Freshmen intending to take Algebra II
Student Expectations

Freshmen that intend to take the Algebra II placement test are expected to be proficient in the following areas. Freshmen are also expected to be proficient in 8th grade mathematics and Algebra 1. These expectations are included in the "Freshman Entering Algebra 1" and Freshman Entering Geometry" documents.

Vocabulary

Point	Line	Plane	Line Segment	Endpoints
Ray	Opposite Rays	Postulate	Axiom	Theorem
Congruent	Midpoint	Segment Bisector	Acute	Right
Obtuse	Straight Angles	Angle Bisector	Linear Pair	Vertical Angles
Polygon	Convex	Concave	n-gon	Equilateral
Equiangular	Regular	Supplementary	Complementary	Adjacent
Non-adjacent	Vertex	Sides	Perimeter	Circumference
Area	Diameter	Radius	Conjecture	Inductive reasoning
Counterexample	Conditional	Converse	Contrapositive	Deductive Reasoning
Inverse	If-then Form	Hypothesis	Conclusion	Negation
Perpendicular	Parallel	Biconditional	Proof	Two Column Proof
Reflexive	Transitive	Symmetric	Skew	Transversal
Corresponding Angles	Alternate Interior Angles	Consecutive Interior Angles	Alternate Exterior Angles	Corresponding Parts
Isosceles	Acute	Interior Angles	Exterior Angles	Corollary
Scalene	Right Triangle	Legs	Hypotenuse	Flow Proof
Base Angles	Transformation	Translation	Reflection	Rotation
Dilation	Midsegment	Coordinate Proof	Concurrent	Equidistant
Median	Centroid	Circumcenter	Incenter	Orthocenter
Indirect Proof	Altitude	Ratio	Proportion	Scale
Geometric Mean	Similar Polygon	Scale Factor	Pythagorean Triple	Trigonometric Ratio
Tangent	Sine	Cosine	Angle of Elevation	Angle of Depression
Inverse Tangent	Inverse Sine	Inverse Cosine	Diagonal	Parallelogram
Rhombus	Square	Trapezoid	Kite	Circle
Center	Chord	Secant	Tangent Line	Central Angle
Minor Arc	Major Arc	Semicircle	Inscribed angles	Intercepted Arc
Apothem	Sector of a circle	Arc Length	Geometric Probability	Standard Equation of a Circle
Polyhedra	Face	Edge	Vertex	Prism
Platonic Solids	Pyramid	Cone	Sphere	Volume
Surface Area				

Fundamentals of Geometry

Students will be able to:

- Describe and measure geometric figures using correct geometric terminology and geometric tools including: ruler and protractor.
- Understand equality and congruence in order to correctly classify shapes and measures of geometric figures.
- Use the midpoint and distance formulas to determine distances and coordinates on the coordinate plane and understand the relationship between the distance formula and the Pythagorean Theorem.
- Identify and apply angle pair relationships such as vertical angles, linear pairs, and supplementary and complementary angles and use algebra to correctly solve for angle measures in these cases.
- Identify and classify angles formed by a transversal cutting two parallel lines and recognize and prove properties associated with these angle pairs; use algebra to correctly solve for angle measures in these cases.

Logic

Students will be able to:

- Use inductive reasoning to recognize patterns and make and test conjectures.
- Analyze and use conditional statements of all forms, including the Laws of Detachment and Syllogism.
- Apply definitions, theorems, and given information from postulates and diagrams in order to prove segment and angle congruence using a formal two-column proof.
- Solve and justify algebraic equations by constructing formal Algebraic proofs, incorporating the Algebraic Properties of Equality.
- Use and prove Parallel and Perpendicular Line theorems and their converses.
- Write a paragraph proof to articulate a hypothesis, a logical theorem-based argument and justify a conclusion in a geometric proof.
- Prove geometric properties using a logically based flow-proof and formulate indirect proof by making a temporary assumption and proving it logically impossible.

Triangle Congruence and Similarity

Students will be able to:

- Classify triangles by sides and angles.
- Apply and prove the Triangle Sum Theorem and Exterior Angle Theorem and apply these properties to find angle measures algebraically.
- Prove triangles congruent using SSS, SAS, AAS, ASA, and HL Congruence theorems.
- Use properties of Isosceles Triangles and Equilateral Triangles, such as the Base Angles Theorem to solve algebraically (including correct use of quadratic equations and factoring) for angle measures and perimeter.
- Recognize and perform and use correct notation to execute Triangle Congruence transformations including translation, reflection and rotation, on the coordinate plane.
- Identify and apply special properties of triangles like the midsegment and those of triangles centers to include the circumcenter, orthocenter, centroid, and incenter.
- Determine possible side lengths and angle measures of triangles using the Triangle Inequality Theorem and the Hinge Theorem and its Converse (SAS and SSS Inequality Theorems).
- Use ratios and proportions to solve geometry problems and determine triangle similarity.

➢ Show that triangles are similar using AA, SAS, and SAS Similarity Theorems and apply the Side-Splitter Theorem and its converse to solve algebraically for angle and side measures, once triangles are proved similar.

Right Triangles and Trigonometry
Students will be able to:
➢ Apply and prove the Pythagorean Theorem and its Converse and identify and use common Pythagorean Triples and their multiples. Use the converse to classify triangles as right, acute and obtuse.
➢ Use special relationships in right triangles to solve algebraically for leg and hypotenuse measures.
➢ Use trigonometric ratios, to include tangent, sine, cosine and their respective inverse to solve right triangles for the measures of all their sides and angles.
➢ Find distances and angle measures using the Law of Sines and Law of Cosines.

Polygons
Students will be able to:
➢ Classify polygons by number of sides and according to side and angle congruencies.
➢ Find perimeter/circumference and area of polygons.
➢ Show that polygons are similar using equal side proportions and corresponding angle congruence.
➢ Determine interior and exterior angle measures in polygons using the Polygon Interior Angles and Exterior Angles Theorems
➢ Use properties of parallelograms to algebraically determine angle measure and side lengths.
➢ Classify quadrilaterals by their properties, such as opposite congruent sides and angles and bisecting diagonals.
➢ Classify special quadrilaterals like the rhombus, square, trapezoid, and kite, using properties of these special quadrilaterals.
➢ Use area and perimeter formulas for polygons to determine these measures and apply area of polygons to determine geometric probability.

Circles
Students will be able to:
➢ Use properties of segments that intersect circles such as secants and tangents. Identify chords created by secants and determine that a radio to a tangent line creates a perpendicular angle.
➢ Identify and find the measure of a central angle of a circle and apply knowledge of minor and major arcs to do so.
➢ Use special properties of chords to algebraically determine angle measure and diameter.
➢ Apply and Prove the Inscribed Angle Theorem and recognize special properties of polygons inscribed in a circle.
➢ Find angle and arc measures and segment lengths in a circle using angles relationships inside and outside a circle.
➢ Use circles in the coordinate plane and write equations of circles in a coordinate plane in standard form, using knowledge of radius length and center.

➢ Use area and circumference formulas to determine these measures and compare measures for parts of the circle to the whole circle, such as arc length and circle sectors.

Solids
Students will be able to:
➢ Identify solids to include polyhedral and non-polyhedra and use Euler's Theorem with platonic solids.
➢ Find surface area and volume of prisms, cylinders, pyramids, cones, and spheres.

Constructions (not tested on placement test)
Students will be able to:
➢ Bisect segments and angles as well as construct a median and altitude of a triangle using a compass and straightedge.
➢ Incorporate above constructions to construct triangle centers such as the circumcenter, incenter, centroid and orthocenter.
➢ Use triangle centers to inscribe and circumscribe circles around and inside triangles.

Graphing Technology (not tested on placement test)
Students will be able to:
➢ Use the graphing calculator to create graphs and interpret the meaning of graph on a coordinate plane.
➢ Construct shapes, bisect angles and segments and determine angle and side lengths.
➢ Use the graphing calculator to create tables and use the table data to solve problems.
➢ Change views and settings on the graphing calculator so that the data or graph can be displayed properly.