Scope and Sequence for Geometry

For the first several units, students practice making conjectures and observations. This begins with work on compass and straightedge constructions. Students gradually build up to writing formal proofs in narrative form, engaging in a cycle of conjecture, rough draft, peer feedback, and final draft. To support their proof writing, students record definitions, theorems, and assertions in a reference chart, which will be used and expanded throughout the course.

Students build on their middle school study of transformations of figures. Using transformation-based definitions of congruence and similarity allows students to rigorously prove the triangle congruence and similarity theorems. Students apply these theorems to prove results about quadrilaterals, isosceles triangles, and other figures. Students extend their understanding of similarity to right triangle trigonometry in this course and to periodic functions in future courses.

Next, students derive volume formulas and study the effect of dilation on both area and volume. They use coordinate geometry to connect ideas from algebra and geometry: Students review theorems, skills, and functions from prior units and reconsider them, using the structure of the coordinate plane. Students use transformations and the Pythagorean Theorem to build equations of circles, parabolas, parallel lines, and perpendicular lines from definitions, and students link transformations to the concept of functions.

Nearing the end of the course, students analyze relationships between segments and angles in circles and develop the concept of radian measure for angles, which will be built upon in subsequent courses. Students close the year by extending what they learned about probability in grade 7 to consider probabilities of combined events and to identify when events are independent.

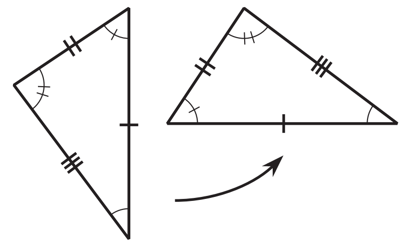
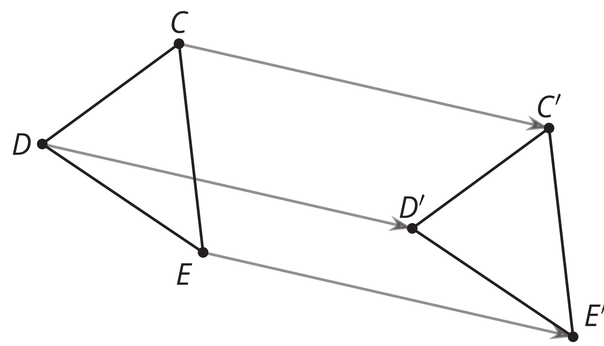
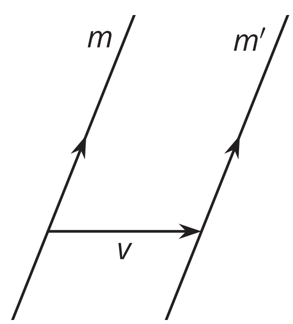
Modeling prompts are provided for use throughout the course. While students have opportunities to engage in aspects of mathematical modeling during class activities, modeling prompts allow students to engage in the full modeling cycle. Modeling prompts can be implemented in various ways. Please see the *Mathematics Modeling Prompts* section of this Course Guide for a more detailed explanation.

Geometry Reference Chart

In order to write convincing arguments, students need to support their statements with facts. The reference chart is a way to keep track of those facts for future reference when students are trying to prove new facts. At the beginning of the course, the chart is blank. Students continue adding entries and referring to them through the “Circles” unit.

Print charts double sided to save paper. There should be a system for students to keep track of their charts (for example, hole punch and keep in a binder, or staple and tuck in the front of a notebook or the back of the workbook).

Each entry includes a statement, a diagram, a type and the date. A statement can be one of these three types: assertion, definition, or theorem. An assertion is an observation that seems to be true but is not proven. Sometimes assertions are not proven, because they are axioms or because the proof is beyond the scope of this course. The chart includes the most essential definitions. If there are additional definitions from previous courses that students would benefit from, feel free to add them. For example, it is assumed that students recall the definition of “isosceles.” If this is not the case, that would be a useful definition to record. Here are some entries to show the chart’s structure:

date, type	statement	diagram
9/13/24 assertion	A **rigid transformation** is a translation, reflection, rotation, or any sequence of the three. Rigid transformations take lines to lines, angles to angles of the same measure, and segments to segments of the same length.	
9/13/24 definition	Two figures are **congruent** if there is a sequence of translations, rotations, and reflections that takes one figure exactly onto the other. The second figure is called the image of the rigid transformation.	$\triangle EDC \cong \triangle E'D'C'$ 
9/25/24 theorem	Translations take lines to parallel lines or to themselves.	$m \parallel m'$ 

Students are not expected to record all of their observations in the chart. Sometimes students' conjectures will be proven in a subsequent lesson and added later as theorems rather than assertions. Other times students prove something that they will not need to use again. Students are welcome to use any proven statement in a later proof, but the reference chart is designed to be as concise as possible so it is a more useful reference than students' entire notebooks.

The intention is for students to be able to use their reference charts at any time, including during assessments. The goal is to learn to apply statements precisely, not to memorize. Some teachers ask students to make a tally mark each time they use a statement in the chart to justify a response. This allows students to see which are the most powerful statements and teachers to see how students are using their charts. Including the date will help students to know if they missed a row when they were absent or to locate a statement if they remember approximately how long ago they added it.

In addition to the blank reference chart, there is also a scaffolded version of the reference chart. The scaffolded version is intended to provide access for students with disabilities (language based, low vision, motor challenges) and English learners. In this version, students are provided with sentence frames for the “statement” column. The diagrams are also partially provided so students can focus on annotating key information. There is a teacher version of the chart in which the words needed to fill in the blanks and the missing annotations are highlighted.

Notation

Within student-facing text, these materials use words rather than symbols to allow students to focus on content instead of translating the meanings of symbols while reading. To increase exposure to different notation, images with information that is given by tick marks or arrows include a caption with the symbolic notation (like $\overline{AB} \cong \overline{CD}$). Teachers are encouraged to use the symbolic notation when recording student responses, since that is an appropriate use of shorthand.

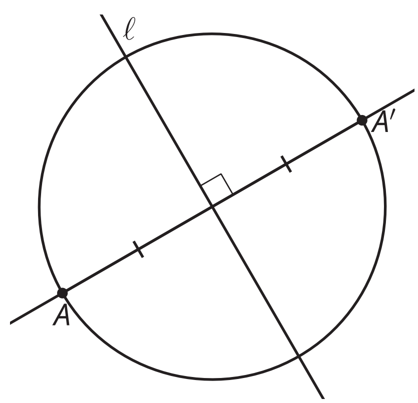
Unit 1: Constructions and Rigid Transformations

This unit begins with constructions, continues to rigid transformations, and concludes with an introduction to proof writing. In grade 8, students determined the angle-preserving and length-preserving properties of rigid transformations experimentally, mostly with the help of a coordinate grid. Students have also previously studied the angle properties that they will prove in this unit.

Constructions play a significant role in the logical foundation of geometry. A focus of this unit is for students to explore properties of shapes in the plane without the aid of given measurements. At this point, students have worked so much with numbers, equations, variables, coordinate grids, and other quantifiable structures that it may come as a surprise just how far they can push concepts in geometry without measuring distances or angles.

At the beginning of the unit, students have the opportunity to move from informal explorations of lines and arcs to generating conjectures and writing justifications based on their constructions. The definition of a circle is an important foundation for concepts in this unit and throughout the course.

Next, students recall transformations from previous grades and learn to create rigid motions using construction tools instead of a grid. This leads to rigorous definitions of rotations, reflections, and translations without reference to a coordinate grid.



Finally, students begin to use the definitions they have learned to prove theorems. They begin to express their reasoning more formally, moving from vague statements (“It looks like . . .”) toward the more formal point-by-point transformation proofs used by mathematicians.

Starting in the second section, a blank reference chart is provided for students, and a completed reference chart is provided for teachers. The reference chart is a resource for students to refer to as they make formal arguments. Students will continue adding to it throughout the course. Refer to the Course Guide for more information.

These materials use words rather than symbolic notation to allow students to focus on the content. By using words, students do not need to translate the meaning of the symbol while reading. To increase exposure to different notations, images with given information marked using ticks, right angle marks, or arrows also have a caption with the symbolic notation ($\overline{AB} \cong \overline{AC}$, $\overline{AB} \perp \overline{AC}$, or $\overline{AB} \parallel \overline{AC}$). Feel free to use the symbolic notation when recording student responses, as that is an appropriate use of shorthand.

Students have the opportunity to choose appropriate tools (MP5) in nearly every lesson as they select among the options in their geometry toolkit as well as dynamic geometry software. For this reason, this math practice is only highlighted in lessons where it's particularly salient.

Section A: Constructions

- Lesson 1: Build It
- Lesson 2: Constructing Patterns
- Lesson 3: Construction Techniques 1: Perpendicular Bisectors
- Lesson 4: Construction Techniques 2: Equilateral Triangles
- Lesson 5: Construction Techniques 3: Perpendicular Lines and Angle Bisectors
- Lesson 6: Construction Techniques 4: Parallel and Perpendicular Lines
- Lesson 7: Construction Techniques 5: Squares
- Lesson 8: Using Technology for Constructions
- Lesson 9: Speedy Delivery

Section B: Defining Rigid Transformations

- Lesson 10: Rigid Transformations
- Lesson 11: Defining Reflections
- Lesson 12: Defining Translations
- Lesson 13: Incorporating Rotations
- Lesson 14: Defining Rotations

Section C: Working with Rigid Transformations

- Lesson 15: Symmetry
- Lesson 16: More Symmetry
- Lesson 17: Working with Rigid Transformations
- Lesson 18: Practicing Point-by-Point Transformations

Section D: Evidence and Proof

- Lesson 19: Evidence, Angles, and Proof
- Lesson 20: Transformations, Transversals, and Proof
- Lesson 21: One Hundred Eighty

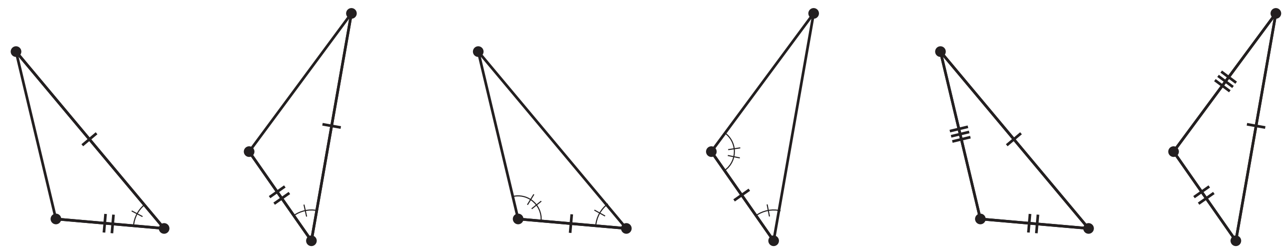
Section E: Let's Put It to Work

- Lesson 22: Now What Can You Build?

Unit 2: Congruence

In this unit, students prove a variety of figures congruent. They start with segments (2 vertices), then triangles (3 vertices), and finally quadrilaterals (4 vertices). Before starting this unit, students are familiar with rigid transformations and congruence from a previous unit. The triangle congruence theorems in this unit lay the foundation for triangle similarity in a subsequent unit.

The first section focuses on establishing congruence. Students recall from middle school that if two figures are congruent, then each pair of corresponding parts of the figures are also congruent. Next, students use rigid transformations to justify the triangle congruence theorems of Euclidean geometry: Side-Side-Side Triangle Congruence, Side-Angle-Side Triangle Congruence, and Angle-Side-Angle Triangle Congruence. Students justify that for each set of criteria, a sequence of rigid motions exists that will take one triangle onto the other.



In a previous unit, students began justifying their responses. In this unit, students write more rigorous proofs. At first, students may use imprecise language to convey their ideas. Throughout the unit they will read examples, practice explaining ideas to a partner, and build a reference of precise statements to use in future proofs. Writing proofs doesn't only mean providing the reasons for someone else's claim, constructing a viable argument includes writing conjectures and detailing given information.

Students write congruence proofs using transformations so the resulting theorems can be used in future work without repeating the argument. Many of the applications students explore involve quadrilaterals. Students will use the theorems they prove about quadrilaterals later in coordinate geometry as they use algebraic methods to prove additional results about quadrilaterals.

Note on materials: For most activities in this unit, students have access to a geometry toolkit that includes many tools that students can choose from strategically: compass and straightedge, tracing paper, colored pencils, and scissors. In some lessons, students will also need access to a ruler and protractor. When students work with quadrilaterals, instructions for making 1-inch strips cut from cardstock with evenly spaced holes are included. These strips allow students to explore dynamic relationships among sides and diagonals of quadrilaterals. Finally, there are some activities that are best done using dynamic geometry software, and these lessons indicate that digital materials are preferred. Students will continue to use and add to their reference charts. The completed reference chart for this unit is provided for teacher reference.

Section A: Congruent Figures

- Lesson 1: Congruent Parts, Part 1
- Lesson 2: Congruent Parts, Part 2
- Lesson 3: Congruent Triangles, Part 1
- Lesson 4: Congruent Triangles, Part 2
- Lesson 5: Points, Segments, and Zigzags

Section B: Triangle Congruence Theorems

- Lesson 6: Side-Angle-Side Triangle Congruence

- Lesson 7: Angle-Side-Angle Triangle Congruence
- Lesson 8: The Perpendicular Bisector Theorem
- Lesson 9: Side-Side-Side Triangle Congruence
- Lesson 10: Practicing Proofs
- Lesson 11: Side-Side-Angle (Sometimes) Congruence

Section C: Proofs about Quadrilaterals

- Lesson 12: Proofs about Quadrilaterals
- Lesson 13: Proofs about Parallelograms
- Lesson 14: Bisect It

Section D: Let’s Put It to Work

- Lesson 15: Congruence for Quadrilaterals

Unit 3: Similarity

In this unit, students explore similar figures as pairs of figures for which one can be taken onto the other through a sequence of rigid transformations and a dilation. The work of this unit expands upon students’ understanding of similarity, previously encountered in grade 8, and their work in an earlier unit on congruence.

The unit begins with an exploration of dilation properties, including the idea that angles are preserved through dilation and lines are taken to themselves or parallel lines depending on the center of dilation. Then students practice using a dilation along with rigid transformations to show that a pair of figures are similar and look for other ways to know that a pair of figures will be similar. The unit then focuses more closely on similar triangles, introducing theorems such as the Angle-Angle Similarity Theorem and connections to the Pythagorean Theorem.

Students focus on writing conjectures and proving them throughout the unit. Students should become more familiar with the process of noticing a pattern, making a conjecture, then looking to find counterexamples or justifying the conjecture with a proof.

Note on materials: For most activities in this unit, students have access to a geometry toolkit that includes tools that students can choose from strategically: compass and straightedge, tracing paper, colored pencils, and scissors. In some lessons, students will also need access to a ruler and a protractor. Students are given access to measuring tools in certain activities, to ensure that their focus during most activities is on logic and reasoning. Using a straightedge without markings on it forces students to attend to attributes of diagrams other than the specific length. In the final section, “Let's Put It to Work,” there are optional activities involving going outside to indirectly measure the heights of tall objects. Students will need measuring tools and may also choose to use speciality materials such as straws or small mirrors. Finally, there are some activities that are best done using dynamic geometry software, and these lessons encourage teachers to prepare to give students access to the digital version of the student materials. Students will continue to use and add to their reference charts. The completed reference chart for this unit is provided for teacher reference.

Section A: Properties of Dilations

- Lesson 1: Scale Drawings
- Lesson 2: Scale of the Solar System
- Lesson 3: Measuring Dilations
- Lesson 4: Dilating Lines and Angles
- Lesson 5: Splitting Triangle Sides with Dilation (Part 1)

Section B: Similarity Transformations and Proportional Reasoning

- Lesson 6: Connecting Similarity and Transformations
- Lesson 7: Reasoning about Similarity with Transformations
- Lesson 8: Are They All Similar?
- Lesson 9: Conditions for Triangle Similarity
- Lesson 10: Other Conditions for Triangle Similarity
- Lesson 11: Splitting Triangle Sides with Dilation (Part 2)
- Lesson 12: Practice with Proportional Relationships

Section C: Similarity in Right Triangles

- Lesson 13: Using the Pythagorean Theorem and Similarity
- Lesson 14: Proving the Pythagorean Theorem
- Lesson 15: Converse of the Pythagorean Theorem
- Lesson 16: Finding All the Unknown Values in Triangles

Section D: Let's Put It to Work

- Lesson 17: Reflection Similarity

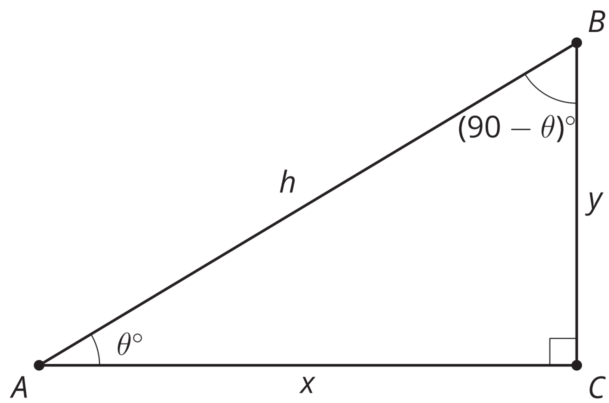
Unit 4: Right Triangle Trigonometry

In this unit students build an understanding of ratios in right triangles, which leads to naming cosine, sine, and tangent as trigonometric ratios.

Prior to beginning this unit, students will have considerable familiarity with right triangles and similarity. They learned to identify right triangles in grade 4. Students studied the Pythagorean Theorem in grade 8, and used similar right triangles to build the idea of slope. This unit builds on this extensive experience and grounds trigonometric ratios in familiar contexts.

Several concepts build throughout the unit. Students begin by using similar triangles to create a table of ratios of the side lengths in right triangles. At first, their table includes only the bottom rows of the table shown here. Taking the time to both build and use the table helps students construct a solid foundation before they learn the names of trigonometric ratios.

	cosine	**sine**	**tangent**
angle	adjacent leg ÷ hypotenuse	opposite leg ÷ hypotenuse	opposite leg ÷ adjacent leg
25°	0.906	0.423	0.466
65°	0.423	0.906	2.145



Students notice patterns between the columns for cosine and sine before they first hear the terms “cosine” and “sine.” In a subsequent lesson they investigate that relationship, proving the two ratios are equal for complementary angles. Finding the measures of acute angles in a right triangle follows a similar arc, where students first use the table to estimate and then in a subsequent lesson learn how to calculate an angle measure given the side measures by using arcsine, arccosine, and arctangent.

As students measure side lengths and compute ratios, there is an opportunity to discuss precision. In this unit, students will round side lengths to the nearest tenth and angle measures to the nearest degree in most cases. When students solve problems in context they grapple with whether or not their answer is reasonable, as well as the appropriate degree of precision to report.

Students will continue to use and add to their reference charts. The completed reference chart for this unit is provided for teacher reference.

Section A: Angles and Steepness

- Lesson 1: Angles and Steepness
- Lesson 2: Half a Square
- Lesson 3: Half an Equilateral Triangle
- Lesson 4: Ratios in Right Triangles
- Lesson 5: Working with Ratios in Right Triangles

Section B: Defining Trigonometric Ratios

- Lesson 6: Working with Trigonometric Ratios
- Lesson 7: Applying Ratios in Right Triangles
- Lesson 8: Sine and Cosine in the Same Right Triangle
- Lesson 9: Trigonometry Squared
- Lesson 10: Using Trigonometric Ratios to Find Angles

Section C: Let’s Put It to Work

- Lesson 11: Solving Problems with Trigonometry
- Lesson 12: Approximating Pi

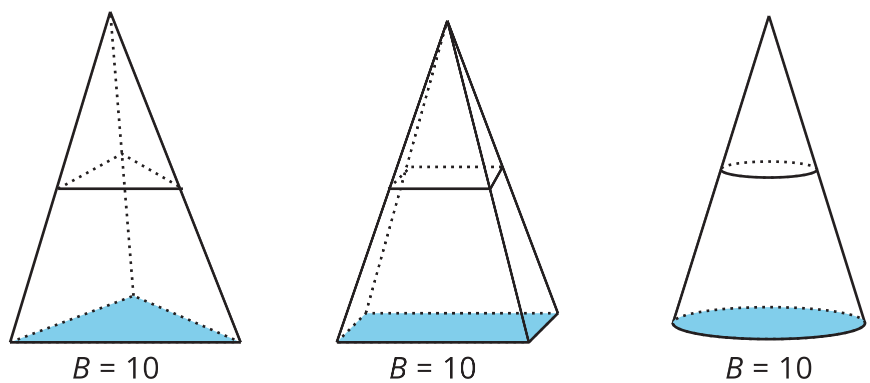
Unit 5: Solid Geometry

In this unit, students practice spatial visualization in three dimensions. They sketch cross-sections, study dilations, derive volume formulas, and apply their understandings to solve problems.

In previous grades, students studied multiple aspects of solids. In grade 6, they started calculating surface areas and volumes of right rectangular prisms. They extended this understanding to the volume and surface area of right prisms in grade 7, and to that of spheres, cones, and cylinders in grade 8. Students also described cross-sections of three-dimensional figures in grade 7.

In future courses, the visualization skills developed in this unit will be applicable when using calculus to compute volumes or when using linear algebra in three or more dimensions.

Students begin the unit by examining solids of rotation and cross-sections of a variety of solids. They make a connection between cross-sections and dilation to see that cross-sections of a pyramid may be viewed as dilations of the base for scale factors between 0 and 1. Later in the unit they learn Cavalieri's Principle: Suppose two solids have equal heights. If at all distances from the base, the cross-sections of the two solids have equal areas, then the solids have equal volumes. Combining the concepts of dilations, cross-sections, and Cavalieri's Principle with dissection allows students to derive the volume formulas for a pyramid or cone.



When students establish that dilating by a scale factor of k multiplies areas by k^2 and volumes by k^3, it provides an opportunity to use square root and cube root graphs to illustrate the relationship between scaled area or volume and scale factors. While this unit is the primary opportunity to study root functions, students will continue to graph functions and interpret the meaning of points, coefficients, and constants in future courses.

In this unit, students may assume that cylinders or prisms that appear to be oblique are indeed oblique, and those that appear to be right are right. For right cylinders and prisms, right angles will not be marked to indicate that the bases are at right angles to the lateral surfaces. Unless otherwise stated, all responses given in decimal form are rounded to the nearest tenth.

Students will continue to use and add to their reference charts. The completed reference chart for this unit is provided for teacher reference.

Section A: Cross-Sections, Scaling, and Area

- Lesson 1: Solids of Rotation
- Lesson 2: Slicing Solids
- Lesson 3: Creating Cross-Sections by Dilating
- Lesson 4: Scaling and Area
- Lesson 5: Scaling and Unscaling

Section B: Scaling Solids

- Lesson 6: Scaling Solids
- Lesson 7: The Root of the Problem
- Lesson 8: Speaking of Scaling

Section C: Prism and Cylinder Volumes

- Lesson 9: Cylinder Volumes
- Lesson 10: Cross-Sections and Volume
- Lesson 11: Prisms Practice

Section D: Understanding Pyramid Volumes

- Lesson 12: Prisms and Pyramids
- Lesson 13: Building a Volume Formula for a Pyramid
- Lesson 14: Working with Pyramids
- Lesson 15: Putting All the Solids Together

Section E: Let's Put It to Work

- Lesson 16: Surface Area and Volume
- Lesson 17: Volume and Density
- Lesson 18: Volume and Graphing

Unit 6: Coordinate Geometry

Prior to beginning this unit, students will have spent most of the course studying geometric figures not described by coordinates. However, students have seen figures on the grid (notably transformations in grade 8) as well as lines and curves on the coordinate plane (in previous courses). This unit brings together students' experience from previous years with their new understanding from this course for an in-depth study of coordinate geometry.

The first few lessons examine transformations in the plane. Students encounter a new coordinate transformation notation that connects transformations to functions. Students transform figures using rules such as $(x, y) \rightarrow (x + 3, y + 1)$ and connect the geometric definitions of reflections and dilations to coordinate rules that produce them. They prove that objects are similar or congruent, using reasoning including distance (via the Pythagorean Theorem), angles (calculated using trigonometry), and definitions of transformations.

The next set of lessons focuses on building equations from definitions. Students examine circles and parabolas through the lens of distance. A circle is the set of points the same distance from a given center, and a parabola is the set of points equidistant from a given point (the focus) and line (the directrix). Based on these definitions, students develop a general equation for a circle, and they write equations that represent specific parabolas.

The unit progresses next to coordinate proof. Students build the point-slope form of the equation of a line. They then write and prove conjectures about slopes of parallel and perpendicular lines, applying concepts of transformations in the proofs. They apply these ideas to other proofs, such as classifying quadrilaterals, and they use graphs to solve simple systems of equations that include a linear equation and a quadratic equation.

At the end of the unit, students use weighted averages to partition segments, scale figures, and locate the intersection points of the medians of a triangle. Students locate the intersection points of the altitudes of a triangle. Then there are several optional activities that offer diverging paths toward the Euler line or toward practicing equations of lines through constructing and describing tessellations.

In the final lesson, students apply their understanding of slope and distances in a plane, as they explore the Nazca lines in a real-world situation.

In the images in this unit, students may assume that a point that appears to be the center of a circle is indeed the true center. Students will continue to use and add to their reference charts. The completed reference chart for this unit is provided for teacher reference.

Section A: Transformations in the Plane

- Lesson 1: Rigid Transformations in a Plane
- Lesson 2: Transformations as Functions
- Lesson 3: Types of Transformations

Section B: Distances, Circles, and Parabolas

- Lesson 4: Distances and Circles
- Lesson 5: Squares and Circles
- Lesson 6: Completing the Square
- Lesson 7: Distances and Parabolas
- Lesson 8: Equations and Graphs

Section C: Proving Geometric Theorems Algebraically

- Lesson 9: Equations of Lines
- Lesson 10: Parallel Lines in the Plane
- Lesson 11: Perpendicular Lines in the Plane
- Lesson 12: It’s All on the Line
- Lesson 13: Intersection Points
- Lesson 14: Coordinate Proof
- Lesson 15: Weighted Averages
- Lesson 16: Weighted Averages in a Triangle
- Lesson 17: Lines in Triangles

Section D: Let’s Put It to Work

- Lesson 18: Applying Area and Perimeter on the Plane

Unit 7: Circles

In this unit, students investigate the geometry of circles more closely. In grade 7, students used formulas for the area and circumference of a circle to solve problems. Earlier in this course, students made formal geometric constructions, studied similarity and proportional reasoning, and proved theorems about lines and angles. This unit builds on these skills and concepts. In Algebra 2, the concepts learned in this unit will be helpful as students connect the unit circle to trigonometric functions.

Students define the terms “chord,” “arc,” and “central angle” before observing that inscribed angles are half the measure of their associated central angles, and writing related proofs about congruent chords and similar triangles. Throughout this unit, students also construct lines tangent to circles and use their proofs that a tangent line is perpendicular to the radius drawn to the point of tangency.

Next, students prove properties of cyclic quadrilaterals, and they use their understanding of perpendicular bisectors from a previous unit to construct triangles with circumscribed circles and define “circumcenter.” Students then use angle bisectors to construct incenters of triangles and circles inscribed in triangles.

In the next section, students develop methods for calculating sector areas and arc lengths, and then students define “radian measure of a central angle” as the quotient of the length of the arc defined by the angle and the radius of the circle. They develop fluency with radian measures by shading portions of circles and working with a double number line.

In the final lesson, students apply what they have learned about circles to solve problems in context.

In this unit, students will do several constructions. A particular choice of construction tools is not necessary. Paper folding and straightedge and compass moves are both acceptable methods.

Students will continue to use and add to their reference charts. The completed reference chart for this unit is provided for teacher reference.

Section A: Lines, Angles, and Circles

- Lesson 1: Lines, Angles, and Curves
- Lesson 2: Inscribed Angles
- Lesson 3: Tangent Lines

Section B: Polygons and Circles

- Lesson 4: Quadrilaterals in Circles
- Lesson 5: Triangles in Circles
- Lesson 6: A Special Point
- Lesson 7: Circles in Triangles

Section C: Measuring Circles

- Lesson 8: Arcs and Sectors
- Lesson 9: Part to Whole
- Lesson 10: Angles, Arcs, and Radii
- Lesson 11: A New Way to Measure Angles
- Lesson 12: Radian Sense
- Lesson 13: Using Radians

Section D: Let’s Put It to Work

- Lesson 14: Putting It All Together

Unit 8: Conditional Probability

In this unit, students extend their understanding of probability, sample spaces, and events from their introduction in grade 7. The chance experiments under consideration have multiple parts, such as rolling a number cube and then flipping a coin—allowing events within the sample space to be considered in new ways.

The unit begins with students creating different models for understanding sample spaces and probability. The models include tables, trees, lists, and Venn diagrams. Venn diagrams allow students to visualize various subsets of the sample space, such as “A and B,” “A or B,” or “not A.” Tables help students determine the probability of those subsets occurring, and support students’ understanding of the Addition Rule, $P(\text{A or B}) = P(\text{A}) + P(\text{B}) - P(\text{A and B})$.

Conditional probability is discussed and applied using several games and connections to everyday situations. In particular, the Multiplication Rule $P(\text{A and B}) = P(\text{A} \mid \text{B}) \cdot P(\text{B})$ is used to determine conditional probabilities. Conditional probability leads to a study of independence of events. Students describe independence using everyday language and use the equations $P(\text{A} \mid \text{B}) = P(\text{A})$ and $P(\text{A and B}) = P(\text{A}) \cdot P(\text{B})$ when events A and B are independent.

The unit closes with students making conjectures about the independence of events, when playing games with one another, and then testing those conjectures by collecting data and analyzing the results.

Section A: Up to Chance

- Lesson 1: Up to Chance
- Lesson 2: Playing with Probability
- Lesson 3: Sample Spaces
- Lesson 4: Tables of Relative Frequencies
- Lesson 5: Combining Events
- Lesson 6: The Addition Rule

Section B: Related Events

- Lesson 7: Related Events
- Lesson 8: Conditional Probability
- Lesson 9: Using Tables for Conditional Probability
- Lesson 10: Using Probability to Determine Whether Events Are Independent

Section C: Let's Put It to Work

- Lesson 11: Probabilities in Games

Pacing Guide

Number of days includes assessments. Upper bound of range includes optional lessons.
Time for modeling prompts is not included.

week 1, week 2, week 3, week 4, week 5, week 6, week 7, week 8, week 9, week 10, week 11, week 12, week 13, week 14, week 15, week 16, week 17, week 18, week 19, week 20, week 21, week 22, week 23, week 24, week 25, week 26, week 27, week 28, week 29, week 30, week 31

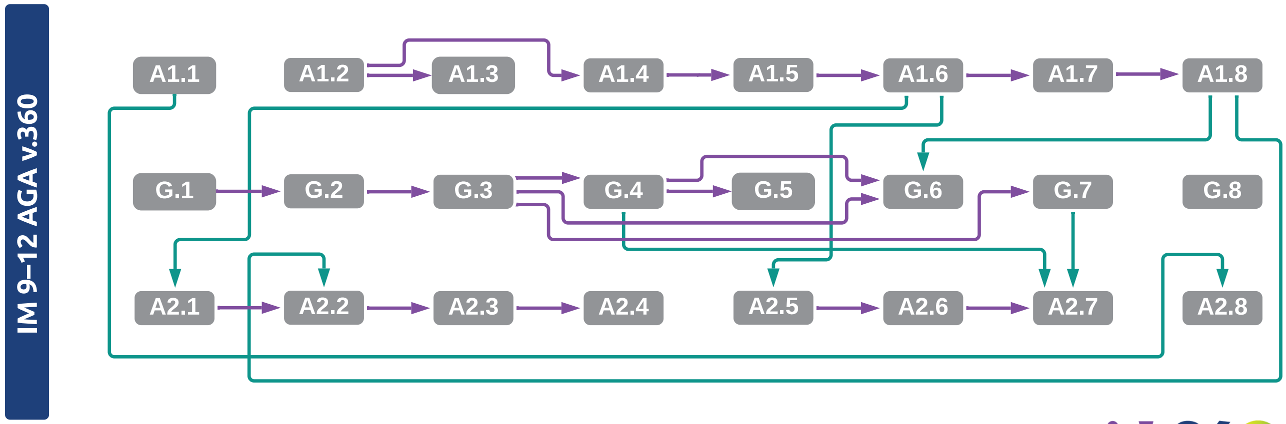
Algebra 1	Geometry	Algebra 2
Unit 1 One-variable Statistics 13–18 days Optional Lessons: 2, 5, 6, 7, 8	Unit 1 (MA) Constructions and Rigid Transformations 22–25 days Optional Lessons: 8, 18, 22	Unit 1 Sequences and Functions 12–13 days Optional Lesson: 4
Unit 2 Linear Equations and Systems 16–21 days Optional Lessons: 2, 4, 5, 18, 19	Unit 2 Congruence 16–17 days Optional Lesson: 11	Unit 2 Polynomials 17 days Optional Lessons: none
Unit 3 Two-variable Statistics 11–12 days Optional Lesson: 10	Unit 3 Similarity 16–19 days Optional Lessons: 2, 10, 12	Unit 3 Rational Functions & Identities 13 days Optional Lessons: none
Unit 4 Linear Inequalities and Systems 11 days Optional Lessons: none	Unit 4 Right Triangle Trigonometry 12–14 days Optional Lessons: 2, 3	Unit 4 Complex Nums & Rat Exponents 15–22 days Optional Lessons: 1, 2, 9, 14, 16, 19, 20
Unit 5 (MA) Functions 21 days Optional Lessons: none	Unit 5 Solid Geometry 20 days Optional Lessons: none	Unit 5 (MA) Exponential Functions and Equations 18–21 days Optional Lessons: 2, 7, 18
Unit 6 (MA) Introduction to Exponential Functions 22–24 days Optional Lesson: 13, 14	Unit 6 Coordinate Geometry 20 days Optional Lessons: none	Unit 6 Transformations of Functions 16–17 days Optional Lessons: 14
Unit 7 (MA) Introduction to Quadratic Functions 17–20 days Optional Lesson: 13, 14, 16	Unit 7 Circles 16 days Optional Lessons: none	Unit 7 (MA) Trigonometric Functions 22–23 days Optional Lessons: 13
Unit 8 (MA) Quadratic Equations 26–27 days Optional Lessons: 18	Unit 8 Conditional Probability 11–13 days Optional Lessons: 1, 11	Unit 8 (MA) Statistical Inferences 17–18 days Optional Lesson: 4

(MA) = Unit has Mid-Unit Assessment

Total number of days = Lessons + Assessments – Optional Lessons

Algebra 1 = 137, Geometry = 133, Algebra 2 = 130

Dependency Chart



In the unit dependency chart, an arrow indicates that a particular unit is designed for students who already know the material in a previous unit. Reversing the order of the units would have a negative effect on mathematical or pedagogical coherence. For example, there is an arrow from A1.6 to A1.7, because when quadratic functions are introduced, they are contrasted with exponential functions, assuming that students are already familiar with exponential functions.

The following chart shows unit dependencies between 6–8 and Algebra 1.