Jesuit High School
Math Department

Algebra 2 Honors Challenge Topics

The following topics are covered on the Algebra 2 Honors Challenge Exam.

Foundations for Geometry

1. Identify, name and draw points, lines, segments, rays and planes
2. Find length and midpoint of a segment
3. Construct midpoints and congruent segments
4. Name and classify angles
5. Measure and construct angles and angle bisectors
6. Identify and find the measures of adjacent, vertical, complementary and supplementary angles
7. Apply formulas for perimeter, area and circumference
8. Use the midpoint formula to calculate the midpoint of two points
9. Use the distance formula to calculate the distance between two points

Geometric Reasoning

1. Differentiate inductive and deductive reasoning
2. Use inductive reasoning to make conjectures
3. Use deductive reasoning to verify conjectures
4. Recognize the hypothesis and conclusion in a conditional statement
5. Write the inverse, converse and contrapositive of a conditional statement
6. Find the truth value of a statement
7. Write an algebraic proof
8. Write a geometric two-column proof

Parallel and Perpendicular Lines

1. Classify the angle pairs formed when parallel lines are cut by a transversal
2. Calculate measures of angles formed by parallel lines cut by a transversal
3. Use the properties of transversals to prove that two lines are parallel
4. Determine whether given lines are parallel or perpendicular
5. Calculate the slope of a line

Triangle Congruence

1. Classify triangles by side length
2. Classify triangles by angle measure
3. Calculate the measures of the angles of a triangle
4. Determine if triangles are congruent using SSS, SAS, ASA, AAS and HL
5. Use CPCTC to solve triangles
6. Use the properties of isosceles and equilateral triangles to solve triangles

Properties and Attributes of Triangles

1. Use the properties of perpendicular bisectors, angle bisectors, altitudes and medians
2. Use the triangle midsegment theorem
3. Classify triangles by angle measure
4. Solve triangle inequalities in one triangle and in two triangles
5. Use the Pythagorean Theorem to solve triangles
6. Model with special right triangles

Polygons and Quadrilaterals

1. Determine the angles of a polygon
2. Use the properties of a polygon to solve the polygon for a given measure
3. Determine if a polygon is a parallelogram, a rectangle, a rhombus or a square
4. Determine if a polygon is a kite or a trapezoid

Similarity

1. Identify similar polygons
2. Apply properties of similar polygons to solve problems
3. Draw and describe similarity transformations
4. Prove triangle similarity using AA, SSS, SAS
5. Use triangle similarity to solve problems
6. Apply the triangle proportionality and triangle bisector theorems
7. Use ratios and scale drawings to solve problems

Right Triangles and Trigonometry

1. Apply similarity relationships in right triangles to solve problems
2. Find sine, cosine and tangent of an acute angle
3. Use trig ratios to solve right triangles
4. Solve problems involving angles of elevation and angles of depression
5. Use the Law of Sines and the Law of Cosines to solve problems
6. Find the magnitude and direction of a vector

Transformational Geometry

1. Identify and draw reflections, translations and rotations and their compositions
2. Identify and describe symmetry in geometric figures

Perimeter, Circumference, Area, Surface Area and Volume

1. Find the perimeter and area of a triangle or special quadrilateral
2. Find the circumference and area of a circle
3. Find the area of a regular polygon
4. Find the area of composite figures
5. Find the perimeter and area of a figure in the coordinate plane
6. Find the volume of a prism, cylinder, pyramid, cone or sphere
7. Find the surface area of a prism, cylinder, pyramid, cone or sphere

Circles

1. Identify and apply properties of tangents, secants and chords
2. Find the areas of sectors and arc lengths
3. Find the measure of an inscribed angle
4. Find the measures of angles and lengths of segments formed by lines that intersect circles
5. Write equations of and graph circles in the coordinate plane