

# 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 (“Geometry-Type Statements”) as well as the different type of thinking that will be required throughout the course. There are also a couple connections to Algebra along the way via an introduction to Coordinate Geometry.

**Lesson 1:** Geometry Basics (Points, Lines, Planes, and More)

**Lesson 2:** Making “Geometry-Type Statements”

**Lesson 3:** Postulates and Theorems Basics

**Lesson 4:** Coordinate Geometry: Slope and Parallel/Perpendicular Lines

**Lesson 5:** Midpoint Formulas

**Lesson 6:** Angle Basics

**Lesson 7:** Segment Bisectors and Common Constructions

## Unit 2: Reasoning and Introduction to Proofs

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/Deductive Reasoning and Conditionals

**Lesson 2:** Properties of Equality and Inequality

**Lesson 3:** Introduction to Proofs

**Lesson 4:** Vertical Angles, Linear Pairs, and Complementary/Supplementary Angles

**Lesson 5:** Working with Proofs (Part 1)

**Lesson 6:** Working with Proofs (Part 2)

## 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 lesson where students explore some of the simpler Propositions of Euclid.

**Lesson 1:** Parallel Lines and Transversals

**Lesson 2:** Special Angle Pairs Related to Parallel Lines (Part 1)

**Lesson 3:** Special Angle Pairs Related to Parallel Lines (Part 2)

**Lesson 4:** Parallel/Perpendicular Lines and Distance

**Lesson 5:** Coordinate Geometry: Linear Equations and Missing Coordinates

**Lesson 6:** Introduction to Euclid's Propositions

## 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:** Angles in Triangles

**Lesson 3:** Introduction to Congruent Triangles

**Lesson 4:** Proving Triangles Congruent (Part 1)

**Lesson 5:** Proving Triangles Congruent (Part 2)

**Lesson 6:** Properties of Isosceles Triangles

## Unit 5: Special Points/Segments in Triangles and 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 7 introduces students to the SSS and SAS Inequality Theorems.

**Lesson 1:** Special Segments in Triangles

**Lesson 2:** Points of Concurrency in Triangles

**Lesson 3:** Proving Right Triangles Congruent

**Lesson 4:** Triangle or No Triangle?

**Lesson 5:** Indirect Proofs and the Exterior Angle Inequality Theorem

**Lesson 6:** Triangle Side-Angle Relationships

**Lesson 7:** Triangle Inequality Theorems

## 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:** Quadrilateral Definitions and Parallelogram Properties

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

**Lesson 3:** Rectangles

**Lesson 4:** Squares and Rhombi

**Lesson 5:** Trapezoids

**Lesson 6:** Kites

## Unit 7: Connecting Proportion and Similarity

Two concepts that should have been learned in previous courses (proportionality and similarity) take center stage in this unit. Among other things, students will discover the proportional relationships that exist when two triangles are geometrically similar. They will also learn (and prove!) ways to know that two triangles are similar. The unit ends with a lesson on dilation and how scale factor is involved with enlarging/shrinking figures.

**Lesson 1:** Proportions Review

**Lesson 2:** Similar Figures and Scale Factor

**Lesson 3:** Similar Triangles (Part 1)

**Lesson 4:** Similar Triangles (Part 2)

**Lesson 5:** Triangle Proportionality Theorem

**Lesson 6:** Proportional Special Segments in Similar Triangles

**Lesson 7:** Dilation

## 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.

Additionally, they continue to get practice with logic and proofs through proving the Pythagorean Theorem. In the second half of the unit, 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 Altitude of a Right Theorems

**Lesson 2:** Pythagorean Theorem

**Lesson 3:** 45-45-90 and 30-60-90 Triangles

**Lesson 4:** Trigonometric Ratios

**Lesson 5:** Applications of Trigonometric Ratios

**Lesson 6:** Law of Sines and Law of Cosines Introduction

## 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:** Pi, Circumference, and Area of a Circle

**Lesson 2:** Central Angles and Arcs

**Lesson 3:** Arcs and Chords Relationships

**Lesson 4:** Inscribed Angles/Polygons

**Lesson 5:** Tangent Segment Basics

**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. In lesson 5 students will apply their previously learned knowledge (including the trigonometric ratios) to unique problems. The unit ends with a lesson on using various area calculations in the context of probability.

**Lesson 1:** Angles of a Polygon

**Lesson 2:** Area of Parallelograms and Triangles

**Lesson 3:** Area of Rhombi, Trapezoids, and Kites

**Lesson 4:** Area of Regular Polygons

**Lesson 5:** Area of Complex Shapes

**Lesson 6:** Geometric Probability Using Area

## 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, Nets, and Surface Area

**Lesson 2:** Surface Area of Prisms and Cylinders

**Lesson 3:** Surface Area of Pyramids

**Lesson 4:** Surface Area of Cones

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

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

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

## Optional Content

Outside of the units above, there is some optional content may 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.