence starters like…
  - Another strategy I can use is…
  - I can prove that by…
  - I disagree/agree because…
  - My first step was…

For discussion strategies, the following Kagan strategies could be used…

- Numbered Heads Together: Students are put into groups. Each student is given a number within the group. The teacher poses a question. Each student individually writes his or her answer. The group discusses the answer and must come to a consensus about what answer/solution is the best answer. The teacher then calls a number. The selected students solve a similar problem to the one completed. For this unit, this could be used in multiple ways: Instant Star is similar to Numbered Heads Together except that the teacher poses a question and then calls on a "star" to share to his or her group. If the group agrees with the person's answer, the students cheer. If they do not agree, the group "coaches" the individual to the correct answer.
- Talking Chips: This strategy could be used for more in depth questions such as the ones in the Thinking/Reasoning section. Each student is given the same number of chips. Every time a student talks, he or she must place a chip into the middle of the table. Once all of your chips are used, you are only allowed to listen. When everyone has used their talking chips, the students would start again. The questions under the Thinking/Reasoning Skills could be used for this discussion strategy.
- For more information visit · https://www.kaganonline.com/free_articles/dr_spencer_kagan/281/Kagan-Structures-A-Miracle-of-Active-Engagement,3
- Find the Fiction: Students would write down two facts that are true and one fact that is

false. They would exchange with partners. Their partners must then identify the facts that are true and the one that is false. The focus is on being able to identify and create examples and nonexamples of a given term. The students must then explain why that fact is not true. For this unit, students could be given a term like quadrilateral. They could either write two features of a quadrilateral (4 sides, 4 angles, etc.) or draw two shapes. This could also be used with words like polygon, parallel, etc.

- Inside/Outside Circles: Students form two concentric circles. The students in the outside circle face the students in the inside circle. The teacher poses a question and students discuss with that partner. The questions from the Thinking/Reasoning Section could be used for this strategy. The following link provides more information and a video showing how this strategy was used. http://www.theteachertoolkit.com/index.php/tool/inside-outside-circles

Technology/Manipulatives: Protractors, Whiteboards/Markers/Erasers,
Teaching and exploration activities:

- Practice with angles: this website is an excellent visual of angles as they change from acute to obtuse
- Geometry: An Introduction to Terms
- Basic Geometry
- Plane Geometry from Math Is Fun
- Introduction to Basic Geometry Concepts
- Classification of Triangles and Angles
- Classifying Triangles
- Classifying Quadrilaterals
- Classification of Quadrilaterals (Detailed)
- EAI Catalog (Miras)
- EAI Catalog (pattern blocks)
- Line Symmetry Worksheets

Technology to Help with Assessment:

- Padlet (Students respond through writing) or Flipgrid (Students can respond with writing or video) - These sites could be used for many different purposes. The teacher could post a question/problem, and students can respond. Students could also post allowing for other students to respond.
- Kahoot/Quizalize/Quizlet --- All of these sites allow for the teacher to create a test over a given area and students complete the quiz. Most of these sites work best as multiple-choice quizzes.
- Padlet - Teachers create questions in which the students must respond using multiple choice cards. The teacher uses a smart device to scan the students' cards to receive their answers.
- Various Place Value Activites

Technology Games for Practice or Enrichment

- Brainpop: Brainpop, requires a membership, and is an educational website that provides videos to reinforce skill in this unit.
- Hoodamath: Hoodamath, is a free website, that provides an array of mathematical games for students to practice a variety of skills.
- Sheppardsoftware: Sheppardsoftware Sheppardsoftware is a free website that provides a wide variety of mathematical games to reinforce unit skills and concepts.
- Scholastic Study Jams - Scholastic Study Jams contains free animated videos for students. The

site contains math and science videos. For this unit, there are videos that address prime and composite numbers, multiplication, and patterns.

- Khan Academy: Khan Academy provides free video tutorials and assessments for mathematical standards that are addressed in grades K-12. This could be used with any student to challenge or to remediate instruction for a certain skill or standard.
- Freckle: - Freckle offers a free account for teachers and students. The site provides practice to build on fact fluency as well as skills within the different math domains. For this unit, students would work within the Base 10 and Operations and Algebraic Thinking Domains. Students take a pre-assessment, and the program uses that data to provide learning that is individualized for the student's abilities.
- ABCya: ABCya is a free website and has educational math games for grades PreK-5.
- IXL: IXL houses practice for Math, Social Studies, Science, language Arts, and Spanish. You could access a free 30-day trial period, but after that it is a cost to your school. IXL provides immediate feedback to incorrect answers and keeps track of student progress within a given skill until they have reached mastery level. Saying that you could master the skill in 24 questions or 100 questions. This program really allows you to target differentiated instruction.
- Math Antics: Math Antics provides free videos over a range of mathematical concepts. The videos are free and engaging, but the activities require a paid subscription.
- https://giftedandtalented.com/4th-grade-math

Manipulatives:

- geoboards
- dot paper
- pencils
- markers
- protractors

Accommodations/Acceleration/Differentiation:

Accommodations - Differentiation

- Divide students into groups by ability to provide differentiated instruction: collect data throughout the unit to determine individual student needs - then group by ability (1) guided practice with using a protractor and identifying shape attributes; reteach along the way (2) symmetry/attribute practice (3) independent project - https://www.khanacademy.org/math/cc-fourth-grade-math/cc-4th-geometry-topic
- Provide manipulatives for students who need the visual representations
- Provide 1:1 time for explicit instruction (where needed)
- Collaborate with Act 89 Teacher
- Vary number of items in self–evaluation check rubric(s) for assistance with creating rubrics you can visit https://www.exemplars.com/resources/rubrics/student-rubrics
- Keep practicing multiplication facts
- Worksheets for this unit of study available at: https://www.education.com/lesson-plans/fourth-grade/geometry/

Acceleration - Extensions:

- Career interest inventory - www.pacareerzone.org
- http://illuminations.nctm.org/Lesson.aspx?id=1794 (must be a member of NCTM to access)
- Prepare center games (for ex. using task cards) for students to extend and apply addition & subtraction of like denominator fractions in various ways
- Games that are found in the technology section

- Have students tape off the table using painters' tape. They can intersect lines. After doing this, students can then measure the angles.
- The following activity is from a free math club called *Crazy 8 Math Club* (http://bedtimemath.org/). The activity allows for students to be "ninjas" and puts their geometry skills to the test in a "laser maze." Create a laser maze using red yarn. Wrap the yarn around the legs of chairs and around the seat to ensure that the yarn is various heights. Have students line up at one end of the maze. Give the students a challenge as they go through such as: only step in the triangles, quadrilaterals, shapes with parallel lines, shapes with perpendicular lines, etc. To challenge some students, have them create the maze telling them that they can only build lines that are perpendicular or only four-sided shapes, equilateral triangles, etc. Play music such as the Mission Impossible theme song to get students into the mood to become super-shape spies!
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