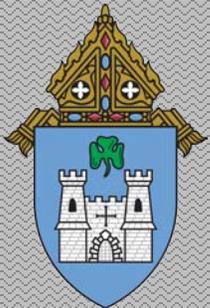


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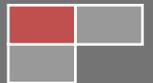
# CURRICULUM STANDARDS

## MATHEMATICS K – 8<sup>th</sup> & Algebra

This curriculum document was written by administrators and teachers in the Archdiocese of Hartford. Principals and teachers in the Diocese of Fort Worth have reviewed and revised these standards for use in Fort Worth Catholic schools.



Diocese of Fort Worth  
Catholic Schools Office  
5/25/2010



Adopted from Archdiocese of Hartford Curriculum Standards

K – 8<sup>th</sup> and Algebra I

2010 – 2011

The Diocese of Ft. Worth Catholic Schools Office has evaluated and studied the Archdiocese of Hartford Curriculum Standards. Teachers from the Diocese of Ft. Worth worked to ensure these standards provide Ft. Worth Diocesan teachers with the framework to provide Diocesan students rigorous, relevant lesson as they study Mathematics in diocesan schools.

Thank you to all teachers who served on the Mathematics Curriculum Committee.



## Profile of a High School Graduate from the Diocese of Fort Worth Catholic Schools

### *Person of Faith*

The graduate confidently and actively articulates and practices the teachings of the Catholic faith.

### *Moral Decision Maker/Problem Solver*

The graduate considers the moral and ethical implications of decisions and chooses to do what is right according to the teaching of the Church

### *Appreciative Human*

The graduate will develop an appreciation for the beauty in the world and the wonder of his body through fine arts and physical activity.

### *Culturally Sensitive*

The graduate exhibits global awareness and cultural sensitivity, and supports the Church's teachings regarding social justice.

### *Academically Proficient*

The graduate is academically prepared for higher education or a professional occupation.

### *Effective Communicator*

The graduate dialogues objectively and persuasively articulating ideas through various modes of expression and seeks to clarify diverse points of view through active listening.

### *Creative Learner*

The graduate applies creative talents to solve problems and serve others.

### *Critical Thinker*

The graduate uses reason in pursuit of truth recognizing that all Truth is rooted in the person of Christ.

### *Life Long Learner*

The graduate engages in the pursuit of knowledge as a life-long activity.

## Structure of the Document

This mathematics standards-based curriculum represents the completion of five years of research into current mathematics teaching practice, thoughtful consideration of teaching and assessment methods used in the Archdiocese, and collaborative and consultation with teachers and experts in the field of mathematics in developing content and student learning objectives.

The standards for mathematics instruction in the Archdiocese of Hartford are divided by grade level and then outlined sequentially by quarter. Within each grade level, with the exception of Algebra I, there are five strands:

- Number Theory, Estimation and Operations
- Algebra: Patterns and Functions
- Geometry
- Measurement
- Data Analysis, Statistics and Probability

The Archdiocesan Standards/Goals listed in each quarter are restatements of the National Council of Teachers of Mathematics Learning Standards and are aligned with the CT Frameworks. They are the primary instructional targets that outline essential topics and skills that students must know and be able to do by the end of high school. Student objectives are bold-faced in the last column and reflect broad concepts that reflect, in the standards, what students should understand and master. Enabling outcomes are bulleted skills that reflect what students should specifically be able to do, and demonstrate mastery of, in order to achieve the broader student objectives. Teachers are expected to integrate mathematics in all subject areas and to protect instructional time to ensure a greater depth of understanding in the area of mathematics across all grade levels.

The student objectives outlined in each quarter represent an instructional plan for the year. This curriculum provides guidance to teachers regarding content to be addressed at each specific grade level and in each quarter. The standards are comprehensive and cover a wide range on the curricular spectrum. Therefore, it is recommended that teachers and administrators identify essential, core curriculum content that is aligned with the provided Benchmarks for Critical foundations in Mathematics and emphasizes enduring understandings, reinforces essential skills and procedures, and includes student interests. Content must be taught for depth of understanding rather than coverage of objectives. As schools meet in their professional learning communities, conversations should be had regarding the use of the standards, the use of testing data including formative data, summative data, and standardized test data in order to effectively and efficiently inform instructional planning to meet the needs of each student, and to discuss best practices.

Daily standards-based lesson planning enables educators to align curriculum and instruction with standards, as they have been adapted by this Archdiocese, thereby keeping the goals of our students in mind. The purpose of standards-based curriculum is to empower all students to meet new, challenging standards of education and to “provide them with lifelong education...that equips them to be lifelong learners.” (Fullan, 2006)

The premise of this curriculum is based upon the NCTM Standards. Instruction should be modeled upon those standards, both in content and in style. Classrooms should incorporate a learning environment that values problem solving in real life situations and encourages the active participation of the students in the learning process. Instruction should engage students in the learning process rather than allowing them to be the passive recipients of information.

Each introduction of a new skill or concept should be developed with the idea that *knowing mathematics is doing mathematics*. Associated learning activities should arise from problem situations. Learning should include opportunities for appropriate project work, group and individual assignments alike, discussions between teachers and students, practice, and teacher exposition. In addition, students should have frequent opportunities to formulate problems and questions that arise from their own interests. Small group work can be both collaborative and cooperative, ensuring that each individual student is assessed and not the “group.” The ultimate goal of group work should be to enable the student to become a more independent thinker.

### **Accountable Talk in Mathematics**

**Instructional programs from prekindergarten through grade 12 should enable all students to--**

- organize and consolidate their mathematical thinking through **communication**;
- communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
- analyze and evaluate the mathematical thinking and strategies of others;
- use the language of mathematics to express mathematical ideas precisely.

Just as students are required to read, write, and speak about what they have learned in the language arts and other content areas, so should this be the practice in mathematics. As students are asked to **communicate** about the mathematics they are studying (“Accountable Talk”), they gain insights into their thinking. In order to communicate their thinking to others, students naturally reflect on their learning and organize and consolidate their thinking about mathematics. *The ability to write about mathematics* should be particularly nurtured across the grades.

By working on problems with classmates, students also have opportunities to see the perspectives and methods of others. They can learn to understand and evaluate the thinking of others and to build on those ideas. They may benefit from the insights of students who solve the problem using a visual representation. Students need to learn to weigh the strengths and limitations of different approaches, thus becoming critical thinkers about mathematics. **Differentiating instruction plays a paramount role in this determination and in planning *daily learning objectives*.**

### **Problem Solving**

The mastery of problem solving strategies is a critical component of 21<sup>st</sup> century skills that students must advance to become productive members of a global society. As the curriculum evolves during the course of the school year, teachers are urged to note the various problem-solving strategies cultured and integrated throughout the enabling outcomes. Some of these strategies may include:

- > Draw text and electronic pictures
- > Use manipulatives
- > Write number sentences
- > Identify patterns
- > Act it out
- > Guess and check
- > Make a chart, table, graph
- > Choose a method/operation
- > Make a model
- > Solve a simpler problem
- > Use logical reasoning
- > Work backwards

### **Vocabulary**

Each grade level has a list of vocabulary to be used by teachers and students to instruct, learn, and communicate mathematically. Students will demonstrate mastery of terms in written and oral forms. The use of correct mathematical terms is essential for consistent instruction and for mathematical applications to life situations.

### **Resources/Strategies/Cross Curricular Connections**

Each grade level of the document ends with two or three tables. On the primary and intermediate levels, there is a resource table for reading-math connections. On all levels, there are two additional tables, one that suggests teaching and learning strategies and another that lists suggestions for cross curricular and Catholic social teachings connections. Strategies and integration activity suggestions are minimal as these sections are designed to be expounded upon by the classroom teacher.

### **Sequence**

The Archdioceses of Hartford Mathematics Curriculum Standards is organized in sequence by quarter. Teachers and administrators should determine what is core or essential for all learners and what is supplemental or enrichment aspects of the curriculum, using the Archdiocesan Benchmarks as a guide. Each mathematics teacher should become familiar with the objectives for the preceding as well as the following grade, and have a good overall picture of the sequence of instruction throughout the twelve grades.

## **Grades Seven/Eight, Algebra I and Secondary**

It is our goal that all students will complete Algebra I by the end of eighth grade. Completion of algebra in grade eight affords students the possibility of completing five years of secondary mathematics before college. Nurturing the expectation that all students will take Algebra I eliminates the possibility of inequality and untapped potential that may result from accelerating only a few students into Algebra. However, if a student needs a stronger foundation in standard grade 7 or grade 8 math to ensure a successful year of Algebra I in high school, that is the recommended course for that student. Benchmark assessments are encouraged to be given at the end of grade 6 to determine readiness for a grade 7 pre-algebra course. The Archdiocesan Algebra Readiness Test should be given at the end of grade 7 to determine readiness for a grade 8 algebra course. The Archdiocesan Algebra I End-of-Course Assessment should be given to students completing the 8<sup>th</sup> grade Algebra I course. The most important goal is that Catholic school students in the Archdiocese of Hartford have a rich and challenging middle school math experience; one that builds on the foundation of algebraic thinking begun and nurtured through the primary and intermediate levels.

The secondary school structure is very different from its primary, intermediate, and middle school counterparts. This section of the document, more than any other, is based on the 2005 Connecticut Mathematics Frameworks. The structure follows a more general framework to accommodate both required and elective math courses and the various ability levels offered.

### **Use of Technology**

As in all areas of curriculum, technology can and should enhance learning of mathematics. There are countless website resources for student exploration and practice and for assisting teachers in lesson planning. Interactive white boards provide powerful opportunities for motivating and challenging students in the study of mathematics. Calculators, too, are a valuable tool in math instruction. The National Council of Teachers of Mathematics, in its position statement on the use of technology, states:

**Calculators, computer software tools, and other technologies assist in the collection, recording, organization, and analysis of data. They also enhance computational power and provide convenient, accurate, and dynamic drawing, graphing, and computational tools. With such devices, students can extend the range and quality of their mathematical investigations and encounter mathematical ideas in more realistic settings.**

**In the context of a well-articulated mathematics program, technology increases both the scope of the mathematical content and the range of the problem situations that are within students' reach. Powerful tools for computation, construction, and visual representation offer students access to mathematical content and contexts that would otherwise be too complex for them to explore. Using the tools of technology to work in interesting problem contexts can facilitate students' achievement of a variety of higher-order learning outcomes, such as reflection, reasoning, problem posing, problem solving, and decision making. Technologies are essential tools within a balanced mathematics program. Teachers must be prepared to serve as knowledgeable decision makers in determining when and how their students can use these tools most effectively.**

**[http://www.nctm.org/about/position\\_statements/position\\_statement](http://www.nctm.org/about/position_statements/position_statement)**

While these tools do not replace the need to compute mentally, do reasonable paper and pencil computation, and learn facts; calculators, computers, hand held data devices, etc. must be accepted as valuable tools for learning and teaching mathematics. Their effectiveness depends on the ability of students to recognize reasonable answers.

Additionally, technological tools enable students to extend their problem solving ability beyond their knowledge of paper and pencil computation. This increases their math power. These tools also free students from tedious computation and allow them to concentrate on problem solving, both the posing and the solving of problems.

Calculators in grades 5 through 8 should include the following features: square root, reciprocal, exponent, +/- keys, algebraic logic, and constants. Some use of graphing calculators in Algebra I is recommended.

All textbook publishers provide interactive websites for teachers, students, and parents. (These are listed in the Approved Programs and Texts list published by the Office of Catholic Schools.) Almost all have the availability of online texts and often have proprietary software in conjunction with their series. This support includes lesson plans for teachers, practice and challenge opportunities for students, as well as activities for parents. In addition, both web and software resources offer a variety of choices in assessment tools. Teachers should investigate, select and use these resources carefully.

### **Technology Integration**

Highlighted areas in this document are intended to focus your attention on *Outcomes* and *Strategies* that are particularly conducive to technology integration. However, there are many other creative means of achieving this goal. *Internet Resources* are listed below and additional resources can be found at <http://ad hoc.org/07.curriculum/resources2.html> under the heading of *Technology*.

### **Instructional Resources**

The materials needed to support math instruction **on every level** should reflect three sequential components of learning. First, the student needs multiple concrete experiences that illustrate a mathematical principle or process. Students should be given access to manipulatives (both physical and virtual) – those materials that can be organized, categorized, combined, separated, changed – that provide varied concrete experiences of mathematical thinking and processes. These materials should include, but are not limited to: unifix cubes, geoboards, spinners, coins, counters, pattern blocks, fraction pieces, algebra tiles, compasses, scales, scissors, rulers, protractors, graph paper, grid/dot paper. Samples of these are found in the teachers resources of any math text.

Once the student has recognized a general pattern, materials and instruction are provided to help the student explain, describe, and represent what has taken place. The manipulation of materials is represented as an algorithm, a written record of thinking. Finally, the student develops the ability to apply concrete experiences to new and abstract situations, often as problem solving.

Each student should have adequate resources to learn. For most schools, these resources would include a text either in print or electronic form. The text should be chosen from the Archdiocesan Approved Programs and Texts list. Additional classroom resources might include student workbooks, computer generated practice materials and games designed to develop mathematical thinking.

All schools should have a membership in the National Council of Teachers of Mathematics.

### Internet Resources

Websites of publishers (Also, *Google* “free math worksheets” to get a plethora of **free** math resources for all grade levels, strands and objectives in mathematics.)

<http://www.learner.org/resources/series140.html>

[http://www.math.com/students/worksheet/algebra\\_sp.htm](http://www.math.com/students/worksheet/algebra_sp.htm)

<http://mathforum.org/algebra/alg.lessons.html>

<http://homework-help.aol.com/aolalgebrareview>

<http://www.aolatschoolsearch.com/elementary/search/search.adp?query=algebra&invocationType=topsearchbox>

<http://mathforum.org/algebra/k12.algebra.html>

<http://www.sitesforteachers.com/cgi-bin/autorank/search.cgi?key=algebra>

[http://seeingmath.concord.org/sms\\_interactives.html](http://seeingmath.concord.org/sms_interactives.html)

<http://www.veazeys.com/math/lessons.htm>

<http://www.nctm.org/>

[http://nlvm.usu.edu/en/nav/category\\_g\\_4\\_t\\_2.html](http://nlvm.usu.edu/en/nav/category_g_4_t_2.html)

[http://www.internet4classrooms.com/gateway\\_algebra.htm](http://www.internet4classrooms.com/gateway_algebra.htm)

<http://www.analyzemath.com/quadratics/quadratics.htm> (scroll down to start button)

<http://www.analyzemath.com/precalculus.html>

[http://www.superkids.com/aweb/pages/reviews/math/algebra/1/sw\\_sum1.shtml](http://www.superkids.com/aweb/pages/reviews/math/algebra/1/sw_sum1.shtml)

<http://www.educational-software-directory.net/math/algebra.html>

## ASSESSMENT



*Assessment is a means of measuring performance. It illustrates how well we are accomplishing our stated mission, goals, and objectives to educate and form the whole person. Through an integrated system of standards and of multiple forms of evaluation, assessment measures:*

- *beliefs, attitudes and behaviors, which are expressions of our Catholic identity;*
  - *content knowledge*
  - *student achievement (individual and group) ; and the*
  - *learning and teaching environment*
- (NCEA'S Statement on Accountability and Assessment in Catholic Education)*

Assessments of students should match the learning outcome or goal. In all classrooms, a variety of assessments, both objective and subjective, should be used to enhance learning and measure progress. Assessments are both instructional tools for students while they are learning and accountability tools to determine if learning has occurred.

Summative assessments are *MILEPOSTS* while formative assessments are *CHECKPOINTS*. *Milepost/Summative assessments* are designed initially by a teacher for each course and reflect where you want your students to be at end of unit. It is a measure OF learning designed to determine degree of mastery of each student...it judges the success of the process/product at the end.

*Checkpoint/Formative assessments* are designed to prepare students for the milepost assessment; they direct instruction and ensure students have the appropriate practice opportunities before the summative assessment. They are stops along the way. Results are used to direct instruction and/or to plan corrective activities.

	FORMATIVE	SUMMATIVE
PURPOSE	To monitor and guide process/product while still in progress	To judge the success of process/product at the end (however arbitrarily defined)
TIME OF ASSESSMENT	During the process or development of the product	At the end of the process or when the product is completed
TYPES OF ASSESSMENT	Informal observation, quizzes, homework, teacher questions, worksheets	Formal observation, tests, projects, term papers, exhibitions
USE OF ASSESSMENT INFORMATION	To improve or change a process/product while it is still going on or being developed	Judge the quality of a process/product; grade, rank, promote

**FORMS OF ASSESSMENT:**

***Criterion Referenced (CRA):***

**(Paper/Pencil Tests/Quizzes)**

- Multiple Choice
- Matching Items
- Completion Items
- Short Answer
- Essay Style
- Visual Representation
- Standardized Tests (*ITBS/CogAT –Grades 2-7*)
- Teacher/text created tests (Written or oral)
- Fluency tests
- Teacher or text generated check lists of skills

***Performance Assessment (PA):***

Student formal and informal presentations **across the curriculum using rubrics, checklists, rating scales, anecdotal records:**

- Recitations, reading, retellings, speeches, debates, discussions, video or audio performances
- Written work across the curriculum
- Cooperative group work (students are assessed individually, never as a group)
- Story, play, poem, paragraph(s), essay, research paper
- Spelling bees

- Poetry recitals
- Oratorical Competitions
- Classroom performance/demonstration (live or taped)
- Parent/Teacher/Student conferences
- Presentations (live or taped)
- Oral, dance, visual (photos or video)
- Seminars
- Projects
- Anecdotal records
- Application of Standard English in daily written and oral work across the curriculum (*including notebooks, journals, blogs, responses to questions*)
- Teacher observation of student activities across the curriculum
- Oral reading
- Informal and formal inventories
- Daily work
- Student spelling in written work
- Notebook checks
- Running records
- Application of skills across the curriculum
- \*Portfolios

**\*All schools are required keep portfolios of student writing.** Each year there should be a minimum of two pieces of original writing included in the portfolio. The writing may be from any area of curriculum (religion, math, social studies, science, etc.), but **must be accompanied by the rubric used to evaluate the writing.**

***Independent (IA):***

- Teacher observation
- Teacher-student conference
- Student self-correction and reflection on learning and performance
- Student self-assessment of goals
- On-line programs that allow students to self-assess
- Instructional questions
- Questionnaires
- Response Journals
- Learning Logs
- Oral tests/exams

## National Council of Teachers of Mathematics Mathematics Standards

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**Instructional programs from pre-kindergarten through grade twelve  
should enable all students to:**

1. Students understand numbers, ways of representing numbers, relationships among numbers, and number systems
2. Students understand meanings of operations and how they relate to one another
3. Students compute fluently and make reasonable estimates
4. Students understand patterns, relations, and functions
5. Students represent and analyze mathematical situations and structures using algebraic symbols
6. Students use mathematical models to represent and understand quantitative relationships
7. Students analyze change in various contexts
8. Students analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
9. Students specify locations and describe spatial relationships using coordinate geometry and other representational systems
10. Students apply transformations and use symmetry to analyze mathematical situations
11. Students use visualization, spatial reasoning, and geometric modeling to solve problems
12. Students understand measurable attributes of objects and the units, systems, and processes of measurement
13. Students apply appropriate techniques, tools, and formulas to determine measurements
14. Students formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
15. Students select and use appropriate statistical methods to analyze data

## Archdiocesan Standards

16. Students will use their study of math to make data-driven moral decisions and to promote justice in the world.

*We must expect all of our students to learn mathematics well beyond what we previously expected. We need all students to be more proficient than in the past, and we need many more students to pursue careers based on mathematics and science.*

Seely, Cathy, NCTM [http://www.nctm.org/news/pastpresident/2005\\_03president.htm](http://www.nctm.org/news/pastpresident/2005_03president.htm)

## Benchmarks for Critical Foundations in Mathematics



The following **Benchmarks for Critical Foundations in Mathematics** should be used to guide classroom curricula, mathematics instruction, and assessments. They should be interpreted flexibly, to allow for the needs of students and teachers. *For our purposes, **proficient** is defined as 80-85% mastery.*

The major goals for K-8 mathematics education should be:

- Proficiency with **whole numbers**
- Proficiency with **fractions** (including decimals and percents)
- Proficiency with particular aspects of **geometry and measurement**

### Fluency with Whole Numbers

1. By the end of grade 3, students should be proficient with the addition and subtraction of whole numbers.
2. By the end of grade 4, students should be proficient with multiplication and division of whole numbers.

### Fluency with Fractions

1. By the end of grade 4, students should be able to identify and represent fractions and decimals, and compare them on a number line or with other common representations of fractions and decimals.
2. By the end of grade 5, students should be proficient with comparing fractions and decimals and common percents, and with the addition and subtraction of fractions and decimals.
3. By the end of grade 5, students should be proficient with multiplication and division of fractions and decimals.
4. By the end of grade 5, students should be proficient with all operations involving positive and negative integers.

5. By the end of grade 5, students should be proficient with all operations involving positive and negative fractions.
6. By the end of grade 6, students should be able to solve problems involving percent, ratio, and rate, and extend this work to proportionality.

### Geometry and Measurement

1. By the end of grade 3, students should be able to solve problems involving perimeter.
2. By the end of grade 4, students should be able to solve problems involving the area of triangles and all quadrilaterals having at least one pair of parallel sides (i.e., trapezoids).
3. By the end of grade 6, students should be able to analyze the properties of two-dimensional shapes and solve problems involving perimeter and area.
4. By the end of grade 7, students should be familiar with the relationship between similar triangles and the concept of the slope of a line.
5. By the end of grade 8, students should be able to analyze the properties of three-dimensional shapes and solve problems involving surface area and volume.

## GRADE 1 MATHEMATICS CURRICULUM

### Grade 1: QUARTER 1

STRANDS/ADH STANDARDS	Topic	Enabling Outcome	Objective
<u>Number Theory, Estimation, Operations (NEO)</u> I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems  II. Understand meanings of operations and how they relate to one another  III. Compute fluently and make reasonable estimates	Addition & Subtraction to 12	<ul style="list-style-type: none"> <li>• <b>Count, read, write, order, compare, expand and represent</b> numbers to 100</li> <li>• <b>Count</b> on from a given amount, orally and with models</li> <li>• <b>Count</b> back from 20</li> <li>• <b>Identify</b> one more and one less than a number</li> <li>• <b>Plot</b> numbers to 100 on a number line</li> <li>• <b>Identify</b> and <b>use</b> zero</li> </ul>	<b>To count by groups, add one more to groups, and compare groups. (NEO)</b>
		<ul style="list-style-type: none"> <li>• <b>Memorize</b> addition and related subtraction facts to 12</li> <li>• <b>Check</b> subtraction with addition</li> <li>• <b>Relate</b> the inverse relationship of addition and subtraction facts to 12</li> </ul>	<b>To develop and apply fact families using inverse relationships. (NEO)</b>
<u>Algebra: Patterns and Functions (A)</u> I. Understand patterns, relations, and functions II. Represent and analyze		<ul style="list-style-type: none"> <li>• <b>Represent</b> addition and subtraction on a number line</li> </ul>	<b>To add by counting and combining and subtract by separating, comparing, or counting on or back. (NEO)</b>  <b>To represent the result of</b>

- mathematical situations and structures using algebraic symbols
- III. Use mathematical models to represent and understand quantitative relationships
  - IV. Analyze change in various contexts
  - V. Use operations, properties and algebraic symbols to determine equivalence and solve problems

**Grade 1: QUARTER 2**  
**Number Theory, Estimation, Operations (NEO)**

- I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- II. Understand meanings of operations and how they relate to one another
- III. Compute fluently and make reasonable estimates

**Algebra: Patterns and Functions (A)**

- I. Understand patterns, relations, and functions
- II. Represent and analyze mathematical situations and structures using algebraic

Place Value

- **Model** real-life situations that involve addition and subtraction of whole numbers using objects, pictures, and open sentences
  - **Identify, describe, extend, and create** patterns
  - **Describe** how specific patterns are generated
- 
- **Identify** number words to ten
  - **Identify** ordinal position of objects first through tenth
  - **Identify** ordinal words to tenth
  - **Identify** and **name** place values
  - **Use** place value models to **identify** tens and ones
  - **Identify** and **name** place values to hundreds place
  - **Identify** 10 more and 10 less than a number
  - **Estimate** quantity of items in a group
  - **Estimate** and **describe** quantity with benchmark amount such as 1, 10 and 100.
  - **Demonstrate** equivalence using models
  - **Identify** and **use** symbols of inequality (<, >)
  - **Identify** and **apply** symbol of equality (=)
  - **Balance** simple number sentences by finding the missing numbers
  - **Skip count** by 2,5,10
  - **Represent** even and odd numbers concretely as pairs and leftover ones
  - **Identify** even and odd numbers to 100
  - **Describe** relationships between quantities with familiar contexts using ratios: one desk has four legs, two desks, eight, etc.

counting, combining, and separating sets of objects using number sentences. (A)

To examine attributes of objects and describe their relationships. (A)

To represent and order 2 digit numbers using the base ten place value system. (NEO)

To describe quantitative relationships and develop benchmark representations. (NEO)

To identify and represent quantities as equivalent or non-equivalent. (A)

To analyze change of quantity and quality using patterns. (A)

<p>symbols</p> <p>III. Use mathematical models to represent and understand quantitative relationships</p> <p>IV. Analyze change in various contexts</p> <p>V. Use operations, properties and algebraic symbols to determine equivalence and solve problems</p>	<p>Addition &amp; Subtraction to 20</p>	<ul style="list-style-type: none"> <li>• <b>Memorize</b> addition and related subtraction facts to 20</li> <li>• <b>Identify</b> missing addends (sums to 20)</li> <li>• <b>Identify</b> functional number relationships</li> <li>• <b>Choose</b> addition or subtraction to complete function tables</li> <li>• <b>Choose</b> the correct operation in a word problem (+,- )</li> <li>• <b>Identify</b> reasonable answers to problems that reflect real-world experience.</li> <li>• <b>Select</b> a reasonable answer to a problem reflecting a change in place value (i.e., 5, 50, 500)</li> </ul>	<p>To develop and apply fact families using inverse relationships. (NEO)</p> <p>To understand and describe functional relationships. (A)</p> <p>To create and solve one step story and picture problems. (NEO)</p> <p>To describe quantitative relationships and develop benchmark representations. (M)</p>
<p><u>Grade 1: QUARTER 3</u></p> <p><u>Measurement (M)</u></p> <p>I. Understand measurable attributes of objects and the units, systems, and processes of measurement</p> <p>II. Apply appropriate techniques, tools and formulas to determine measurements</p>	<p>Money</p>	<ul style="list-style-type: none"> <li>• <b>Name</b> a penny, nickel, dime, quarter and dollar bill</li> <li>• <b>Identify</b> the value of a penny, nickel, dime, quarter and dollar bill</li> <li>• <b>Use</b> the cents sign (¢)</li> <li>• <b>Determine</b> and <b>compare</b> values of sets of coins</li> <li>• <b>Trade</b> with sets of pennies and dimes</li> <li>• <b>Count</b> and <b>show</b> money to one dollar</li> <li>• <b>Use</b> dollar sign (\$)</li> <li>• <b>Add and subtract</b> money to 12 cents</li> </ul>	<p>To determine and compare coin values (M)</p> <p>To express monetary value in oral and written forms (M)</p> <p>To recognize, identify, and trade equivalent sets of coins (M)</p> <p>To express monetary value in oral and written forms (M)</p> <p>To solve problems involving money (M)</p>
	<p>Time</p>	<ul style="list-style-type: none"> <li>• <b>Tell and/or show</b> time to the hour using both analog and digital clocks</li> <li>• <b>Tell and/or show</b> time to the half hour using both analog and digital clocks</li> <li>• <b>Write</b> time in standard notation</li> <li>• <b>Estimate</b> elapsed or projected time in terms of an hour or a minute</li> </ul>	<p>To use calendars and clocks to measure and record time (M)</p>

- **Identify** days of the week, months of the year, current year
- **Use** a calendar to **identify** dates
- **Read and write** the date
- **Identify** the number of days in a month

To plan and sequence events (M)

- **Use** a calendar to **identify** dates and **sequence** events
- **Describe** time in terms like: today, yesterday, next week, last week, tomorrow
- **Estimate and compare** the length of time needed to complete tasks using terms like longer or shorter

Measurement

- **Recognize** and **apply** nonstandard units of measure

To measure through direct comparison and repetition of units (M)

- **Identify** inch and foot as standard customary unit
- **Demonstrate** approximate inch, approximate foot

To use standard units to communicate measure (M)

- **Compare** lengths of given objects using “longer” and “shorter”

To use concrete examples to make estimates and to determine and describe the reasonableness of answers to measurement problems (M)

- **Estimate** and **measure** length and height in non-standard units

To measure through direct comparison and repetition of units (M)

- **Identify** centimeter as standard metric measure
- **Estimate** and **measure** length and height in inches and centimeters

To use standard units to communicate measure (NEO)

To use concrete examples

**Number Theory, Estimation, Operations (NEO)**

- I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- II. Understand meanings of operations and how they relate to one another
- III. Compute fluently and make reasonable estimates

- **Identify** cup, pint, quart and pound as standard customary units
- **Identify** liter as standard metric unit
- **Compare** capacity using “more” or “less”
- **Compare** mass of objects using a balance scale
- **Compare** volume/capacity of given containers using concrete materials, i.e., water, sand, beans, etc.
- **Read** Fahrenheit and Celsius thermometers

to make estimates and to determine and describe the reasonableness of answers to measurement problems (M)

To measure through direct comparison and repetition of units (M)

**Grade 1: QUARTER 4**  
**Algebra (A)**

- I. Understand patterns, relations, and functions

**Geometry (G)**

- I. Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about relationships
- II. Specify locations and describe spatial relationships using coordinate geometry and other representational systems
- III. Apply transformations and use symmetry to analyze mathematical situations
- IV. Use visualization, spatial reasoning, and geometric modeling to solve problems

Geometry

- **Sort, classify, and order** objects by size, number, and other properties
- **Identify** points inside, outside, or on a figure
- **Use** the descriptive terms: top, bottom, left, right, near, far, up, down, above, below, next to, close by
- **Sort** and **describe** plane figures (square, circle, rectangle, triangle)
- **Identify** plane figures
- **Identify** common objects in the environment that depict plane figures
- **Count** corners and sides of plane figures
- **Explore and identify** solid figures (cube, cone, cylinder, sphere)
- **Identify** figures having the same size and shape
- **Identify** open or closed figures
- **Explore** lines of symmetry
- **Create** shapes and design with symmetry
- **Build and draw** two and three dimensional shapes
- **Draw** shapes from memory (i.e., draw a triangle)

To examine attributes of objects and describe their relationships. (A)

To describe, name and interpret relative direction, location, proximity, and position of objects (G)

To classify plane figures and solids by common characteristics including examples with change of position (G)

To describe, name and interpret relative direction, location, proximity, and position of objects (G)

To classify plane figures and solids by common characteristics including examples with change of

<p><b><u>Number Theory, Estimation, Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand meanings of operations and how they relate to one another</p> <p>III. Compute fluently and make reasonable estimates</p>	<p>Fractions</p> <ul style="list-style-type: none"> <li>• <b>Predict</b> the results of putting together and taking apart two- and three-dimensional shapes</li> <li>• <b>Identify</b> equal parts of a whole</li> <li>• <b>Make</b> a whole of equal sized parts of familiar objects</li> <li>• <b>Identify</b> halves and quarters using models</li> <li>• <b>Identify</b> half of a small set of objects considered to be the whole.</li> </ul>	<p>position(G)</p> <p>To recognize and use geometric relationships to solve problems (G)</p> <p>To identify and compare equal parts of a whole (NEO)</p> <p>To partition a set of objects into smaller groups with equal amounts. (NEO)</p> <p>To identify and compare equal parts of a whole (NEO)</p>
<p><b><u>Data Analysis, Statistics, and Probability (DSP)</u></b></p> <p>I. Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer them</p> <p>II. Select and use appropriate statistical methods to analyze data</p> <p>III. Develop and evaluate inferences and predictions that are based on data</p> <p>IV. Understand and apply basic concepts of probability</p>	<p>Data &amp; Graphs</p> <ul style="list-style-type: none"> <li>• <b>Identify</b> events as certain, possible or impossible</li> <li>• (If a bowl is filled with red jelly beans, is it possible to pick a red jelly bean from the bowl? A green one?)</li> <li>• <b>Observe, record, graph,</b> and <b>describe</b> the results of simple probability activities and games</li> <li>• <b>Read and Use</b> data from a graph, table, glyphs (coded pictures), and/or picture</li> <li>• <b>Make and interpret</b> a real object, picture, and <b>bar graphs</b></li> <li>• <b>Make and interpret</b> a tally chart</li> <li>• <b>Pose</b> questions to collect data</li> <li>• <b>Conduct</b> simple surveys to gather data</li> <li>• <b>Choose and Use</b> various methods to organize information including lists, systematic counting, sorting, <b>graphic organizers,</b> and tables</li> <li>• <b>Use</b> comparative language to describe/interpret data in tables and <b>graphs</b></li> <li>• The student will: <b>Use</b> a Venn diagram and other <b>graphic organizers</b> to sort items</li> </ul>	<p>To determine the likelihood of certain events through simple games and experiments (DSP)</p> <p>To collect, organize, and describe data (DSP)</p> <p>To analyze data in tables and graphs (DSP)</p> <p>To collect, organize, and</p>

**VOCABULARY**

	<ul style="list-style-type: none"> <li>• <b>Develop, describe, choose</b> and <b>use</b> strategies to add and subtract one- and two-digit numbers</li> <li>• <b>Add</b> and <b>subtract</b> 2 digit numbers without regrouping</li> <li>• <b>Add</b> 1 and 2 digit numbers with three addends (column addition)</li> <li>• <b>Add</b> and <b>subtract</b> 3 digit numbers without regrouping</li> </ul>	<p><b>describe data (DSP)</b></p> <p><b>To add by counting and combining and subtract by separating, comparing, or counting on or back. (NEO)</b></p>
<b>Number Theory</b>	equal to; place names: ones , tens hundreds	
<b>Whole Numbers</b>	add; addend; addition sentence ; count on; difference; doubles; fact families; minus; number sentence; plus ; related facts; subtraction sentence; sum; turn-around fact; +, -, =	
<b>Fractions</b>	fourth ; fraction; half; part; third ; whole	
<b>Estimation</b>	between; estimate; greater than; less than	
<b>Algebra</b>	even; number; odd; pair; pattern; <, >, =	
<b>Geometry</b>	angles; corners ; face; inside/outside; left and right; open and closed figures; plane figures ; sides; solid figures; symmetry; top and bottom	
<b>Measurement</b>	length/height: centimeter; foot; inch ; longer/shorter ; metric ; standard ;  Capacity: cup ; liter ; pint; quart; more/less  Money: cent ¢; dime ; dollar \$; nickel ; penny; quarter  Temperature; thermometer  Time: half hour ; hour ; o'clock	
<b>Data Analysis, Statistics, Probability</b>	bar graph; data; graph; greater than/less than/equal to; less/more; possible/impossible; certain; table; tally; Venn diagram; vertical	

**Resources for Grade One Math Literacy Connections**

<b><i>Strand</i></b>	<b><i>Book Title</i></b>
<b>Number Theory</b>	<b><i>Over in the Meadow</i>, Langstaff and Rojankowsky. San Diego: Harcourt Brace, 1957. <i>Hold Tight Bear</i>, Rod Maris, New York: Delacorte, 1989.</b>

	<p><i>Yellow Ball</i>, Molly Bang, New York: Morrow, 1991.</p> <p><i>The Enormous Turnip</i>, Kathy Parkinson.</p> <p><i>The Crickets from Mouse Soup</i>, Arnold Lobel.</p> <p><i>Maurice Goes to School</i>, B. Wiseman. <i>Band-aids</i>, Shel Silverstein.</p> <p><i>Animal Numbers</i>, Bert Kitchen, New York: Dial, 1987.</p> <p><i>The Bicycle Race</i>, Donald Crews, New York: Greenwillow, 1985.</p> <p><i>M&amp;M Counting Book</i>, Barbara Barbieri McGrath.</p> <p><i>Bunches and Bunches of Bunnies</i>, by Louise Matthews.</p> <p><i>Eating Fractions</i>, Bruce McMillan. New York: Scholastic, 1991.</p> <p><i>The Doorbell Rang</i>, Pat Hutchins.</p> <p>New York: Scholastic, 1986.</p>
Algebra	<p><i>Ten in a Bed</i>, Mary Rees, Boston: Little Brown, 1988.</p> <p><i>Mouse Count</i>, Ellen Stoll Walsh, San Diego: Harcourt Brace, 1990.</p> <p><i>Bat Jamboree</i>, Kathi Appelt, Morrow, 1996.</p> <p><i>Frog and Toad are Friends</i>, Arnold Lobel, Harper Trophy, 1970.</p>
Geometry	<p><i>Circles, Triangles, and Squares</i>, Tana Hoban. New York: Macmillian, 1974.</p> <p><i>The Most Wonderful Eggs in the World</i>, Melme Heine.</p> <p><i>The Greedy Triangle</i>, Marilyn Burns.</p> <p><i>Grandfather Tangs Story</i>, Ann Tompert.</p>
Measurement	<p>"A List" from <i>Frog and Toad Together</i>, Arnold Lobel.</p> <p><i>Mud for Sale</i>, Brenda Nelson.</p> <p><i>If You Give a Mouse a Cookie</i>, Laura Joffe Numeroff. New York: Harper Collins 1985.</p> <p><i>Inch by Inch</i>, Leo Lionni. New York: Astor-Honor, 1962.</p> <p><i>Is It Larger, Is It Smaller</i>, Tana Hoban, New York: Green Willow, 1985.</p>

Suggested Teaching Strategies	Suggested Learning Strategies
<p>The teacher provides a "number-rich" environment:</p> <p>Numbers on display (charts, graphs, timelines, calendars)</p> <p>Collections of countable objects</p> <p>Books that tell number stories</p> <p>Tapes and CDs of number songs</p> <p>Other:</p>	<p><b>Teacher Directed</b></p> <p>The teacher:</p> <p>Creates counting and estimating experiences and activities across the curriculum</p> <p>Provides manipulatives for student use</p> <p><b>Other:</b> _____</p> <p><b>Cooperative</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>Participate in number games</li> </ul>

	<ul style="list-style-type: none"> <li>• Keep score in games</li> <li>• Work in cooperative teams or groups to collect and express data</li> <li>• Use flashcards</li> </ul> <p><b>Other:</b></p> <p><b>Independent</b></p> <p>Students</p> <ul style="list-style-type: none"> <li>• Use electronic devices to collect and illustrate data</li> <li>• Express specific quantities in written work across the curriculum</li> </ul> <p style="text-align: right;"><b>Other:</b> _____</p>
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**Suggested Cross Curricular and Catholic Social Teaching Links**

**Grade One**

- ✚ Students measure the growth of classroom plants, record their observations and talk about taking care of God’s creation. (Science, Math, Religion, Written language)
- ✚ Students keep a graph of sunny/cloudy days and write prayers thanking God for both. (Math, Science, Religion, Language Arts)

**Notes:**

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**Textbooks / Resources:**

**GRADE 2 MATHEMATICS CURRICULUM**

**Grade 2: QUARTER 1**

<b><u>STRANDS/ADH STANDARDS</u></b>	<b><u>TOPIC</u></b>	<b><u>ENABLING OUTCOMES</u></b>	<b><u>OBJECTIVES</u></b>
<p><b><u>Number Theory, Estimation, and Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand meanings of operations and how they relate to one another</p>	<p><b>Addition and Subtraction to 20</b></p>	<ul style="list-style-type: none"> <li>• <b>Model</b> real-life situations that involve addition and subtraction of whole numbers, using objects, pictures and open sentences</li> <li>• <b>Write</b> related fact families for addition and subtraction</li>   <li>• <b>Relate</b> the inverse relationship of addition and subtraction facts to 20</li> </ul>	<p><b>To represent the result of counting, combining and separating sets of objects using number sentences (NEO)</b></p> <p><b>To develop fact families using inverse relationships (NEO)</b></p>

- III. Compute fluently and make reasonable estimates
- IV. Use *fractions* to draw conclusions about the fairness and equity of resources

**Algebra: Patterns and Functions (A)**

- I. Understand patterns, relations, and functions
- II. Represent and analyze mathematical situations and structures using algebraic symbols
- III. Use mathematical models to represent and understand quantitative relationships
- IV. Analyze change in various contexts

- **Complete** a number of fact problems within a specific time limit
- **Memorize** addition and related subtraction facts to 20
  
- **Describe** attributes and relationships of objects
- **Sort, classify, and order** objects and numbers based on one and two attributes and describe the rule used
- **Translate** the same pattern from one representation (such as color) to another representation (such as shape)
- **Describe** counting and number patterns
- **Explore** and **solve** problems involving simple number patterns.
- **Identify** objects with common
  - or different attributes
- **Identify** missing objects in a pattern
  
- **Read** and **write** number words to one hundred
- **Identify** and **use** symbols of inequality (<, >)
- **Use** concrete, pictorial, and verbal examples to **demonstrate** an understanding that = is a relationship that indicates equivalence
- **Identify** quantities as equivalent or non-equivalent
- **Demonstrate** balance or equivalence using models
- **Identify** and **use** symbols of inequality (<, >)
- **Identify** and **use** symbol of inequality (≠)
  
- **Balance** simple number sentences by finding the missing numbers
- **Identify** missing numbers to 20 in addition and subtraction sentences and **justify** the answer
- **Determine** and **justify** the missing addition/subtraction signs in addition and subtraction sentences
- **Identify** and **justify** missing numbers in addition and subtraction sentences
  
- **Determine** whether a number is even or odd using manipulatives
- **Skip count** by 3, 4, and 100
- **Identify** numbers as odd or even

To identify, describe, create, and extend a number of patterns (A)

To identify and represent quantities as equivalent or nonequivalent (NEO, A)

To use number sentences to represent quantitative relationships (A)

Students will analyze change in quantity and quality using patterns. (A)

To represent and order number concepts in verbal and written form (NEO)

**Measurement (M)**

- I. Understand measurable attributes of objects and the units, systems, and processes of measurement
- II. Apply appropriate techniques, tools and formulas to determine measurements

**Place Value**

**Money**

- **Identify** number words to one hundred
- **Identify** and **name** place values: hundreds, tens and ones
- **Identify** ordinal positions to twentieth
- **Identify** ordinal words to twentieth
- **Read** and **write** numerals to 999
  
- **Count and show** money to one dollar
- **Find** equivalent sets of coins
  
- **Use** dollar sign
- **Use** decimal point in writing money amounts
- **Make** change up to \$1.00
  
- **Add** and **subtract** 2 digit numbers with regrouping
- **Add** 1 and 2 digit numbers with 3 addends – column addition
  
- **Choose** addition or subtraction to complete functions tables
- **Identify** missing addends with 2 digit numbers
  
- **Choose** and **justify** the correct operation in a word problem (+, -)
- **Check** subtraction with addition
  
  
- **Round** numbers to the nearest 10
- **Round** to estimate sums of two digit numbers
- **Use** estimation strategies that result in reasonable answers to a problem

**To recognize, identify and trade sets of equivalent coins (M)**

**To express monetary values in oral and written forms (M)**

**To use concepts based on patterns and place values to add and subtract (NEO)**

**To identify functional number relationships (A)**

**To represent the result of counting, combining and separating sets of objects using number sentences (NEO)**

**Students will identify and use equivalent representations of numbers to estimate and compute. (NEO)**

**Grade 2: QUARTER 2**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPIC</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>Measurement (M)</b></p> <p>I. Understand measurable attributes of objects and the units, systems, and processes of measurement</p> <p>II. Apply appropriate techniques, tools and formulas to determine measurements</p>	<p>Length, Capacity, Volume/Time</p> <p>Add and Subtract 2-Digit Numbers</p>	<ul style="list-style-type: none"> <li>• <b>Tell and/or show</b> time to the half hour using both analog and digital clocks</li> <li>• <b>Tell, write, and show</b> time to the quarter hour, to five and one minute intervals</li> <li>• <b>Estimate and/or compute</b> elapsed or projected time in terms of an hour or a minute</li> <li>• <b>Use A.M. and P.M.</b> appropriately</li> <li>• <b>Recognize and apply</b> non standard units of measure</li> <li>• <b>Estimate and measure</b> length and height in centimeters and inches</li>   <li>• <b>Compare and order</b> objects according to length</li>   <li>• <b>Find</b> the area of squares and rectangles by <b>modeling</b> and <b>counting</b> square units</li> <li>• <b>Demonstrate</b> ways to fill a region with different shapes</li> <li>• <b>Model and identify</b> the perimeter of a polygon</li>   <li>• <b>Identify</b> cup, pint, quart, liter and gallon and <b>relate</b> to their use in real life</li> <li>• <b>Compare and order</b> objects according to capacity and/or weight</li> <li>• <b>Demonstrate</b> balance or equivalence using models</li> <li>• <b>Identify</b> pound as a unit of measure and <b>relate</b> use in real life</li> <li>• <b>Read</b> Fahrenheit and Celsius thermometers</li> </ul>	<p><b>To determine and use various tools and units to estimate and measure (M)</b></p> <p><b>To use measurement to determine and explain relative size of a given object (M)</b></p> <p><b>To identify and generalize relationships between measurable attributes of plane and solid figures (M)</b></p> <p><b>To use standard units and identify examples of measurements in daily life (M)</b></p>

**Grade 2: QUARTER 3**

<b><u>STRANDS/ADH STANDARDS</u></b>	<b><u>TOPIC</u></b>	<b><u>ENABLING OUTCOMES</u></b>	<b><u>OBJECTIVES</u></b>
<p><b><u>Geometry (G)</u></b></p> <p>I. Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about relationships</p> <p>II. Specify locations and describe spatial relationships using coordinate geometry and other representational systems</p> <p>III. Apply transformations and use symmetry to analyze mathematical situations</p> <p>IV. Use visualization, spatial reasoning, and geometric modeling to solve problems</p>	Plane and Solid Figures	<ul style="list-style-type: none"> <li>• <b>Relate</b> solid figures to common items</li> <li>• <b>Recognize, name, compare, and sort:</b> cube, cylinder, cone sphere, rectangular prism, and pyramid</li> <li>• <b>Identify, model/construct</b> geometric solids by the attributes: face and edge</li> <li>• <b>Describe</b> the relationship between plane and solid figures</li> <li>• <b>Describe</b> plane and solid figures by number of sides and/or faces</li> <li>• <b>Classify</b> plane figures by size and shape</li> <li>• <b>Identify</b> corners, sides, and points inside and outside of a figure</li> <li>• <b>Identify</b> and <b>create</b> open and closed figures</li> <li>• <b>Identify</b> congruent figures</li> </ul>	<p><b>To classify and identify plane figures and solids by common characteristics (G)</b></p> <p><b>To identify shapes as the same where there are changes in position (G)</b></p> <p><b>To collect, organize, and describe data (DSP)</b></p> <p><b>To pose questions to be answered through collection and analysis of data (DSP)</b></p> <p><b>To determine the likelihood of certain events through games and simple experiments (DSP)</b></p>
	Spatial Relationships	<ul style="list-style-type: none"> <li>• <b>Recognize, apply</b> and <b>manipulate</b> slides, flips and turns</li> <li>• <b>Explore, identify</b> and <b>draw</b> lines of symmetry in simple shapes and forms</li> <li>• <b>Recognize</b> and <b>create</b> simple figures and drawings with symmetry</li> <li>• <b>Identify</b> translations, rotations, and reflections</li> </ul>	
	Graphs	<ul style="list-style-type: none"> <li>• <b>Read and interpret</b> vertical graphs, pictographs</li> </ul>	
	Data Analysis	<ul style="list-style-type: none"> <li>• <b>Conduct</b> simple surveys to gather data</li> <li>• <b>Create</b> a tally chart using given data</li> <li>• <b>Create</b> simple (picture, bar) graphs from given data</li> <li>• <b>Use</b> a Venn diagram and other <b>graphic organizers</b> to sort items</li> <li>• <b>Demonstrate</b> and <b>explain</b> survey findings</li> <li>• <b>Use</b> range and mode to explain data</li> </ul>	
<p><b><u>Data Analysis. Statistics, and Probability (DSP)</u></b></p> <p>I. Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer them</p> <p>II. Select and use appropriate statistical methods to analyze data</p> <p>III. Develop and evaluate inferences and predictions that are based on data</p> <p>IV. Understand and apply basic concepts of probability</p>	Probability	<ul style="list-style-type: none"> <li>• <b>Identify</b> events as certain, possible or impossible, fair or unfair (If a bowl is filled with red M&amp;M’s, is it possible to pick a red M&amp;M from the bowl? A green M&amp;M?)</li> <li>• Predict sample data</li> </ul>	



	<p>Roman Numerals</p>	<p>repeated subtraction.)</p> <ul style="list-style-type: none"> <li>• <b>Illustrate</b> repeated addition and subtraction on a number line</li> <li>• <b>Use</b> arrays to <b>relate</b> multiplication and division</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> Roman numerals I, V, and X</li> <li>• <b>Read</b> and <b>write</b> Roman numerals to 30</li> </ul>	<p>To recognize and explore Roman numerals (NEO)</p>
<p><u>VOCABULARY</u></p>	<p>Number Theory</p> <p>Whole Numbers</p> <p>Fractions</p> <p>Estimation</p> <p>Algebra</p> <p>Geometry</p> <p>Measurement</p> <p>Data Analysis, Statistics, Probability</p>		

Resources for Grade Two Math Literacy Connections

<b>Strand</b>	<b>Book Title</b>
<b>Number Theory</b>	<p><i>A Birthday Basket for Tia</i>, by Pat Moran  <i>Ocean Parade</i>, by Patricia McCarthy  <i>Numbers of Things</i>, by Helen Oxenbury  <i>A Thousand Pails of Water</i>, by Ronald Roy  <i>Two Hundred Rabbits</i>, by Lonzo Anderson and Adrienne Adams  <i>Even Steven &amp; Odd Todd Making Sense of Census 2000</i>, Scholastic  <i>Each Orange had Eight Slices</i>, by Paul Giganti  <i>Ninety-nine Pockets</i>, by Jean Myrick  <i>How many Snails</i>, by Paul Giganti  <i>How Many Feet in the Bed</i>, by Diane Hamry  <i>One Hundred Hungry Ants</i>, by Elinor Pinczes.  <i>Fractions are Parts of Things</i>, by Richard Dinnis  <i>How Many Ways Can you Cut a Pie</i>, by Jane Belk Moncure</p>
<b>Geometry</b>	<p><i>The Village of Round and Square Houses</i>, by Ann Grifalconi  <i>The Button Box</i>, by Margarete S. Reid</p>
<b>Measurement</b>	<p><i>How Big is a Foot</i>, by Rolf Myller  <i>On a Hot, Hot Day</i>, by Nicki Weiss  <i>Farmer Mack Measures his Pig</i>, by Toni  <i>Bargain for Frances</i>, by Russell Hoban  <i>Penelope Gets Wheels</i>, by Esther Peterson  <i>Where the Sidewalk Ends</i>, by Shel Silverstein  <i>Clocks and More Clocks</i>, by Pat Hutchins  <i>Alexander Who Used to be Rich Last Sunday</i>, by Judith Viorst</p>

<b>Suggested Teaching Strategies</b>	<b>Suggested Learning Strategies</b>
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The teacher provides a “number-rich” environment:

Numbers on display (charts, **graphs**, calendars)

Collections of countable objects

Books that tell number stories

Tapes and CDs of number songs

Other: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### **Teacher Directed**

The teacher:

Creates counting and estimating experiences and activities across the curriculum

Provides manipulatives for student use

**Other:** \_\_\_\_\_

### **Cooperative**

Students:

- Participate in number games
- Keep score in games
- Work in cooperative teams or groups to collect and express data
- Use flashcards

**Other:** \_\_\_\_\_

### **Independent**

Students

- Use electronic devices to collect and illustrate data
- Express specific quantities in written work

**Other:** \_\_\_\_\_

**Suggested Cross Curricular and Catholic Social Teaching Links**

## Grade Two

- ✚ Students draw maps of their community/communities (neighborhood, parish, school yard, etc.), write address numbers in different ways (One Hundred Grant St., 100 Grant St.). (Art, Social Studies, Math) [Harcourt Math, 2004]
- ✚ Students graph ways in which people in communities help one another and ways in which they can help their communities (family, school, parish, and neighborhood)). (Religion, Social Studies, Math)
- ✚ Students make string phones with a paper cup at each end; they record and graph sounds heard at 10 ft, 20 feet, etc. (Science, Math)
  - ✚ Students plan a food drive. (Religion, Math, Health)
- ✚ Students compare pieces of string, one cut 53 inches, the length of a dinosaur's foot, the other the length of the student's foot, and write a paragraph describing their conclusions. (Science, Math)
- ✚ Students work together to plan a bus route from their homes to school and compare lengths of routes with one another. (Social Studies, Math)

### Notes:

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**Grade 3: QUARTER 2**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPIC</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b><u>Number Theory, Estimation, and operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand meanings of operations and how they relate to one another</p> <p>III. Compute fluently and make reasonable estimates</p> <p><b><u>Algebra: Patterns &amp; Functions (A)</u></b></p> <p>I. Understand patterns, relations, and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Use mathematical models to represent and understand quantitative relationships</p> <p>IV. Analyze change in various contexts</p>	<p><b>Multiplication and Division Facts</b></p> <p><b>Multiplication and Division Concepts</b></p>	<ul style="list-style-type: none"> <li>• <b>Relate</b> skip counting and repeated addition to multiplication</li> <li>• <b>Draw</b> arrays to model multiplication</li>   <li>• <b>Skip count</b> by 3, 4, and 100</li> <li>• <b>Explore</b> and <b>describe</b> multiplication fact patterns</li>   <li>• <b>Identify, express</b> and <b>apply</b> the zero properties of multiplication</li> <li>• <b>Identify, express</b> and <b>apply</b> the commutative, associative and identity properties of addition and multiplication</li> <li>• <b>Illustrate</b> repeated addition and subtraction on a number line</li>   <li>• <b>Choose</b> multiplication or division to complete functions tables</li>   <li>• <b>Memorize</b> multiplication facts and related division facts through twelve times table</li>   <li>• <b>Identify and justify</b> missing numbers in multiplication and division facts</li>   <li>• <b>Use</b> mental math to <b>multiply</b> by 10, 100, and 1000</li> </ul>	<p><b>To use concepts based on patterns and place value to multiply and divide (NEO)</b></p> <p><b>To analyze change in quantity and quality using patterns (A)</b></p> <p><b>To use properties of whole numbers to maintain equivalence (A)</b></p> <p><b>To identify functional number relationships (A)</b></p> <p><b>To use concepts based on patterns and place value to multiply and divide (NEO)</b></p> <p><b>To identify and represent quantities that are equivalent or non-equivalent (A)</b></p>



	<b>Fractions</b>	<p>graphics, etc.)</p> <ul style="list-style-type: none"> <li>• <b>Read, write</b> and <b>identify</b> all <i>fractions</i></li> <li>• <b>Identify</b> and <b>model</b> fractional parts of a set</li> <li>• <b>Find</b> fractional parts of numbered groups</li> </ul>	<p>sharing portions of equal size (NEO)</p>
		<ul style="list-style-type: none"> <li>• <b>Use</b> visual models to identify and compare <i>fractions</i></li> <li>• <b>Compare</b> <i>fractions</i> with like denominators</li> <li>• <b>Compare</b> unit <i>fractions</i></li> <li>• <b>Compare</b> proper <i>fractions</i> with unlike denominators</li> </ul>	<p>To use models and number lines to compare <i>fractions</i> (NEO)</p>
		<ul style="list-style-type: none"> <li>• <b>Identify</b> mixed numbers</li> </ul>	<p>To model and identify mixed numbers (NEO)</p>
	<b>Decimals</b>	<ul style="list-style-type: none"> <li>• <b>Add</b> and <b>subtract</b> like <i>fractions</i> using models</li> </ul>	<p>To construct and use models to add and subtract like <i>fractions</i> (NEO)</p>
		<ul style="list-style-type: none"> <li>• <b>Model</b> and <b>write</b> <i>decimals</i> in tenths and hundredths</li> <li>• <b>Relate</b> money (pennies and dimes) to <i>decimals</i></li> <li>• <b>Compare</b> and <b>order</b> <i>decimals</i> of tenths and hundredths</li> <li>• <b>Locate</b> <i>decimals</i> on a number line</li> <li>• <b>Count</b> by tenths and hundredths</li> </ul>	<p>To extend whole number place value patterns, models, and notations to include <i>decimals</i> (NEO)</p>
		<ul style="list-style-type: none"> <li>• <b>Write</b> <i>fractions</i> with denominators of 10 or 100 as <i>decimals</i></li> </ul>	<p>To express equivalent relationships between <i>decimals</i> and <i>fractions</i> whose denominator is a multiple of ten (NEO)</p>

**Grade 3: QUARTER 4**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPIC</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>Data Analysis, Statistics, &amp; Probability (DSP)</b></p> <p>I. Formulate questions that can be addressed with data; collect,</p>		<ul style="list-style-type: none"> <li>• <b>Identify</b> events as more likely, equally likely, less likely</li> <li>• <b>Express</b> probability in verbal and numerical terms</li> <li>• <b>Use</b> results of experiments to predict future events</li> <li>• <b>Calculate</b> probability of an event</li> </ul>	<p>To determine the likelihood of certain events through games and simple</p>





<p>arguments about relationships</p> <p>II. Specify locations and describe spatial relationships using coordinate geometry and other representational systems</p> <p>III. Apply transformations and use symmetry to analyze mathematical situations</p> <p>IV. Use visualization, spatial reasoning, and geometric modeling to solve problems</p> <p><b><u>Number Theory, Estimation, and Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p>	<p>Roman numerals</p>	<ul style="list-style-type: none"> <li>• <b>Identify and draw</b> points, lines, line segments, and rays</li> <li>• <b>Classify</b> angles as right, acute or obtuse</li> <li>• <b>Identify, compare</b> and <b>contrast</b> intersecting, perpendicular and parallel lines</li> <li>• <b>Identify, describe, classify</b> and <b>draw</b> polygons: quadrilaterals, pentagons, hexagons, octagons and <b>classify</b> triangles according to sides and angles</li> <li>• <b>Identify</b> translations, rotations, and reflections</li> <li>• <b>Identify</b> congruent figures</li> <li>• <b>Compute</b> the perimeter of a polygon</li> <li>• <b>Find</b> the area of squares and rectangles by <b>modeling</b> and <b>counting</b> square units</li> <li>• <b>Estimate</b> the area of squares and rectangles</li> <li>• <b>Identify</b> similar figures</li> <li>• <b>Find</b> the volume of rectangular prisms by <b>modeling</b> and <b>counting</b> cubic units</li> <li>• <b>Identify</b> ways to tile or tessellate a region or shape using various polygons</li> <li>• Identify Roman numerals L and C</li> <li>• Read and write Roman numerals to 50</li> <li>• Identify Roman numerals D and M</li> <li>• Read and write Roman numerals to 100</li> </ul>	<p>To identify shapes as the same where there are changes in position (G)</p> <p>To recognize and use geometric relationships to solve problems (G)</p> <p>To recognize and explore Roman Numerals (NEO)</p>
<p><b><u>VOCABULARY</u></b></p>	<p><b>Number Theory</b></p> <p><b>Whole Numbers</b></p> <p><b>Fractions</b></p> <p><b>Estimation</b></p>	<p>Ordinal; expanded numeral form; greatest, least standard form, period change</p> <p>Arrays; dividend; divisor; multiple; quotient; multiplier; remainder; compatible</p> <p>Denominator; numerator; mixed number; unit fraction; equivalent fraction ; Decimal; tenth; hundredth; whole number; roman numeral</p>	

	<p><b>Algebra</b></p> <p><b>Geometry</b></p> <p><b>Measurement</b></p> <p><b>Data Analysis, Statistics, Probability</b></p>	<p>front end estimation</p> <p>Grid; ordered pair</p> <p>angles: acute, obtuse, right; center point; degree; hexagon; intersecting line; line segment; octagon. parallel lines; pentagon; perpendicular lines; polygon; point; quadrilateral; ray; tessellate triangles: isosceles, scalene, equilateral</p> <p>A.M./P.M.; align; gram; mile; milliliter; seconds</p> <p>equally/less likely; frequency; likely; median; mean; probability; survey; venn diagram</p>	
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### Resources for Grade Three Math Literacy Connections

<i>Strand</i>	<i>Book List</i>
<b>Number Theory</b>	<p><i>How Much is a Million</i>, David M. Schwartz. New York: Morrow, 1985</p> <p><i>Anno's Mysterious Multiplying Jar</i>, Philomel Books, 1983</p> <p><i>Too Man Kangaroo Things to Do</i>, Harper Collins, 1996</p> <p><i>2X2= Boo a Set of Spooky Multiplication Stories</i>, Holiday House, 1995</p> <p><i>Charlotte's Web</i>, E.B. White</p> <p><i>The 329<sup>th</sup> Friend</i>, Marjorie Weinman Sharman, New York: Macmillian Publishers, 1992</p> <p><i>Sideways Stories from Wayside School</i>, Louis Sacher. New York: Camelot, 1985</p> <p><i>Let's Investigate Estimating</i>, Marion Smoothey, Marshall Cavendish Corporation, 1995</p> <p>Gator Pie, Louise Matthews. Dodd Mead 7 Co.</p> <p><i>Wayside School is Falling Down</i>, Louis Sacher. NY: Lothrop, Lee &amp; Shephard, 1989</p> <p><i>Fractions are Parts of Things</i>, J. Richard Dennis. NY: Harper Collins Children's Books, 1972</p>
<b>Algebra</b>	<p><i>Caps for Sale</i>, Esphyr Slobodkina Scholastic</p> <p><i>The I Hate Mathematics!</i> Book by Marilyn Burns. Little, Brown and Co., 1975</p> <p><i>20,000 Baseball Cards Under the Sea</i>. John Buller &amp; Susan Schade. NY: Random House, 1991.</p> <p><i>Goldilocks and the Three Squares</i></p>
<b>Geometry</b>	<p><i>A Light in the Attic</i> (Shapes, p. T1), Shel Silverstein, Harper &amp; Row</p> <p><i>The Greedy Triangle</i>, Marilyn Burns: Scholastic, 1994</p> <p><i>Right Angles: Paper Folding Geometry</i>, Jo Phillips: Thomas Crownwell Co., 1992.</p> <p><i>Grandfather Tang's Story</i>, Ann Tompert</p>
<b>Measurement</b>	<p><i>\$1.00 Word Riddle Book</i>, Marilyn Burns. Cuisenaire</p> <p><i>Inch by Inch</i>, Leo Lionn: Astorhmor, 1960</p> <p><i>A Quarter from the Tooth Fairy</i>, Carne Holtzman, Scholastic</p> <p><i>How Much is that Guinea Pig in the Window?</i> By Joanne Rocklin, Scholastic Inc.</p>

### Strategies - Grade 3

Suggested Teaching Strategies	Suggested Learning Strategies
<p>The teacher provides a “number-rich” environment:</p> <p>Numbers on display (charts, <b>graphs</b>, calendars)</p> <p>Collections of countable objects</p> <p>Books that tell number stories</p> <p>Tapes and CDs of number songs</p> <p>Other: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><b>Teacher Directed</b></p> <p>The teacher:</p> <p>Creates counting and estimating experiences and activities across the curriculum</p> <p>Provides manipulatives for student use</p> <p><b>Other:</b> _____</p> <p>_____</p> <p><b>Cooperative</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• Participate in number games</li> <li>• Keep score in games</li> <li>• Work in cooperative teams or groups to collect and express data</li> <li>• Use flashcards</li> </ul> <p><b>Other:</b> _____</p> <p>_____</p> <p><b>Independent</b></p> <p>Students</p> <ul style="list-style-type: none"> <li>• Use electronic devices to collect and illustrate data</li> <li>• Express specific quantities in written work</li> </ul> <p><b>Other:</b> _____</p>

**Suggested Cross Curricular and Catholic Social Teaching Links**

**Grade Three**

-  Students write a paragraph comparing and contrasting two solid figures using words like *face* and *edge*. (*Language Arts, Math*) [Harcourt Math, 2004]
-  Students read a book like *Selina and the Bear Paw Quilt* and create artwork using patterns. (*Language Arts, Art, Math*) [Harcourt Math, 2004]
-  Students create fair and unfair spinners for games and discuss the importance of honesty and justice. (*Math, Art, Religion*) [Harcourt Math, 2004]

**Notes:**

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**Text/Resources:**

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## GRADE 4 MATHEMATICS CURRICULUM

### Grade 4: QUARTER 1

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b><u>Number Theory, Estimation, Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand that a variety of numerical representations can be used to describe quantitative relationships</p> <p>III. Understand meanings of operations and how they relate to one another</p> <p>IV. Compute fluently and make reasonable estimates</p> <p>V. Use numbers and their properties to compute flexibly and fluently and to estimate measures and quantities reasonably</p> <p>VI. Understand and describe patterns and functional relationships</p> <p>VII. Represent and analyze quantitative relationships in a variety of ways</p> <p>VIII. Use operations and properties to determine equivalence and solve problems</p>	Place Value	<ul style="list-style-type: none"> <li>• <b>Use</b> place value models, diagrams, number patterns and number lines to identify, order, round, and compare whole numbers to 100,000,000</li> <li>• <b>Identify</b> and <b>name</b> place values to the hundred millions place</li> <li>• <b>Use</b> ten as a repeated factor to define place value through hundred millions</li> <li>• <b>Use</b> mental math to <b>multiply</b> by 10, 100, and 1000</li> <li>• <b>Build</b> place value models, <b>draw</b> diagrams and <b>show</b> equivalent representations for numbers to 999,999,999 in expanded and regrouped form</li> <li>• <b>Read, write, count, skip count, order, compare,</b> and <b>expand</b> numerals to 999,999,999</li> <li>• <b>Write</b> expanded numerals in standard form</li> <li>• <b>Identify</b> and <b>name</b> place values to the hundred billions place</li> </ul>	<p><b>To represent numbers as groups of millions, thousands, hundreds, tens, and ones in the base ten number system (NEO)</b></p>
	Estimation	<ul style="list-style-type: none"> <li>• <b>Read</b> and <b>write</b> number words to one billion</li> <li>• <b>Round</b> numbers to the nearest thousand, ten thousand, hundred thousand</li> </ul>	<p><b>To represent and order number concepts in verbal and written form (NEO)</b></p> <p><b>To use place value concepts, number patterns, and number properties to develop estimation and computation strategies (NEO)</b></p>
	Money	<ul style="list-style-type: none"> <li>• <b>Use</b> decimal point in writing money amounts</li> <li>• <b>Identify</b> half dollars</li> <li>• <b>Find</b> equivalent sets of coins</li> </ul>	<p><b>To express monetary values in oral and written forms (M)</b></p> <p><b>To recognize, identify and</b></p>

<p><b><u>Measurement (M)</u></b></p> <ol style="list-style-type: none"> <li>I. Understand measurable attributes of objects and the units, systems, and processes of measurement</li> <li>II. Develop and apply appropriate techniques, tools and formulas to estimate and determine measurements</li> <li>III. Apply appropriate techniques, tools and formulas to determine measurements</li> <li>IV. Use numbers and their properties to estimate measures and quantities reasonably</li> </ol> <p><b><u>Algebra: Patterns &amp; Functions (A)</u></b></p> <ol style="list-style-type: none"> <li>I. Understand patterns, relations, and functions</li> <li>II. Represent and analyze mathematical situations and structures using algebraic symbols</li> <li>III. Use algebraic symbols to determine equivalence and solve problems</li> <li>IV. Use mathematical models to represent and understand quantitative relationships</li> <li>V. Analyze change in various contexts</li> </ol>	<p style="text-align: center;"><b>Addition, Subtraction, Multiplication, Division Facts</b></p>	<ul style="list-style-type: none"> <li>• <b>Find</b> a given sum of money using the least number of coins</li> <li>• <b>Add</b> amounts of money less than a dollar to sums greater than a dollar</li> <li>• <b>Subtract</b> amounts of money</li> <li>• <b>Apply</b> and explain a variety of estimation strategies in problem-solving situations to add and subtract money amounts less than \$10.00 and two- and three-digit numbers with and without regrouping</li> <li>• <b>Make</b> change</li> <li>• <b>Add</b> and <b>subtract</b> sums of money in columns <b>aligning</b> decimal points;</li> <li>• <b>Round</b> amounts of money to the nearest dollar</li> <li>• <b>Add</b> and <b>subtract</b> 6 digit numbers with and without regrouping</li> <li>• <b>Use</b> a calculator to add and subtract large numbers</li> <li>• <b>Use</b> front-end estimation</li> <li>• <b>Choose and justify</b> the correct operation in a word problem (+,-)</li> <li>• <b>Identify, express</b> and <b>apply</b> the zero property of multiplication</li> <li>• <b>Describe</b> the property of zero in multiplication and its implication in division</li> <li>• <b>Use</b> commutative and associative properties, to estimate, compute and to solve problems</li> <li>• <b>Demonstrate</b> equivalence with the commutative and associative properties of whole numbers</li> <li>• <b>Demonstrate</b> equivalence with the distributive property of whole numbers</li> <li>• <b>Determine</b> the proper operation to solve a problem and justify the reasoning</li> <li>• <b>Identify, express</b> and <b>apply</b> the commutative, and associative</li> </ul>	<p><b>trade sets of equivalent coins (M)</b></p> <p><b>To solve problems involving money (M)</b></p> <p><b>To determine and compare coin values (M)</b></p> <p><b>To add and subtract whole numbers written in vertical and horizontal form, choosing appropriately between paper and pencil methods and calculators (NEO)</b></p> <p><b>To recognize and demonstrate equivalence using number properties (NEO)</b></p> <p><b>To recognize and demonstrate equivalence using number properties (A)</b></p>
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		<p>properties of whole numbers in addition and multiplication</p> <ul style="list-style-type: none"> <li>• <b>Demonstrate</b> the equivalence of both sides of an equation as the same value is added, subtracted, multiplied, or divided on each side</li> <li>• <b>Find</b> missing numbers in number sentences</li> <li>• <b>Find</b> missing symbols in number sentences (&gt;), (&lt;), (=) and (≠)</li> <li>• <b>Find</b> missing operation symbols in number sentences</li> </ul> <ul style="list-style-type: none"> <li>• <b>Relate</b> multiplication and division to models with groups and rectangular arrays</li> </ul> <ul style="list-style-type: none"> <li>• <b>Multiply</b> and <b>divide</b> money using single digit multipliers/divisors.</li> </ul>	<p><b>To recognize and demonstrate equivalence using number properties (A)</b></p> <p><b>To use number patterns, basic facts, arrays, and place value models to multiply and divide whole numbers (NEO)</b></p>
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**Grade 4: QUARTER 2**

<b><u>STRANDS/ADH STANDARDS</u></b>	<b><u>TOPICS</u></b>	<b><u>ENABLING OUTCOMES</u></b>	<b><u>OBJECTIVES</u></b>
<p><b><u>Number Theory, Estimation, and Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand that a variety of numerical representations can be used to describe quantitative relationships</p> <p>III. Understand meanings of operations and how they relate to one another</p> <p>IV. Compute fluently and make reasonable estimates</p> <p>V. Use numbers and their properties to compute flexibly</p>	<p><b>Multiplication and Division</b></p> <p><b>Facts by 1 &amp; 2</b></p> <p><b>Digit Numbers</b></p>	<ul style="list-style-type: none"> <li>• <b>Memorize</b> and <b>apply</b> divisibility rules for 2,5, 10</li> <li>• <b>Square</b> a whole number</li> <li>• <b>Represent</b> in pictorial form a 2x2 square</li> <li>• <b>Identify</b> the written form <math>n^2</math></li> </ul> <ul style="list-style-type: none"> <li>• <b>Multiply</b> two and three digit numbers by a one digit number with regrouping</li> </ul> <ul style="list-style-type: none"> <li>• <b>Use</b> exponents to the power of 2</li> </ul> <ul style="list-style-type: none"> <li>• <b>Use</b> equations to describe the rules for number patterns</li> <li>• <b>Use</b> equations to model word problems</li> </ul> <ul style="list-style-type: none"> <li>• <b>Use</b> calculators to explore and create number patterns</li> </ul>	<p><b>To use factors to explore, represent and classify numbers (NEO)</b></p> <p><b>To write equations to express relationships between numbers (A)</b></p> <p><b>To recognize, create and extend numerical and geometric patterns, using</b></p>

<p>and fluently and to estimate measures and quantities reasonably</p> <p>VI. Understand and describe patterns and functional relationships</p> <p>VII. Represent and analyze quantitative relationships in a variety of ways</p> <p>VIII. Use operations and properties to determine equivalence and solve problems</p> <p><b>Algebra</b></p> <p>I. Understand patterns, relations, and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Use algebraic symbols to determine equivalence and solve problems</p> <p>IV. Use mathematical models to represent and understand quantitative relationships</p> <p>V. Analyze change in various contexts</p>		<ul style="list-style-type: none"> <li>• <b>Explore</b> and <b>describe</b> multiplication fact patterns</li> <li>• <b>Describe</b> and write the rule for number, color, rhythmic and symbolic patterns</li> <li>• <b>Identify</b> and <b>use the inverse</b> relationships of multiplication and division to solve and check problems</li> <li>• <b>Solve</b> practical problems and extend patterns involving 10 and 100 more and less than a number</li> <li>• <b>Recognize</b> and <b>identify</b> prime and composite numbers to 100</li> <li>• <b>Create</b> and <b>extend</b> patterns</li> <li>• <b>Extend</b> and <b>compare</b> arithmetic and geometric sequences</li> <li>• <b>Make</b> generalizations about patterns and relationships and <b>test</b> those generalizations</li> <li>• <b>Multiply</b> to find special products with multipliers that are multiples of 10, 100, 1000</li> <li>• <b>Multiply</b> four-digit numbers by a one-digit multiplier, two and three digit numbers by a two-digit multiplier</li> <li>• <b>Divide</b> three-digit dividends by multiples of 10</li> <li>• <b>Divide</b> three-digit dividends by a one-digit divisor to find quotients of two or three places with zeros and remainders</li> <li>• <b>Record</b> division using an algorithm (long division)</li> <li>• <b>Divide</b> multiples of 10, 100, 1000 and 10,000 by multiples of 10</li> <li>• <b>Identify</b> and <b>use the inverse</b> relationships of multiplication and division to solve and check problems</li> <li>• <b>Model</b> and <b>interpret</b> division with remainders</li> <li>• <b>Use</b> arrays and explore using the distributive property [<math>10 \times (4+5) = (10 \times 5) + (10 \times 4)</math>] to estimate, multiply and divide two and three digit numbers by one-digit factors</li> <li>• <b>Recognize and apply</b> the distributive property of multiplication</li> <li>• <b>Use</b> compatible numbers to <b>make</b> reasonable estimates</li> </ul>	<p>concrete materials, number lines, symbols, tables and words (A)</p> <p>To use factors to explore, represent and classify numbers (NEO)</p> <p>To use number patterns, basic facts, arrays, and place value models to multiply and divide whole numbers (NEO)</p> <p>To identify whole number properties and apply them to whole number operations and algorithms (NEO)</p> <p>To use place value concepts, number patterns, and number properties to develop estimation and computation strategies (NEO)</p>
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		<ul style="list-style-type: none"> <li>• <b>Estimate</b> products and quotients and <b>describe</b> the method of estimation</li> <li>• <b>Describe</b> and <b>use</b> estimation strategies that can identify a reasonable answer to a problem when an estimate is appropriate</li> <li>• <b>Use</b> clustering to estimate sums</li> <li>• <b>Determine</b> and discuss the reasonableness of an answer and explain why a particular estimation strategy will result in an over or underestimate</li> <li>• <b>Write</b> and solve multi-step word problems involving estimation</li>   <li>• <b>Divide</b> four-digit dividends by a one digit divisor to find three and four digit quotients with zeros and remainders</li> <li>• <b>Divide</b> two- and three-digit dividends by two-digit divisors to find one digit quotients with and without remainders</li>   <li>• <b>Use</b> order of operations to evaluate arithmetic expressions with parentheses</li>   <li>• <b>Draw</b> factor trees</li> <li>• <b>Identify</b> the Least Common Multiple (LCM) given pairs of numbers less than or equal to 10</li> <li>• <b>Identify</b> the Greatest Common Factor (GCF) given pairs of numbers up to 81</li> </ul>	<p><b>To use number patterns, basic facts, arrays, and place value models to multiply and divide whole numbers (NEO)</b></p> <p><b>To use factors to explore, represent and classify numbers (NEO)</b></p>
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**Grade 4: QUARTER 3**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b><u>Number Theory, Estimation, and Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand that a variety of numerical representations can be used to describe quantitative relationships</p> <p>III. Understand meanings of operations and how they relate to one another</p> <p>IV. Compute fluently and make reasonable estimates</p> <p>V. Use numbers and their properties to compute flexibly and fluently and to estimate measures and quantities reasonably</p> <p>VI. Understand and describe patterns and functional relationships</p> <p>VII. Represent and analyze quantitative relationships in a variety of ways</p> <p>VIII. Use operations and properties to determine equivalence and solve problems</p>	<p><b>Fractions and Probability</b></p>	<ul style="list-style-type: none"> <li>• <b>Read, write and identify</b> all <i>fractions</i></li> <li>• <b>Identify</b> and <b>model</b> fractional parts of a set</li> <li>• <b>Find</b> fractional parts of numbered groups</li> <li>• <b>Use</b> division to find a fractional part of a set</li> <li>• <b>Identify</b> and <b>find</b> the simplest form of a fraction</li> <li>• <b>Write</b> <i>fractions</i> in lowest terms</li> <li>• <b>Model</b> equivalent <i>fractions</i> (using manipulatives, pictures, graphics, etc.)</li> <li>• <b>Identify</b> equivalent <i>fractions</i></li> <li>• <b>Find</b> <i>fractions</i> that are equivalent using models</li> <li>• <b>Find</b> equivalent <i>fractions</i> using multiplication and division</li> <li>• <b>Identify</b> mixed numbers</li>   <li>• <b>Use</b> visual/virtual models to identify and compare <i>fractions</i></li> <li>• <b>Use</b> models to <b>change</b> an improper fraction to a mixed number</li> <li>• <b>Locate</b> and <b>place</b> <i>fractions</i> on a number line</li> <li>• <b>Apply</b> the concepts of Greatest Common Factor and Least Common Multiple to <i>fractions</i></li> <li>• <b>Use</b> the Least Common Multiple to identify the lowest common denominator of a set of <i>fractions</i></li>   <li>• <b>Add</b> and <b>subtract</b> like <i>fractions</i></li> <li>• <b>Solve</b> problems involving addition and subtraction of <i>fractions</i> with like denominators</li> <li>• <b>Compare</b> proper <i>fractions</i> with unlike denominators</li> <li>• <b>Add</b> and <b>subtract</b> <i>fractions</i> with unlike denominators</li> <li>• <b>Add and subtract</b> two <i>fractions</i> where one denominator is a multiple of the other</li> </ul>	<p><b>To model, identify, compare <i>fractions</i>, and express them in equivalent forms (NEO)</b></p> <p><b>To extend whole number place value patterns, models, and notations to include <i>decimals</i> (NEO)</b></p> <p><b>To extend place value concepts and number properties to addition and subtraction of decimal numbers (NEO)</b></p> <p><b>To compute with <i>fractions</i>(NEO)</b></p>

- **Model, read** and **write** *decimals* in tenths and hundredths
  - **Locate** *decimals* on a number line
  - **Count** by tenths and hundredths
  - **Annex** zeroes to create equivalent decimal numbers
  - **Write** decimal numbers to express *fractions* with denominators of 10 and 100
  - **Relate** *decimals* in tenths to *fractions*, and mixed numbers
  - **Compare** and **order** *decimals* of tenths and hundredths (use symbols  $<$ ,  $>$ ,  $=$ , and  $\neq$ )
  - **Relate** money (pennies and dimes) to *decimals*
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- **Round** decimal numbers to the nearest tenth and whole number
  - **Round** decimal numbers to the nearest hundredth
  - **Estimate** decimal sums and differences using rounding
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- **Construct** and **use** models and pictures to add and subtract *decimals*
  - **Add** and **subtract** *decimals* to hundredths
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- **Model, read** and **write** *decimals* to thousandths place in standard form and as number words
  - **Identify** place value in decimal numbers and write *decimals* in expanded form. (EX.  $61.34 = 60 + 1 + 0.3 + 0.04$ )
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- **Use** models and pictures to estimate reasonable answers when adding or subtracting *decimals*, *fractions*, and mixed numbers
  - **Write** and solve multi-step word problems with *fractions*, including problems with extraneous information

		<ul style="list-style-type: none"> <li>• <b>Model</b> and <b>demonstrate ratios</b> through the use of concrete objects and pictures using ratios</li> <li>• <b>Describe</b> the relationship between <i>decimals, fractions</i> and <i>percents</i></li> <li>• <b>Use</b> models, pictures, and number patterns to solve simple problems involving ratio and proportions</li> </ul>	
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**Grade 4: QUARTER 4**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b><u>Measurement (M)</u></b></p> <p>I. <b>Understand measurable attributes of objects and the units, systems, and processes of measurement</b></p> <p>II. <b>Develop and apply appropriate techniques, tools and formulas to estimate and determine measurements</b></p> <p>III. <b>Apply appropriate techniques, tools and formulas to determine measurements</b></p> <p>IV. <b>Use numbers and their properties to estimate measures and quantities reasonably</b></p>	<p><b>Measurement</b></p>	<ul style="list-style-type: none"> <li>• <b>Choose</b> an appropriate unit to estimate length or distance</li> <li>• <b>Estimate, draw, and measure</b> length and height to the nearest inch, half inch, quarter inch and centimeter</li> <li>• <b>Solve</b> practical problems that involve estimation and measurement of length, perimeter, and area</li> <li>• <b>Develop</b> and <b>explain</b> strategies for using nonstandard and standard referents to estimate measurement of length and area</li> <li>• <b>Solve</b> practical problems that involve estimation and measurement of volume and capacity</li> <li>• <b>Compare and order</b> objects according to capacity</li> <li>• <b>Identify</b> and use the appropriate customary and metric units and tools for measuring length, area and perimeter</li> <li>• <b>Identify</b> the conversions for feet, yards and miles</li> <li>• <b>Estimate</b> and <b>measure</b> length and height in millimeters, decimeters, kilometers</li> <li>• <b>Identify</b> and <b>use</b> the appropriate customary and metric units and tools for measuring volume and capacity</li> </ul>	<p><b>To determine and use various tools and units to estimate and measure (M)</b></p>

<p><b><u>Geometry (G)</u></b></p> <p>I. Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about relationships</p> <p>II. Use properties and characteristics of two-and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems</p> <p>III. Use spatial reasoning, location and geometric relationships to solve problems</p> <p>IV. Specify locations and describe spatial relationships using coordinate geometry and other representational systems</p>	<p>Geometry</p>	<ul style="list-style-type: none"> <li>• <b>Identify</b> cup, pint, quart, gallon, liter, milliliter and <b>apply</b> to real life</li> <li>• <b>Define, identify, use</b> and <b>relate</b> benchmarks to ounce and gram</li> <li>• <b>Identify</b> pound and ounce as units of measure and <b>relate</b> use in real life</li> <li>• <b>Identify</b> and <b>memorize</b> conversion for pounds and ounces</li> <li>• <b>Solve</b> practical problems that involve estimation and measurement of weight</li> <li>• <b>Name</b> the time zones within the US</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> and <b>memorize</b> conversions for cups, pints, quarts, and gallons</li> <li>• <b>Identify</b> and use the appropriate customary and metric units and tools for measuring weight / mass</li> <li>• <b>Compare and order</b> objects according to weight</li> <li>• <b>Identify</b> a liter as 1000 milliliters</li> <li>• <b>Define, identify, use</b> and <b>relate</b> benchmarks to millimeter</li> <li>• <b>Define, identify, use</b> and <b>relate</b> benchmarks to milliliter</li> <li>• <b>Identify</b> conversion factors in the metric system</li> <li>• <b>Solve</b> practical problems that involve estimation and measurement of temperature</li> <li>• <b>Use</b> estimation to predict reasonable answers to measurement problems</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> and <b>use</b> the appropriate customary and metric units and tools for measuring temperature</li> <li>• <b>Read</b> Fahrenheit and Celsius thermometers and <b>describe</b> temperatures as hot, warm, or cold</li> <li>• <b>Identify</b> and <b>use</b> cubic units (inch, centimeter, mile, and kilometer)</li> <li>• <b>Identify</b> and <b>use</b> kilogram and ton</li> </ul> <ul style="list-style-type: none"> <li>• <b>Build, draw, create, describe,</b> and <b>classify</b> two- and three-</li> </ul>	<p><b>To use standard units and identify and express examples of measurement in daily life (M)</b></p> <p><b>To use measurement to determine and explain relative size of a given objects and measures (M)</b></p> <p><b>To determine and use various tools and units to estimate and measure (M)</b></p>
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<p>V. Apply transformations and use symmetry to analyze mathematical situations</p> <p>VI. Use visualization, spatial reasoning, and geometric modeling to solve problems</p>		<p>dimensional figures</p> <ul style="list-style-type: none"> <li>• <b>Sort</b> polygons and solids by using characteristics such as the relationship of sides (parallel, perpendicular), kinds of angles (right, acute, obtuse), symmetry, and congruence</li> <li>• <b>Describe</b> similarities and differences of two and three dimensional shapes in the environment using physical features such as number of sides, number of angles, lengths of sides and straight and curved parts</li> <li>• <b>Describe</b> solid figures using faces, edges, and vertices</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify and draw</b> points, lines, line segments, and rays</li> <li>• <b>Identify, compare</b> and <b>contrast</b> intersecting, perpendicular and parallel lines</li> <li>• <b>Classify</b> angles as right, acute or obtuse</li> <li>• <b>Identify</b> translations, rotations, and reflections</li> <li>• <b>Explain</b> the results of dividing, combining, and transforming shapes and the effects of slides, flips, and turns</li> <li>• <b>Identify</b> ways to tile or tessellate a region or shape using various polygons</li> </ul> <ul style="list-style-type: none"> <li>• <b>Analyze</b> two-dimensional shapes and determine lines of symmetry and congruence</li> <li>• <b>Identify</b> similar figures</li> <li>• <b>Analyze</b> shapes with more than one line of symmetry</li> <li>• <b>Identify, describe</b> and <b>classify</b> triangles according to sides and angles</li> <li>• <b>Identify, describe, classify</b> and <b>draw</b> polygons: quadrilaterals, pentagons, hexagons, octagons</li> </ul> <ul style="list-style-type: none"> <li>• <b>Compute</b> perimeter of a polygon using the formula</li> <li>• <b>Find</b> the area of squares and rectangles</li> <li>• <b>Develop</b> and <b>apply</b> the formula for finding area of squares and rectangles</li> <li>• <b>Describe</b> relationships between the lengths of sides of rectangles and their areas and perimeters; <b>generalize</b> the patterns as simple formulas</li> </ul>	<p>To describe geometric properties of plane and solid figures (G)</p> <p>To identify, draw and describe elements needed to explain spatial relationships (G)</p> <p>To describe geometric properties of plane and solid figures (G)</p> <p>To identify and generalize relationships between measurable attributes of plane and solid figures (G)</p>
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<p><u>Data Analysis, Statistics, and Probability (DSP)</u></p> <p>I. Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer them</p> <p>II. Collect, organize and display data using appropriate statistical and graphical methods.</p> <p>III. Select and use appropriate statistical methods to analyze data</p> <p>IV. Analyze data sets to form hypotheses and make predictions</p> <p>V. Understand and apply basic concepts of probability</p> <p>VI. Develop and evaluate inferences and predictions that are based on data</p> <p>VII. Understand and apply basic concepts of probability</p>	<p>Graphs</p>	<ul style="list-style-type: none"> <li>• Find the volume of rectangular prisms by <b>modeling</b> and <b>counting</b> cubic units</li> <li>• <b>Estimate</b> the volume of rectangular prisms</li> <li>• <b>Find</b> strategies for estimating and measuring the perimeters and areas of irregular shapes</li> <li>• <b>Identify</b> and find the radius and diameter of a circle</li> <li>• <b>Identify</b> and <b>estimate</b> the circumference of a circle</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> and use the appropriate tools for measuring time</li> <li>• <b>Tell, write, and show</b> time to the quarter hour, to five and one minute intervals</li> <li>• <b>Use</b> <i>A.M.</i> and <i>P.M.</i> appropriately</li> <li>• <b>Tell</b> time in two ways (minutes before the hour/minutes after the hour)</li> <li>• <b>Use</b> a schedule, calendar, and/or a timeline to measure elapsed time</li> <li>• <b>Calculate</b> elapsed time in seconds</li> <li>• <b>Estimate and/or compute</b> elapsed or projected time in terms of an hour or a minute using a clock</li> <li>• <b>Use</b> a timeline to determine sequence of events</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> and <b>memorize</b> conversion factors for seconds, minutes, hours and days</li> <li>• <b>Convert</b> from one unit to another when measuring time and solve problems that involve elapsed time using clocks and calendars</li> <li>• <b>Change</b> customary units by multiplying and dividing</li> </ul> <ul style="list-style-type: none"> <li>• <b>Use, read, create</b> and <b>interpret</b> a variety of graphic organizers, charts, and graphs</li> <li>• (These charts, graphs, etc. should include broken line graphs, bar graphs, picture graphs, glyphs, Venn diagrams and simple</li> </ul>	<p>To determine and use various tools and units to estimate and measure (M)</p> <p>To use measurement to determine and explain relative size of a given objects and measures (M)</p> <p>To collect, organize and describe data (DSP)</p>
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	<i>More for me</i> , Software: Fraction Factory <i>Gator Pie</i> , Louise Mathews. Dodd Mead, 1979
<b>Algebra</b>	Game: Battleship, Milton Bradley
<b>Geometry</b>	Math Blaster 2 – Creature Creator Tangrams
<b>Measurements</b>	<i>How Big Is a Foot?</i>
<b>Probability, Statistics &amp; Graphing</b>	Microsoft Works / Excel graph survey results

### STRATEGIES - GRADE 4

Suggested Teaching Strategies	Suggested Learning Strategies
<p>The teacher provides a “number-rich” environment:</p> <p>Numbers on display (charts, graphs, timelines, calendars)</p> <p>Collections of countable objects</p> <p>Books that tell number stories</p> <p>Tapes and CDs of number songs</p> <p>Other: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><b>Teacher Directed</b></p> <p>The teacher:</p> <p>Provides manipulatives for student use (tangrams)</p> <p><b>Other:</b> _____</p> <p>_____</p> <p><b>Cooperative</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• Participate in number games</li> <li>• Keep score in games</li> <li>• Work in cooperative teams or groups to collect and express data</li> <li>• Use flashcards</li> </ul> <p><b>Other:</b> _____</p> <p>_____</p>

	<p><b>Independent</b></p> <p>Students</p> <ul style="list-style-type: none"> <li>• Use electronic devices to collect and illustrate data</li> <li>• Express specific quantities in written work</li> </ul> <p>Other: _____</p>
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<p><b>Suggested Cross Curricular and Catholic Social Teaching Links</b></p> <p><b>Grade Four</b></p>
<ul style="list-style-type: none"> <li>✚ Students take their heart beats and create equations based on how often their heart beats in a minute, five minutes, etc. (Science, Math)</li> <li>✚ Students organize a fund raising event for charity setting a goal; they measure their progress toward that goal on a graph in terms of <i>percents</i>. (Religion, Math)</li> </ul>

Notes:

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**Text/Resources:** \_\_\_\_\_  
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	<p><b>Distributive Property</b></p> <p><b>Multiplying 1 and 2 Digits</b></p> <p><b>1 Digit Divisors</b></p>	<ul style="list-style-type: none"> <li>• <b>Use</b> the short division algorithm (to follow mastery of long division)</li> <li>• <b>Multiply</b> and <b>divide</b> <i>decimals</i> by <i>decimals</i></li> <li>• <b>Change</b> a fraction to a decimal using division</li> <li>• <b>Use</b> arrays and explore using the distributive property [<math>10 \times (4+5) = (10 \times 5) + (10 \times 4)</math>] to estimate, multiply and divide two and three digit number</li> <li>• <b>Recognize and apply</b> the distributive property of multiplication</li> <li>• <b>Estimate</b> products and missing factors using multiples of 10, 100, 1000</li> <li>• <b>Use mental math</b> to multiply by 10, 100, and 1000</li> <li>• <b>Use</b> mental math to <b>multiply</b> by multiples of 10, 100, and 1000</li> <li>• <b>Multiply</b> to <b>find</b> special products with multipliers that are multiples of 10, 100, 1000</li> <li>• <b>Multiply</b> four digit numbers by a one digit multiplier, two and three digit numbers by a two digit multiplier and three digit numbers by a two digit multiplier</li> <li>• <b>Describe</b> the property of zero in multiplication and its implication in division</li> <li>• <b>Divide</b> three-digit dividends by multiples of 10 and 100</li> <li>• <b>Divide</b> multiples of 10, 100,1000 and 10,000 by multiples of 10, 100, and 1000</li> <li>• <b>Divide</b> multi-digit dividends by one and two digit divisors to find multi-digit quotients with zeros and remainders</li> <li>• <b>Solve</b> problems involving finding 10, 100. And 1000 more and less than a number</li> <li>• <b>Determine</b> the proper operation to solve a problem and <b>justify</b> the reasoning</li> </ul>	<p><b>To use number patterns, basic facts, arrays, place value models and the distributive property to multiply and divide (NEO)</b></p>
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**Grade 5: QUARTER 2**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>Number Theory, Estimation, and Operations (NEO)</b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand that a variety of numerical representations can be used to describe quantitative relationships</p> <p>III. Understand meanings of operations and how they relate to one another</p> <p>IV. Compute fluently and make reasonable estimates</p> <p>V. Use numbers and their properties to compute flexibly and fluently</p> <p>VI. Understand and describe patterns and functional relationships</p> <p>VII. Represent and analyze quantitative relationships in a variety of ways</p> <p>VIII. Use operations and properties to determine equivalence and solve problems</p>	<p><b>Divisibility Rules</b></p> <p><b>Prime and Composite Numbers</b></p> <p><b>Prime Factorization</b></p> <p><b>GCF &amp; LCM</b></p> <p><b>Squaring Numbers</b></p> <p><b>Fractions</b></p>	<ul style="list-style-type: none"> <li>• <b>Memorize</b> and <b>apply</b> divisibility rules for 2,3,5,6,9 and 10</li> <li>• <b>Recognize</b> and <b>identify</b> prime and composite numbers to 100</li> <li>• <b>Use</b> rectangular arrays to identify factor pairs and to classify numbers as prime, composite, and perfect squares</li> <li>• <b>Draw</b> and <b>use</b> factor trees to determine all the factors of a number</li> <li>• <b>Draw</b> and <b>use</b> factor trees to <b>find</b> all prime factors and <b>write</b> prime factorization of numbers</li> <li>• <b>Represent</b> numbers by using exponents</li> <li>• <b>Change</b> exponent form to standard numeral, write as repeated factors and vice versa</li> <li>• <b>Use</b> order of operations including exponents</li> <li>• <b>Identify</b> the Greatest Common Factor (GCF) given pairs of numbers up to 81</li> <li>• <b>Identify</b> the Least Common Multiple (LCM) given pairs of numbers less than or equal to 10</li> <li>• <b>Draw</b> and <b>use</b> factor trees to determine all the factors of a number</li> <li>• <b>Identify</b> the written form <math>n^2</math></li> <li>• <b>Represent</b> in pictorial form a <math>2 \times 2</math> square</li> <li>• <b>Square</b> a whole number</li> <li>• <b>Use</b> exponents to the power of 2</li> <li>• <b>Memorize</b> the perfect squares of numbers from 1 to 15</li> <li>• <b>Express</b> a perfect square in exponent form</li> <li>• <b>Identify</b> and <b>find</b> equivalent <i>fractions</i></li> <li>• <b>Locate</b> and <b>place</b> <i>fractions</i> and mixed numbers on a number line</li> </ul>	<p><b>To use factors to explore, represent and classify numbers (NEO)</b></p> <p><b>To model, identify, and express equivalent forms of numbers expressed as whole numbers,</b></p>

	<p><b>Operations with Fractions and Mixed Numbers</b></p>	<ul style="list-style-type: none"> <li>• <b>Identify</b> and <b>find</b> the simplest form of a fraction</li> <li>• <b>Write</b> <i>fractions</i> in lowest terms</li> <li>• <b>Use</b> models to <b>change</b> an improper fraction to a mixed number</li> <li>• <b>Find</b> fractional parts of numbered groups</li> <li>• <b>Construct</b> and <b>use</b> models to <b>add</b> and <b>subtract</b> like and unlike <i>fractions</i> and mixed numbers</li> <li>• <b>Use</b> equivalence and substitution with common denominators when adding and subtracting</li> <li>• <b>Add</b> and subtract like and unlike <i>fractions</i> and mixed numbers <b>expressing</b> answers in simplest form</li> <li>• <b>Use</b> models and pictures to estimate reasonable answers when adding or subtracting <i>decimals</i>, <i>fractions</i>, and mixed numbers</li> <li>• <b>Use</b> models to <b>change</b> an improper fraction to a mixed number</li> <li>• <b>Recognize</b> that multiplication by a unit fraction is equivalent to dividing by the fraction's denominator</li> <li>• <b>Construct</b> and <b>use</b> models and pictorial representations to multiply common <i>fractions</i> and mixed numbers</li> <li>• <b>Use</b> models to <b>divide</b> whole numbers by <i>fractions</i> and <i>fractions</i> by whole numbers</li> <li>• <b>Model</b> and <b>describe</b> when products or quotients with <i>fractions</i> and <i>decimals</i> can yield a larger or smaller result than either factor</li> <li>• <b>Multiply</b> and <b>divide</b> <i>fractions</i>, whole numbers and mixed numbers</li> <li>• <b>Subtract</b> mixed numbers with renaming</li> </ul>	<p><i>fractions</i> and mixed numbers (NEO)</p> <p>To add and subtract <i>fractions</i> and mixed numbers using models, pictures and number sentences (NEO)</p> <p>To use models and pictorial representations to develop concepts and methods by which to multiply and divide <i>fractions</i> and mixed numbers (NEO)</p>
	<p><b>Fractions and Reciprocals</b></p>	<ul style="list-style-type: none"> <li>• <b>Recognize</b> that multiplication by a unit fraction is equivalent to dividing by the fraction's denominator</li> <li>• <b>Identify</b> reciprocal numbers</li> <li>• <b>Apply</b> reciprocal numbers to division of a whole number by a fraction</li> <li>• <b>Write</b> whole number division problems in fraction form and</li> </ul>	



		<ul style="list-style-type: none"> <li>• <b>Add, subtract, multiply and divide</b> amounts of money</li> <li>• <b>Find</b> a given sum of money using the least number of coins</li> </ul>	<b>money (M)</b>
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**Grade 5: QUARTER 3**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>Algebra (A)</b></p> <p>I. Understand patterns, relations, and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Use algebraic symbols to determine equivalence and solve problems</p> <p>IV. Use mathematical models to represent and understand quantitative relationships</p> <p>V. Analyze change in various contexts</p>	<p><b>Simplifying and Evaluating Expressions</b></p> <p><b>Integers and Absolute Value</b></p> <p><b>Writing and Solving Equations</b></p>	<ul style="list-style-type: none"> <li>• <b>Evaluate</b> variable expressions that involve a single operation</li> <li>• <b>Use</b> order of operations to <b>evaluate</b> single variable algebraic expressions with parentheses</li> <li>• <b>Explain</b> the difference between algebraic and arithmetic expressions</li> <li>• <b>Use</b> variables to represent quantities in expressions and number sentences</li> <li>• <b>Write</b> and <b>evaluate</b> algebraic expressions with two variables</li> <li>• <b>Use</b> a number line to compare and order integers</li> <li>• <b>Identify</b> the absolute value of an integer</li> <li>• <b>Identify</b> opposite integers</li> <li>• <b>Use</b> a model to add and subtract integers</li> <li>• <b>Identify, express</b> and <b>apply</b> the commutative and associative properties of whole numbers and identify properties of addition and multiplication</li> <li>• <b>Use</b> commutative and associative properties to solve problems, estimate, and compute</li> <li>• <b>Demonstrate</b> equivalence with the commutative, distributive and associative properties of whole numbers</li> <li>• <b>Demonstrate</b> the equivalence of both sides of an equation as the same value is added, subtracted, multiplied, or divided on each side</li> </ul>	<p><b>To recognize, use and simplify arithmetic and algebraic expressions (A)</b></p> <p><b>To explore numbers less than zero and extend the number line to illustrate integers (NEO)</b></p> <p><b>To recognize and demonstrate equivalence using number properties (A)</b></p>

<p><b><u>Data Analysis, Statistics, and Probability (DSP)</u></b></p> <p>I. Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer them</p> <p>II. Collect, organize and display data using appropriate statistical and graphical methods.</p> <p>III. Select and use appropriate statistical methods to analyze data</p> <p>IV. Analyze data sets to form hypotheses and make predictions</p> <p>V. Understand and apply basic concepts of probability</p> <p>VI. Develop and evaluate inferences and predictions that are based on data</p> <p>VII. Understand and apply basic concepts of probability</p>	<p><b>Integers and Functions</b></p> <p><b>Graphing and Equations</b></p> <p><b>Measurements of Central Tendency</b></p> <p><b>Ratios- Percents</b></p>	<ul style="list-style-type: none"> <li>• <b>Model</b> and <b>solve</b> one step equations using materials that model equivalence</li> <li>• <b>Represent</b> mathematical relationships using variables in expressions, equations and inequalities</li> <li>• <b>Describe</b> how a change in one variable relates to a change in a second variable in a practical situation</li> <li>• <b>Determine</b> the nature of changes in linear relationships using graphs, tables, and equations</li> <li>• <b>Use</b> a table to explore functions and graph them</li> <li>• <b>Compute</b> the mean of a set of data</li> <li>• <b>Use</b> range, mean, median, and mode to explain data</li> <li>• <b>Describe</b> how a change in an outlier can change the measures of central tendency</li> <li>• <b>Locate</b> points on a four quadrant coordinate grid by using ordered pairs</li> <li>• <b>Generate</b> a table of equal ratios and graph the ordered pairs</li> <li>• <b>Choose</b> and <b>use</b> benchmarks to <b>approximate</b> locations on number lines and coordinate grids</li> <li>• <b>Read, write,</b> and <b>illustrate</b> ratios using three standard forms</li> <li>• <b>Use</b> a table to generate equal ratios, <b>write</b> equal ratios, and <b>tell</b> if two ratios form a proportion</li> <li>• <b>Use</b> cross products, multiplication and division to <b>find</b> equivalent ratios</li> <li>• <b>Generate</b> a table of equal ratios and graph the ordered pairs</li> <li>• <b>Read</b> and <b>write</b> rates, and change a rate to a unit rate</li> <li>• <b>Illustrate and describe</b> the relationship between <i>decimals, fractions</i> and <i>percents</i></li> <li>• <b>Represent</b> a rational number in its equivalent fraction, decimal, ratio and percent forms with models, number patterns and common factors</li> </ul>	<p><b>To write expressions, equations and inequalities to express relationships between numbers (A)</b></p> <p><b>To represent numerical relationships on a coordinate grid (A)</b></p> <p><b>To describe features of a data set (DSP)</b></p> <p><b>To model, identify, compare, and relate rational numbers (NEO)</b></p> <p><b>To compare quantities and solve problems using ratios, rates and percents. (NEO)</b></p>
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<p>mathematical situations</p> <p><b>VI. Use visualization, spatial reasoning, and geometric modeling to solve problems</b></p>	<p><b>Symmetry</b></p> <p><b>Perimeter and Area</b></p> <p><b>Circumference</b></p> <p><b>Area of Circle</b></p> <p><b>Volume</b></p> <p><b>Transformations</b></p>	<ul style="list-style-type: none"> <li>• <b>Identify</b> line and rotational symmetry</li> <li>• <b>Demonstrate and describe</b> the relationship between area and perimeter when the dimensions of a polygon change</li> <li>• <b>Apply</b> formulas to find the perimeter and area of squares and rectangles</li> <li>• <b>Develop</b> and <b>apply</b> the formulas for perimeter and area of triangles</li> <li>• <b>Describe</b> relationships between the lengths of sides of rectangles and their areas and perimeters and generalize the patterns as simple formulas</li> <li>• <b>Find</b> strategies for estimating and measuring the perimeters and areas of irregular shapes</li> <li>• <b>Identify</b> and <b>measure</b> the parts of a circle (radius, diameter, chord, central angle)</li> <li>• <b>Identify</b> the meaning of pi</li> <li>• <b>Find</b> the circumference of a circle using a formula</li> <li>• <b>Find</b> the area of a circle</li> <li>• <b>Develop</b> strategies to determine the formula for the volume of rectangular solids</li> <li>• <b>Identify</b> line and rotational symmetry</li> <li>• Identify translations, rotations, and reflections</li> <li>• <b>Explain</b> the results of dividing, combining, and transforming shapes and the effects of slides, flips, and turns</li> <li>• <b>Draw</b> and <b>interpret</b> simple maps using coordinate systems and shapes or pictures</li> <li>• <b>Plot</b> points on the rectangular coordinate system and <b>estimate</b> and <b>determine</b> the distance between points</li> </ul>	<p><b>To identify, draw and describe elements needed to explain spatial relationships (G)</b></p> <p><b>To identify and generalize relationships between measurable attributes of plane and solid figures (G)</b></p> <p><b>To identify, draw and describe elements needed to explain spatial relationships (G)</b></p> <p><b>To use coordinate systems to identify and illustrate spatial location and geometric relationships (G)</b></p>
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**GRADE 5 VOCABULARY TERMS**

<b>Number Theory</b>	<b>Algebra</b>	<b>Geometry</b>	<b>Measurement</b>	<b>Data Analysis, Statistics, Probability</b>
absolute value associate property benchmarks clustering compatible numbers compensation composite numbers commutative property distributive property divisibility rules exponents front end estimation greater than or equal to	four quadrant grid geometric sequences ordered pair	angles: acute obtuse right center point chord degree diameter hexagon intersecting line line segment net octagon parallel lines	customary units decimeters kilometers mass millimeters weight	broken line graph data set equally/less likely fairness frequency likely median mean mode outliers probability spreadsheets

$(\geq)$ Less than or equal to $(\leq)$ integer prime numbers product proportion quotient ratio reciprocal numbers repeated factors relative magnitude rounding short division algorithm simplest form		pentagon perpendicular lines polygon point quadrilateral radius ray symmetry (line & rotational tessellate triangles: isosceles scalene equilateral		survey Venn diagram
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<b>Resources for the Grade Five Math Literacy Connections</b>	
<b>Strand</b>	<b>Book Titles</b>
<b>Number Theory</b>	<i>Is a Blue Whale the Biggest Thing There Is?</i> By Robert Wells, Whitman & Company, 1993 <i>Fractions</i> , by David Steinecker. Benchmark Books, 1996 <i>Locks, Crocs &amp; Skeeters</i> , by Nancy Winslow Parker. Greenwillow Books, 1996 <i>Accidents May Happen</i> , by Charlotte Fultz Jones. Delacorte Press, 1996 <i>The Librarian Who Measured the Earth</i> , by Kathryn Lasky. Little, Brown & Co., 1994
<b>Algebra</b>	Logical reasoning puzzle books
<b>Geometry</b>	Pentominoes Tangrams Geoboards

<b>Whole Numbers</b>	<i>Let's Investigate Estimating</i> by Marion Smoothey. Marshall Canvendish Corporation, 1995 <i>Larson Leapfrog Math</i> , Meridian Creative Group (software)
<b>Measurements</b>	<i>Spaghetti and Meatballs for All!</i> By Marilyn Burns. Scholastic, 1997. Geoboards

<b>&amp; Graph</b>	<b>Probability, Statistics &amp; Graph</b>
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<b>Suggeted Learning Strategies</b>	
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<p>The teacher provides a “number-rich” environment:</p> <p>Numbers on display (charts, graphs, calendars)</p> <p>Collections of countable objects</p> <p>Books that tell number stories</p> <p>Tapes and CDs of number songs</p> <p>Other: _____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><b>Teacher Directed</b></p> <p>The teacher:</p> <p>Creates counting and estimating experiences and activities across the curriculum</p> <p>Provides manipulatives for student use (tangrams)</p> <p><b>Other:</b> _____</p> <p><b>Cooperative</b></p> <p>Students:</p> <ul style="list-style-type: none"> <li>• Participate in number games</li> <li>• Keep score in games</li> <li>• Work in cooperative teams or groups to collect and express data</li> <li>• Use flashcards</li> </ul> <p><b>Other:</b> _____</p> <p><b>Independent</b></p> <p>Students</p> <ul style="list-style-type: none"> <li>• Use electronic devices to collect and illustrate data</li> <li>• Express specific quantities in written work</li> </ul> <p><b>Other:</b> _____</p>
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**Suggested Cross Curricular and Catholic Social Teaching Links**

## Grade Five

- ✚ Students create equations based on the calories found in different kinds of food and create menus that are nutritious. (Math, Health)
- ✚ Students will create and measure the effects of plans to conserve energy, reflecting an understanding of the call to be stewards of this earth. (Science, Math, Religion)

### Notes:

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### Text/Resources:

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	<p><b>Whole Numbers and Decimals</b></p> <p><b>Number Theory</b></p> <p><b>Fractions</b></p>	<p>to <b>develop</b> estimation and computation strategies</p> <ul style="list-style-type: none"> <li>• <b>Select</b> and <b>apply</b> the most suitable estimation strategy: rounding, clustering, front end (with adjustment), compatible numbers, compensation</li> <li>• <b>Recognize</b> place value patterns when multiplying and dividing <i>decimals</i> by powers of 10</li> <li>• <b>Use</b> the distributive property <math>[10 \times (4+5) = (10 \times 5) + (10 \times 4)]</math> to estimate, multiply and divide multi-digit numbers by one-digit factors</li> <li>• <b>Identify</b> and <b>use</b> the inverse relationships of multiplication and division to solve and check problems <b>Determine</b> the proper operation to solve a problem and <b>justify</b> the reasoning</li> <li>• <b>Locate, order</b> and <b>compare</b> <i>decimals</i> on number lines, scales and the coordinate grid <b>Multiply</b> and <b>divide</b> <i>decimals</i> by <i>decimals</i></li> <li>• <b>Find</b> all prime factors and <b>write</b> prime factorization of numbers</li> <li>• <b>Represent</b> numbers by using exponents</li> <li>• <b>Change</b> exponent form to standard numeral, write as repeated factors and vice versa</li> <li>• <b>Use</b> factors of composite numbers, powers of ten and divisibility rules to <b>find</b> products and missing factors</li> <li>• <b>Memorize</b> and <b>apply</b> the divisibility rules for 2, 3, 4, 5, 6, 8, 9, and 10</li> <li>• <b>Explain</b> orally and in writing when a situation requires an exact answer or when an estimate is sufficient</li> <li>• <b>Locate, order</b> and <b>compare</b> <i>fractions</i> on number lines, scales and the coordinate grid</li> <li>• <b>Determine</b> the decimal equivalents of <i>fractions</i></li> <li>• <b>Convert</b> <i>fractions</i> to <i>decimals</i>, <i>decimals</i> to <i>fractions</i>, and</li> </ul>	<p><b>To apply place value concepts and number properties to the addition, subtraction, multiplication and division of multi-digit numbers (NEO)</b></p> <p><b>To use factors to explore, represent and classify numbers (NEO)</b></p> <p><b>To model , identify and express equivalent forms of numbers expressed as whole numbers, fractions and mixed numbers (NEO)</b></p>
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		<p><i>fractions to percents</i></p> <ul style="list-style-type: none"> <li>• <b>Change</b> a fraction to a decimal using division</li> <li>• <b>Write</b> <i>fractions</i> as terminating and repeating <i>decimals</i></li> <li>• <b>Convert</b> repeating <i>decimals</i> to <i>fractions</i></li> </ul> <ul style="list-style-type: none"> <li>• <b>Add and subtract</b> <i>fractions</i>, whole numbers and mixed numbers using a variety of computational strategies</li> <li>• <b>Subtract</b> mixed numbers with renaming</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> reciprocal numbers</li> <li>• <b>Apply</b> reciprocal numbers to division of a whole number by a fraction</li> <li>• <b>Use</b> models to <b>divide</b> whole numbers by <i>fractions</i> and <i>fractions</i> by whole numbers</li> <li>• <b>Multiply</b> and <b>divide</b> <i>fractions</i>, whole numbers and mixed numbers using a variety of computational strategies</li> <li>• <b>Use</b> cancellation in multiplication of <i>fractions</i></li> <li>• <b>Model</b> and <b>describe</b> when products or quotients with <i>fractions</i> and <i>decimals</i> can yield a larger or smaller result than either factor</li> <li>• <b>Write</b> whole number division problems in fraction form and round the fraction form to estimate an answer to a division problem</li> <li>• <b>Write</b> division problems in fraction form</li> <li>• <b>Express</b> remainders in division as <i>fractions</i></li> </ul>	<p><b>To use models, number lines, scales and a coordinate grid to represent and illustrate decimal numbers and to express them in equivalent forms (NEO)</b></p> <p><b>To add and subtract <i>fractions</i> and mixed numbers using models, pictures and number sentences (NEO)</b></p> <p><b>To use models and pictorial representations to develop concepts and methods by which to multiply and divide <i>fractions</i> and mixed numbers (NEO)</b></p>
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represent and understand quantitative relationships V. Analyze change in various contexts		<ul style="list-style-type: none"> <li>• <b>Write</b> and <b>evaluate</b> algebraic expressions with two variables</li> </ul>	<b>evaluate arithmetic and algebraic expressions (A)</b>
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**GRADE 6: QUARTER 3**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>Algebra (A)</b></p> <p>I. Understand patterns, relations, and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Use algebraic symbols to determine equivalence and solve problems</p> <p>IV. Use mathematical models to represent and understand quantitative relationships</p> <p>V. Analyze change in various contexts</p> <p><b>Geometry &amp; Measurement (GM)</b></p> <p>I. Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about relationships</p> <p>II. Use properties and characteristics of two-and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems</p> <p>III. Use spatial reasoning, location and geometric relationships to</p>	<p><b>Functions</b></p> <p><b>Patterns</b></p> <p><b>Plane and Solid Figures</b></p>	<ul style="list-style-type: none"> <li>• <b>Choose</b> and <b>use</b> benchmarks to <b>approximate</b> locations on number lines and coordinate grids</li> <li>• <b>Locate</b> points on a four quadrant coordinate grid by using ordered pairs</li> <li>• <b>Use</b> a table to explore functions and graph them</li> <li>• <b>Determine</b> the nature of changes in linear relationships using graphs, tables, and equations</li> <li>• <b>Describe, analyze</b> and <b>extend</b> numeric, geometric and statistical patterns</li> <li>• <b>Make</b> generalizations about patterns and relationships and <b>test</b> those generalizations</li> <li>• <b>Extend</b> and <b>compare</b> arithmetic and geometric sequences</li> <li>• <b>Represent</b> geometric and numeric patterns using words, tables, <b>graphs</b> and equations</li> <li>• <b>Analyze</b> patterns and data to make predictions</li> <li>• <b>Determine</b> the nature of changes in linear relationships using <b>graphs</b>, tables, and equations</li> <li>• <b>Make</b> and <b>test</b> conjectures about geometric relationships</li> <li>• <b>Classify</b> polygons according to their transformational properties</li> <li>• <b>Use</b> the relationships of sides and angles to <b>classify</b> sets of polygons</li> <li>• <b>Make</b> and <b>test</b> conjectures about side and angle relationships and congruence</li> <li>• <b>Identify, compare and contrast</b> regular and irregular polygons</li> </ul>	<p><b>To represent numerical and linear relationships in graphic forms (A)</b></p> <p><b>To represent, extend and analyze numerical and geometric patterns (A)</b></p> <p><b>Students will describe and develop relationships between geometric properties of plane and solid figures. (GM)</b></p>







<p><b>X. Use numbers and their properties to estimate measures and quantities reasonably</b></p> <p><u>Data Analysis, Statistics, and Probability (DSP)</u></p> <p><b>I. Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer them</b></p> <p><b>II. Collect, organize and display data using appropriate statistical and graphical methods.</b></p> <p><b>III. Select and use appropriate statistical methods to analyze data</b></p> <p><b>IV. Analyze data sets to form hypotheses and make predictions</b></p> <p><b>V. Understand and apply basic concepts of probability</b></p> <p><b>VI. Develop and evaluate inferences and predictions that are based on data</b></p> <p><b>VII. Understand and apply basic concepts of probability</b></p>		<p><b>3. Recognize</b> that changes in a data set can affect the mode, median, mean, and range</p> <p><b>1. Recognize</b> misleading data</p>	
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**GRADE 6 VOCABULARY TERMS**

Number Theory, Patterns, Estimation & Operations	Algebra	Geometry & Measurement	Data Analysis, Statistics, Probability
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coordinate grid standard form scientific notation prime factorization exponent square root, squares radical ( $\sqrt{\quad}$ ) properties rounding clustering front end estimation compatible numbers compensation powers of ten distributive property inverse algorithm equivalent <i>fractions</i> terminating/repeating <i>decimals</i> scales reciprocal rational numbers <i>percents</i> ratio proportion cross products ordered pairs rate unit rate integers, absolute value	arithmetic and geometric sequences linear variable function relation constants quadrant	polygons regular & irregular polygons quadrilateral pentagon hexagon octagon congruence radius diameter chord central angle nets protractor pi pyramids cylinders prism dilations intersecting center point line ray right angle line segment volume point degree angle perpendicular lines parallel lines triangles: isosceles, scalene, equilateral	Venn diagram frequency stem and leaf scatter plots outcomes outliers misleading data likely equally likely less likely probability survey mean median
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**STRATEGIES - GRADE 6**

<b>Suggested Teaching Strategies</b>	<b>Suggested Learning Strategies</b>
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The teacher provides a “number-rich” environment:

Numbers on display (charts, graphs, timelines)

Books and activities that encourage mathematical thinking  
*(Sudoku, Sir Circumference series, Grandfather Tang, A Grain of Rice, The Librarian Who Measured the Earth, Anno)*

Other: \_\_\_\_\_

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**Teacher Directed**

The teacher:

Creates counting and estimating experiences and activities across the curriculum  
 (virtual or real shopping field trips that provide opportunities for students to apply math concepts to life experiences)

Provides manipulatives for student use (*Two Color Counters, Hands on Equations, etc.*)

**Other:** \_\_\_\_\_

**Cooperative**

Students:

- Create and participate in number games
- Keep score in games
- Work in cooperative teams or groups to collect and express data
- Use flashcards
- Math Fairs

**Other:** \_\_\_\_\_

**Independent**

Students

- Use electronic devices to collect and illustrate data
- Express specific quantities in written work

**Other:** \_\_\_\_\_

**Suggested Cross Curricular and Catholic Social Teaching Links**

## Grade Six

- ✚ Students read *From the Mixed-Up Files of Mrs. Basil E. Frankweiler* and create proportions that measure the difference in the cost of subway fare, food, etc. described in the book with current day costs and make generalizations about the increase in the cost of living from the 1960's to the present. Online resources should be used. (Math, Language Arts)
- ✚ Students create a budget for a service project, such as providing a meal for a local soup kitchen. (Religion, Math)

### Notes:

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### Text/Resources:

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## GRADE 7&8 MATHEMATICS CURRICULUM

### Grade 7&8: QUARTER 1

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b><u>Number Theory, Estimation, and Operations (NEO)</u></b></p> <p>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</p> <p>II. Understand that a variety of numerical representations can be used to describe quantitative relationships</p> <p>III. Understand meanings of operations and how they relate</p>	<p><b>Place Value</b></p> <p><b>Metric System</b></p> <p><b>Scientific Notation</b></p>	<ul style="list-style-type: none"> <li>• <b>Locate, order and compare</b> whole numbers on number lines, scales and the coordinate grid</li> <li>• <b>Compare</b> large numbers using expanded forms and powers of ten</li> <li>• <b>Read, write, count, skip count, order, compare, round,</b> and <b>expand</b> numerals to one billion</li> <li>• <b>Write</b> expanded numerals in standard form</li>   <li>• <b>Express</b> a standard form number in scientific notation and vice versa</li> <li>• <b>Identify</b> negative exponents by examining patterns</li> </ul>	<p><b>To represent numbers in expanded and regrouped forms in the base ten place value system (NEO)</b></p> <p><b>To use powers of ten and scientific notation to write very large and very small numbers</b></p>





<p>VII. Represent and analyze quantitative relationships in a variety of ways</p> <p>VIII. Use operations and properties to determine equivalence and solve problems</p>	<p>Decimals</p>	<ul style="list-style-type: none"> <li>• Find prime factorizations of integers and monomials</li> <li>• Find GCF of integers and monomials</li> <li>• Write <i>percents</i> greater than 100% and less than 1% as <i>decimals</i> and <i>fractions</i></li> <li>• Write <i>fractions</i> as terminating and repeating <i>decimals</i> and vice versa</li> <li>• Estimate and compute with <i>fractions</i>, <i>decimals</i>, mixed numbers, improper <i>fractions</i>, ratios, proportions, and <i>percents</i></li> </ul>	<p>To represent practical situations and solutions to problems using the appropriate symbolic form – <i>fractions, decimals, or percents</i> (NEO)</p>
<p><b>Algebra (A)</b></p> <p>I. Understand patterns, relations, and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Represent and analyze quantifiable relationships in a variety of ways</p> <p>IV. Use algebraic symbols to determine equivalence and solve problems</p> <p>V. Use mathematical models to represent and understand quantitative relationships</p> <p>VI. Analyze change in various contexts</p>	<p>Integers</p>	<ul style="list-style-type: none"> <li>• Identify the characteristics of functions and relations, including domain and range</li> <li>• Determine whether a relation is a function</li> <li>• Use tables and graphs to measure and describe changes</li> <li>• Graph linear equations on an xy-axis</li> <li>• Graph functions from ordered pairs</li> <li>• Find function values</li> <li>• Solve problems with positive and negative numbers using models and number lines</li> <li>• Add, subtract, multiply and divide integers</li> <li>• Use order of operations including exponents</li> <li>• Use the order of operations to compute and solve a variety of multi-step problems, including those with parentheses and exponents</li> <li>• Use absolute value in solving problems</li> </ul>	<p>To identify relationships that are linear and nonlinear and compare and contrast their properties using tables, graphs, equations and verbal descriptions (NEO) To apply</p> <p>apply apply apply apply place value concepts and properties of numbers to the addition, subtraction, multiplication and division of multi-digit integers (NEO)</p>
	<p>Solving Equations</p>	<ul style="list-style-type: none"> <li>• Simplify algebraic expressions by combining like terms</li> <li>• Demonstrate how to maintain equivalence in equations</li> <li>• Model and solve one step linear equations by maintaining equivalence (use inverse operations)</li> </ul>	<p>To recognize and demonstrate equivalence using number properties (A)</p>

- **Represent** numerical and contextual situations with algebraic expressions, equations, and inequalities
- **(Use** variables in patterns, formulas, functions and relations)
- **Contrast** constants and variables
- **Simplify** expressions that contain rational numbers
  
- **Write** verbal expressions as algebraic expressions and sentences as equations
- **Evaluate** expressions with exponents
- **Write** an equation given some of the solutions
- **Evaluate** expressions with square roots
- **Generalize** mathematical situations using variables in expressions, equations and inequalities
- **Identify, express** and **apply** the commutative, distributive, and associative properties of whole numbers
  
- **Use** functional notation **to express** algebraic relationships
- **Graphically** find the solution to a system of equations
  
- **Represent** numerical and contextual situations with algebraic expressions, equations and inequalities
- **Evaluate** algebraic expressions and formulas
- **Solve** problems using concrete, verbal, symbolic, graphic and tabular representations
- **Solve** equations in one variable that contain absolute value expressions
  
- **Model** and **solve** two-step linear equations using a variety of methods (i.e., concrete materials, algebra tiles, pictorial representations, etc.)

**To write and analyze expressions, equations and inequalities that express relationships between numbers (A)**

**To use numbers, symbols, and words to represent and describe mathematical relationships (A)**

**To identify relationships that are linear and nonlinear and compare and contrast their properties using tables, graphs, equations and verbal descriptions (A)**

**To solve problems using a variety of algebraic representations (A)**

**To recognize and demonstrate equivalence using number**

	<p><b>Solving 2-Step Equations</b></p> <p><b>Slope</b></p>	<ul style="list-style-type: none"> <li>• <b>Graph</b> inequalities on the coordinate plane</li> <li>• <b>Recognize</b> that a linear relationship has a constant rate of change called slope</li> <li>• <b>Find</b> the slope of a line</li> <li>• <b>Use graphs</b>, tables, equations and verbal descriptions to represent and analyze changes in linear and nonlinear relationships</li> <li>• <b>Identify</b> the <math>x</math> and <math>y</math> intercepts</li> <li>• <b>Describe</b> what a line will look like before it is graphed, i.e. if the line is in a positive or negative direction, and how steep the line should be by analyzing the slope</li> <li>• <b>Solve</b> linear equations for “<math>y</math>” given the linear equation in any other form</li> <li>• <b>Determine</b> the solutions of linear equations (0, 1, or an infinite number)</li> <li>• <b>Identify</b> and <b>write</b> the equation for a line in point-slope, slope-intercept and standard forms</li> </ul>	<p><b>properties (A)</b></p> <p><b>To use numbers, symbols, and words to represent and describe mathematical relationships (A)</b></p> <p><b>To identify relationships that are linear and nonlinear and compare and contrast their properties using tables, graphs, equations and verbal descriptions (A)</b></p>
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**Grades 7&8: QUARTER 3**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b><u>Number Theory, Estimation, and Operations (NEO)</u></b></p> <p><b>I. Understand numbers, ways of representing numbers, relationships among numbers, and number systems</b></p> <p><b>II. Understand that a variety of numerical representations can be used to describe quantitative relationships</b></p> <p><b>III. Understand meanings of</b></p>	<p><b>Fractions</b></p>	<ul style="list-style-type: none"> <li>• <b>Convert</b> <i>fractions to decimals, decimals to fractions, fractions to percents, and percents to fractions</i> (including repeating <i>decimals</i>)</li> <li>• <b>Write</b> <i>fractions</i> as terminating and repeating <i>decimals</i> and vice versa</li> <li>• <b>Use</b> the distributive property to multiply and divide mixed numbers and <i>decimals</i></li> <li>• <b>Estimate and compute</b> with <i>fractions, decimals, mixed numbers, improper fractions, ratios, proportions, and percents</i></li> </ul>	<p><b>To represent practical situations and solutions to problems using the appropriate symbolic form – <i>fractions, decimals, or percents</i> (NEO)</b></p>

<p>operations and how they relate to one another</p> <p>IV. Compute fluently and make reasonable estimates</p> <p>V. Use numbers and their properties to compute flexibly and fluently</p> <p>VI. Understand and describe patterns and functional relationships</p> <p>VII. Represent and analyze quantitative relationships in a variety of ways</p> <p>VIII. Use operations and properties to determine equivalence and solve problems</p> <p><b><u>Data Analysis, Statistics, and Probability (DSP)</u></b></p> <p>I. Formulate questions that can be addressed with data; collect, organize, and display relevant data to answer them</p> <p>II. Collect, organize and display data using appropriate statistical and graphical methods.</p> <p>III. Select and use appropriate statistical methods to analyze data</p> <p>IV. Analyze data sets to form hypotheses and make predictions</p> <p>V. Understand and apply basic concepts of probability</p> <p>VI. Develop and evaluate inferences and predictions that are based on data</p> <p>VII. Understand and apply basic</p>	<p><b>Ratios and Rates</b></p> <p><b>Solve Proportions</b></p> <p><b>Work with Percents</b></p> <p><b>Theoretical and Experimental Probability</b></p> <p><b>Data Analysis</b></p>	<ul style="list-style-type: none"> <li>• <b>Write</b> and <b>use</b> ratios, rates, and unit rates</li> <li>• <b>Write and solve</b> proportions</li> <li>• <b>Use</b> proportions to solve problems involving geometric figures</li> <li>• <b>Use</b> proportions and similar figures to measure objects indirectly</li> <li>• <b>Solve</b> problems involving <i>percents</i></li> <li>• <b>Estimate and use</b> common applications of <i>percents</i></li> <li>• <b>Estimate</b> and <b>solve</b> problems involving percent of increase and decrease</li> </ul> <ul style="list-style-type: none"> <li>• <b>Identify</b> experimental probability by gathering data from experiments</li> <li>• <b>Identify</b> theoretical probability by analyzing possible and likely outcomes</li> <li>• <b>Conduct</b> experiments and compare experimental to theoretical probabilities</li> <li>• <b>Solve</b> problems involving the probability of simple and compound events in familiar contexts</li> </ul> <ul style="list-style-type: none"> <li>• <b>Make</b> and <b>evaluate</b> statistical claims and <b>justify</b> conclusions with evidence</li> <li>• <b>Identify</b> trends and <b>justify</b> conclusions</li> <li>• <b>Describe</b> the role of random sampling, random number generation, and the effects of sample size on statistical claims</li> </ul> <ul style="list-style-type: none"> <li>• <b>Distinguish</b> between combinations and permutations as ways to predict possible outcomes in certain situations</li> <li>• <b>Use</b> combinations and permutations, trees, and networks (counting strategies) in a variety of contexts</li> <li>• <b>Identify</b> when order is irrelevant in determining a solution</li> </ul>	<p><b>To determine probabilities and outcomes (DSP)</b></p> <p><b>To describe and analyze features of a data set and justify conclusions (DSP)</b></p>
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<p>concepts of probability</p> <p><b>Algebra (A)</b></p> <p>I. Understand patterns, relations, and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Represent and analyze quantifiable relationships in a variety of ways</p> <p>IV. Use algebraic symbols to determine equivalence and solve problems</p> <p>V. Use mathematical models to represent and understand quantitative relationships</p> <p>VI. Analyze change in various contexts</p>	<p><b>Graphs and Data Analysis</b></p>	<ul style="list-style-type: none"> <li>• <b>Determine</b> the nature of changes in linear relationships using <b>graphs</b>, tables, and equations</li> <li>• <b>Describe</b> in context how a change in one variable relates to a change in a second variable</li> <li>• <b>Identify</b> the independent and dependent variables in a given situation</li> <li>• <b>Formulate</b> questions, <b>design</b> surveys and samplings</li> <li>• <b>Organize</b> and <b>analyze</b> gathered data and <b>defend</b> the analysis</li> <li>• <b>Organize and display</b> data using graphical representations</li> <li>• <b>Make</b> and <b>defend</b> predictions based on patterns and trends</li> <li>• <b>Use</b> a matrix to organize and describe data</li> </ul>	<p><b>To analyze physical phenomena and patterns to identify relationships and make generalizations (A)</b></p> <p><b>To collect and construct appropriate representations of data (DSP)</b></p>
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**Grades 7&8: QUARTER 4**

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>Geometry &amp; Measurement (GM)</b></p> <p>I. Analyze characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about relationships</p> <p>II. Use properties and</p>	<p><b>Geometry</b></p>	<ul style="list-style-type: none"> <li>• <b>Identify</b> which classes of polygons have line and/or rotational symmetry</li> <li>• <b>Identify</b> and <b>classify</b> angles as complementary or supplementary</li> <li>• <b>Develop and use</b> formulas to determine the volume of pyramids and cylinders</li> <li>• <b>Calculate</b> the surface area of a rectangular prism</li> </ul>	<p><b>To describe and develop relationships between geometric properties of plane and solid figures (GM)</b></p>

<p>characteristics of two-and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas and solve problems</p> <p>III. Use spatial reasoning, location and geometric relationships to solve problems</p> <p>IV. Specify locations and describe spatial relationships using coordinate geometry and other representational systems</p> <p>V. Apply transformations and use symmetry to analyze mathematical situations</p> <p>VI. Use visualization, spatial reasoning, and geometric modeling to solve problems</p> <p>VII. Understand measurable attributes of objects and the units, systems, and processes of measurement</p> <p>VIII. Develop and apply appropriate techniques, tools and formulas to estimate and determine measurements</p> <p>IX. Apply appropriate techniques, tools and formulas to determine measurements</p> <p>X. Use numbers and their properties to estimate measures and quantities reasonably</p> <p><b>Algebra (A)</b></p> <p>I. Understand patterns, relations,</p>		<ul style="list-style-type: none"> <li>• <b>Describe</b> the effect of scale factors on the length, area, and volume ratios of similar polygons, circles, and solids</li> <li>• <b>Make</b> and <b>test</b> conjectures about the relationships among angles, sides, perimeters, and areas of congruent and similar polygons (Include the Pythagorean Theorem)</li> <li>• <b>Verify</b> the Pythagorean Theorem, using diagrams, concrete materials, and measurement</li> <li>• <b>Apply</b> the Pythagorean Theorem to find the missing length of a side of a right triangle when given the lengths of the other two sides</li> <li>• <b>Draw</b> and <b>interpret</b> nets, cross-sections, and front, side, and top views of various solids</li> <li>• <b>Use</b> rectangular grids to represent polygons and perform transformations (translations, rotations, reflections, and dilations)</li> <li>• <b>Describe</b> the effect of transformations on polygons with line and/or rotational symmetry</li> <li>• <b>Construct</b> similar polygons on coordinate grids</li> <li>• <b>Describe</b> the similarity of polygons as a result of dilations (reductions or enlargements) and their effects on measurements</li> <li>• <b>Use</b> spatial reasoning, location, and geometric relationships to solve problems</li> <li>• <b>Apply</b> transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures represented on a graph</li> <li>• <b>Identify</b> applications of transformations, such as tiling, fabric design, art, and scaling</li> <li>• <b>Develop</b> and <b>use</b> formulas to <b>determine</b> the surface area of three-dimensional objects</li> </ul>	<p>To identify and generalize relationships between measurable attributes of plane and solid figures (GM)</p> <p>To identify, draw, and describe elements needed to explain spatial relationships (GM)</p> <p>To identify and generalize relationships between measurable attributes of plane</p>
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<p>and functions</p> <p>II. Represent and analyze mathematical situations and structures using algebraic symbols</p> <p>III. Represent and analyze quantifiable relationships in a variety of ways</p> <p>IV. Use algebraic symbols to determine equivalence and solve problems</p> <p>V. Use mathematical models to represent and understand quantitative relationships</p> <p>Analyze change in various contexts</p>	<p>Algebra</p>	<ul style="list-style-type: none"> <li>• <b>Add</b> and <b>subtract</b> polynomials</li> <li>• <b>Multiply</b> and <b>divide</b> monomials</li> <li>• <b>Multiply</b> a polynomial by a monomial</li> <li>• <b>Multiply</b> binomials</li> <li>• <b>Simplify</b> expressions involving powers of monomials and products and quotients of monomials</li> </ul> <ul style="list-style-type: none"> <li>• <b>Determine</b> the nature of changes in linear relationships using <b>graphs</b>, tables, and equations</li> <li>• <b>Describe, analyze,</b> and <b>extend</b> numeric, geometric and statistical patterns</li> <li>• <b>Make</b> generalizations about patterns and relationships and <b>test</b> those generalizations</li> <li>• <b>Represent, extend,</b> and <b>compare</b> geometric and numeric patterns using words, tables, <b>graphs</b> and equations</li> <li>• <b>Analyze</b> patterns and data to make predictions</li> <li>• <b>Write</b> recursive and explicit functions to <b>generalize</b> patterns</li> <li>• <b>Recognize</b> and <b>solve</b> problems of direct variation</li> </ul>	<p>and solid figures (GM)</p> <p>To solve problems using a variety of algebraic representations (A)</p> <p>To use tables, graphs, rules and words to investigate, describe, and analyze functional relationships in a variety of patterns (A)</p>
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**Grades 7&8 Vocabulary**

Number Theory	Algebra	Geometry	Data Analysis
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<p>absolute value  exponential  compatible numbers  counting numbers  equivalent fraction  integers  irrational numbers  monomials  negative exponents  negative integers  opposite integers  percent of  increase/decrease  positive integers  prime factors  radical (<math>\sqrt{\quad}</math>)  rational expressions  rational numbers  real numbers  scientific notation  similar figures  square root  terminating/repeating  <i>decimals</i>  unit fraction  whole numbers</p>	<p>binomials  constants  direct variation  domain  equation/inequality  expression  explicit functions  formulas  functions  functional notation  grid  independent/dependent  variables  inverse operations  ordered pair  patterns  point slope  polynomials  properties:  Commutative, Distributive, Associative  range  recursive functions  relations  rise over run (<math>\Delta y/\Delta x</math>)  slope  slope intercept  system of  equations  variable  xy-axis  x and y intercepts</p>	<p>angles: acute, right, obtuse  congruent  diameter  degree  perpendicular lines  parallel lines  rotational symmetry  triangle: isosceles, scalene,  equilateral  pentagon  polygon  Pythagorean Theorem  quadrilateral  radius  protractor  compass  chord  pi  circumference</p>	<p>histograms  stem and leaf plots  Scatter plots  outlier  Venn diagram</p>
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<p><b>Suggested Teaching Strategies</b></p>	<p><b>Suggested Learning Strategies</b></p>
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The teacher provides a “number-rich” environment:

Numbers on display (charts, graphs, timelines)

Books and activities that encourage mathematical thinking  
*(Sudoku, Sir Cumference series, Grandfather Tang, A Grain of Rice, The Librarian Who Measured the Earth, Anno, The Number Devil, The Tortoise and the Hare)*

Other:

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**Teacher Directed**

The teacher:

- Creates counting and estimating experiences and activities across the curriculum
- Uses student interest in sports, movies, music to develop math concepts and skills
- Provides manipulatives for student use (*Two Color Counters, Hands on Equations, etc.*)

**Other:** \_\_\_\_\_

**Cooperative**

Students:

- Create and participate in number games
- Keep score in games
- Work in cooperative teams or groups to collect and express data
- Use flashcards
- Participate in math Fairs

**Other:** \_\_\_\_\_

**Independent**

Students

- Use electronic devices to collect and illustrate data
- Express specific quantities in written work

**Other:** \_\_\_\_\_

**Suggested Cross Curricular and Catholic Social Teaching Links**

**Grade Seven/Eight**

✚ Students write about and calculate the cost of war, natural disasters, unemployment, etc., expressing an understanding that, as Catholic Christians, we are called to work globally and locally for justice. (Math, Social Studies, Science)

✚ Students create graphs describing the inequality of the consumption of the world's resources and design service projects that address local and global injustice. (Math, Religion, Science)

**Notes:**

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**Text/Resources:**

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## ALGEBRA CURRICULUM

This one-year algebra course is designed to meet the requirements of the Archdiocese of Hartford high school Algebra I course. This traditional Algebra I course meets the expectations of the standards outlined by the National Mathematics Advisory Panel of the United States Department of Education and the National Council of Teachers of Mathematics. Based on the Archdiocesan Algebra I Benchmark Assessment, students may be eligible to take this course during their eighth grade year.

The Archdiocesan Algebra I End-of-Course Assessment will be administered to all algebra students. Eighth grade students from any Archdiocesan middle school taking the Algebra I End-of-Course Assessment must pass the assessment with 80% proficiency, and achieve a class performance average of a B or higher in order to satisfy the Algebra I requirement in any of the four Archdiocese of Hartford high schools. This does not exempt students from taking the high school math placement test as this will best place the student in the appropriate level high school math course. Students who do not meet the proficiency requirement may be required to take an additional Algebra I course as a freshman to assure mastery of basic algebra skills. Students who take this course as a freshman in an Archdiocesan high school must meet the standards of passing as outlined in their respective high school.

This course is the culmination of an eight year mathematics program. It directly follows a rigorous pre-algebra course. It is expected that students who enter this course come with a strong conceptual foundation in fractions, ratios and proportional relationships, as well as an understanding in certain aspects of measurement and geometry. Mastery of real number operations and integer exponents and roots is required. Therefore, to ensure optimal student success in this course, a benchmark assessment will be administered to all end-of-year seventh graders as well as meet other established criteria to determine eligibility for the eighth grade Algebra I course.

Technology is expected to be integrated in all traditional course work. This includes but is not limited to employing technological tools to assist in student formation of algebraic understandings and skills, as well as in assessing conjectures, creating graphs and data displays, and determining lines of fit for data. Testing with and without technological tools is recommended.

The **Algebra Curriculum** that follows provides the scope and sequence for the Algebra I course. Enabling Outcomes and Objectives are listed in sequential order and reflects the Archdiocesan Mathematics Curriculum Standards for Algebra I. Each skill should be taught using a variety of methods and applications so that students attain a deep understanding of these concepts. Every opportunity must be taken to integrate and connect the concepts of Algebra I to those learned in middle school mathematics and to other disciplines. The integration of real-world problem solving applications is an unstated requirement that infuses this curriculum to ensure quality and depth of understanding. *Students should be*

encouraged to be creative and innovative in their approach to problems, to be productive and persistent in seeking solutions, and to use multiple means to communicate their insights and understandings. (Achieve, Inc., May, 2008)

### ALGEBRA I

<u>STRANDS/ADH STANDARDS</u>	<u>TOPICS</u>	<u>ENABLING OUTCOMES</u>	<u>OBJECTIVES</u>
<p><b>I. Understand and describe patterns and functional relationships</b></p> <p><b>II. Represent and analyze quantitative relationships in a variety of ways</b></p> <p><b>III. Use operations, properties and algebraic symbols to determine equivalence and solve problems</b></p> <p><b>IV. Use properties and characteristics of two- and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas, and solve problems</b></p> <p><b>V. Use spatial reasoning, location, and geometric relationships to solve problems</b></p> <p><b>VI. Develop and apply units, systems, formulas and appropriate tools to estimate and measure</b></p>	<p><b>I. FOUNDATIONS OF FUNCTIONS</b></p>	<p>The students will...</p> <ol style="list-style-type: none"> <li>1. Solve algebraic equations graphically, tabularly, and verbally</li> <li>2. Recognize and use the properties of identity and equality</li> <li>3. Use the Distributive, Commutative and Associative properties to evaluate and simplify expressions and solve linear problems</li> <li>4. Describe relationships and make generalizations about patterns and functions</li> <li>5. Identify the characteristics of functions and relations, including domain and range</li> <li>6. Make and justify predictions based on patterns</li> <li>7. Use tables and graphs to measure and describe changes</li> <li>8. Graph functions from ordered pairs</li> <li>9. Determine whether a relation is a function</li> <li>10. Find function values</li> <li>11. Interpret and draw graphs of functions</li> <li>12. Use functional notation to express algebraic relationships</li> <li>13. Simplify expressions using order of operations</li> </ol>	<p><b>To understand that a function represents a dependence of one quantity on another;</b></p> <p><b>To use properties and attributes of functions;</b></p> <p><b>To understand how algebra can be used to express generalizations, and to recognize the power of algebraic symbols to represent situations;</b></p> <p><b>To use necessary algebraic skills to simplify algebraic expressions, solve equations, and inequalities in problem situations.</b></p>

		<p>14. Write, evaluate, and simplify algebraic expressions and solve open sentences in a single variable</p> <p>15. Use tables, graphs, and equations to represent mathematical relationships and solve real-world problems</p> <p>16. Multiply monomials</p> <p>17. Simplify expressions involving powers of monomials and products and quotients of monomials</p> <p><b>18.</b> Simplify expressions containing negative exponents and zero</p>	
<p><b>I. Understand and describe patterns and functional relationships</b></p> <p><b>II. Represent and analyze quantitative relationships in a variety of ways</b></p> <p><b>III. Use operations, properties and algebraic symbols to determine equivalence and solve problems</b></p> <p><b>IV. Use properties and characteristics of two- and three-dimensional shapes and geometric theorems to describe relationships, communicate ideas, and solve problems</b></p> <p><b>V. Use spatial reasoning, location, and geometric relationships to solve problems</b></p> <p><b>VI. Develop and apply units, systems, formulas and</b></p>	<p><b>II. LINEAR FUNCTIONS</b></p>	<p>The students will...</p> <ol style="list-style-type: none"> <li>1. Solve compound inequalities and graph their solutions</li> <li>2. Use tables and graphs to measure and describe changes</li> <li>3. Graph linear equations on an xy-axis</li> <li>4. Describe the correlation, slope, and y-intercept of a given linear equation</li> <li>5. Transform linear equations into slope-intercept form</li> <li>6. Solve real world problems using linear equations</li> <li>7. Recognize and solve problems of direct variation</li> <li>8. Determine the constant rate of change in a linear relationship and recognize this as the slope of a line</li> </ol>	<p><b>To understand and interpret linear function graphically, analytically, tabularly, and verbally</b></p>

<p><b>appropriate tools to estimate and measure</b></p>		<p>9. Compare and contrast the graphs of lines with the same slope versus those with different slopes</p> <p>10. Use slope as the change in “y” over the change in “x”</p> <p>11. Interpret slope and y-intercepts from contextual situations, graphs, and linear equations</p> <p>12. Write and use ratios, rates, and unit rates</p> <p>13. Write and solve proportions</p> <p>14. Interpret points on a scatter plot</p> <p>15. Write lines of fit</p>	
	<p><b>III. SYSTEMS OF EQUATIONS</b></p>	<p>The students will:</p> <ol style="list-style-type: none"> <li>1. Determine the solutions of linear equations (0, 1, or an infinite)</li> <li>2. Find the solution to a system of two linear equations</li> <li>3. Solve real world problems involving systems of equations and inequalities by using substitution, elimination, and graphing</li> </ol>	<p><b>To write and interpret systems of linear equations in two variables</b></p>
	<p><b>IV. QUADRATIC FUNCTIONS</b></p>	<p>The students will...</p> <ol style="list-style-type: none"> <li>1. Simplify expressions and solve equations involving with square roots</li> <li>2. Use tables and graphs to measure and describe changes</li> </ol>	<p><b>To understand and interpret quadratic function graphically, analytically, verbally, and numerically</b></p>

		<ol style="list-style-type: none"> <li>3. Solve problems that involve using the Pythagorean Theorem and distance formula</li> <li>4. Solve quadratic equations by graphing, completing the square, and using the quadratic formula</li> <li>5. Factor polynomials using the Distributive Property</li> <li>6. Factor trinomials and perfect square trinomials</li> </ol>	
	<b>V. OTHER NON-LINEAR FUNCTIONS</b>	<p>The students will...</p> <ol style="list-style-type: none"> <li>1. Simplify expressions and solve equations involving exponents</li> <li>2. Solve problems involving exponential growth or decay</li> <li>3. Recognize, solve, and graph problems of fundamental indirect variation</li> <li>4. Add, subtract, multiply, and divide simple rational expressions</li> <li>5. Solve simple rational equations</li> </ol>	<p><b>To understand and apply laws of integral exponents</b></p> <p><b>To develop a basic understanding of rational functions</b></p>
<b>SUPPLEMENTAL</b>	<b>Supplemental Algebraic Enabling Outcomes</b>	<p>The students will...</p> <ol style="list-style-type: none"> <li>1. Solve absolute value equations and inequalities</li> <li>2. Add, subtract, and multiply radical expressions</li> </ol>	

	<p><b>SUPPLEMENTAL GEOMETRY</b></p>	<ol style="list-style-type: none"> <li>3. Solve radical equations</li> <li>4. Solve equations in one variable that involve absolute value expressions</li> <li>5. Identify and interpret data with exponential behavior</li> </ol> <p>The students will...</p> <ol style="list-style-type: none"> <li>1. Explore the effect of scale factors on the length, area and volume ratios of similar polygons, circles and solids and state these using variables and algebraic expressions</li> <li>2. Make and test conjectures about the relationships among angles, sides, perimeters and areas of congruent and similar polygons including the Pythagorean Theorem</li> <li>3. Determine whether a triangle is a right triangle</li> <li>4. Determine whether two triangles are similar</li> <li>5. Transform figures by using reflections, translations dilations and rotations</li> <li>6. Transform figures on a coordinate plane using reflections, translations, dilations, and rotations</li> <li>7. Write equations of line that pass through given points, parallel or perpendicular to given lines</li> <li>8. Recognize and extend geometric sequences</li> </ol>	<p><b>To explore the relationships among sides, angles, perimeters, areas, surface areas and volumes of congruent and similar polygons and solids;</b></p> <p><b>To solve problems involving measurement through the use of appropriate tools, techniques, and strategies.</b></p>
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|  |  | <p>9. Use the Pythagorean Theorem to solve indirect measurement problems</p> <p>10. Find unknown measures of sides of similar triangles</p> <p>11. Define sine, cosine, and tangent ratios</p> <p>Use trigonometric ratios to solve right triangles</p> |  |
|--|--|---|--|

### LESSON STRUCTURE SAMPLE

**5 - 10 minutes**

**Connections to Prior Knowledge**

Review previous objective

Mental math/Mixed computational review (oral or written)

Homework assignment correction (not necessary to do every example; not scored for formal grade)

**15-20 minutes**

**Concept/Skill Development**

Introduce daily objective

Keep the class active

Use discovery where possible

Relate to problem solving application/authentic application

**10 - 15 minutes**

**Flexible Grouping**

Differentiated assignments are given\*

Allow students assigned practice or enrichment to

begin on their own

Work with the small group of students who need

5 minutes

re-teaching or remediation\*\*

**Closing**

Review daily objective

Assign homework if applicable

\* Use the worksheets provided in the teacher resource kit for practice, enrichment, and re-teaching. Students are each challenged at their own ability level. \*\* The identification of students for flex grouping is accomplished during the lesson by observation of student responses and written work.

Table I

**Roman Numerals**



I	II	III	IV	V	VI	VII	VIII	IX	X
1	2	3	4	5	6	7	8	9	10
V	X	XV	XX	XXV	XXX	XXXV	XL	XLV	L
5	10	15	20	25	30	35	40	45	50
X	XX	XXX	XL	L	LX	LXX	LXXX	XC	C
10	20	30	40	50	60	70	80	90	100

C	CC	CCC	CD	D	DC	DCC	DCCC	CM	M
100	200	300	400	500	600	700	800	900	1000

To find the Roman numeral:

**ADD:**

✗ if the letter is repeated

$$II = 1 + 1 = 2$$

$$XXX = 10 + 10 + 10 = 300$$

✗ if a letter with a smaller value comes *after* a letter

with a larger value

$$XVI = 10 + 5 + 1 = 16$$

$$DCV = 500 + 100 + 5 = 605$$

**SUBTRACT:**

✗ if a letter with a smaller value comes *before* a letter

with a larger value

$$XC = 100 - 10 = 90$$

$$CM = 1000 - 100 = 900$$

A LETTER IS NEVER REPEATED MORE THAN THREE TIMES.

Sometimes you must both add and subtract:  $CMXCIV = (1000 - 100) + (100 - 10) + (5 - 1) = 994$

Table II

## OPERATIONS WITH INTEGERS



### Addition of Integers

#### Like signs

find the sum

use the sum of the addends

$$^{-}5 + ^{-}10 = ^{-}15$$

#### Unlike signs

Find the difference

Use the sign of the addend having the greater absolute value

$$^{+}10 + ^{-}7 = ^{+}3$$

### Subtraction of Integers

The same as adding the opposite of the subtrahend

$$^{+}5 - ^{+}10 = ^{+}5 + ^{-}10 = ^{-}5$$

### Multiplication of Integers

**Like signs**

Product is positive

$$^{-}7 \times ^{-}5 = ^{+}35$$

**Unlike signs**

Product is negative

$$^{+}4 \times ^{-}6 = ^{-}24$$

**Division of Integers****Like signs**

Quotient is positive

$$+20 / +4 = +5$$

**Unlike signs**

$$-45 / +5 = -9$$

Table III

**Properties of Integers****Property****Algebraic Example****Opposites:**

$$x + (-x) = 0$$

The sum of any number and its opposite is zero.

**Zero Property of Addition:**

$$x + 0 = x$$

The sum of any number and zero is equal to the number.

**One Property:**

$$(x) (+1) = x$$

The product of any number and one is equal to the number.

**Commutative Property:**

$$x + y = y + x$$

Changing the order of the addends or factors does not change the sum or product.

**Associative Property:**

$$(x+y) + z = x + (y+z)$$

Changing the grouping of addends or factors, does not change the sum or product.

**Distributive Property:**

$$x(y + z) = xy + xz$$

Multiplying a sum by a number is the same as multiplying each addend by the number and then adding.

Table IV

**COMMON PERCENT EQUIVALENTS**

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$$25\% = 1/4$$

$$50\% = 1/2$$

$$75\% = 3/4$$

$$10\% = 1/10$$

$$20\% = 1/5$$

$$30\% = 3/10$$

$$12 \frac{1}{2}\% = 1/8$$

$$37 \frac{1}{2}\% = 3/8$$

$$62 \frac{1}{2}\% = 5/8$$

$$87 \frac{1}{2}\% = 7/8$$

$$16 \frac{2}{3}\% = 1/6$$

$$33 \frac{1}{3}\% = 1/3$$

$$40\% = 2/5$$

$$66 \frac{2}{3}\% = 2/3$$

$$80\% = 4/5$$

$$83 \frac{1}{3}\% = 5/6$$

$$60\% = 3/5$$

$$9 \frac{1}{11}\% = 1/11$$

$$15\% = 3/20$$

$$11 \frac{1}{9}\% = 1/9$$

$$5\% = 1/20$$

$$14 \frac{2}{7}\% = 1/7$$

$$1\% = 1/100$$

$$6 \frac{1}{4}\% = 1/16$$

$$1/2\% = 1/200$$

$$8 \frac{1}{3}\% = 1/12 \quad 2\% = 1/50$$

$$4\% = 1/25$$

Table V

**Common Measures**

Table VI

**Mathematical Symbols**



=	is equal to	$\overleftrightarrow{AB}$	line $AB$
$\neq$	is not equal to	$\overline{AB}$	segment $AB$
<	is less than	$\overrightarrow{AB}$	ray $AB$
>	is greater than	$\angle ABC$	angle $ABC$
$\approx$	is approximately equal to	$ABC$	plane $ABC$
...	continues without end	$\sim$	is similar to
+	plus	$\cong$	is congruent to
-	minus	$\parallel$	is parallel to
$\times$	times	$\perp$	is perpendicular to
$\div$	divided by	$\pi$	pi
\$	dollars	$\text{cm}^2$	square centimeter
¢	cents	$\text{in.}^3$	cubic inch
%	percent	$^\circ$	degree
$0.\overline{3}$	$0.333\dots$ (repeating decimals)	$2 : 3$	two to three (ratio)
(3, 4)	ordered pair	$P(E)$	probability of an event
.	decimal point		

## Glossary of Terminology



<b>Standard</b>	Primary instructional target that identifies what a student should know and be able to do by graduation of high school. Archdiocesan standards are aligned directly National Standards and cross-referenced with the CT Framework.
<b>Strand</b>	A discrete concept unit of teaching. These are not necessarily arranged in a sequential teaching order.
<b>Student Objective</b>	Primary tasks stated in student learning terms that are measured by means of a summative assessment, and should be mastered by students as a result of instruction of enabling outcomes. These are specifically aligned with Archdiocesan standards and are subsets of each strand.
<b>Enabling Outcome</b>	Specific skill that supports mastery of student objectives. These are suggestions for lesson planning that describe how a daily learning objective will be taught. They measured formatively on a daily basis.
<b>Daily Learning Objective</b>	Teacher developed daily objectives that outline what a student is to be taught on a given day on a given subject.
<b>Core</b>	An essential student learning objective that is to be newly introduced. It implies an ability to recognize and work with the skill or concept.
<b>Extended/Mastery</b>	A student learning objective that builds upon the same concept or skills introduced in a preceding grade. Extended implies an ability to recognize, gain a clear understanding of, work successfully with, and apply the skill or concept with few errors. Not every student in a class will achieve mastery for each objective.

## Materials for Older Students

- Compendium of the Social Doctrine of the Church (Pontifical Council for Justice and Peace; Order through USCCB, 1/800-235-8722). Provides a complete and systematic overview of the Church's social teaching with an extensive index for easy reference on almost any topic.
- A Place at the Table: A Catholic Recommitment to Overcome Poverty and to Protect the Dignity of All God's Children (USCCB, 1/800-235-8722). The U.S. bishops remind us that central to our identity as disciples of Jesus Christ is our concern for those who are poor or suffering.
- Faithful Citizenship: A Catholic Call to Political Responsibility (USCCB, 1/800/235-8722) The 2003 bishops' statement includes Church teaching about civic participation, as well as the Church's position on a range of issues.
- The Challenge of Faithful Citizenship (USCCB, 1/800/235-8722) This two-color brochure summarizes the bishops' statement, Faithful Citizenship: A Catholic Call to Political Responsibility and includes "Question for the Campaign" for voters and candidates.
- Sharing Catholic Social Teaching: Challenges and Directions (USCCB, 800/235-8722) A statement of the U.S. bishops urging that Catholic social teaching be incorporated into every Catholic educational program. Identifies seven key themes of Catholic social teaching.
- A Leader's Guide to Sharing Catholic Social Teaching (USCCB, 800/235-8722) Step-by-step process to help catechetical leaders and other adults explore Catholic social teaching. Includes camera-ready handouts.
- Leaven for the Modern World: Catholic Social Teaching and Catholic Education (National Catholic Education Association, 202/337-6232) A resource designed to help educators at the secondary level deepen their understanding of Catholic social teaching and explore ways to share it with young people.
- Everyday Christianity: To Hunger and Thirst for Justice (USCCB, 202/835-8722) The most important way lay Catholics work for justice and peace is through their choices and actions every day.
- Brothers and Sisters to Us/Nuestros Hermanos y Hermanas (USCCB, 800/235-8722) The U.S. bishops promote discussion and action against racism.
- The Challenge of Peace (USCCB, 800/235-8722) U.S. bishops' landmark pastoral on nuclear weapons and the arms race.
- Living the Gospel of Life: A Challenge to American Catholics (USCCB, 800/235-8722) Calls U.S. Catholics to recover their identity as followers of Jesus Christ and to be leaders in the renewal of U.S. respect for the sanctity of life.

- *Sharing the Light of Faith: An Official Commentary* (USCCB, Department of Education, 800/235-8722) Chapter VII explores Catholic social teaching and guidelines on catechesis for social ministry.
- *Confronting a Culture of Violence: A Catholic Framework for Action* (USCCB, 800/235-9722) This statement recognizes programs in dioceses, parishes and schools across the country.
- *Economic Justice for All: Pastoral Letter on Catholic Social Teaching and the U.S. Economy* by the U.S. bishops (USCCB, 800/235-8722) Resources such as posters and suggestions for using the pastoral letters in the classroom.
- *Renewing the Earth* (National Catholic Rural Life Conference, 515/270-2634) Study guides for children, teens and adults on the bishops' environment statement. *Materials for Classroom and Small Groups*
- *In the Footsteps of Jesus: Resource Manual on Catholic Social Teaching* (USCCB, 800/253-8722) Provides background reading, lesson plans for all ages, camera-ready resource, and other tools. Designed to be used with the video, *In the Footsteps of Jesus*.
- *From the Ground Up: Teaching Catholic Social Principles in Elementary Schools* (National Catholic Education Association, 202/337-6232) A faculty preparation guide that includes a process for faculty development and sample activities for sharing the seven key themes of Catholic social in grades K through 8.
- *Excerpts from Sharing Catholic Social Teaching* (USCCB, 800/253-8722) An easy to distribute card summarizing the seven themes of Catholic social teaching. Also available as a poster.
- *Making a Place at the Table* (USCCB, 1/800235-8722) A brief, compelling, four-panel brochure summarizing the bishops' statement on poverty.
- *That's Not Fair!* (Tom Turner, Bishop Sullivan Center, 816-231-0984) A complete kit with exercises and handouts to teach middle school students about Catholic social doctrine, culminating in an advocacy/lobbying project on a social justice issue.
- *Lesson Plans on Poverty* ([www.povertyusa.org](http://www.povertyusa.org)). Lesson plans for grades K-12 and adults developed by the Catholic Campaign for Human Development.

- A Catholic Framework for Economic Life (USCCB, 800/235-8722) A card containing ten key principles of Catholic social teaching on economic life.
- Catholic Call to Justice: An Activity Book for Raising Awareness of Social Justice Issues ([www.usccb.org/CCHD](http://www.usccb.org/CCHD)) A lesson plan designed for ages 14-22 to experience through an obstacle course the major themes of Catholic social teaching.
- Teaching Resources on Sweatshops & Child Labor (Archdiocese of Newark, 973-497-4000) A complete kit including video, background materials, and classroom exercises and handouts to help educators teach about sweatshops and child labor.
- Integrating Catholic Social Teaching in the High School Curriculum: English and Religion (University of St. Thomas, 651-962-5712) A curriculum resource developed by Catholic high school educators.
- Building God's Kingdom: Implementing Catholic Social Teaching—Resources and Activities for Grades K – 12 (Religious Education Dept., Diocese of Toledo, 419/244-6711) Resources for schools and religious education programs.
- A Good Friday Appeal to End the Death Penalty (USCCB, 800/235-8722) A brochure containing the U.S. bishops' 1999 statement urging abolition of the death penalty.
- Sharing the Tradition, Shaping the Future (Catholic Campaign for Human Development, 800/541-3212). A small group workbook on seven themes of Catholic social teaching.
- Educating for Peace and Justice: Religious Dimensions, Grades 7-12 and Grades K-6 by James McGinnis (Institutes for Peace and Justice, 314/533-4445)
- Food Fast (Catholic Relief Services, 800/222-0025) Free materials include a detailed coordinator's manual with an outline for a 24-hour fast and activities that can be used in a classroom setting to explore issues of hunger and poverty.
- Math for a Change/Math for a World that Rocks (Mathematical Teachers' Association, 847/827-1361) Two booklets that use situations of injustice to apply or illustrate mathematics for grades 8-12.
- Offering of Letters Kit and other resources (Bread for the World, 301/608-2400)

- Operation Rice Bowl (Catholic Relief Services, 800/222-0025) Lenten program of fasting, education, almsgiving and prayer. The free materials include a video and religious educator's guide.
- Videos *In the Footsteps of Jesus* (USCCB, 800/235-8722) Part I (9 minutes): A compelling overview of seven key themes of Catholic social teaching. Part II (19 minutes): A more in-depth illustration of the seven themes highlighting people who have lived them.
- Faithful Citizenship (USCCB, 800/235-8722) Great for small groups and classes, an appealing video message about the Catholic tradition of political responsibility.
- Global Solidarity (USCCB, 800/235-8722) The U.S. bishops' message of solidarity with our brothers and sisters throughout the world.
- Sisters and Brothers Among Us (Catholic Campaign for Human Development, 202/541-3212) A 16-minute video that tells the story of poverty through the faces and voices of the poor.

## Web Sites –

- [www.usccb.org/sdwp](http://www.usccb.org/sdwp) -- The USCCB Department of Social Development and World Peace website—background information and action alerts on a variety of domestic and international issues, as well as general information on educating for justice and political responsibility.
- [www.usccb.org/faithfulcitizenship](http://www.usccb.org/faithfulcitizenship) --Provides statements from the U.S. bishops and a wide range of resources, including lesson plans for all ages on Faithful Citizenship, Solidarity, Human Dignity, and the Option for the Poor.
- [www.catholicrelief.org/what/advocacy--Up-to-date](http://www.catholicrelief.org/what/advocacy--Up-to-date) information on international public policy issues and how you and your students can act.
- [www.catholiccharitiesusa.org/programs/advocacy](http://www.catholiccharitiesusa.org/programs/advocacy) ---Up-to date information on domestic public policy issues and how you and your students can act. Includes a special section for children/youth and for teachers and catechists.
- [www.povertyusa.org](http://www.povertyusa.org) --Extensive information on poverty in the United States, including lesson plans.
- [www.educationforjustice.org](http://www.educationforjustice.org) --The Center of Concern offers a wide range of educational materials on issues of justice and peace. Membership fee required.
- [www.osjspm.org](http://www.osjspm.org) --The Office for Social Justice of the Archdiocese of St. Paul/Minneapolis offers a variety of first rate resources for justice education, including an annotated bibliography and information on models and ideas from their Catholic Justice Educator’s Network.
- [www.stthomas.edu/cathstudies/cst/educ](http://www.stthomas.edu/cathstudies/cst/educ) -- The University of St. Thomas in St. Paul, MN offers a clearinghouse of resources and models for weaving Catholic social teaching into education programs at all levels.

