Greensburg Community School Corporation
Seventh Grade Math Curriculum

Seventh Grade Math

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Greensburg Community schools
Seventh Grade Math

Mission Statement

The mission of the Greensburg Community School Corporation is to provide and promote lifelong learning through its commitment to quality educational programs that prepare the students to be effective, successful, and responsible citizens. This is to be accomplished in a financially prudent manner.

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Narrative Description

The state of Indiana has established the following mathematics standards to make clear to teachers, students, and parents what knowledge, understanding, and skills students should acquire in Grade 7:

Number Sense
Understanding the number system is the basis of mathematics. Students extend this understanding to include irrational numbers, such as pi and the square root of 2. They compare and order rational and irrational numbers and convert terminating decimals into fractions. They also use exponents to write whole numbers in scientific notation and to write the prime factorizations of numbers.

Computation
Fluency in computation is essential. Students add, subtract, multiply, and divide integers, fractions, and decimals. They solve problems using percentages, including calculating discounts, mark-ups, and commissions. They use mental arithmetic to compute with simple fractions, decimals, and powers.

Algebra and Functions
Algebra is a language of patterns, rules, and symbols. Students at this level use variables and other symbols to translate verbal descriptions into equations and formulas. They write and solve linear equations and inequalities, and write and use formulas to solve problems. They also use properties of the rational numbers to evaluate and simplify algebraic expressions, and they further extend their understanding of graphs by investigating rates of change for linear and nonlinear functions and by developing and using the concept of slope of a straight line.

Geometry
Students learn about geometric shapes and develop a sense of space. They link geometry to coordinate graphs, using them to plot shapes, calculate lengths and areas, and find images under transformations. They understand the Pythagorean theorem and use it to find lengths in right triangles. They also construct nets (two-dimensional patterns) for three-dimensional objects, such as prisms, pyramids, cylinders, and cones.

Measurements
The study of measurement is essential because of its uses in many aspects of everyday life. Students measure in order to compare lengths, areas, volumes, weights, times, temperatures, etc. They develop the concept of similarity and use it to make scale drawings and scale models and to solve problems relating to these drawings and models. They find areas and perimeters of two-dimensional shapes and volumes and surface areas of three-dimensional shapes, including irregular shapes made up of more basic shapes.

Statistics, Data Analysis, and Probability
Statistics are all around us – in newspapers and magazines, in television news and commercials, in quality control for manufacturing – and students need to learn how to understand these presentations. At this level, they learn how to display data in bar, line, and circle graphs and in stem-and-leaf plots. They analyze data displays to find whether they are misleading and analyze the wording of survey questions to tell whether these could influence the results. They find the probability of disjoint events. They also find the number of arrangements of objects using a tree diagram.

Problem Solving
In a general sense, mathematics <u>is</u> problem solving. In all mathematics, students use problem-solving skills: they choose how to approach a problem, they explain their reasoning, and they check their results. As they develop their skills with irrational numbers, analysing graphs, or finding surface areas, for example, students move from simple ideas to more complex ones by taking logical steps that build a better understanding of mathematics.

Course Concepts and Generalizations

1. Number Theory
2 Computation with Fractions, Decimals, and Integers
3. Measurement
4. Algebra
5. Data Analysis
6. Probability and Statistics
7. Ratio, Proportion, Percent
8. Problem Solving

9. Number Sense

10. Geometry

11. Graphing

Greensburg Community Schools
Seventh Grade Math

Units of Study

UNITS/AREA OF STUDY	LENGTH OF TIME
1. Decimals	5 Weeks and ongoing
2. Fractions	5 Weeks and ongoing
3. Algebra	5 Weeks and ongoing
4. Ratio, Proportion, Percent	6 Weeks and ongoing
5. Problem Solving	4 Weeks and ongoing
6. Geometry	6 Weeks and ongoing
7. Data Analysis	5 Weeks and ongoing

Greensburg Community Schools
Seventh Grade Math

Unit 1 Plan

Decimals (Unit 1)

Individual Learner Objectives

The seventh grade math student will be able to do the following.

1. Do decimal computation (exact and estimation).

2. Write numbers in scientific notation and in standard form.

3. Use and convert units within the metric system.

4. Compare decimals.

5. Use and compute with exponents.

Unit 1 Outline

I. Place Value
   - A. Reading, writing, spelling
   - B. Rounding
   - C. Comparing
   - D. Different number bases

II. Computation
   - A. Add, subtract, multiply, divide decimals
   - B. Estimating answers
   - C. Mental computation

III. Exponents
   - A. Bases, powers, exponents
   - B. Multiply/ divide by powers of ten
   - C. Scientific notation

IV. Metric system
   - A. Meter, liter, gram
   - B. Prefixes
   - C. Comparing
   - D. Converting within the metric system
   - E. Measuring within the metric system

Unit 2 Plan

Fractions (Unit 2)

Individual Learner Objectives

The seventh grade math student will be able to do the following.

1. Compute and estimate addition, subtraction, multiplication, and division problems involving fractions.

2. Find the prime factorization of a number.

3. Find the GCF and LCM of two or three given numbers.

4. Identify rational and irrational numbers.

5. Compare fractions.

6. Convert between fractions and decimals.

7. Measure and convert within customary units.

Unit 2 Outline

I. Rational Numbers

- A. Define and identify rational and irrational numbers

II. Number Theory

- A. Divisibility rules for 2,3,4,5,6,9,10
- B. Define and identify prime and composite numbers
- C. Prime factorization
- D. GCF
- E. LCM

III. Fractions/Mixed Numbers

- A. Convert fractions $\leftrightarrow$ mixed numbers
- B. Convert decimals to fractions
- C. Define terminating and repeating decimals
- D. Convert fractions to decimals
- E. Compare fractions and decimals

IV. Computation of Fractions / Mixed numbers

- A. Estimate - add, subtract, multiply, divide
- B. Compute - add, subtract, multiply, divide

C. Compute mentally

V. Measurement – Customary units

A. Measuring length, volume, weight
B. Comparing units
C. Converting within the system
D. Memorizing important measurement facts

Unit 3 Plan

Algebra (Unit 3)

Individual Learner Objectives

The seventh grade math student will be able to do the following.

1. Simplify numerical and algebraic expressions using order of operations.

2. Solve one and two step equations.

3. Solve word problems by using an algebra equation.

4. Calculate slope and graph a linear function.

5. Do computation with integers.

Unit 3 Outline

I. Expressions

A. Terminology (variable, coefficient, equation, expression, constant, etc.)
B. Order of operations
C. Properties (commutative, associative, identity, zero, one, distributive)
D. Simplify numerical expressions
E. Simplify algebraic expressions
F. Translate words into algebraic expressions

II. Solving equations

A. Solve one step equations by using inverse operations
B. Solve two step equations by using inverse operations
C. Use algebra equations to solve word problems
D. Use formulas
E. Solve formula for one variable in terms of the other variables

III. Integers

A. Definition / number line
B. Opposites
C. Absolute value
D. Computation (add, subtract, multiply, divide with rules)

IV. Functions / Graphing

A. Identify functions (linear or nonlinear)
B. Graph points given the ordered pair on a rectangular coordinate system
C. Given a point on the graph, find its ordered pair
D. Define slope
E. Given the equation, graph the line
F. Given the slope and 1 point or 2 points, graph the line
G. Given the graph of a line, find the slope
H. Determine if a given point satisfies the equation of a line
I. Identify and describe situations with constant or varying rates of change (know that constant rate of change describes a linear function)
J. Graph 2 lines on the same graph to find the solution that satisfies both
K. Use graphing to estimate solutions

Unit 4 Plan

Ratio, Proportion, Percent (Unit 4)

Individual Learner Objectives

The seventh grade math student will be able to do the following.

1. Solve proportions.

2. Use ratios and proportions to solve word problems.

3. Use proportions or equations to solve percent problems involving discount, sales tax, interest, percent increase, etc.

4. Convert and compare fractions, decimals, and percents.

Unit 4 Outline

I. Ratio

A. Definition
B. Comparing
C. Unit rate / speed

II. Proportion

A. Definition
B. Solving a proportion
C. Similar figures
D. Scale drawing
E. Use proportions to solve word problems

III. Percents

A. Convert fractions ↔ decimals ↔ percents
B. Comparing fractions, decimals, and percents

IV. Applications with percents

A. Solving percent problems with proportions or algebraic equations
B. Discount, mark-ups, commissions
C. Interest – simple (I = PRT)
D. Sales tax
E. Percent increase or decrease
G. Solving other word problems involving percents

Unit 5 Plan

Problem Solving (Unit 5)

Individual Learner Objectives

The seventh grade math student will be able to do the following.

1. Solve word problems involving fractions, decimals, percents, and proportions using a variety of methods.

2. Use estimation to determine if an answer is reasonable.

Unit 5 Outline

I. Word problems involving fractions, decimals, percents, proportions

II. Methods

A. Analyze information / determine relevant information from irrelevant information
B. Estimating answer
C. Work backwards
D. Use diagrams, charts, pictures
E. Break problem into simpler parts

F. Apply method of solving a simpler problem to a more complex one
G. Make and justify a conjecture based on a general description of a problem
H. Solve similar problem using concept of solving already tested
I. Make and test conjectures by inductive and deductive reasoning

III. Solutions
A. Estimate to see if answer is reasonable
B. Make sure the exact answer is valid in the problem
C. Express solution clearly and logically by using mathematical symbols
D. Determine the advantage and appropriateness of either an exact or approximate answer
E. Make and test conjectures by inductive and deductive reasoning

Unit 6 Plan

Geometry (Unit 6)

INDIVIDUAL LEARNER OBJECTIVES

The seventh grade math student will be able to do the following.

1. Identify and use common geometric terms.

2. Measure and classify angles.

3. Calculate perimeter and area of common polygons using formulas.

4. Calculate surface area and volume of 3-dimemsional figures using formulas and models.

5. Classify polygons according to sides and angles.

6. Calculate and estimate square root.

7. Use the Pythagorean Theorem.

8. Define and use transformations of geometric figures.

Unit 6 Outline

I. Definitions
A. Angle, line, ray, acute, parallel, perpendicular, etc.

II. Polygons
A. Polygons – classify by number of sides
B. Quadrilaterals – classify by parallel sides/ congruent sides and angles
C. Triangles – classify by sides or angles
D. Circles – radius, diameter, circumference
E. Congruent angles / sides / figures

F. Similar polygons / corresponding angles and sides

III. Angles
- A. Measuring
- B. Classifying (right, obtuse, straight, acute)
- C. Constructing / Bisecting
- D. Constructing a perpendicular bisector

IV. Lines
- A. Transversals
- B. Intersecting lines
- C. Parallel lines
- D. Perpendicular lines
- E. Skew lines

V. Perimeter
- A. Perimeter of polygons
- B. Circumference of circles

VI. Area
- A. Areas of rectangles, parallelograms, triangles, trapezoids using formulas
- B. Circles
- C. Complex figures – by breaking down into simpler polygons

VII. Surface area
- A. Rectangular / triangular prisms
- B. Cylinders
- C. Pyramids
- D. Build 3-dimensional objects with blocks to help compute surface area and volume
- E. Construct 2-dimensional patterns for 3-dimensional objects

VIII. Volume
- A. Rectangular / triangular prisms
- B. Cylinders

IX. Square Roots
- A. Square roots – perfect squares, using tables, using calculators
- B. Pythagorean Theorem

X. Transformations
- A. Translations (slides)
- B. Reflections (flips)
- C. Rotations (turns)
- D. Figures stay congruent through translations, reflections, and rotations

Unit 7 Plan

Data Analysis (Unit 7)

INDIVIDUAL LEARNER OBJECTIVES

The seventh grade math student will be able to do the following.

1. Calculate mean, median, mode, and range for a set of data.

2. Interpret data, make predictions, and identify misleading information from a variety of types of graphs and statistics.

3. Construct bar, line, circle, and stem and leaf graphs.

4. Calculate the probability of a simple event.

Unit 7 Outline

I. Graphs (Bar, line, circle, stem and leaf, scatter plot)
- A. Interpret data
- B. Make predictions
- C. Recognize misleading displays
- D. Constructing graphs listed above
- E. Random samples
- F. Biased vs. unbiased survey questions and samples

II. Statistics
- A. Mean
- B. Median
- C. Mode
- D. Range
- E. Effect of an outlier on the above statistics
- F. Quartiles

III. Combinations
- A. Tree diagrams
- B. Making lists
- C. Counting principle

IV. Venn diagrams
- A. Union
- B. Intersection
- C. Null set
- D. Universe
- E. Disjoint events

V. Probability
- A. Random selection
- B. Probability of one event occurring $P(A)$
- C. $P(\text{not } A) = 1 - P(A)$
- D. $P(A \cup B) = P(A) + P(B)$ if $P(A \cap B) = 0$

Greensburg Community Schools
Seventh Grade Math

Modifications

Modifications of instructional content in this course may include, but are not limited to, the following:

- Modified pace
- Modified homework assignments
- Modified tests (as to length or type of problems)
- Adaptive equipment
- Use of a calculator
- Use of Resource Staff
- Addition of more challenging material (for gifted / interested students)
- Other modifications as specified in a student's IEP