

## Geometry

### **RCAS Policies/Procedures:**

Students will be required to follow all RCAS policies and procedures. To view the RCAS High School Student Handbook, click [handbook](#).

### **Course Description:**

The focus of Geometry includes topics such as properties of plane and solid figures; deductive methods of reasoning and use of logic; geometry as an axiomatic system including the study of postulates, theorems, and formal proofs; concepts of congruence, similarity, parallelism, perpendicularity, and proportion; and rules of angle measurement in triangles.

### **Textbook:**

Envision AGA Geometry

### **Required Resources:**

N/A

**“Limited Choice” Resources:** (students will be asked to choose at least one title from this list)

N/A

### **Student Choice:**

Will student be asked to choose additional reading material from the classroom or school library?

No

## **Essential Questions:**

1. What are some of the fundamentals of geometry?
2. What properties are specific to parallel lines and perpendicular lines?
3. What are the properties of the four types of rigid motions?
4. What relationships between sides and angles of triangles can be used to probe triangles congruent?
5. How are the sides, segments, and angles of triangles related?
6. How are the properties of parallelograms used to solve problems and to classify quadrilaterals?
7. How are similar figures useful in solving problems?
8. How are the Pythagorean Theorem and trigonometry useful?
9. How can geometric figures be represented in the coordinate plane?
10. When a line or lines intersect a circle how are the figures formed related to the radius, circumference, and area of the circle?
11. How can you find the probability of events and the combination of events?

## **Essential Learning Intentions:**

### Topic 1

- Use properties of segments and angles to find their measures.
- Use a straightedge and compass (or similar technology) to construct basic figures.
- Use inductive reasoning to make conjectures about mathematical relationships
- Write conditionals and biconditionals
- Use deductive reasoning to draw conclusions

- Use the midpoint and distance formula to solve problems

## Topic 2

- Determine the measures of the angles formed when parallel lines are intersected by a transversal.
  - o Use deductive reasoning to prove theorems.
- Use angle relationships to prove that lines are parallel.
- Solve problems using the measures of interior and exterior angles of triangles. (Prove using parallel lines and a transversal)
- Use slope to solve problems about parallel and perpendicular lines.

## Topic 3 (PBL Topic: Logo)

- Use Pythagorean Theorem to find side lengths
- Draw and describe the reflection of a figure across a line of reflection.
- Describe the properties of a figure before and after translation.
- Draw and describe the rotation of a figure about a point of rotation for a given angle of rotation.
- Identify different rigid motions used to transform two-dimensional shapes.
- Identify different types of symmetry in two-dimensional figures.\*

## Topic 4

- Use a composition of rigid motions to show that two objects are congruent.
- Construct and apply theorems about isosceles and equilateral triangles to solve problems.
- Use SAS and SSS to determine whether triangles are congruent.

- Determine congruent triangles by comparing two angles and one side. (ASA and AAS)
- Identify congruent right triangles. (HL)
- Use triangle congruence to solve problems with overlapping triangles.

## Topic 5

- Use perpendicular and angle bisectors to solve problems.
- Use triangle bisectors to solve problems.
- Find the points of concurrency for the medians of a triangle and the altitudes of a triangle.
- Use theorems to compare the sides and angles of a triangle.
- Compare a pair of sides of two triangles when the remaining pairs of sides are congruent.

## Topic 6

- Find the sums of the measures of the exterior angles and interior angles of polygons. (Before winter break)
- Use triangle congruence to understand kites and trapezoids.
- Use the properties of parallel lines, diagonals, and triangles to investigate parallelograms.
- Use properties of sides, angles, and diagonals to identify a parallelogram.
- Use the properties of rhombuses, rectangles, and squares to solve problems.
- Identify rhombuses, rectangles, and squares by the characteristics of their diagonals.

## Topic 7

- Dilate figures and identify characteristics of dilations.
- Determine whether figures are similar.
- Use dilation and rigid motion to establish triangle similarity theorems.
- Use similarity and the geometric mean to solve problems involving right triangles.
- Find the lengths of segments using proportional relationships in triangles resulting from parallel lines.

## Topic 8

- Prove the Pythagorean Theorem using similarity and establish the relationships in special right triangles.
- Use trigonometric ratios to find lengths and angle measures of right triangles.
- Use the Law of Sines to solve problems.\*
- Use the Law of Cosines to solve problems.\*
- Use trigonometry to solve problems.

## Topic 9

- Use the coordinate plane to analyze geometric figures.
- Prove geometric theorems using algebra and the coordinate plane.
- Use the equations and graphs of circles to solve problems.

## Topic 10

- Find arc length and sector area of a circle and use them to solve problems.
- Use properties of tangent lines to solve problems.\*

- Relate the length of a chord to its central angle and the arc it intercepts.\*
- Use the relationships between angles and arcs in circles to find their measures.\*

## Topic 11

- Identify three-dimensional figures and their relationships with polygons to solve problems.
- Use the properties of prisms and cylinders to calculate their volumes.
- Use the volumes of right and oblique pyramids and cones to solve problems.
- Calculate the volume of a sphere and solve problems involving the volumes of spheres.

## Topic 12

- Use relationships among events to find probabilities.
- Find the probability of an event given that another event has occurred.
- Use permutations and combinations to find the number of outcomes in a probability experiment.\*
- Define probability distributions to represent experiments and solve problems.\*
- Calculate, interpret, and apply expected value.
- Use probability to make decisions.\*