

## Grade Level Expectations Geometry

### Number and Number Relations

#### Benchmark GLE

<b>N-1-H</b>		<b>Demonstrating an understanding of the real number system</b>
	N-1-H	Define and identify real numbers and subsets
<b>N-2-H</b>		<b>Demonstrating that a number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, percents, and scientific notation)</b>
	N-2-Ha	Factor an integer into its prime factors and write in exponential form
	MGLE-1	Simplify and determine the value of radical expressions
	N-2-Hb	Perform operations on radical expressions
<b>N-3-H</b>		<b>Using number sense to estimate and determine if solutions are reasonable</b>
	MGLE-2	Predict the effect of operations on real numbers (e.g., the quotient of a positive number divided by a positive number less than 1 is greater than the original dividend)
	N-3-H	Identify, recognize, and use real number properties
<b>N-4-H</b>		<b>Determining whether an exact or approximate answer is necessary</b>
	N-4-H	Determine when an exact value or an approximation is appropriate for a given situation
<b>N-5-H</b>		<b>Selecting and using appropriate computational methods and tools for given situations (e.g., estimation, or exact computation using mental arithmetic, calculator, symbolic manipulator, or paper and pencil)</b>
<b>N-6-H</b>		<b>Applying ratios and proportional thinking in a variety of situations (e.g., finding a missing term of a proportion)</b>
	MGLE-3	Define <i>sine</i> , <i>cosine</i> , and <i>tangent</i> in ratio form and calculate them using technology
	N-6-Ha	Identify math symbols
	N-6-Hb	Determine opposites and absolute value of real numbers
	MGLE-4	Use ratios and proportional reasoning to solve a variety of real-life problems including similar figures and scale drawings
	N-6-Hc	Construct scale drawings
	N-6-Hd	Find the dimensions of an object from scale drawings
	N-6-He	Explore scale factors and develop a definition of similar figures
	N-6-Hf	Determine slope of a line
	N-6-Hg	Relate the slope of a line to the tangent ratio
<b>N-7-H</b>		<b>Justifying reasonableness of solutions and verifying results</b>
	N-7-H	Simplify and determine the value of radical expressions
	MGLE-2	Predict the effect of operations on real numbers (e.g., the quotient of a positive number divided by a positive number less than 1 is greater than the original dividend)
	MGLE-23	Draw and justify conclusions based on the use of logic (e.g., conditional statements, converse, inverse, contrapositive)

### Algebra

#### Benchmark GLE

<b>A-1-H</b>		<b>Demonstrating the ability to translate real-world situations (e.g., distance versus time relationships, population growth, growth functions for diseases, growth of minimum wage, auto insurance rates ) into algebraic expressions, equations, and inequalities and vice versa</b>
	A-1-Ha	Translate verbal expressions to algebraic expressions and vice versa
	MGLE-4	Use ratios and proportional reasoning to solve a variety of real-life problems including similar figures and scale drawings
	A-1-Hb	Solve equations involving radicals
	A-1-Hc	Evaluate algebraic expressions
<b>A-2-H</b>		<b>Recognizing the relationship between operations involving real numbers and operations involving algebraic expressions</b>
	MGLE-5	Write the equation of a line of best fit for a set of 2-variable real-life data presented in table or scatter plot form, with or without technology

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### Algebra

#### Benchmark GLE

<b>A-2-H</b>		<b>Recognizing the relationship between operations involving real numbers and operations involving algebraic expressions</b>
	A-2-Ha	Construct scatter plots with or without technology
	A-2-Hb	Analyze data displayed on scatter plots and tables
<b>A-3-H</b>		<b>Using tables and graphs as tools to interpret algebraic expressions, equations, and inequalities</b>
	A-3-Ha	Define terminology of linear graphing
	A-3-Hb	Use transformations to interpret the effects of constants on the graphs of equations
	MGLE-6	Write the equation of a line parallel or perpendicular to a given line through a specific point
<b>A-4-H</b>		<b>Solving algebraic equations and inequalities using a variety of techniques with the appropriate tools (e.g., hand-held manipulatives, graphing calculator, symbolic manipulator, or pencil and paper)</b>

### Measurement

#### Benchmark GLE

<b>M-1-H</b>		<b>Selecting and using appropriate units, techniques, and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error ( or tolerance) of measurements</b>
	M-1-H	Measure and compare quantities using appropriate units, instruments, and methods
<b>M-2-H</b>		<b>Demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of results as related to area, volume, mass, rate, and distance)</b>
	M-2-H	Apply appropriate instruments, scales, and formulas to solve problems and interpret results.
<b>M-3-H</b>		<b>Estimating, computing, and applying physical measurement using suitable units (e.g., calculate perimeter and area of plane figures, surface area and volume of solids presented in real-world situations)</b>
	M-3-Ha	Apply formulas to geometric concepts of perimeter, area, circumference, surface area, and volume
	M-3-Hb	Measure line segments and angles
	MGLE-7	Find volume and surface area of pyramids, spheres, and cones
<b>M-4-H</b>		<b>Demonstrating the concepts of measurement as it applies to real-world experiences</b>
	M-4-Ha	Use the appropriate unit of measure specific to a given situation
	MGLE-8	Model and use trigonometric ratios to solve problems involving right triangles
	M-4-Hb	Apply the inverse trig functions to find the measure of an angle

### Geometry

#### Benchmark GLE

<b>G-1-H</b>		<b>Identifying, describing, comparing, constructing, and classifying geometric figures in two and three dimensions using technology where appropriate to explore and make conjectures about geometric concepts and figures</b>
	MGLE-9	Construct 2- and 3-dimensional figures when given the name, description, or attributes, with and without technology
	G-1-Ha	Identify the parts of triangles and classify triangles by their parts
	MGLE-10	Form and test conjectures concerning geometric relationships including lines, angles, and polygons (i.e., triangles, quadrilaterals, and n-gons), with and without technology
	G-1-Hb	Identify and use geometric symbols
	G-1-Hc	Identify and model points, lines, and planes and their relationships
	G-1-Hd	Define and identify parallel and perpendicular lines
	G-1-He	Define terms associated with lines, angles, polygons, and circles
	G-1-Hf	Classify angles as acute, right, obtuse, straight
	G-1-Hg	Find angle measures related to polygons
	G-1-Hh	Investigate the relationship of the angles and the special segments of a triangle

## Grade Level Expectations Geometry

### Geometry Benchmark

### GLE

<b>G-2-H</b>		<b>Representing and solving problems using geometric models and the properties of those models (e.g., Pythagorean Theorem or formulas involving radius, diameter, and circumference)</b>
	MGLE-11	Determine angle measurements using the properties of parallel, perpendicular, and intersecting lines in a plane
	G-2-Ha	Apply the definition of complementary and supplementary angles
	MGLE-12	Apply the Pythagorean theorem in both abstract and real-life settings
	MGLE-13	Solve problems and determine measurements involving chords, radii, arcs, angles, secants, and tangents of a circle
	G-2-Hb	Determine the length of an arc and/or the area of a sector
	G-2-Hc	Explore vectors
<b>G-3-H</b>		<b>Solving problems using coordinate methods, as well as synthetic and transformational methods (e.g., transform on a coordinate plane a design found in real-life situations)</b>
	G-3-Ha	Apply the midpoint formula
	MGLE-14	Develop and apply coordinate rules for translations and reflections of geometric figures
	G-3-Hb	Explore transformations with geometric figures
	G-3-Hc	Write and apply an equation to represent a circle in a coordinate plane
	MGLE-15	Draw or use other methods, including technology, to illustrate dilations of geometric figures
	MGLE-16	Represent and solve problems involving distance on a number line or in the plane
	G-3-Hd	Recognize and use distance relationships among points, lines, and planes
	G-3-He	Read and create coordinate graphs/maps
	G-3-Hf	Read and use data provided by scale drawings
<b>G-4-H</b>		<b>Using inductive reasoning to predict, discover, and apply geometric properties and relationships (e.g., patty paper constructions, sum of the angles in a polygon)</b>
	MGLE-17	Compare and contrast inductive and deductive reasoning approaches to justify conjectures and solve problems
	G-4-Ha	Discover, confirm, and/or apply properties of parallelograms and special parallelograms
	G-4-Hb	Recognize and apply the properties of a trapezoid
<b>G-5-H</b>		<b>Classifying figures in terms of congruence and similarity and applying these relationships</b>
	G-5-Ha	Discuss the symmetry of various figures
	G-5-Hb	Identify and use congruent figures
	G-5-Hc	Explore and apply the conditions necessary for two polygons to be congruent
	MGLE-18	Determine angle measures and side lengths of right and similar triangles using trigonometric ratios and properties of similarity, including congruence
<b>G-6-H</b>		<b>Demonstrating deductive reasoning and mathematical justification (e.g., oral explanation, informal proof, and paragraph proof)</b>
	MGLE-19	Develop formal and informal proofs (e.g., Pythagorean Theorem, flow charts, paragraphs)

### Data Analysis, Probability, and Discrete Math

### Benchmark GLE

<b>D-1-H</b>		<b>Designing and conducting statistical experiments that involve the collection, representation, and analysis of data in various forms (Analysis should reflect an understanding of factors such as: sampling, bias, accuracy, and reasonableness of data.)</b>
<b>D-2-H</b>		<b>Recognizing data that relate two variables as linear, exponential, or otherwise in nature (e.g., match a data set, linear or nonlinear, to a graph and vice versa)</b>
	MGLE-20	Show or justify the correlation (match) between a linear or nonlinear data set and a graph
<b>D-3-H</b>		<b>Using simulations to estimate probabilities (e.g., lists and tree diagrams)</b>
<b>D-4-H</b>		<b>Demonstrating an understanding of the calculation of finite probabilities using permutations, combinations, sample spaces, and geometric figures</b>
	MGLE-21	Determine the probability of conditional and multiple events, including mutually and non-mutually exclusive events

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### Data Analysis, Probability, and Discrete Math

#### Benchmark GLE

D-5-H		<b>Recognizing events as dependent or independent in nature and demonstrating techniques for computing multiple-event probabilities</b>
D-6-H		<b>Recognizing and answering questions about data that are normally or non-normally distributed</b>
	D-6-H	Calculate mean, median, mode, and range of a frequency distribution
D-7-H		<b>Making inferences from data that are organized in charts, tables, and graphs (e.g., pictograph; bar, line, or circle graph; stem-and-leaf plot or scatter plot)</b>
	MGLE-22	Interpret and summarize a set of experimental data presented in a table, bar graph, line graph, scatter plot, matrix, or circle graph
	D-7-H	Determine what information can and cannot be assumed from a diagram
D-8-H		<b>Using logical thinking procedures, such flow charts, Venn diagrams, and truth tables</b>
	MGLE-23	Draw and justify conclusions based on the use of logic (e.g., conditional statements, converse, inverse, contrapositive)
D-9-H		<b>Using discrete math to model real-life situations (e.g., fair games or elections, map coloring)</b>
	MGLE-24	Use counting procedures and techniques to solve real-life problems
	MGLE-25	Use discrete math to model real-life situations (e.g., fair games, elections)

### Patterns, Relations, and Functions

#### Benchmark GLE

P-1-H		<b>Modeling the concepts of variables, functions, and relations as they occur in the real world and using the appropriate notation and terminology</b>
	MGLE-26	Generalize and represent patterns symbolically, with and without technology
	P-1-Ha	Recognize patterns in a sequence
	P-1-Hb	Identify the terms in a sequence
	P-1-Hc	Identify geometric and arithmetic sequences and series
	P-1-He	Discover that the ratio of the circumference of a circle to its diameter is the constant $\pi$
	P-1-Hf	Discover and apply patterns of side lengths in special triangles (e.g., $30^\circ$ - $60^\circ$ - $90^\circ$ triangles and $45^\circ$ - $45^\circ$ - $90^\circ$ triangles)
	P-1-Hg	Discover and apply patterns of side lengths of polygons (e.g., Pythagorean triples, similar triangles, and polygons)
P-2-H		<b>Translating between tabular, symbolic, or graphic representations of functions</b>
	MGLE-27	Translate among tabular, graphical, and symbolic representations of patterns in real-life situations, with and without technology
	P-2-H	Discover and apply patterns in relation to the effects of slope on a coordinate plane and its table
P-3-H		<b>Recognizing behavior of families of elementary functions, such as polynomial, trigonometric, and exponential functions, and, where appropriate, using graphing technologies to represent them</b>
P-4-H		<b>Analyzing the effects of changes in parameters (e.g., coefficients and constants) on the graphs of functions, using technology whenever possible</b>
P-5-H		<b>Analyzing real-world relationships that can be modeled by elementary functions</b>
	MGLE-20	Show or justify the correlation (match) between a linear or nonlinear data set and a graph