Geometry Syllabus

Course Summary

This course is meant for students ages 13 to 16 who have completed, at a minimum, the Common Core (or equivalent) curriculum for Algebra 1. Students will be exposed to the Focus Areas section listed below, and we expect students to master the skills listed in the Expected Outcomes section listed below.

Focus Areas at this Level

Concepts, skills, and learning tools students see in this course include, but are not limited to:

- Euclidean Geometric Definitions and Constructions
- Triangles: Congruence, Similarity, Right, and Parts (types of centers, medians, altitudes, etc..)
- Quadrilaterals and other Polygons
- Geometric Inequalities
- Circles and Angles
- Trigonometric Functions

Expected Outcomes

Students will be **expected to adequately perform in or explain** the following areas after course completion:

Students will study the foundations of geometry and logic by going through a selection of constructions and proofs from Euclid's Elements. They will then dive deeper into Geometry and study circles (including chords, tangents, sectors and segments), triangles (including similarity and congruence theorems) and angle theorems to better understand the relationships between shapes.

- Logical construction of certain objects from base principles
- Similarity and Congruence of triangles
- Understanding and applying theorems involving Circles using chords, tangents, sectors, segments and other constructs
- Visualize relationships between two-dimensional and three-dimensional objects and transforming those relations into equations
- Expressing and solving for unknown geometric properties with equations
- Use the basic three trigonometric functions to solve for missing pieces of a right triangle

Pre Requisites

Students registering for this course should be **comfortable with the following Math**:

- Performing arithmetic operations with all rational and radical numbers
- Drawing and labeling a Cartesian plane
- Translating word problems into mathematical expressions or pictures
- Using variables in expressions and equations

Students should also be **willing and able to**:

- Communicate in English at a beginner's level
- Be respectful of other students in their classes
- Practice writing things down on paper
- Share their thoughts with the instructors to help them discover solutions to their problems

- Take constructive criticism when it comes to their learning habits

Course Materials (Required)

- All classes will be taught online, via **Zoom**. Your student will need a device with a microphone and camera.
- Homework will be assigned via the textbook:
  - The Art of Problem Solving: Geometry by Richard Rusczyk
  - Purchasable here: https://artofproblemsolving.com/store ; **Mandatory purchase** required
  - Physical or eBook contain the same problems
- Parents are expected to have read and understood the online Parent Handbook
  - Parents should review the expectations in class with their student(s)
  - Parents of this age group will need to help their students learn the technology used on the student's end

Students should also have access to:

- Ruler, Protractor, Compass (to make circles)
- Calculator with sin, cos and tan functions (at a minimum)
- Paper, Pencils and Erasers
- Colored pencils or markers
- Reliable internet connection and digital device

Homework Expectations

Homework at EMC is set up to be flexible for the needs of your student. Usually we feel students fall into three general categories:

- EMC is **replacing public school or** accelerating my student for **testing out of Math** in the future
  - All Homework is **mandatory**
- EMC is helping **improve my grades** or **skills**
  - Homework is **highly recommended**, we recommend concentrating on school homework first
- EMC is for **interest's sake** and/or for **exposure** to problem solving **before seeing it in school**
  - Homework is **recommended, yet optional**

Homework Delivery

Homework is delivered in a two main ways:

- **Practice Homework**
  - Assigned through the Art of Problem Solving (AoPS) Textbook
  - PDFs of our lesson slides are posted weekly and include extra questions not assigned
  - AoPS has challenging questions and an alternate learning style compared to EMC, outlined below:
    - Problem Section
      - Questions designed to teach, read all these solutions if you're self-paced learning outside of the class times
    - Exercises
      - Questions to demonstrate understanding of the content ; we recommend not reading these solutions until after you have your first answer or get completely stuck

- **Assessment Homework** (aka Quizzes, Tests)
  - Canvas, set of questions to show instructors a student's understanding of the content
  - Auto-graded upon submission

- Instructors adjust grades after seeing results to give partial marks where appropriate, and plan to cover certain problem areas in the Homework Check portion of next class

Course Calendar

On yellow dates on the calendar below, no classes are held. Some days of the week (Sat, Sun, Mon) have less classes per year. These courses will have slightly condensed in-class schedules, and your instructor will let you know which homework assignments to do each week.

EMC SCHOOL

2026-2027 School Calendar

August 2026

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

September 2026

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October 2026

M	Tu	W	Th	F	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

November 2026

M	Tu	W	Th	F	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

December 2026

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

January 2027

M	Tu	W	Th	F	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February 2027

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March 2027

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April 2027

M	Tu	W	Th	F	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

May 2027

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June 2027

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

First and Last Day of School
School Holidays & Vacations

Aug 17	First Day of Classes
Sep 5 - 7	Labor Day Weekend - No Classes
Nov 23 - 29	Thanksgiving Week - No Classes
Dec 21 - Jan 3	Winter Break - No Classes
Apr 12 - 18	Spring Break - No Classes
May 29 - 31	Memorial Day - No Classes
Jun 13	Last Day of School

Course Itinerary

EMC Chapter	Lesson	Class Dates	AoPS Homework Assigned
Chapter 1: Foundations of Geometry	1) Euclidean Geometry	Aug 17- Aug 23	**1.1 Why Names and Symbols?:** Read, no problems **1.2 Points, Lines, and Planes:** 1.2.1 to 1.2.3 **1.3 Round and Round:** 1.3.1 to 1.3.3 **1.5 The Burden of Proof:** Read, no problems
	2) Simple Euclidean Constructions	Aug 24 - Aug 30	**1.4 Construction: Copy a Segment:** 1.4.1- to be shown next class on paper **3.7 Construction: Equilateral Triangle and Perpendicular Bisector:** 3.7.3, 3.7.4
Chapter 2: Types of Angle	3) Angles and their Measure	Aug 31 - Sept 6 OFF Sat Sept 5, Sun Sept 6 Labor Day	**2.1 What is an Angle?:** Read, no problems **2.2 Measuring Angles:** 2.2.1 to 2.2.2 **2.3 Straight and Vertical Angles:** 2.3.1 to 2.3.3 **2.4 Parallel Lines:** 2.4.3 to 2.4.5
	4) Parallel Line Theorems	Sept 7 - Sept 13 OFF Mon Sept 7 Labor Day	**2.5 Angles in a Triangle:** 2.5.2 to 2.5.4 **2.6 Exterior Angles:** 2.6.1 to 2.6.3 **2.7 Parallel Lines Revisited:** 2.7.2, 2.7.4
Chapter 3: Comparing Triangles	5) Congruence	Sept 14 - Sept 20	**3.1 Introduction:** Read, no problems **3.2 SSS Congruence:** 3.2.1 to 3.2.3 **3.3 SAS Congruence:** 3.3.3, 3.3.4 **3.4 ASA and AAS Congruence:** 3.4.2, 3.4.4 **3.5 SSA Not-Necessarily Congruence:** Read, no problems
	6) Triangle Properties	Sept 21 - Sept 27	**3.6 Isosceles and Equilateral Triangles:** 3.6.2, 3.6.4, 3.6.5 **4.1 Perimeter:** 4.1.2, 4.1.4, 4.1.5 **4.2 Area:** 4.2.1, 4.2.5 **4.3 Same Base/Same Altitude:** 4.3.1, 4.3.2 **10.1 Sides and Angles of a Triangle:** 10.1.1 & 10.1.2 **10.3 The Triangle Inequality:** 10.3.1 to 10.3.3
	7) Similarity	Sept 28 - Oct 4	**5.1 What is Similarity?:** 5.1.1 **5.2 AA Similarity:** 5.2.1, 5.2.3 **5.3 SAS Similarity:** 5.3.1 to 5.3.3 **5.4 SSS Similarity:** 5.4.1
Chapter 4: Right Angle Triangles	8) Pythagorean Theorem	Oct 5 - Oct 11	**6.1 Pythagorean Theorem:** 6.1.1, 6.1.3, 6.1.5, 6.1.6 **6.2 Two Special Right Triangles:** 6.2.1 **6.3 Pythagorean Triples:** 6.3.1, 6.3.2
	9) Heron's Formula	Oct 12 - Oct 18	**6.4 Congruence and Similarity Revisited:** 6.4.2 **6.5★ Heron's Formula:** Read, no problems
	10)	Oct 19 - Oct 25	18.1 **Trigonometry and Right Triangles:** all Exercises

	Trigonometric Functions		**18.2 Not Just For Right Triangles:** all Exercises
Chapter 5: Applied Trig	**11) Inverse Trig Functions**	Oct 26 - Nov 1	**10.2 Pythagoras -- Not Just For Right Triangles?:** 10.2.1
	12) Solving Triangles	Nov 2 - Nov 8	**EMC** Provided Practice Quiz
Chapter 6: Parts of Triangles	**13) Bisectors**	Nov 9 - Nov 15	**7.1 Bisectors:** Read, no problems **7.2 Perpendicular Bisectors of a Triangle:** 7.2.1 to 7.2.3 **7.3 Angle Bisectors of a Triangle:** 7.3.1 to 7.3.4
	14) Medians and Altitudes	Nov 16 - Nov 22	**7.4 Medians:** 7.4.1 to 7.4.3 **7.5 Altitudes:** 7.5.1 & 7.5.2
Holiday	**Thanksgiving**	**OFF** Nov 23 - Nov 29	**Have a great week!**
Chapter 7: Polygons	**15) Properties of Quadrilaterals**	Nov 30 - Dec 6	**8.1 Quadrilateral Basics:** Read, no problems **8.2 Trapezoids:** 8.2.1 to 8.2.3 **8.3 Parallelograms:** 8.3.1 to 8.3.3 **8.4 Rhombi:** 8.4.1 & 8.4.2 **8.5 Rectangles:** 8.5.1 to 8.5.6 **8.6 Squares:** 8.6.1 to 8.6.3
	16) Solving Quadrilaterals	Dec 7 - Dec 13	**EMC** Provided Practice Quiz
17) Midterm Review		Dec 14 - Dec 20	• Review of Chapters 1 through 7
Holiday	**Winter Break**	**OFF 2 WEEKS** Dec 21 - Jan 3	**Have a great break!**
Chapter 7: Polygons	**18) Polygons**	Jan 4 - Jan 10	**9.1 Introduction to Polygons:** Read, no problems **9.2 Angles in a Polygon:** 9.2.1, 9.2.3 **9.3 Polygon Area:** 9.3.1 to 9.3.4 **9.4 Polygon Problems:** 9.4.2 & 9.4.3
	19) Chapter Review	Jan 11 - Jan 17	**9.4 Polygon Problems:** 9.4.1, 9.4.4 **Ch.9 Review & Challenge**: 9.22, 9.23, 9.30
Chapter 8: Circles	**20) Properties and Pi**	Jan 18 - Jan 24	**11.1 Arc Measure, Arc Length, and Circumference:** 11.1.3 & 11.1.4 **11.2 Area:** 11.2.1 to 11.2.6 **11.3 Funky Areas:** 11.3.2, 11.3.3, 11.3.4

	21) Inscribed Angles	Jan 25 - Jan 31	**12.1 Inscribed Angles:** 12.1.1 to 12.1.4 **12.2 Angles Inside and Outside Circles:** 12.2.1 to 12.2.4
	22) Tangents	Feb 1 - Feb 7	**12.3 Tangents:** 12.3.1 to 12.3.5 **12.4 Problems:** Read, no problems
	23) Points and Circles	Feb 8 - Feb 14	**13.1 What is Power of a Point?:** 13.1.1 to 13.1.4 **13.2 Power of a Point Problems:** 13.2.1 & 13.2.2
	24) Chapter Review	Feb 15 - Feb 21	**Ch 11 Review** 11.14 to 11.16, 11.19, 11.20 **Ch 12 Review** 12.28 to 12.31, 12.38 **Ch 13 Review** 13.11 to 13.14
Chapter 9: 3D Geometry	**25) Planes**	Feb 22 - Feb 28	**14.1 Planes:** Read solutions to all problems **EMC** Provided Practice Quiz
	26) Prisms, Pyramids	Mar 1 - Mar 7	**14.2 Prisms:** 14.2.1 to 14.2.7 **14.3 Pyramids:** 14.3.1 to 14.3.3
27) Spring Review		Mar 8 - Mar 14	• Review of Chapters 7 through 9 • **Math Map** Where does this go?
Chapter 9: 3D Geometry	**28) Polyhedra and Euler's Formula**	Mar 15 - Mar 21	**14.4 Regular Polyhedra:** 14.4.1 & 14.4.2 Add problems on vertices, edges and faces for a variety of polyhedra. Discuss dice and how to make a 5- 7- 9- or 10-sided die.
	29) Surface Area and Volume	Mar 22 - Mar 28	**EMC** Provided Practice Quiz
Chapter 10: Curved Geometry	**30) Cylinders & Cones**	Mar 29 - Apr 4	**15.1 Cylinders:** 15.1.1 to 15.1.4 **15.2 Cones:** 15.2.1 to 15.2.4
	31) Spheres	Apr 5 - Apr 11	**15.3 Spheres:** 15.3.1 & 15.3.2
Holiday	**Spring Break**	**OFF** **Apr 12 - Apr 18**	**Have a great week!**
Chapter 11: Transformations	**32) Translations and Rotations**	Apr 19 - Apr 25	**16.1 Translations:** Read, no problems **16.2 Rotations:** 16.2.1 to 16.2.3
	33) Reflection	Apr 26 - May 2	**16.3 Reflections:** 16.3.1 to 16.3.4
	34) Dilation	May 3 - May 9	**16.4 Dilation:** 16.4.1 to 16.4.3
	35) Chapter Review	May 10 - May 16	**16.5 Changing the Question:** 16.5.2 & 16.5.3 **Review & Challenge Problems:** 16.22 to 16.26,

			16.30
Chapter 12: Analytic Geometry	**36) Analysis on the Cartesian Plane**	May 17 - May 23	**17.1 Lines:** 17.1.1 to 17.1.5 **17.2 Circles:** 17.2.1 to 17.2.3 **17.3 Basic Analytic Geometry Problems:** 17.3.1 & 17.3.2
	37) Analysis Using Formulae	May 24 - May 30 **OFF Sat Sun May 29 and 30 Memorial Day**	**17.4 Proofs with Analytic Geometry:** 17.4.1 to 17.4.3 **17.5 Distance Between a Point and a Line:** 17.5.1 to 17.5.5
	38) Put it all Together	May 31 - June 6 **OFF Mon May 31 Memorial Day**	**17.6 Advanced Analytic Geometry Problems:** 17.6.1 to 17.6.3
39) Final Review		June 7 - June 13	● Review of Chapters 7 through 12