

# Mathematics

## Fifth Grade

### Program Goal

The learner will develop and integrate mathematical strategies necessary to become a logical thinker, problem solver, competent communicator, responsible, successful, life-long learner and productive citizen in an ever changing world. The learner will apply math concepts to real-world situations including those related to human dignity and Catholic Social Teaching.

### Grade Level Goal

The learner will be competent in calculating and solving complex problems using all four operations. The learner will become proficient in addition, subtraction, and multiplication of fractions and decimals. The learner will successfully solve mathematical problems using customary and metric units.

### Content Criteria

#### Functions

- The learner will demonstrate the ability to use manipulatives to show patterns.
- The learner will apply patterns using different operations.
- The learner will demonstrate the ability to problem solve by looking for patterns.
- The learner will demonstrate the ability to use variables.

#### Measurement

- The learner will describe, define, and demonstrate an understanding of geometric concepts through illustration.

- The learner will identify the properties of and describe the relationships among shapes.
- The learner will measure familiar shapes using appropriate tools and units of measurement.
- The learner will demonstrate an understanding of transformation of objects.
- The learner will develop 3-Dimensional spatial sense.

### **Data Analysis**

- The learner will demonstrate an ability to collect, interpret, and organize a variety of data in charts, tables, and graphs.
- The learner will determine and use the measures of central tendency.

### **Numeration**

- The learner will demonstrate the ability to read, recite, and write numbers.
- The learner will identify the properties of numbers.
- The learner will recognize and generate equivalent representations of a number.
- The learner will convert fractions to simplest form.
- The learner will identify and use the prime factorization of composite numbers.
- The learner will demonstrate the ability to illustrate geometric representations of numbers.
- The learner will demonstrate an ability to round numbers to a given place value.
- The learner will compare and order numbers.
- The learner will apply models and use written expressions to show ratio and percent.
- The learner will identify and apply rules for divisibility.
- The learner will identify and use multiples of numbers.
- The learner will identify and use factors of numbers.

### **Operations**

- The learner will model, represent and explain basic operations.
- The learner will demonstrate the ability to estimate the results of computations.

- The learner will compare and contrast theoretical and empirical probabilities.

### **Applications**

- The learner will apply problem solving steps and strategies to determine possible solutions.
- The learner will use appropriate technology to compute complex problems.
- The learner will analyze various algorithms.
- The learner will identify and describe objects in terms of their directions and degree equivalence.
- The learner will communicate with others using mathematical vocabulary.
- The learner will use mental math when appropriate.

### **Instructional Criteria**

- The learner will use different strategies to demonstrate an understanding of material.
- The learner will be provided with independent practice daily.
- The learner will use the steps and strategies in problem solving.
- The learner will work cooperatively to solve mathematical problems.
- The learner will apply mathematical concepts across the curriculum.

### **Scope**

#### **I. Functions**

##### **A. Patterns**

1. Use manipulatives to create
2. Application
  - a.) Addition
  - b.) Subtraction
  - c.) Multiplication
  - d.) Division
  - e.) Exponents
3. Problem solve
  - a.) Predict
  - b.) Make a rule

c.) Analyze

B. Variables

1. Define

a.) Variable

b.) Expression

c.) Equation

d.) Inequality

e.) Solution

2. Identify the variable

3. Read and write algebraic expressions

4. Solve

a.) Equation

b.) Inequality

II. Measurement

A. Describe, define, and draw

1. Point

2. Line

3. Line segment

4. Ray

5. Cube

6. Vertex

7. Perimeter

8. Circumference

9. Chord

10. End point

11. Diameter

12. Radius

13. Parallel

14. Perpendicular

15. Intersection

16. Angles

a.) Acute

b.) Obtuse

c.) Right

17. Polygons

a.) Triangle

1.) Right

- 2.) Acute
- 3.) Obtuse
- 4.) Equilateral
- 5.) Scalene
- 6.) Isosceles
- b.) Quadrilaterals
  - 1.) Square
  - 2.) Rectangle
  - 3.) Trapezoid
  - 4.) Parallelogram
  - 5.) Rhombus
- c.) Pentagon
- d.) Hexagon
- e.) Octagon

B. Properties of shapes

- 1. Congruency
- 2. Similarity
- 3. Symmetry

C. Measurement of shapes

- 1. Tools
  - a.) Protractor
  - b.) Compass
  - c.) Ruler (standard to nearest  $1/16^{\text{th}}$ )
  - d.) Cooking utensils
- 2. Units
  - a.) Degrees
  - b.) Metric
  - c.) U.S. customary
- 3. Formulas
  - a.) Perimeter
    - 1.) Square
    - 2.) Rectangle
    - 3.) Triangle
  - b.) Area
    - 1.) Square
    - 2.) Rectangle
    - 3.) Triangle

- c.) Volume
  - 1.) Cube
- d.) Circumference
- 4. Transformations
  - a.) Slide (translate)
  - b.) Flip (reflect)
  - c.) Turn (rotate)
- 5. Create 3 dimensional figures ( fold 2-dimensional net into 3-dimensional figure)
- 6. Coordinate grid (positive quadrant only)
  - a.) Locate points
  - b.) Plot points
- 7. Conversions within same measurement system.
  - a.) Metric
  - b.) U.S. customary

### III. Data Analysis

#### A. Collect

- 1. Develop survey
- 2. Establish demographic
- 3. Compile data

#### B. Interpret

- 1. Central tendencies
  - a.) Mean
  - b.) Median
  - c.) Mode
- 2. Range
  - a.) Maximum
  - b.) Minimum

#### C. Organize

- 1. Charts
- 2. Tables
- 3. Graphs
  - a.) Bar
  - b.) Double bar
  - c.) Line
  - d.) Pie (circle)
  - e.) Frequency

- f.) Pictograph
- g.) Stem and leaf
- 4. Diagrams
  - a.) Venn
  - b.) Number line

#### IV. Numeration

##### A. Read, write, and recite numbers.

- 1. Integers
- 2. Fractions
- 3. Decimals
- 4. Whole numbers
  - a.) Standard form
  - b.) Expanded form
  - c.) Written form
  - d.) Scientific notation
  - e.) Cardinal
  - f.) Ordinal

##### B. Properties

- 1. Addition
  - a.) Associative
  - b.) Commutative
  - c.) Identity property of zero
- 2. Multiplication
  - a.) Associative
  - b.) Commutative
  - c.) Distributive
  - d.) Identity property of one
  - e.) Zero property

##### C. Operational elements

- a.) Inverse
- b.) Reciprocal

##### D. Equivalentents

- 1. Whole numbers
  - a.)  $1 = 7/7 = 1.0$ ;  $2 = 4/2$
- 2. Fractions
  - a.)  $\frac{3}{4} = 9/12 = 75\% = .75$
- 3. Decimals

- a.)  $.5 = .50 = \frac{1}{2} = 50\%$
- 4. Percent
  - a.)  $75\% = \frac{3}{4} = .75 = 75/100$
- E. Convert to simplest form
  - 1. Fractions
    - a.) Manipulatives
    - b.) Pictures
    - c.) Symbols
- F. Composite Numbers
  - 1. Identification
  - 2. Prime factorization
- G. Geometric representation
  - 1. Triangular numbers
  - 2. Square numbers
- H. Rounding to given place
  - 1. Whole numbers
  - 2. Decimals
  - 3. Fractions
- I. Compare and order numbers
  - 1. Whole numbers
  - 2. Integers
  - 3. Fractions
  - 4. Decimals
  - 5. Percents
  - 6. Prime numbers
  - 7. Composite numbers
- J. Ratio and percent
  - 1. Apply models: use written expressions
    - a.) Rational
      - 1.) Fraction
      - 2.) Decimal
      - 3.) Analogy
      - 4.) Percent
    - b.) Percent
      - 1.) Part to whole
      - 2.) As a fraction
      - 3.) As a decimal

K. Divisibility

1. Rules for 2,3,4,5,6,9, and 10

L. Multiples

1. Skip counting
2. Common multiples
3. Least common multiple

M. Factors

1. Common factors
2. Greatest common factors

V. Operations

A. Addition

1. Whole numbers
2. Decimals
3. Fractions

B. Subtraction

1. Whole numbers
2. Decimals
3. Fractions

C. Multiplication

1. Whole numbers
2. Decimals
3. Fractions

D. Division

1. Whole numbers
2. Decimals
3. Fractions (whole number divisor)

E. Estimation

1. Numbers
  - a.) Whole numbers
  - b.) Decimals
  - c.) Fractions
2. Operations
  - a.) Addition
  - b.) Subtraction
  - c.) Multiplication
  - d.) Division

F. Probability

1. Theoretical
2. Empirical

VI. Applications

A. Problems solving

1. Use steps
  - a.) Understand
    - i. Identify relevant vs. irrelevant information
    - ii. Question
  - b.) Plan
  - c.) Solve
  - d.) Check
2. Use strategies
  - a.) Act out or make a model
  - b.) Diagram
  - c.) Guess, check, revise
  - d.) Make a table
  - e.) Look for a pattern
  - f.) Make an organized list
  - g.) Solve a simpler problem
  - h.) Work backwards
  - i.) Write an equation
  - j.) Make a graph
  - k.) Use technology
  - l.) Combine strategies
3. Real world problems
  - a.) Formulate and identify
  - b.) Hypothesize
  - c.) Test
  - d.) Explain results

B. Technology

1. Calculator
2. Computer

C. Algorithms

1. Addition
2. Subtraction

3. Multiplication
  4. Division
  5. Multiple step
  6. Order of operations
- D. Describe objects (angle measure)
1. Degree
    - a.)  $0^\circ$
    - b.)  $45^\circ$
    - c.)  $90^\circ$
    - d.)  $180^\circ$
    - e.)  $270^\circ$
    - f.)  $360^\circ$
  2. Direction
    - a.) North (N)
    - b.) East (E)
    - c.) South (S)
    - d.) West (W)
- E. Communication
1. Oral
  2. Written
- F. Mental math