

A1 = Algebra I
 A2 = Algebra II
 G = Geometry
 I = Integrated Math

Groveport Madison Local School District
Ninth Grade Math Content Standards
Planning Sheets

Standard: Data Analysis & Probability

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

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.				
1. Classify data as univariate (single variable) or bivariate (two variables) and as quantitative (measurement) or qualitative (categorical) data.		A1, I		
2. Create a scatter plot for a set of bivariate data, sketch the line of best fit, and interpret the slope of the line of best fit.		A1, I		
3. Analyze and interpret frequency distributions based on spread, symmetry, skewness, clusters and outliers.		A1, I		
B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose.				
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.				
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.				
E. Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis				
4. Describe and compare various types of studies (survey, observation, experiment), and identify possible misuses of statistical data.		A1, I		
F. Construct convincing arguments based on analysis of data and interpretation of graphs.				
6. Make inferences about relationships in bivariate data, and recognize the difference between evidence of relationship (correlation) and causation.		A1, I		
G. Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population.				
5. Describe characteristics and limitations of sampling methods, and analyze the effects of random versus biased sampling; e.g., determine and justify whether the sample is likely to be representative of the population.		A1, I		
H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes.				
7. Use counting techniques and the Fundamental Counting principle to determine the total number of possible outcomes for mathematical situations.		A1, I		

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Ninth Grade Math Content Standards
Planning Sheets

Standard: Data Analysis & Probability

1st
9 wks

2nd
9 wks

3rd
9wks

4th
9 wks

I. Design an experiment to test a theoretical probability, and record and explain results.				
8. Describe, create and analyze a sample space and use it to calculate probability.		A1, I		
J. Compute probabilities of compound events, independent events, and simple dependent events.				
9. Identify situations involving independent and dependent events, and explain differences between and common misconceptions about probabilities associated with those events.		A1, I		
K. Make predictions based on theoretical probabilities and experimental results.				
10. Use theoretical and experimental probability, including simulations or random numbers to estimate probabilities and to solve problems dealing with uncertainty; e.g., compound events, independent events, simple dependent events		A1, I		

Groveport Madison Local School District

Ninth Grade Math Content Standards

Planning Sheets

Standard: Geometry and Spatial Sense

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

A. Formally define geometric figures.				
B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence.				
C. Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines.				
D. Use coordinate geometry to represent and examine the properties of geometric figures.				
E. Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.				
F. Represent and model transformations in a coordinate plane and describe the results.				
G. Prove or disprove conjectures and solve problems involving two- and three-dimensional objects represented within a coordinate system.				
3. Analyze two-dimensional figures in a coordinate plane; e.g., use slope and distance formulas to show that a quadrilateral is a parallelogram.			G	
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.				
I. Use right triangle trigonometric relationships to determine lengths and angle measures.				
1. Define the basic trigonometric ratios in right triangles; sine, cosine and tangent.				G
2. Apply proportions and right triangle trigonometric ratios to solve problems involving missing lengths and angle measures in similar figures.				G

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Ninth Grade Math Content Standards

Planning Sheets

Standard: Mathematical Process Standard

	1st 9 wks	2nd 9 wks	3rd 9wks	4th 9 wks
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. Apply mathematical knowledge and skills routinely in other content areas and practical situations.				
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.				
D. Apply reasoning processes and skills to construct logical verifications or counter-examples to test conjectures and to justify and defend algorithms and solutions.				
E. Use a variety of mathematical representations flexibly and appropriately to organize, record and communicate mathematical ideas.				
F. Use precise mathematical language and notations to represent problem situations and mathematical ideas.				
G. Write clearly and coherently about mathematical thinking and ideas.				
H. Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner.				

Groveport Madison Local School District

Ninth Grade Math Content Standards

Planning Sheets

Standard: Measurement Standard

1st
9 wks

2nd
9 wks

3rd
9wks

4th
9 wks

A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results.				
B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision.				
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.				
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.				
1. Convert rates within the same measurement system; e.g., miles per hour to feet per second; kilometers per hour to meters per second.	I, A2			
2. Use unit analysis to check computations involving measurement.	I, A2			
3. Use the ratio of lengths in similar two-dimensional figures or three-dimensional objects to calculate the ratio of their areas or volumes respectively.			G	
4. Use scale drawings and right triangle trigonometry to solve problems that include unknown distances and angle measures.				G
5. Solve problems involving unit conversion for situations involving distances, areas, volumes and rates within the same measurement system.	A2		G	
E. Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision.				
F. Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.				

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Groveport Madison Local School District
Ninth Grade Math Content Standards
Planning Sheets

Standard: Number, Number Sense and Operations

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

A. Use scientific notation to express large numbers and numbers less than one.				
B. Identify subsets of the real number system.				
C. Apply properties of operations and the real number system, and justify when they hold for a set of numbers.				
1. Identify and justify whether properties (closure, identity, inverse, commutative and associative) hold for a given set and operations; e.g., even integers and multiplication.	A1, A2, I			
D. Connect physical, verbal and symbolic representations of integers, rational numbers and irrational numbers.				
E. Compare, order and determine equivalent forms of real numbers.				
2. Compare, order and determine equivalent forms for rational and irrational numbers.	A1, A2, I			
F. Explain the effects of operations on the magnitude of quantities.				
3. Explain the effects of operations such as multiplication or division, and of computing powers and roots on the magnitude of quantities.	A2			A1
G. Estimate, compute and solve problems involving real numbers; including ratio, proportion and percent, and explain solutions.				
4. Demonstrate fluency in computations using real numbers.			I, A1	
H. Find the square root of perfect squares, and approximate the square root of non-perfect squares.				
I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents.				
5. Estimate the solutions for problem situations involving square and cube roots.		A2		A1

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Groveport Madison Local School District
Eighth Grade Math Content Standards
Planning Sheets

Standard: Number, Number Sense and Operations

1st
9 wks

2nd
9 wks

3rd
9wks

4th
9 wks

H. Find the square root of perfect squares, and approximate the square root of non-perfect squares.				
5. Recognize and identify perfect squares and their roots.	A1			
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.	A1			
I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents.				
2. Explain the meaning of exponents that are negative or 0.	A1			
3. Apply order of operations to simplify expressions and perform computations involving integer exponents and radicals.	A1			
8. Add, subtract, multiply, divide and compare numbers written in scientific notation.	A1			

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Groveport Madison Local School District

Ninth Grade Math Content Standards

Planning Sheets

Standard: Patterns, Functions and Algebra

	1st 9 wks	2nd 9 wks	3rd 9wks	4th 9 wks
A. Generalize and explain patterns and sequences in order to find the next term and the n^{th} term.				
2. Generalize patterns using functions or relationships (linear; quadratic and exponential), and freely translate among tabular; graphical and symbolic representations.			A1	I
B. Identify and classify functions as linear or nonlinear, and contrast their properties using tables, graphs or equations.				
1. Define function with ordered pairs in which each domain element is assigned exactly one range element.	A2		A1	I
3. Describe problem situations (linear, quadratic and exponential) by using tabular; graphical and symbolic representations.			A2, A1	I
C. Translate information from one representation (words, table, graph or equation) to another representation of a relationship or function.				
2. Generalize patterns using functions or relationships (linear; quadratic and exponential); and freely translate among tabular, graphical and symbolic representations.			A1, A2	
D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.				
7. Use formulas to solve problems involving exponential growth and decay.		A1		A2
11. Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only).			A2	A1
12. Simplify rational expressions by eliminating common factors and applying properties of integer exponents.		I		A1, A2
E. Analyze and compare functions and their graphs using attributes, such as rates of change, intercepts and zeros.				
4. Demonstrate the relationship among zeros of a function, roots of equations, and solutions of equations graphically and in words.			A2	A1
5. Describe and compare characteristics of the following families of functions; linear, quadratic and exponential function; e.g., general shape, number of roots, domain, range, and rate of change, maximum or minimum.			A1	A2
F. Solve and graph linear equations and inequalities.				
6. Write and use equivalent forms of equations and inequalities in problem situations; e.g., changing a linear equation to the slope-intercept forms.	A2		A1	I
8. Find linear equations that represent lines that pass through a given set of ordered pairs, and find linear equations that represent lines parallel or perpendicular to a given line through a specific point.	A2		A1	

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Ninth Grade Math Content Standards
Planning Sheets

Standard: Patterns, Functions and Algebra

1st
9 wks

2nd
9 wks

3rd
9wks

4th
9 wks

G. Solve quadratic equations with real roots by graphing, formula and factoring.				
10. Solve quadratic equations with real roots by factoring, graphing, using the quadratic formula and with technology.			A2	A1
H. Solve systems of linear equations involving two variables graphically and symbolically.				
9. Solve and interpret the meaning of 2 by 2 systems of linear equations graphically, by substitution and by elimination, with and without technology		A2		A1
I. Model and solve problem situations involving direct and inverse variation.				
13. Model and solve problems involving direct and inverse variation using proportional reasoning.				A2, I
14. Describe the relationship between slope and the graph of a direct variation and inverse variation.				A1, I
J. Describe and interpret rates of change from graphical and numerical data.				
15. Describe how a change in the value of a constant in a linear or quadratic equation affects the related graphs.			A2	A1, I

