

MATH

LENGTH OF TIME: one year

GRADE LEVEL: 8

COURSE STANDARDS:

Students will:

1. Demonstrate connections and relationships to real life situations by computing, measuring and estimating with integers and rational numbers and identify and approximate irrational numbers. (PA Std. 2.1.8 a,b,c,f; 2.2.8 b,c)
2. Evaluate and construct mathematical ideas by formulating and solving equations and inequalities to interpret given math information. (PA Std. 2.1.8 g; 2.8.8 d,e,f)
3. Use variables to translate the concepts of math algorithms to generalize mathematical ideas. (PA Std. 2.4.8 D; 2.8.8 a,b)
4. Interpret and solve a variety of open-ended extended tasks using a step-by-step problem solving strategy. (PA Std. 2.4.8 a-f; 2.5,8 a-d)
5. Ability to communicate understanding of solving a problem using correct mathematical vocabulary both orally and in writing. (PA Std. 2.5.8 b)
6. Graph functions on a coordinate plane using tables, slope or a formula (equation). (PA Std. 2.8.8 f-i)
7. Use graphing calculators to determine line plots, box and whisker, stem and leaf, scatter plots, line graphs, and bar graphs. (PA Std. 2.6.8 a-g)
8. Make valid inferences, predictions, arguments and decisions based on probability and statistics. (PA Std. 2.7.8 a-e)
9. Think and solve and reason proportionally with similar figures and scale drawings. (PA Std. 2.1.8 D; 2.2.8 d)
10. Solve percent problems using equations and proportions. (PA Std. 2.1.8 A; 2.2.8 d)
11. Apply algebra to geometric concepts. (PA Std. 2.3.8 E; 2.8.8 a)
12. Perform transformations (translations, reflections, rotations) on geometric figures. (PA Std. 2.8.8 g,j)
13. Be able to exhibit math skills through practical applications, construction, and making predictions. (PA Std. 2.2.8 d,e,f; 2.3.8 b,d; 2.4.8 a,c,e,f)

RELATED PA ACADEMIC STANDARDS FOR MATHEMATICS

- 2.1 Numbers, Number Systems and Number Relationships
- 2.2 Computation and Estimation
- 2.3 Measurement and Estimation
- 2.4 Mathematical Reasoning and Connections
- 2.5 Mathematical Problem Solving and Communication
- 2.6 Statistics and Data Analysis
- 2.7 Probability and Predictions
- 2.8 Algebra and Functions

PERFORMANCE ASSESSMENTS:

Students will demonstrate achievement of the standards by:

1. Illustrating through drawing addition, subtraction, multiplication and division of real numbers and variables using fraction bars, integer charges, and algebra tiles and the number line. (Course Standard 1)
2. Using calculators to estimate and/or compute with all number sets and problem solving situations. (Course Standard 1)
3. Collecting data on temperatures and graphing temperature change using integers. (Course Standard 13)
4. Showing connections between scale measure and proportion by drawing floor plans or reading road maps for an imaginary trip. (Course Standard 9)
5. Creating equations using variables to interpret and solve routine and non-routine problems. (Course Standard 3)
6. Taking a poll and developing charts/graphs to interpret the information. Statistics Poster Contest in 7th grade. (Course Standard 8)
7. Applying formulas to find area, perimeter, volume, interest, discount, commission, and taxes. (Course Standard 10,11)
8. Creating projects such as tessellations, math games, and crossword/number puzzles, and collages to make mathematics relevant. (Course Standard 13)
9. Eighth grade project – charts, graphs, statistical information and interpretation (Course Standard 8, 13)

DESCRIPTION OF COURSE:

This course moves the four math operations out of the concrete stage, using numbers, and into the abstract stage, using variables. Students will be able to problem solve with equations and extend this critical thinking into everyday situations. Throughout the course they will have to discuss and explain their thinking, justifying the math concepts used.

TITLES OF UNITS:

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|--|---------|
| 1. Variables / Evaluation | 12 days |
| 2. Order of Operations / Properties | 20 days |
| 3. Integers / Operations | 14 days |
| 4. Solving Equations and Inequalities | 18 days |
| 5. Number Theory - Rational and Irrational Numbers | 24 days |
| 6. Functions and Graphing | 12 days |
| 7. Statistics / Probability / Proportional Reasoning | 28 days |
| 8. Geometry Concepts | 25 days |
| 9. Problem Solving Strategies | 12 days |

SAMPLE INSTRUCTIONAL STRATEGIES:

1. Journal writing
2. Cooperative learning
3. Calculators
4. Projects
5. Interdisciplinary units

MATERIALS:

1. Textbook –Glencoe, Pre Algebra, 1999
2. Manipulatives - supplied by Holt
3. Integer charges - (counters)
4. Algebra tiles
5. Probability manipulatives
6. Geoboards
7. Challenge Game – “24”

METHODS OF ASSISTANCE AND ENRICHMENT:

1. Tutoring by teacher
2. Peer tutoring - study group
3. Worksheets for review and enrichment
4. Projects and reports

PORTFOLIO DEVELOPMENT:

1. Solution to open-ended question done as homework
2. Notes from an interview
3. Students' corrections of errors or misconceptions
4. Sketch made by students of his work with manipulatives
5. A math biography
6. Art work done by student
7. Daily journal
8. Draft, revised, final revisions of student work include writing, diagram
9. Description by teacher of a student activity - understanding a math concept.

METHODS OF EVALUATION:

1. Projects - rubrics set by criteria
2. Tests & quizzes
3. Homework - completeness
4. Interdisciplinary Units
5. Open-ended extended task assessments

INTEGRATED ACTIVITIES:

1. Concepts
 - to be adept in 4 math operations (fractions, decimals, integers)
 - to use variables in place of numbers with 4 operations
 - to write and solve equations using integers (and rational numbers)
 - to problem solve using equations
 - fractions, decimals, integers, rational numbers, equations, probability, ratio proportion, variables, percents, statistics.
2. Communication
 - listen and understand
 - respond orally and in writing
 - exchange information orally
 - read and use a variety of methods to make sense of texts
 - interpret information

- produce, perform or exhibit work

3. Thinking/Problem Solving

- analyze (order of operation)
- evaluation (variables)
- compute, measure, estimate
- apply the concepts of (processes)
- formulate and solve problems (problem solving using operations)
- show relationships (number patterns, equivalent of)
- make predictions (proportions, probability)
- construct (geometry)
- synthesize
- translate
- recognize patterns

4. Application of Knowledge

- use (formulas)
- evaluate (variables)
- relate (area, scale, measure, probability)
- exhibit skills
- examine and evaluate problems
- demonstrate connections, relationships

5. Interpersonal Skills

- demonstrate skills
- work cooperatively
- communicate effectively
- work effectively with others