

# Mathematics

## Seventh 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 apply and integrate basic operations and problem solving with a transition into higher levels of math as it relates to functions, measurement, data, analysis, numeration, operations, and applications.

### Content Criteria

#### Functions

- The learner will demonstrate the ability to represent and record patterns and functions in a variety of ways.
- The learner will demonstrate the ability to recognize and interpret linear and nonlinear relationships.

## Measurement

- The learner will compare and contrast properties of one and two-dimensional figures.
- The learner will classify and describe the properties of three-dimensional objects.
- The learner will apply various formulas to geometric figures and three-dimensional objects.
- The learner will identify and demonstrate basic transformations.
- The learner will locate, plot, and interpret coordinate points on a grid.
- The learner will demonstrate the ability to convert within and between customary and metric systems.

## Data Analysis

- The learner will construct and interpret tables, charts, and graphs.
- The learner will analyze a set of data by calculating measures of central tendency.
- The learner will calculate basic statistics, probabilities and frequencies.

## Numeration

- The learner will perform operations using whole numbers and fractions.
- The learner will demonstrate the ability to apply the order of operations when solving a variety of problems.
- The learner will demonstrate an understanding of place value, scientific notation, and powers of 10.
- The learner will apply powers and roots of numbers to problems.

## Operations

- The learner will demonstrate the ability to recognize a variety of uses for variables.
- The learner will solve and check problems involving proportions, percentages and algebraic equations.
- The learner will demonstrate the ability to apply properties of numbers to equalities and inequalities.

- The learner will demonstrate the ability to calculate and apply absolute value.

## Applications

- The learner will demonstrate the ability to define terms and express mathematical reasoning.
- The learner will identify when and how to apply tools and technology appropriately.
- The learner will demonstrate the ability to apply a variety of problem solving strategies.
- The learner will demonstrate the ability to identify and practice appropriate mental math strategies.

## Instructional Criteria

- The learner will be able to add, subtract, multiply and divide real numbers.
- The learner will be able to perform mathematical computations mentally.
- The learner will identify key words as they relate to the operations.
- The learner will create, predict, test, organize and interpret data and communicate the results in a logical format.

## Scope

### I. Functions

#### A. Represent and record patterns and functions

1. Tables
2. Graphs
  - a.) Bar
  - b.) Double bar
  - c.) Line
  - d.) Circle

- e.) Pictograph
- f.) Stem and leaf
- g.) Frequency table
- 3. Formulas
- 4. Linear/nonlinear
- B. Recognize and interpret linear and nonlinear relationships
  - 1.  $f(x) = mx + b$ 
    - a.) Slope (rate of change)
    - b.) Y-intercept
  - 2. Graph
  - 3. Real life situation
  - 4. Compare
- II. Measurement
  - A. Compare and contrast one and two-dimensional figures
    - 1. One dimensional
      - a.) Lines
        - 1.) Perpendicular
        - 2.) Skew
        - 3.) Intersecting
        - 4.) Parallel
      - b.) Line segments
      - c.) Rays
      - d.) Angles
        - 1.) Supplementary
        - 2.) Complementary
        - 3.) Transversal
        - 4.) Adjacent
        - 5.) Corresponding
        - 6.) Vertical
        - 7.) Alternate interior
        - 8.) Alternate exterior
        - 9.) Vertex
        - 10.) Acute/obtuse/right/straight
    - 2. Two-dimensional
      - a.) Polygons
        - 1.) Identify
        - 2.) Describe

- 3.) Classify
  - 4.) Compare
  - b.) Circles
    - 1.) Radius
    - 2.) Diameter
    - 3.) Chord
    - 4.) Sector
    - 5.) Arc
  - c.) Congruent/similar/symmetry
  - d.) Name one-dimensional and two-dimensional
    - 1.) Verbal
    - 2.) Written
  - e.) Construct
    - 1.) One-dimensional
    - 2.) Two dimensional
- B. Compare and contrast three dimensional objects
- 1. Three-dimensional
    - a.) Identify
    - b.) Characteristics
      - 1.) Faces
      - 2.) Edges
      - 3.) Vertices
      - 4.) Curved surface
      - 5.) Parallel faces
      - 6.) Skew
      - 7.) Parallel
      - 8.) Perpendicular
    - c.) Name three-dimensional
      - 1.) Verbal
      - 2.) Written
    - d.) Construct
- C. Apply formulas to geometric figures and objects
- 1. Area
  - 2. Perimeter
  - 3. Volume
  - 4. Surface area
  - 5. Lateral area

- 6. Circumference
- 7. Pythagorean Theorem
- D. Identify and demonstrate basic transformations
  - 1. Translation
  - 2. Reflection
  - 3. Rotation
  - 4. Dilation
  - 5. Tessellation
- E. Locate, plot, and interpret coordinate points on a grid
  - 1. Quadrants
  - 2. Simple linear equations
  - 3. Trends
- F. Convert within and between customary and metric systems
- III. Data Analysis
  - A. Construct and interpret tables, charts, and graphs
    - 1. Tables
    - 2. Graphs
      - a.) Bar
      - b.) Double bar
      - c.) Line
      - d.) Circle
      - e.) Pictograph
      - f.) Frequency table
    - 3. Misleading information
    - 4. Predictions
    - 5. Comparisons
    - 6. Trends
    - 7. Scales
    - 8. Inequalities
  - B. Analyze a set of data by calculating statistical measures or descriptors
    - 1. Mean
    - 2. Median
    - 3. Mode
    - 4. Range
    - 5. Frequency
    - 6. Outlier

7. Quartile
  - C. Calculate basic probabilities and frequencies
    1. Outcomes
    2. Conduct experiments
    3. Independent/dependent
    4. Venn diagrams
- IV. Numeration
- A. Perform operations using real numbers
    1. Integers
      - a.) Addition
      - b.) Subtraction
      - c.) Multiplication
      - d.) Division
      - e.) Factorization
    2. Fractions
      - a.) Addition
      - b.) Subtraction
      - c.) Multiplication
      - d.) Division
      - e.) Greatest Common Factor / Lowest Common Multiplier (GCF/LCM)
    3. Decimals
      - a.) Addition
      - b.) Subtraction
      - c.) Multiplication
      - d.) Division
    4. Converting between fractions, decimals and percents
  - B. Apply the order of operations when solving a variety of problems
    1. Parenthesis
    2. Exponents
    3. Multiplication
    4. Division
    5. Addition
    6. Subtraction
  - C. Understand place value, scientific notations, and powers of 10.

1. Place value
  2. Scientific Notation
  3. Exponents
  4. Expanded form
  5. Standard form
  6. Words
- D. Apply powers and roots of numbers to problems
1. Square roots (with and without calculators)
  2. Exponents (with and without calculators)
- V. Operations
- A. Recognize a variety of uses for variables.
1. Representations
  2. Expressions
  3. Equations
  4. Inequalities
- B. Solve and check proportions, percentages, and algebraic equations
1. Proportions
    - a.) Cross products
    - b.) Ratios
    - c.) Rates
    - d.) Word problems
  2. Percentages
  3. Algebraic equations
    - a.) One step
    - b.) Two step
    - c.) Word problems
- C. Apply properties of numbers to equalities and inequalities
1. Associative
  2. Commutative
  3. Distributive
  4. Identity
  5. Inverses
  6. Opposites
- D. Calculate and apply absolute value
1. Real numbers
  2. Number lines

3. Variables
  4. Inequalities
- VI. Applications
- A. Define terms and express mathematical reasoning
    1. Oral
    2. Written
    3. Illustration
    4. Manipulatives
  - B. Apply tools and technology
    1. Calculators
    2. Computers
    3. Manipulatives
    4. Rulers
    5. Protractors
    6. Compasses
  - C. Problem solving strategies
    1. Act out or make a model
    2. Diagram
    3. Guess, check, revise
    4. Make a table
    5. Look for a pattern
    6. Make an organized list
    7. Solve a simpler problem
    8. Work backwards
    9. Write an equation
    10. Make a graph
    11. Use technology
    12. Combine strategies
  - D. Mental math strategies