Geometry

Holt Public Schools Vision Statement for K-12 Mathematics Instruction:

We believe students in mathematics in Holt Public Schools need a productive disposition towards mathematics and to view themselves as confident mathematicians. In order to build this disposition, students will gain strong conceptual knowledge that then supports development of their procedural skills. Students will make sense of problems and persevere in solving them. In those problems, students will model and reason abstractly and quantitatively. Students will construct viable arguments and critique the reasoning of others.

Math

Tiered Philosophy

In Holt Public Schools, we believe all students are able to become capable mathematicians. We recognize that this does not happen at the same pace for all students, so some students, at various times, will need additional support to be successful. Because we value all students experiencing rigorous math classes with their peers, the support students receive will be in addition to their regular, at-level math course. By increasing the amount of time students engage with mathematics during the day, we are able to help students close existing knowledge gaps that hinder success with their grade level course work, see connections between mathematical ideas, deepen their understanding of current and prior knowledge, and develop a positive mathematical identity.

According to Dr. Rebecca Sarlo, Tier 2 supports and interventions at the secondary level "should be designed to support student success with core instructional content (2014)." The supports should address knowledge or gaps that are more relevant to the current core instruction students are receiving. In addition to supporting students' acquisition of mathematical concepts, students also build their efficacy at being a successful mathematics student. This happens through increasing engagement through goal setting, high quality and high frequency feedback, and students monitoring their own progress.

Students who receive this support at grades 7-9 typically have some gaps in their prior knowledge or underdevelopment of some mathematical habits of mind that will be problematic for future success. Students are identified using data points such as prior course failures, common unit test or exam scores, unit screeners, or teacher recommendation. By utilizing the mathematic support classes, students are engaged in mathematics for more minutes during the day than their peers, which helps to close knowledge gaps. The class sizes are smaller so students receive more frequent teacher feedback. Students engage in the mathematical practice standards and collaborate with their peers in order to become more confident in themselves as capable and successful mathematicians. Teachers organize learning opportunities for students to build their mathematical habits of exploring ideas, orienting/organizing, thinking in reverse, representing, justifying, generalizing, checking for reasonableness, and using mathematical language (Horn 2012). In order to provide these experiences, instruction is not of an "I do, we do, you do" type model.

According to Rollins (2014), support that is remediation of prior content that is not relevant to what the student is expected to do in their current math class only keeps that student behind. She advocates for addressing past conceptual and procedural knowledge gaps connected to the new learning expected students experience in their grade level math class. As a result, the learning opportunities teachers provide are centered on mathematical content that is prerequisite knowledge for what students need to be successful in their core class in real time. This helps students engage in the core instruction with their peers rather than falling further behind and waiting to catch up.

Below are student experiences and related teacher knowledge or actions from literature on best mathematical teaching practices. The resources used to compile this were:

- *Small Steps, Big Changes*, Confer and Ramirez (2012)
- *Principles to Actions*, National Council of Teachers of Mathematics (2014)
- *Adding It Up*, National Research Council (2001)
- *Strength in Numbers*, Horn (2012)

We believe all students need to understand the following expectations and engage in these actions at all grades:

Student experiences	Related teacher knowledge or actions
Students justify their mathematical arguments and critique those of others.	• Teachers keep the complexity of authentic learning tasks • Teachers anticipate and use students' errors and misconceptions as learning opportunities • Teachers facilitate a high level of student discourse, probe student thinking through purposeful questions, and ask students to justify • Teachers have multiple mathematical representations and strategies to help support students in making connections between their mathematical ideas and those of others
Students apply multiple strategies.	• Teachers have a strong understanding of the mathematics they teach and how it connects: concepts, procedures, representations, strategies, language • Teachers gather evidence of knowledge during instruction and use assessment data strategically to help students refine their mathematical knowledge and support building connections between ideas.
Students write, talk about, and present their mathematical ideas.	• Teachers facilitate students making connections between mathematical ideas • Teachers anticipate common mathematical errors and misconceptions, and when students make these, use them as learning opportunities • Teachers facilitate a high level of student discourse, probe student thinking through purposeful questions, and ask students to justify
Students engage in solving mathematical problems with peers.	• Teachers keep the complexity of authentic learning tasks • Teachers build interdependence among students by facilitating group work and having norms.
Students engage in productive struggle and persevere.	• Teachers have a strong understanding of the mathematics they teach and how it connects (concepts, procedures, representations, strategies, language) in order to facilitate a productive struggle • Teachers keep the complexity of authentic learning tasks to promote productive struggle • Teachers facilitate a high level of student discourse, probe student thinking through purposeful questions, and ask students to justify • Teachers anticipate prior knowledge and common possible ways students will attempt a problem while planning in order to know entry points into the problems and suggestions of prior knowledge that

	will help students progress through complex tasks.
Students solve complex problems with multiple solution paths.	• Teachers have a strong understanding of the mathematics they teach and how it connects (concepts, procedures, representations, strategies, language) to allow multiple solution paths • Teachers have multiple mathematical representations and strategies to help teach students • Teachers keep the complexity of authentic learning tasks so there are multiple solution paths • Teachers gather evidence of knowledge during instruction and use assessment data strategically in order to facilitate students seeing a robust set of solution paths
Students create and use visual models and multiple representations.	• Teachers have a strong understanding of the mathematics they teach and how it connects (concepts, procedures, representations, strategies, language) to allow multiple representations • Teachers keep the complexity of authentic learning tasks
Students are self-assessing based on learning goals. Related to students use metacognitive strategies to know when to adjust their learning strategies in relation to learning goals.	• Teachers anticipate common mathematical errors and misconceptions, and when students make these, use them as learning opportunities • Teachers differentiate, when appropriate, for students who are struggling as well as those who need additional challenges
Students value mathematics.	• Teachers facilitate a high level of student discourse, probe student thinking through purposeful questions, and ask students to justify to provide multiple opportunities for students to see value in multiple aspects of mathematics • Teachers differentiate, when appropriate, for students who are struggling as well as those who need additional challenges
Students believe in their own efficacy.	• Teachers facilitate a high level of student discourse, probe student thinking through purposeful questions, and ask students to justify to provide multiple opportunities for students to grow their efficacy • Teachers gather evidence of knowledge during instruction and use assessment data strategically in order to provide support to students • Teachers differentiate, when appropriate, for students who are struggling as well as those who need additional challenges • Teachers anticipate prior knowledge and common possible ways students will attempt a problem while planning in order to support all students at being successful in mathematics
Students will make connections based on **conceptual** understandings.	• Teachers have a strong understanding of the mathematics they teach and how it connects: concepts, procedures, representations, strategies, language • Teachers facilitate students making connections between mathematical ideas • Teachers have multiple mathematical representations and strategies to help teach students • Teachers anticipate prior knowledge and common possible ways students will attempt a problem while planning

Students make connections between multiple representations.	• Teachers have a strong understanding of the mathematics they teach and how it connects: concepts, procedures, representations, strategies, language • Teachers have multiple mathematical representations and strategies to help teach students • Teachers facilitate students making connections between mathematical ideas in order to connect conceptual understandings to procedural knowledge and connections across mathematical ideas • Teachers anticipate prior knowledge and common possible ways students will attempt a problem while planning in order to identify the connections students should see

Geometry course overview

Geometry is typically a ninth grade course, although there is flexibility regarding when the student takes the course. This course extends the knowledge of the students from their K-8 geometry experience. Students begin by investigating concrete, measurable objects they are familiar with from their K-8 experience. They extend their prior knowledge of right triangles to trigonometric ratios to non-right triangles and then use this to find areas and volumes for shapes they didn't have the tools to find before. They then use these to optimize design problems. Students then move into more abstract situations without knowing exact measurements and use properties of shapes related to size and measurement to make comparisons. A more formal structure of proof is introduced. Students formalize their justification into mathematical proofs. Students begin to use properties, rather than physical measurements, to justify congruence and similarity.

Approximate learning timeline

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun

Triangle trigonometry	Area	Volume	Constructions, lines and angles, proof	Transformations and proof	Congruence and similarity	Circles
Pythagorean Theorem, right triangle trigonometry ratios, Law of Sines and Law of Cosines	2-dimensional area: comparing areas of similar figures, finding areas of complex shapes, areas of shapes on coordinate grids, areas of regular polygons incorporating trigonometry, surface area.	Compute volumes of shapes, including those generated by spinning a 2D shape around an axis. Use their knowledge to work optimization design problems using volume and surface area.	Use constructions to create shapes and lines with given properties; use properties of angles in proofs	Transformations on and off the coordinate plane; explore initial ideas of congruence and similarity based in constructions and previously proven properties; prove properties of linear equations (parallel and perpendicular lines' slopes)	Prove congruence and similarity properties for triangles and quadrilaterals	Extend idea of similarity to circles; construct circles and additional properties to prove theorems involving circles; use theorems to solve problems; derive the equation of a circle

Geometry

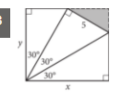
***Callie notes in green*. Blue highlighting on "Proficiency level" indicates drafted by Callie and needs proofing/editing.**

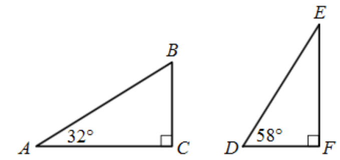
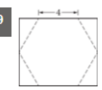
Unit: Triangle Trig

**Department needs to discuss this.

Proficiency level	Standard: **G.SRT.8?** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient	Use Pythagorean Theorem to find distance between two points		
Developing			
Beginning			

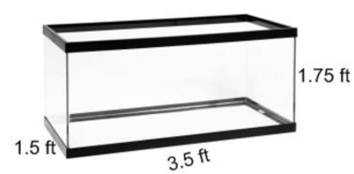
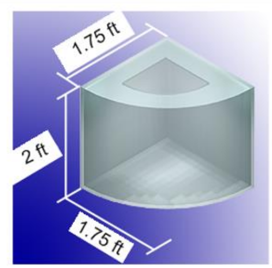
Without seeing assessment questions, I'm not clear on how this is different from the 8th grade standard. Callie would suggest that whatever expectations are in this need to be part of the 1 for the G.SRT.8 goal below. Reference the 8th grade scales on Pythagoras.

Proficiency level	Standard: **G.SRT.8** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. **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.	HPS assessment question	SAT assessment question and strand aligned to
Advanced	Use right triangle trig ratios and Pythagorean Theorem to solve multi-step problems; relate properties of trig ratios to each other and their values (G.SRT.7)		28  The figure above shows that the shaded triangular region with a hypotenuse of 5 centimeters (cm) has been removed from a rectangular tile with dimensions *x* cm by *y* cm. Of the following, which best approximates the area, in square centimeters, of the tile <u>before</u> the piece was removed? A. 15 B. 43 C. 50 D. 65

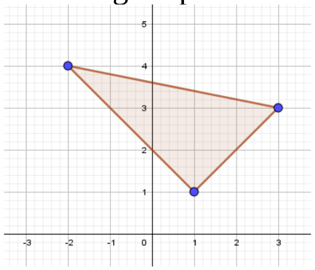
			16  Triangles *ABC* and *DEF* are shown above. Which of the following is equal to the ratio $\frac{BC}{AB}$? A. $\frac{DE}{DF}$ B. $\frac{DF}{DE}$ C. $\frac{DF}{EF}$ D. $\frac{EF}{DE}$
Proficient	Use right triangle trig ratios to find missing sides and angles in triangles in mathematical and real-world contexts.	Benny is flying a kite directly over his friend Frank, who is 125 meters away. When he golds the kite string down to the ground, the string makes a 39 degree angles with the level ground. How high is the kite?	29  Thomas is making a sign in the shape of a regular hexagon with 4-inch sides, which he will cut out from a rectangular sheet of metal, as shown in the figure above. What is the sum of the areas of the four triangles that will be removed from the rectangle? A. $8\sqrt{3}$ B. $8\sqrt{2}$ C. $4\sqrt{2}$ D. 16
Developing	Use right triangle trig ratios to find missing sides or angles in triangles.		
Beginning	Identify which trig ratio to use based on given information for a triangle; determine appropriate sides and angles for a specific trig ratio		

Proficiency level	Standard: **G.SRT.10 (+)** Prove the Law 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 measurement in right and non-right triangles (e.g. surveying problems, resultant forces).	HPS assessment question	SAT assessment question and strand aligned to **Not assessed**
Advanced	Use Law of Sines or Law of Cosines to solve a multi-step problem.		
Proficient	Use Law of Sines and Law of Cosines to find missing side lengths and angles in mathematical and real-world situations.	Two ships leave port at the same time and sail on straight paths making an angle of 60° with each other. How far apart are the ships at the end of 2 hour if the speed of one ship is 25 km/hour and that of the other is 15 km/hour?	
Developing	Use Law of Sines or Law of Cosines to find missing side lengths or angles		
Beginning	Identify which law to use based on given information for a triangle.		

Unit: Area

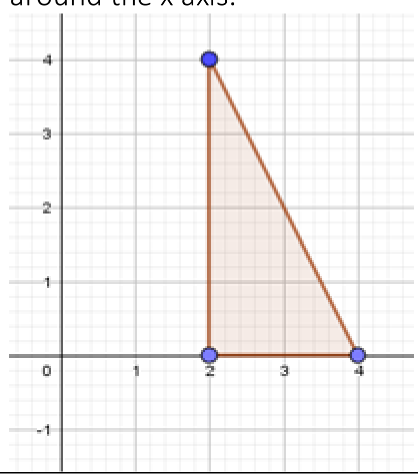
Proficiency level	Standard: **G.MG.3** Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	HPS assessment question	SAT assessment question and strand aligned to **Not assessed**
Advanced	Answer design problems where both surface area and volume need to be analyzed and incorporated into the decision.		
Proficient	Answer design problems involving surface area or volume	Mr. Sullivan is thinking about putting together two new fish tanks. One salt water and one fresh. He has enough water to fill both, but only 575 lbs. of salt to make salt water. You know in order to achieve the right concentration of salt per water the following ratio must be achieved. $1.026 = \frac{Pounds\ of\ salt}{Pounds\ of\ water}$ You also know that 1 cubic foot of water = 62.458 lbs. of water. Decide which tank should be salt and which should be fresh. Justify your choice. Standard Rectangular Prism Tank  Quarter Cylinder Corner Tank 	
Developing	Given a shape, find the surface area and volume		
Beginning	Find areas of 2D shapes		

	(circles and polygons)		

Proficiency level	Standard: **G.GPE.7** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	HPS assessment question	SAT assessment question and strand aligned to **Not assesssed**
Advanced			
Proficient	Find the area and perimeter of 2-dimensional polygons on or off a coordinate plane. Use appropriate information to find missing dimensions given the area.	Find the area and perimeter of the following shape. 	
Developing			
Beginning			

The SAT questions feel like they'd fit with this goal if this were couched in with the triangle trig stuff. Without seeing questions There's a standard about finding perimeters on a coordinate grid (G.GPE.7).

Proficiency level	Standard: **What standard is this aligned to?**	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient	Compare areas of similar 2D figures	Cut from non honors course	
Developing			
Beginning			

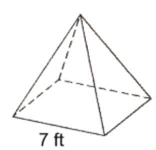
Proficiency level	Standard: **G.GMD.4** Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	HPS assessment question	SAT assessment question and strand aligned to **Not assessed on the SAT**
Advanced	Find the surface area of 3-dimensional figures created from rotating 2-dimensional objects around an axis not through or adjacent to the shape.		
Proficient	Find the surface area of 3-dimensional figures created from rotating 2-dimensional objects around an axis on an edge.	Determine the surface area of the 3D figure created by rotating the triangle around the x axis. 	

Developing	Find surface area when the axis runs through the center of the rotated figure.		
Beginning	Identify individual shapes that make up the net representing the surface area when given a 2D shape rotated. (G.GMD.4)		

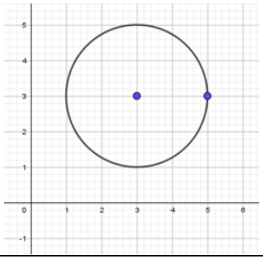
While there is no high school surface area standard, students need to answer optimization problems for G.MG.3 which often involve surface area and volume. G.GMD.4 is a different way for students to access the idea of surface area and see which shapes make up the surfaces that they need to find areas of.

Unit: Volume

Repeat optimization G.MG.3 standard in this unit too.

Proficiency level	Standard: **G.GMD.3** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. **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*. Callie, move this over. Kids see this in 8th and again in Geo, but not assessed on it. SUPER informal.	HPS assessment question	SAT assessment question and strand aligned to **G.GMD.1 is not assessed**
Advanced	Solve multi-step problems, could also involve using trigonometry.		
Proficient	Find the volume of 3 dimensional figures to solve contextual problems; find a dimension given a volume.	A scale model of the great Pyramid of Giza has a volume of 512.87 ft^3 The length of the base 7 ft wide. Find the height of the Pyramid. (Please note this is a square pyramid)  	33 A laboratory supply company produces graduated cylinders, each with an internal radius of 2 inches and an internal height between 7.75 inches and 8 inches. What is one possible volume, rounded to the nearest cubic inch, of a graduated cylinder produced by this company?
Developing	Given a 3D figure, find the volume.		
Beginning	Explain the difference between		

	surface area and volume, and explain the derivation of the volume for 3D shapes (ex. area of the base times the height, but the area of the base depends on the prism).		

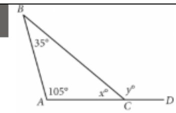
Proficiency level	Standard: **There is no high school surface area standard.** **G.GMD.4** Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	HPS assessment question	SAT assessment question and strand aligned to **Not assessed**
Advanced	Find the volume of 3-dimensional figures created from rotating 2-dimensional objects around an axis not through or adjacent to the shape.		
Proficient	Find the volume of 3-dimensional figures created from rotating 2-dimensional objects around an axis on an edge.		
Developing	Find volume when the axis runs through the center of the rotated figure.	Determine the volume of the 3D figure created by rotating this circle around line x=3 	
Beginning	Identify the 3D shape created when given a 2D shape rotated. (G.GMD.4)		

Proficiency level	Standard: **What standard is this aligned to?**	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient	Compare volumes of similar 3D figures	Cut from non honors courses	
Developing			
Beginning			

Unit: Constructions and Angles

Proficiency level	Standard: **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.*	HPS assessment question	SAT assessment question and strand aligned to **Not assessed**
Advanced	Use constructions to create figures that are new or include additional geometric ideas, for example: a dodecagon, a 45 degree angle, a dilation. Honors could create a dilation with a fractional scale factor.	Teachers will gather and share additional items here to create a more robust menu.	
Proficient	Use single geometric constructions to construct more complex representations. Provide directions/explanation of steps for the construction, for example a square, an equilateral triangle, and a hexagon.	The unit assessment would include constructing shapes that are an extension of what they've done in class. Constructions will not show up on the final exam. Directions students provide need to be very specific. Teachers can gather formative assessment data to make the decision for their own classes when students can shift from giving all the steps to create things, like a perpendicular bisector, to just saying "I constructed a perpendicular bisector"	

Developing	Construct single geometric properties: congruent segments, angles, angle bisectors, perpendicular bisectors, and equilateral triangles and give directions/explanation of steps for the construction.		
Beginning	Define congruent, bisector, perpendicular, and equilateral.		

Proficiency level	Standard: **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.*	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient	Apply proven theorems write proofs on non-routine problems.		7  In triangle *ABC* above, side $\overline{AC}$ is extended to point *D*. What is the value of $y - x$? A. 40 B. 75 C. 100 D. 140
Developing	Prove theorems about lines and angles.		
Beginning	Identify and/or define (both in geometric drawings or written notation) line, segment, ray, parallel, perpendicular, transversal, co-planer, co-linear, right, acute, obtuse, bisector, equidistant, endpoints, alternate interior, congruent, vertical angles, corresponding		

Even though the standard is to prove them, kids have to be able to apply what they had proved. Also, we don't ask them to regurgitate the proof; we do it together in class, right? (We at least check it together in class, to where an assessment of a proof would just be if they memorized it, which is not high depth of knowledge.)

Unit: Transformations and Proof

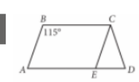
Proficiency level	**G.CO.5** Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. **G.CO.4** Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	HPS assessment question	SAT assessment question and strand aligned to
Advanced	Construct a sequence of transformations.		
Proficient	Given an pre-image and a transformation, construct the image and explain the steps to create it. Given a pre-image and its image, specify the sequence of transformations used to create the image.		
Developing	Able to construct 2 of 3 transformations OR Able to identify a sequence		
Beginning	Identify a single transformation based on properties: reflection, rotation, translation, or dilation.		

- Reflection: know the segment connecting the original to the image point is perpendicular to the line of reflection; given an image and preimage, students can find the line of reflection
- Rotations: know the center of rotation is the intersection of the perpendicular bisectors of the segment connecting corresponding points; given an image and preimage, students can find the center of rotation. On the coordinate plane, limited to increments of 90 degrees in order to be able to write equations.
- Translations: know that the segments connecting all corresponding points are congruent and parallel (feel free to call this the translation vector); given an image and preimage, students can find the

Proficiency level	**G.CO.2** Represent transformations in the coordinate 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).~~	HPS assessment question	SAT assessment question and strand aligned to
Advanced	Given a line and a translation of the line left or right, write the equation for the new line.		
Proficient	On coordinate grids, given a pre-image and an image, identify with rules, the sequence of transformations used. Given pre-image points and a rule, create the image.		
Developing	Able to be proficient for 2 of 3 transformations.		
Beginning	Define and identify image and pre-image, rotation, reflection, translation. Plot points.		

Proficiency level	**G.GPE.5** Prove the slope criteria for parallel and perpendicular lines and use 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).	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient	Write the equation of a line parallel and perpendicular to a given line passing through a given point.		
Developing	Write the equation of a line parallel or perpendicular to a given line and through a given y-intercept.		
Beginning	Give the slope of a line parallel or perpendicular to a given line.		

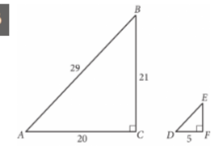
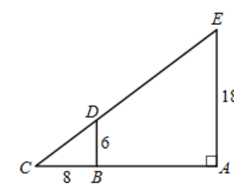
Unit: Congruence and Similarity of Triangles

Proficiency level	Standard: **G.CO.10** Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; 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.SRT.5** Use congruence and similarity criteria for triangles ~~to solve problems and~~ to prove relationships in geometric figures.	HPS assessment question	SAT assessment question and strand aligned to
Advanced	Use properties to prove in situations where the proof is more complex involving proving multiple intermediate properties.		
Proficient	Apply proven theorems to solve problems and prove non-routine triangle problems; write proofs when students need to infer from drawings or given statements what additional properties they can claim.		Q5 is no calculator 5  Note: Figure not drawn to scale. In the figure above, $\overline{BC}$ and $\overline{AD}$ are parallel, $\overline{AB}$ and $\overline{EC}$ are parallel, $CD = CE$, and the measure of $\angle ABC$ is $115°$. What is the measure of $\angle BCD$? A. 85° B. 115° C. 125° D. 140°

Developing	Prove theorems about triangles when the path through proof seems clear based on markings or given information.		
Beginning	Identify and/or define (both in geometric drawings or written notation) interior angles, base angles, isosceles, congruent, segment, midpoint, endpoints, parallel, medians; identify needed corresponding parts for the proof		

"non-routine triangle problems" means some diagram of given info that they haven't seen yet. There may be a better way to describe this, or perhaps that's a 4?

The parallelogram proof standard G.CO.11 relies on students knowing the triangle similarity situations. These types of questions become all level 4 questions. Can we just make that standard the expert level?

Proficiency level	Standard: **G.SRT.5** Use congruence and similarity criteria for triangles to solve problems ~~and to prove relationships in geometric figures.~~	HPS assessment question	SAT assessment question and strand aligned to
Advanced	Solve mathematical and real-world problems using triangle similarity and congruence when students need to also determine where the shapes and given conditions are.		
Proficient	Solve mathematical and real-world problems using triangle similarity and congruence when given the shapes.		16  Triangles *ABC* and *DEF* above are similar. How much longer than segment *EF* is segment *DE* ? A. 1 B. 2 C. 4 D. 8 Q18 is no calculator 18  In the figure above, $\overline{BD}$ is parallel to $\overline{AE}$. What is the length of $\overline{CE}$?
Developing			
Beginning			

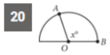
This will be further fleshed out when the team next meets.

Unit: Circles

Proficiency level	Standard: **G.C.3** Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	HPS assessment question	SAT assessment question and strand aligned to
Advanced	Use properties to prove in situations where the proof is more complex involving proving multiple intermediate properties or when needing to infer additional properties that exist but are not labeled or given.		
Proficient	Prove properties of angles for quadrilaterals inscribed in a circle Revisit this scale and all levels when doing some common unit planning with the teachers		
Developing	Prove theorems about circles when the path through proof seems clear based on markings or given information.		
Beginning	Identify and/or define (both in geometric drawings or written notation) interior angles, base angles, isosceles, congruent, segment, midpoint, endpoints, parallel, medians; identify needed corresponding parts for the proof		

We will not assess whether kids can construct. Constructions are used a the vehicle for students to determine what parts within their proofs of circle properties need to be justified.

Do we add in some of the properties in G.C.2 that we want kids to prove also?

Proficiency level	Standard: **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.*	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient			20  Segments $\overline{OA}$ and $\overline{OB}$ are radii of the semicircle above. Arc $\overset{\frown}{AB}$ has length 3π and $OA = 5$. What is the value of x ?
Developing			
Beginning			

Proficiency level	Standard: **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.	HPS assessment question	SAT assessment question and strand aligned to
Advanced			
Proficient			
Developing			
Beginning			

We interpret the first part of this statement as “find the arc length”

Appendix

It is a struggle at grades 7-12 to get in all the content that the standards call for at the depth that students need to truly retain the knowledge by the end of the school year. To exacerbate this, we are asking our 7th graders to take the MSTEP (a test assessing all of 7th grade content standards) beginning the second week of May. Because we assess online, it takes about 3 weeks for students to cycle through our labs, so potentially some students have about 2 more weeks of content instruction than others when they take the test. Until school year 2018-2019, 8th graders were beginning their MSTEP (a test assessing all of 8th grade content standards) the first week back from spring break. Beginning with the 2018-2019 school year, the 8th graders will be taking the PSAT, which falls in early April, usually right after spring break.

In order to maximize our instruction time with students, we have prioritized some standards over others. We based these decisions on what content we know needs lots of time to develop conceptually and procedurally, the limited information we have about the more weighted content areas of the MSTEP, and what students will need most to be successful in our high school math courses and the SAT. What follows is the list of content standards we don't assess or have performance scales written for. The rationale behind why are explained below, along with whether or how students still gain exposure to the ideas of the standards.

Standard	Still Taught?	Rationale
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.	Y	This is included in the 1 level for many of the other standards.
G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	N	Students will work with all transformations so they would be able to answer questions that relate to this standard. We will not explicitly teach these, however.
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.*	Y	This has no separate scale (2018-2019 school year) because students will use their knowledge of the criteria for triangle congruence to prove these. Really these are an extension of their knowledge of triangles. This is not assessed on the SAT.
G.SRT.7 Explain and use the relationship between the sine and cosine of complementary angles.	Y	Students will have experience with this and this is considered a level 4 on a scale. However, students can proceed successfully through courses not being proficient at this knowledge.
G.SRT.9 (+) Derive the formula $A = 1/2\ ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	N	This is a + standard

G.GPE.2 Derive the equation of a parabola given a focus and directrix.	N	We run out of time, and this does not fit into the storyline currently. This is a conic section focus on a parabola. Students study the functional aspect of parabolas in depth in A/B. The parabola as dictated this way is not assessed on the SAT.
G.GPE.3 (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	N	We run out of time, and this does not fit into the storyline currently. This is a conic section topic. This is not assessed on the SAT.
G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	N	This is a small idea, doesn't fit into the storyline, and does not hinder student success in future classes without this standard. It is not assessed on the SAT.
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.*	Y	Students do an informal argument for the area and circumference of a circle in 7th grade. Students will experience an informal argument for the volumes of listed shapes in the volume unit. This is not assessed on the SAT.
G.GMD.2(+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	Y	Students will do an informal argument, but not necessarily using Cavalieri's principle. This is not assessed on the SAT.
G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	N	This is a small topic and does not fit into the story line of geometry. Students gain experience with area and volume and density in science classes.

Parent Resources:

- ?