Sparta Area School District

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Course Outcome Summary

Course Information: Math 8

Description: This course is pre-algebra, preparing the students for high school algebra. We will start the year reviewing number sense and then move right into one-step and two-step algebra. Linear equations and functions are next. Second semester we focus on geometry, statistics and probability.

Instruction Level: Regular

Total Credits: 2

Prerequisites: Math 7

Textbooks: Glencoe Math, Course 3, McGraw Hill, 978-0-07-661929-0

Course Standards:

- Recognize one-digit factors of a number
- Identify a digit's place value
- Locate rational numbers on the number line
- Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent
- Solve some routine two-step arithmetic problems
- Relate a graph to a situation described qualitatively in terms of familiar properties such as before and after, increasing and decreasing, higher and lower
- Apply a definition of an operation for whole numbers (e.g., $a \square b = 3a - b$)
- Substitute whole numbers for unknown quantities to evaluate expressions
- Solve one-step equations to get integer or decimal answers
- Combine like terms (e.g., $2x + 5x$)
- Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent
- Solve some routine two-step arithmetic problems
- Relate a graph to a situation described qualitatively in terms of familiar properties such as before and after, increasing and decreasing, higher and lower
- Apply a definition of an operation for whole numbers (e.g., $a \square b = 3a - b$)

- Extend a given pattern by a few terms for patterns that have a constant factor between terms
- Exhibit some knowledge of the angles associated with parallel lines
- Compute the perimeter of polygons when all side lengths are given
- Compute the area of rectangles when whole number dimensions are given
- Locate points in the first quadrant
- Calculate the average of a list of numbers
- Calculate the average given the number of data values and the sum of the data values
- Read basic tables and charts
- Extract relevant data from a basic table or chart and use the data in a computation
- Use the relationship between the probability of an event and the probability of its complement

Unit

1. **Number and Quantity -- Factors**
2. **Number and Quantity – Place Value and Rational Numbers**
3. **Algebra**
4. **Functions**
5. **Geometry**
6. **Statistics and Probability**

Unit Outlines

1. Number and Quantity -- Factors

Standards:

- Recognize one digit factors of a number.

Essential Question:

Students will be able to answer the following question(s):

- What is the relationship between the multiples of a number and the factors of a number?
- Why do some numbers have few factors and others have many?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit? Students will:

- Generate factors of numbers (rules of divisibility, prime factorization, ladders).
- Create a factor table
- Identify factors of a number*
- Identify the greatest common factor in a real world example

2. Number and Quantity – Place Value and Rational Numbers
Standards:

- Identify place value
- Locate rational numbers on the number line

Essential Question:
Students will be able to answer the question(s):

- Why is it helpful to write numbers in different ways?
- Why is it helpful to know the value of a number?
- How does comparing quantities describe the relationship between them?

Essential Knowledge:
Students will:

- Identify math symbols >, <, ≥, ≤
- Create a place value chart from billions to millionths
- Graph numbers on a number line
- Identify the place value of a given whole number
- Compare rational numbers*
- Identify the place value of a given decimal number*
- Compare fractions with different denominators
- Identify place value in a real world situation story problem.

3. Algebra
Standards:

- Substitute whole numbers for unknown quantities to evaluate expressions
- Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent
- Solve one-step equations to get integer or decimal answers
- Solve some routine two-step arithmetic problems

Essential Question:
Students will be able to answer the question(s):

- What is equivalence?
- How do I know which mathematical operation $(+, -, \times, \div)$to use?

- How do mathematical operations relate to each other?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

Students will:

- Define substitute and variable
- Solve one-step problem
- Define inverse operations and integers
- Solve one-step problem with rational numbers
- Substitute a whole number for unknown quantities to evaluate expressions*
- Solve one-step problem with positive rational numbers*
- Solve one-step equations to get whole number answers
- Solve two-step problem with positive numbers
- Substitute multiple whole numbers for unknown quantities to evaluation expressions
- Solve one-step problem with negative rational numbers
- Solve one-step equations to get integer or decimal answers*
- Solve two-step problem with negative numbers*
- Substitute multiple rational numbers for unknown quantities to evaluation expressions (e.g. fractions, decimals, and integers)
- Solve real world one-step problem with positive/negative rational numbers
- Solve two-step equations to get integer or decimal answers
- Solve real world two-step problem positive/negative numbers

4. Functions
Standards:

- Apply a definition of an operation for whole numbers (e.g.,$a \square b = 3a - b$).
- Extend a given pattern by a few terms for patterns that have a constant factor between terms

Essential Question:
Students will be able to answer the question(s):

- How can we model relationships between quantities?
- How do I express a pattern to show a relationship?
- How can patterns be used to make predictions?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion

of the unit?

Students will:

- Identify common words used to indicate mathematical operations
- Solve a numerical pattern using addition/subtraction
- Rewrite a given phrase or sentence to create an equivalent one-step expression or equation
- Solve a numerical pattern using multiplication*
- Rewrite a given phrase or sentence to create an equivalent multi-step expression or equation*
- Solve numerical pattern using division
- Write a real world phrase or sentence to represent a given expression or equation
- Identify the numerical pattern in a given table using multiplication/division

5. Geometry
Standards:

- Exhibit some knowledge of the angles associated with parallel lines
- Compute the perimeter of polygons when all side lengths are given
- Compute the area of rectangles when whole number dimensions are given
- Locate points in the first quadrant

Essential Question:

Students will be able to answer the question(s):

- How do geometric models describe spatial relationships?
- How are geometric shapes and objects classified?

Essential Knowledge:

What are the key concepts/vocabulary/ideas that students will have mastery of by the completion of the unit?

Students will:

- Define parallel lines, transversal lines, acute and obtuse angles.
- Understand the meaning of perimeter and names of polygons
- Understand the meaning of area and how to label area answers.
- Identify the 4 quadrants on a coordinate plane
- Determine if angles are alternate interior or alternate exterior angles given 2 parallel lines and a transversal line.
- Find the perimeter of a polygon with 3 or 4 sides*
- Find the area of a rectangle using whole numbers*
- Locate points in the first quadrant*

- Identify supplementary, vertical, and adjacent angles given 2 parallel lines and a transversal line. *
- Find the perimeter of a polygon with 5 or more sides
- Find the area of a rectangle, using whole numbers, in context.
- Graph an ordered pair in the first quadrant
- Find the measurements of a missing angle given 2 parallel lines and a transversal line.
- Find the missing side length of a polygon, given the perimeter.
- Find the missing side length of a rectangle, given the area
- Locate points in all 4 quadrants

6. Statistics and Probability
Standards:

- Calculate the average of a list of numbers
- Calculate the average given the number of data values and the sum of the data values
- Read basic tables and charts
- Extract relevant data from a basic table or chart and use the data in a computation
- Use the relationship between the probability of an event and the probability of its complement

Essential Question(s):

Students will be able to answer the following question(s):

- Why is data collected and analyzed?
- How can predictions be made based on data?

Essential Knowledge:

Students will:

- Calculate the average of a list of positive whole numbers
- Calculate the sum of a given set of data values
- Identify data displays (match a display to correct name)
- Describe what a basic table or chart represents
- Calculate the probability of simple events
- Calculate the average of a list of integers *
- Calculate the mean, given the number of data values and the sum of the data values
- Compare and contrast data displays (circle, histogram, bar, stem and leaf, box and whisker, line graph, line plot, etc…)
- Extract more than one relevant number from a basic table or chart
- Use the given probability of an event to identify the probability of its complement
- Calculate the average of a list of integers in context

- Calculate the mean, given the number of data values and the sum of the data values in context*
- Extract data from tables and graphs *
- Extract more than one relevant number from a basic table or chart and use the data computation*
- Calculate the probability and its complement
- Calculate the missing data value, given the average and all data values but one
- Translate from one representation of data to another (ex. represent information from a table on a bar graph)
- Make predictions for next data based on given display
- Extract relevant numbers from a basic table or chart, and use it in computation in context
- Given the probability and total data collected of a simple event find possible data combinations (ex. There are ten red and blue marbles in a data set. The probability of drawing a blue marble is 10%. How many red marbles are in the set?)