

# LIVE Online Math Geometry Scope and Sequence

The course is broken down into units. The units, and lessons that make up each unit, are below.

**Note:** If there is a specific concept/technique that is not listed, please [contact us](#) to see if it is part of the course. Specific content is not always readily identifiable simply from the title of a lesson.

## Unit 1: Foundations of Geometry

Unit 1 introduces students to some introductory concepts that will be building blocks for work later in the course. In addition, one major role of this unit is to familiarize students with the language of geometry as well as the different type of thinking that is involved. There are also a couple connections to Algebra along the way.

**Lesson 1:** The Coordinate Plane

**Lesson 2:** Points, Lines, and Planes

**Lesson 3:** Using Formulas

**Lesson 4:** Measuring Segments

**Lesson 5:** Midpoints and Segment Congruence

**Lesson 6:** Exploring Angles

**Lesson 7:** Angle Relationships

## Unit 2: Reasoning and Proof

In Unit 2, students are introduced to a fundamental part of any Geometry course: Proofs. In addition, various kinds of logic and reasoning are practiced to help with the work of creating proofs. This unit is basically a mini course in logic with a geometric theme.

**Lesson 1:** Inductive Reasoning and Conjectures

**Lesson 2:** "If-Then" Statements and Postulates

**Lesson 3:** Deductive Reasoning

**Lesson 4:** Using Proof in Algebra

**Lesson 5:** Proving Segment Relationships

**Lesson 6:** Proving Angle Relationships

## Unit 3: Parallel and Perpendicular Lines

In this unit, students begin to transition into the real work of Geometry as they work with various postulates and theorems related to parallel and perpendicular lines. Several peripheral concepts are introduced as well and they are referenced at various other points in the course. The unit ends with a look at one kind of "Non-Euclidean Geometry": Spherical Geometry.

**Lesson 1:** Parallel Lines and Transversals

**Lesson 2:** Angles and Parallel Lines

**Lesson 3:** Slopes of Lines

**Lesson 4:** Proving That Lines are Parallel

**Lesson 5:** Parallel Lines and Distance

**Lesson 6:** Spherical Geometry

## Unit 4: Congruent Triangles

Proving that triangles are congruent and working with congruent triangles is a central part of Geometry. This unit focuses on various ways of showing that two triangles are congruent, as well as different properties of congruent triangles. Different kinds of triangles are encountered and several applications of congruent triangles are used in complex problems. Interactive websites are used to help cement abstract concepts.

**Lesson 1:** Classifying Triangles

**Lesson 2:** Measuring Angles in Triangles

**Lesson 3:** Congruent Triangles

**Lesson 4:** Proving Triangles Congruent

**Lesson 5:** Different Kinds of Congruent Triangles

**Lesson 6:** Properties of Isosceles Triangles

## Unit 5: Triangle Inequality

Extending the concept of congruent triangles, unit 5 begins by using the properties of congruent triangles to establish facts about various special segments in triangles and features of right triangles. A new kind of proof is also introduced: Indirect Proof. The second half of the unit focuses on the relationships between sides and angles in and among triangles of different sizes.

**Lesson 1:** Special Segments in Triangles

**Lesson 2:** Right Triangles

**Lesson 3:** Indirect Proof and Inequalities

**Lesson 4:** Inequalities for Sides and Angles of a Triangle

**Lesson 5:** Triangle Inequality Theorem

**Lesson 6:** Inequalities Involving Two Triangles

## Unit 6: Exploring Quadrilaterals

From 3 sides (triangles) to 4 (quadrilaterals)! All of the typical quadrilaterals will be explored and new relationships and properties will be discovered along the way. Students will have multiple opportunities to refine their skills in crafting proofs and using previously learned concepts.

**Lesson 1:** Parallelograms

**Lesson 2:** Is it a Parallelogram?

**Lesson 3:** Rectangles

**Lesson 4:** Squares, Rhombi, and Kites

**Lesson 5:** Trapezoids

## Unit 7: Connecting Proportion and Similarity

Two concepts that should have been learned in previous courses (proportionality and similarity) come together in this unit. Students will discover the proportional relationships that exist when lines are parallel and when two triangles are geometrically similar. The unit ends with a lesson on exploring fractals which are interesting patterns based on "self-similarity".

**Lesson 1:** Proportions Review

**Lesson 2:** Similar Polygons Review

**Lesson 3:** Identifying Similar Triangles

**Lesson 4:** Parallel Lines and Proportional Parts

**Lesson 5:** Parts of Similar Triangles

**Lesson 6:** Fractals and Self-Similarity

## Unit 8: Applying Right Triangles and Introduction to Trigonometry

Unit 8 is highly relevant to real life applications of math. Students use the Pythagorean Theorem in a variety of contexts and also apply 45-45-90 and 30-60-90 triangles to interesting problems. They also continue to get practice with logic and proofs through proving the Pythagorean Theorem. In addition, students will discover the traditional trigonometric ratios known as "sin", "cos", and "tan" and see several ways that these ratios are helpful in real life problems.

**Lesson 1:** Geometric Mean and the Pythagorean Theorem

**Lesson 2:** Special Right Triangles

**Lesson 3:** Trigonometric Ratios

**Lesson 4:** Angles of Elevation and Depression

**Lesson 5:** The Law of Sines

**Lesson 6:** The Law of Cosines

## Unit 9: Exploring Circles

Circles have several interesting properties (besides being round ☺). In this unit, students explore various parts of, and lines related to circles. New concepts include arcs, inscribed angles, and tangents (among other things). Again, writing proofs is a central part of this unit and the proofs get more advanced at this stage as well.

**Lesson 1:** Exploring Circles

**Lesson 2:** Angles and Arcs

**Lesson 3:** Arcs and Chords

**Lesson 4:** Inscribed Angles

**Lesson 5:** Tangents

**Lesson 6:** Secants, Tangents, and Angle Measures

**Lesson 7:** Special Segments in a Circle

## Unit 10: Exploring Polygons and Area

This unit focuses on working with area for various kinds of polygons. The traditional methods of finding area are explored, as well as alternative/new techniques. Lesson 2 focuses on interesting patterns called "Tessellations". The unit ends with a lesson on using various geometric principles in the context of probability.

**Lesson 1:** Polygons

**Lesson 2:** Tessellations

**Lesson 3:** Area of Parallelograms

**Lesson 4:** Area of Triangles, Rhombi, and Trapezoids

**Lesson 5:** Area of Regular Polygons and Circles

**Lesson 6:** Geometric Probability

## Unit 11: Surface Area and Volume

Unit 11 is the natural continuation of the work from Unit 10 as students work with surface area and volume of several different 3D solids. Throughout this unit, students discover the formulas to be used instead of just having them presented in a traditional manner. This unit concludes with a collaborative project that incorporates real world thinking, teamwork, and knowledge of the content of this unit.

**Lesson 1:** Exploring 3D Figures

**Lesson 2:** Nets and Surface Area

**Lesson 3:** Surface Area of Prisms and Cylinders

**Lesson 4:** Surface Area of Pyramids and Cones

**Lesson 5:** Volume of Prisms and Cylinders

**Lesson 6:** Volume of Pyramids and Cones

**Lesson 7:** Surface Area and Volume of Spheres

**Lesson 8:** Congruent and Similar Solids

## Optional Content

After Ch. 11, a handful of optional content will be covered (time permitting). These concepts include "Locus", plotting points in the 3D space, and working with the distance formula and midpoint formula in a 3D context. More content may be added if there is time at the end of the year.