



# MATHEMATICS CURRICULUM MAP

## 8th Grade Geometry

(Geometry Pathway)

August 2022

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**Deerfield Public Schools District 109**  
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**Grade 8 Geometry: Year at a Glance**Reference Resources: *Holt Geometry* (ISBN: 0030995752), *Geometry for Enjoyment and Challenge* (ISBN: 0-86609-965-4), and *McDougal Littell Geometry***Quarter 1**

<b>Unit</b>	<b>Resource Alignment</b>
Foundations for Geometry	<i>Holt Geometry</i> Chapter 1
Extending Perimeter, Circumference, and Area	<i>Holt Geometry</i> Chapter 9 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
Geometric Reasoning	<i>Holt Geometry</i> Chapter 2 and supplemental material from <i>Geometry for Enjoyment and Challenge</i> .
Parallel and Perpendicular Lines	<i>Holt Geometry</i> Chapter 3 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>

**Quarter 2**

<b>Unit</b>	<b>Resource Alignment</b>
Triangle Congruence	<i>Holt Geometry</i> Chapter 4 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
Properties and Attributes of Triangles	<i>Holt Geometry</i> Chapter 5 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
Polygons and Quadrilaterals	<i>Holt Geometry</i> Chapter 6 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>

**Quarter 3**

<b>Unit</b>	<b>Resource Alignment</b>
Similarity	<i>Holt Geometry</i> Chapter 7 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
Extending Transformational Geometry	<i>Holt Geometry</i> Chapter 12 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
Right Triangles and Trigonometry	<i>Holt Geometry</i> Chapter 8 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>

Spatial Reasoning	<i>Holt Geometry</i> Chapter 10 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
<b>Quarter 4</b>	
<b>Unit</b>	<b>Resource Alignment</b>
Circles	<i>Holt Geometry</i> Chapter 11 and supplemental material from <i>Geometry for Enjoyment and Challenge</i>
Probability	<i>Big Ideas Algebra 2</i> - chapter 12

## COMMON CORE STANDARDS - GRADE 8-GEOMETRY

### Congruence (CO)

G.CO.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
G.CO.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
G.CO.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G.CO.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
G.CO.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
G.CO.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
G.CO.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
G.CO.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
G.CO.9	Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.
G.CO.10	Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.
G.CO.11	Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect

	each other, and conversely, rectangles are parallelograms with congruent diagonals.
G.CO.12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.
G.CO.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

### **Similarity, Proof, and Trigonometry (SRT)**

G.SRT.1	Verify experimentally the properties of dilations given by a center and a scale factor. a. A dilation take a line not passing through the center of the dilation to a parallel line and leaves a line passing through the center unchanged. b. The dilation of a line segment is longer or shorter given in the ratio given by a scale factor.
G.SRT.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
G.SRT.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
G.SRT.4	Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally and conversely; the Pythagorean Theorem proved using triangle similarity.
G.SRT.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
G.SRT.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G.SRT.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
G.SRT.9	(+) Derive the formula $A = \frac{1}{2} ab \sin C$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
G.SRT.10	(+) Prove the Laws of Sines and Cosines and use them to solve problems.
G.SRT.11	(+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

### **Modeling with Geometry (MG)**

G.MG.1	Use geometric shapes, their measures, and their properties to describe objects, (e.g. modeling a tree trunk or a human torso as a cylinder) *
G.MG.2	Apply concepts of density based on area and volume in modeling situation (e.g., persons per square mile, BTUs per cubic foot )*

G.MG.3	Apply geometric methods to solve design problems (e.g, designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios.
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### **Geometric Measurement and Dimension (GMD)**

G.GMD.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle and informal limit arguments.
G.GMD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
G.GMD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

### **Expressing Geometric Properties with Equations (GPE)**

G.GPE.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
G.GPE.4	Use coordinates to prove simple geometric theorems algebraically. For example; prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$ .
G.GPE.5	Prove the slope criteria for parallel and perpendicular lines and uses them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
G.GPE.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
G.GPE.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

### **Circles (C)**

G.C.1	Prove that all circles are similar.
G.C.2	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
G.C.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
G.C.4	(+) Construct a tangent line from a point outside a given circle to the circle.
G.C.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

## **Conditional Probability and the Rules of Probability (CP)**

S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or”, “and”, “not”)
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
S.CP.3	Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$ , and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
S.CP.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.
S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
S.CP.6	Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A, and interpret the answer in terms of the model.
S.CP.7	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.
S.CP.8	(+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B/A) = P(B)P(A/B)$ , and interpret the answer in terms of the model.
S.CP.9	(+) Use permutations and combinations to compute probabilities of compound events and solve problems.

## **Using Probability to Make Decisions (MD)**

S.MD.6	(+) Use probabilities to make fair decisions(e.g, drawing by lots, using a random number generator).
S.MD.7	(+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

## **Standards for Mathematical Practice**

- 1. Make sense of problems and persevere in solving them.** Students demonstrate their ability to persevere by selecting a modality to begin representing their understanding (i.e. manipulatives, pictures). They can work collaboratively to represent their measurements or quantities and discuss their representations.
- 2. Reason abstractly and quantitatively.** Students will demonstrate their abstract and quantitative reasoning by estimating lengths

and then refining their estimates based upon new information. They also demonstrate reasoning by explaining indirect measurements. They need to use measurement units correctly—understanding that the smaller the unit, the more units you need to measure a given object.

- 3. Construct viable arguments and critique the reasoning of others.** Students will explain why they chose to represent a quantity or measurement in a particular way. They will also listen to each other and explain what their peers have said.
- 4. Model with mathematics.** In this unit, students are asked to transfer between manipulative, number line, drawings and other visual representations. They are asked to explain in words how their visuals are representing measurements or quantities.
- 5. Use appropriate tools strategically.** Students demonstrate their ability to use non-standard measurement units to measure lengths of objects. They need to select the correct tools and know when a number line is an appropriate representation.
- 6. Attend to precision. Students demonstrate precision by using comparison language appropriately to describe their measurements and quantities.** They count precisely to measure accurately.
- 7. Look for and make use of structure.** Students demonstrate the ability to use structure in their graphs, ten frames and on the 120 chart. Students can use these structures to explain the patterns and answer questions about measurements and quantities.
- 8. Look for express regularity in repeated reasoning.** When students note patterns on, and can use the 10 frames, 120 chart and graphs to solve problems or create new representations, they are using their repeated reasoning.