

# Groveport Madison Local School District

## Eighth Grade Math Content Standards

### Planning Sheets

**Standard: Data Analysis & Probability**

1st                      2nd                      3rd                      4th  
9 wks                      9 wks                      9wks                      9 wks

<b>A. Create, interpret and use graphical displays and statistical measures to describe data; e.g., box-and-whisker plots, histograms, scatter plots, measures of center and variability.</b>				
1. Use, create and interpret scatter plots and other types of graphs as appropriate.			✓	
<b>B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose.</b>				
2. Evaluate different, graphical representations of the same data to determine which is the most appropriate representation for an identified purpose; e.g. line graph for change over time, circle graph for part-to-whole comparison, scatter plot for relationship between two variants.			✓	
3. Differentiate between discrete and continuous data and appropriate ways to represent each.			✓	
<b>C. Compare the characteristics of the mean, median and mode for a given set of data, and explain which measure of center best represents the data.</b>				
5. Explain the mean's sensitivity to extremes and its use in comparison with the median and mode.			✓	
<b>D. Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data.</b>				
4. Compare two sets of data using measures of center (mean, mode, median) and measures of spread (range, quartiles, interquartile range, percentiles).			✓	
<b>E. Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis</b>				
8. Describe how the relative size of a sample compared to the target population affects the validity of predictions.				
<b>F. Construct convincing arguments based on analysis of data and interpretation of graphs.</b>				
6. Make conjectures about possible relationship in a scatter plot and approximate line of best fit.			✓	
9. Construct convincing arguments based on analysis of data and interpretation of graphs.				✓
<b>G. Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population.</b>				
7. Identify different ways of selecting samples, such as survey response, random sample, representative sample and convenience sample.				✓
<b>H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes.</b>				
10. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important.		✓		
<b>I. Design an experiment to test a theoretical probability, and record and explain results.</b>				
7. Design an experiment to test a theoretical probability and explain how the results may vary. (Grade 6)				✓
8. Make predictions based on theoretical probabilities, design and conduct an experiment to test the predictions, compare actual results to predicted results, and explain differences. (Grade 7)				✓
<b>J. Compute probabilities of compound events, independent events, and simple dependent events.</b>				
11. Demonstrate an understanding that the probability of either of two disjoint events occurring can be found by adding the probabilities for each and that the probability of one independent event following another can be found by multiplying the probabilities.		✓		
<b>K. Make predictions based on theoretical probabilities and experimental results.</b>				

**Groveport Madison Local School District**  
**Eighth Grade Math Content Standards**  
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Standard: Geometry and Spatial Sense

1st  
9 wks

2nd  
9 wks

3rd  
9wks

4th  
9 wks

	1st 9 wks	2nd 9 wks	3rd 9wks	4th 9 wks
<b>A. Formally define geometric figures.</b>				
<b>B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence.</b>				
1. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry), of two dimensional figures and three dimensional objects.			✓	
3. Use proportions in several forms to solve problems involving similar figures (part-to-part, part-to - whole, corresponding sides between figures).			✓	
<b>C. Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines.</b>				
2. Recognize the angles formed and the relationship between the angles when two lines intersect and when parallel lines are cut by a transversal.			✓	
<b>D. Use coordinate geometry to represent and examine the properties of geometric figures.</b>				
1. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three dimensional objects.			✓	
4. Represent and analyze shapes using coordinate geometry; e.g., given three vertices and the type of quadrilateral, find the coordinates of the fourth vertex.			✓	
<b>E. Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.</b>				
6. Draw nets for a variety of prisms, pyramids, cylinders and cones.			✓	
<b>F. Represent and model transformations in a coordinate plane and describe the results.</b>				
5. Draw the results of translations, reflections, rotations and dilations of objects in the coordinate plane, and determine properties that remain fixed; e.g., lengths of sides remain the same under translations.			✓	
<b>G. Prove or disprove conjectures and solve problems involving two-and three-dimensional objects represented within a coordinate system.</b>				
<b>H. Establish the validity of conjectures about geometric objects, their properties and relationships by counter-example, inductive and deductive reasoning, and critiquing arguments made by others.</b>				
1. Make and test conjectures about characteristics and properties (e.g., sides, angles, symmetry) of two-dimensional figures and three-dimensional objects.				
<b>I. Use right triangle trigonometric relationships to determine lengths and angle measures.</b>				

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**Standard: Mathematical Process Standard**

	<b>1st</b> <b>9 wks</b>	<b>2nd</b> <b>9 wks</b>	<b>3rd</b> <b>9wks</b>	<b>4th</b> <b>9 wks</b>
<b>A. Formulate a problem or mathematical model in response to a specific need or situation, determine information required to solve the problem, choose method for obtaining this information, and set limits for acceptable solution.</b>				
<b>B. Apply mathematical knowledge and skills routinely in other content areas and practical situations.</b>				
<b>C. Recognize and use connections between equivalent representations and related procedures for a mathematical concept; e.g., zero of a function and the x-intercept of the graph of the function, apply proportional thinking when measuring, describing functions and comparing probabilities.</b>				
<b>D. Apply reasoning processes and skills to construct logical verifications or counter-examples to test conjectures and to justify and defend algorithms and solutions.</b>				
<b>E. Use a variety of mathematical representations flexibly and appropriately to organize, record and communicate mathematical ideas.</b>				
<b>F. Use precise mathematical language and notations to represent problem situations and mathematical ideas.</b>				
<b>G. Write clearly and coherently about mathematical thinking and ideas.</b>				
<b>H. Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner.</b>				

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**Standard: Measurement Standard**

1st  
9 wks

2nd  
9 wks

3rd  
9wks

4th  
9 wks

	1st 9 wks	2nd 9 wks	3rd 9wks	4th 9 wks
<b>A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results.</b>				
5. Analyze problem situations involving measurement concepts, select appropriate strategies, and use an organized approach to solve narrative and increasingly complex problems.		✓		
6. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs.		✓		
<b>B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision.</b>				
3. Use appropriate levels of precision when calculating with measurements.		✓		
4. Derive formulas for surface area and volume and justify them using geometric models and common materials. For example, find:		✓		
a. the surface area of a cylinder as a function of its height and radius;		✓		
b. that the volume of a pyramid (or cone) is one-third of the volume of a prism (or cylinder) with the same base area and height.		✓		
<b>C. Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids.</b>				
5. Determine surface area for pyramids by analyzing their parts.		✓		
9. Demonstrate understanding of the concepts of perimeter, circumference and area by using established formulas for triangles, quadrilaterals, and circles to determine the surface area and volume of prisms, pyramids, cylinders, spheres and cones. (Note: Only volume should be calculated for spheres and cones.		✓		
<b>D. Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates.</b>				
1. Compare and order the relative size of common U.S. customary units and metric units; e.g., mile and kilometer, gallon and liter, pound and kilogram.		✓		
2. Use proportional relationships and formulas to convert units from one measurement system to another; e.g., degrees Fahrenheit to degrees Celsius.		✓		
7. Apply proportional reasoning to solve problems involving indirect measurements or rates.		✓		

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**Standard: Measurement Standard**

1st  
9 wks

2nd  
9 wks

3rd  
9wks

4th  
9 wks

<b>E. Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision.</b>				
3. Use appropriate levels of precision when calculating with measurements.		✓		
8. Find the sum of the interior and exterior angles of regular convex polygons with and without measuring the angles with a protractor.			✓	
10. Use conventional formulas to find the surface area and volume of prisms, pyramids and cylinders and the volume of spheres and cones to a specified level of precision.		✓		
<b>F. Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.</b>				
6. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs.		✓		

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Standard: Number, Number Sense and Operations

	1st 9 wks	2nd 9 wks	3rd 9wks	4th 9 wks
<b>A. Use scientific notation to express large numbers and numbers less than one.</b>				
1. Demonstrate an understanding of place value using powers of 10 and write large numbers in scientific notation.				
1. Use Scientific notation to express large numbers and small numbers between 0 and 1.				✓
<b>B. Identify subsets of the real number system.</b>				
3. Describe differences between rational and irrational numbers; e.g., use technology to show that some numbers (rational) can be expressed as terminating or repeating decimals and others (irrational) as non-terminating and non-repeating decimals.	✓			
2. Recognize that natural numbers, whole numbers, integers, rational numbers and irrational numbers are subsets of the real number system.	✓			
<b>C. Apply properties of operations and the real number system, and justify when they hold for a set of numbers.</b>				
4. Explain and use the inverse and identity properties and use inverse relationships (addition/subtraction, multiplication/division, squaring/square roots) in problem solving situations.	✓			
<b>D. Connect physical, verbal and symbolic representations of integers, rational numbers and irrational numbers.</b>				
<b>E. Compare, order and determine equivalent forms of real numbers.</b>				
<b>F. Explain the effects of operations on the magnitude of quantities.</b>				
10. Recognize that a quotient may be larger than the dividend when the divisor is a fraction; e.g. $6 \div \frac{1}{2} = 12$ .	?			
5. Explain the meaning and effect of adding, subtracting, multiplying and dividing integers; e.g. how adding two integers can result in a lesser value.	✓			
<b>G. Estimate, compute and solve problems involving real numbers; including ratio, proportion and percent, and explain solutions.</b>				
5. Determine when an estimate is sufficient and when an exact answer is needed in problem situations, and evaluate estimates in relation to actual answers; e.g. very close, less than, greater than.				
6. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions.	✓			

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**Standard: Number, Number Sense and Operations**

**1st**  
**9 wks**

**2nd**  
**9 wks**

**3rd**  
**9wks**

**4th**  
**9 wks**

<b>H. Find the square root of perfect squares, and approximate the square root of non-perfect squares.</b>				
5. Recognize and identify perfect squares and their roots.				
7. Find the square root of perfect squares, and approximate the square root of non-perfect squares as consecutive integers between which the root lies; e.g. $\sqrt{130}$ is between 11 and 12.	✓			
<b>I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents.</b>				
2. Explain the meaning of exponents that are negative or 0.	✓			
3. Apply order of operations to simplify expressions and perform computations involving integer exponents and radicals.	✓			
8. Add, subtract, multiply, divide and compare numbers written in scientific notation.				✓

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Standard: Patterns, Functions and Algebra

	1st 9 wks	2nd 9 wks	3rd 9wks	4th 9 wks
<b>A. Generalize and explain patterns and sequences in order to find the next term and the <math>n^{\text{th}}</math> term.</b>				
2. Generalize patterns and sequences by describing how to find the $n^{\text{th}}$ term.	✓			
<b>B. Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations.</b>				
3. Identify functions as linear or nonlinear based on information given in a table, graph or equation.				✓
<b>C. Translate information from one representation (words, table, graph or equation) to another representation of a relations or function.</b>				
1. Relate the various representations of a relationship; i.e., relate a table to graph, description and symbolic form.	✓			
<b>D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.</b>				
4. Extend the uses of variables to include convariants where $y$ depends on $x$ .				✓
5. Use physical models to add and subtract monomials and polynomials, and to multiply a polynomial by a monomial.				✓
7. Use symbolic algebra (equations and inequalities), graphs and tables to represent situations and solve problems.				✓
8. Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.				✓
<b>E. Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros.</b>				
6. Describe the relationship between the graph of a line and its equation, including being able to explain the meaning of slope as a constant rate of change and $y$ -intercept in real-world problems.				✓
<b>F. Solve and graph linear equations and inequalities.</b>				
7. Use symbolic algebra (equations and inequalities), graphs and tables to represent situations and solve problems.				✓
9. Solve linear equations and inequalities graphically, symbolically and using technology.				✓
<b>G. Solve quadratic equations with real roots by graphing, formula and factoring.</b>				
12. Solve simple quadratic equations graphically; e.g. $y = x^2 - 16$ .				✓
<b>H. Solve systems of linear equations involving two variables graphically and symbolically.</b>				
10. Solve 2 by 2 systems of linear equations graphically and by simple substitution.				✓
11. Interpret the meaning of the solution of a 2 by 2 system of equations; i.e., point, line, not solution.				✓

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**Standard: Patterns, Functions and Algebra**

**1st**  
**9 wks**

**2nd**  
**9 wks**

**3rd**  
**9wks**

**4th**  
**9 wks**

<b>I. Model and solve problem situations involving direct and inverse variation.</b>				
14. Differentiate and explain types of changes in mathematical relationships, such as linear vs. nonlinear, continuous vs. noncontinuous, direct variation vs. inverse variation.				✓
<b>J. Describe and interpret rates of change from graphical and numerical data.</b>				
13. Compute and interpret slope, midpoint and distance given a set of ordered pairs.				✓
15. Describe and compare how changes in an equation affects the related graphs; e.g., for a linear equation changing the coefficient of x affects the slope and changing the constant affects the intercepts.				✓
16. Use graphing calculators or computers to analyze change; e.g. interest compounded over time as a nonlinear growth pattern.				✓