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Geometry Topics	Time Allotted	Texas Standards[1]		Topic Descriptions	TAKS[2]	Dana Center Resources			District Resources	
	Suggested time allotment for this topic	Knowledge and Skills Statements	Performance Descriptors		Texas Assessment of Knowledge and Skills Objectives	*Geometry Assessments*[3]	TEXTEAMS Institutes[4]	Agile Mind Topics	Textbook	Other
Geometric structure (3.5 weeks)										
Using inductive reasoning and conjectures	0.5 weeks	G.2 (Geometric structure. The student analyzes geometric relationships in order to make and verify conjectures.) G.3 (Geometric structure. The student applies logical reasoning to justify and prove mathematical statements.) G.5 (Geometric patterns. The student uses a variety of representations to describe geometric relationships and solve problems.) G.9 (Congruence and the geometry of size. The student analyzes properties and describes relationships in geometric figures.)	G.2A; G.2B; G.3B; G.3D; G.5A; G.9C	This topic introduces students to ***inductive reasoning***, the process of observing and forming conclusions about patterns. Using paper folding and inductive reasoning, users observe, discover, and analyze properties of angle bisectors and then develop two conjectures about them.	**6**			**1**		
Terms, notation, and representation	0.5 weeks	*8.7 (Geometry and spatial reasoning. The student uses geometry to model and describe the physical world.)* G.1 (Geometric structure. The student understands the structure of, and relationships within, an axiomatic system.) G.7 (Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.)	*8.7.D*; G.1A; G.1B; G.7A	This topic explores basic geometry terms and notations. Students investigate basic relationships among points, lines, and planes and relate these concepts to the concept of dimensionality. They also investigate other concepts and terms, including line segment, ray, angle, and vertex. Complementary angles and supplementary angles are also defined.	**7**			**2**		
Rigid transformations	0.5 weeks	G.2 G.5 G.10 (Congruence and the geometry of size. The student applies the concept of congruence to justify properties of figures and solve problems.)	G.2B; G.5C; G.10A	Rigid transformations of a geometric shape do not change length, area, or angle measure. This topic explores three basic rigid transformations: reflections, translations, and rotations. Students use these transformations to discover and prove geometric properties and to produce patterns, specifically tessellations.	**6**	**√The Shortest Cable Line**		**3**		
Representations using coordinate geometry	0.5 weeks	G.2 G.3 G.4 (Geometric structure. The student uses a variety of representations to describe geometric relationships and solve problems.) G.7	G.2B; G.3B; G.3C; G.4; G.7B; G.7C	This topic introduces coordinate geometry as a tool for discovering and verifying properties of geometric shapes, using ordered-pair rules to describe reflections, translations, and rotations of a figure. Students explore slope and distance, preservation of measurements, and collinearity and betweenness.	**6,7**			**4**		

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Deductive reasoning, logic, and proof	0.5 weeks	*8.14 (Underlying processes and mathematical tools. The student applies Grade 8 mathematics to solve problems connected to everday experiences, investigations in other disciplines, and activities in and outside of school.)* *8.15 (Underlying processes and mathematical tools. The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models.)* G.1 G.3	*8.14; 8.15*; G.1A; G.1B; G.3B; G.3C; G.3D; G.3E	In this topic students learn how to combine true statements within a mathematical system to deductively prove that some other statement is true for that system. As they explore this topic, students complete flow-chart and two-column proofs. They learn that, once a statement is proven, it can be used to help prove additional statements.	**[6],10**			**5**		
Conditional statements	0.5 weeks	G.1 G.3 *8.14* *8.15*	G.1A; G.1B; G.3A; G.3C; G.3E *8.14; 8.15*	This topic introduces the conditional or if-then statement and demonstrates how to represent if-then statements using both logic notation and Euler diagrams. It allows students to explore the application of formal logic rules to the statement of the converse of a conditional. It also introduces students to the technique of indirect proof, which relies on the consequences of logical contradictions.	**[6],10**	**Mad as a Hatter or Hat as a Madder*		**6**		
Other investigations in logic	0.5 weeks	G.1 G.3 *8.14* *8.15*	G.1A; G.1B; G.3A; G.3C; G.3E *8.14; 8.15*	This topic builds on students' work with conditional statements and their converses. Students learn how to write, notate and diagram the inverse and contrapositive of a statement and explore whether there is a systematic way for deciding if statements are true or false. Students are introduced to "not," "and," and "or" statements and their associated truth tables, and they establish the logical equivalency of the conditional and the contrapositive.				**7**		

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Lines, angles, and triangles (10 weeks)										
Lines and transversals	1 week	G.2 G.7 G.9	G.2B; G.7B; G.9A	This topic explores lines, transversals, and special angles associated with them. Students learn about properties of corresponding angles, alternate interior angles, and consecutive interior angles formed when parallel lines are cut by a transversal. Students also learn how to use angle congruence to establish that two lines are parallel.	**7**			**8**		
Properties of a triangle	2 weeks	G.1 G.5 G.9	G.1A; G.5A; G.9B	This topic explores basic theorems and conjectures about triangles, including the triangle inequality conjecture and the Triangle Sum Theorem. Students also investigate the Exterior Angle Theorem and make conjectures about isosceles triangles.	**6**			**9**		
Congruent triangle postulates	2.5 weeks	G.2 G.3 G.10	G.2B; G.3C; G.3D; G.10A; G.10B	This topic focuses on shortcuts to prove two triangles congruent. Students also learn how to use notation to correctly communicate correspondence between sides and angles of congruent triangles.	**[7]**			**10**		
Using congruent triangles	2.5 weeks	G.3 G.10	G.3E; G.10B	In this topic, students learn to apply the fact that corresponding parts of congruent triangles are congruent. Students use congruent triangles to prove the isosceles triangle conjectures made earlier, and they learn to pull apart complex diagrams to find congruent triangles.	**[6]**			**11**		

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Compass and straight-edge construction	1 week	G.1 G.2 G.3 G.10	G.1A; G.1B; G.2A; G.3B; G.3C; G.3E; G.10B	This topic introduces the principles important in creating and analyzing formal geometric constructions using a compass and a straightedge. Because the steps for making a construction, along with their justifications, function like the statements and reasons in a proof, the result of the construction is true in the same way that the conclusion of a deductive proof must be true.			*High School Geometry: Supporting TEKS and TAKS:* 3.3.1, 3.4.1, 3.4.2	**12**		
Pythagorean Theorem and the distance formula	1 week	G.3 G.7 G.8 (Congruence and the geometry of size. The student uses tools to determine measurements of geometric figures and extends measurement concepts to find perimeter, area, and volume in problem situations.)	G.3A; G.3B; G.3C; G.3D; G.7C; G.8C	This topic explores proofs of the Pythagorean Theorem, using concrete models and algebraic representations. In proving the converse of the Pythagorean Theorem, students are guided to develop related conjectures about acute triangles and obtuse triangles.	**7,8**			**13**		
Similarity (3 weeks)										
Dilations and similarity in polygons	1.5 weeks	G.11 (Similarity and the geometry of shape. The student applies the concepts of similarity to justify properties of figures and solve problems.)	G.11A; G.11B	Focusing on dilations and similarity, the topic begins by defining these terms mathematically, including the concepts of center point and scale factor. Students learn to produce an accurate dilation of a geometric shape by a specific scale factor. Dilations on coordinate graphs are also explored, and students learn how to use AA and other postulates and theorems to prove triangles similar.	**8**			**14**		
Applications of triangle similarity	1.5 weeks	G.3 G.5 G.11	G.3E; G.5D; G.11A; G.11B; G.11C	This topic extends the idea of triangle similarity to indirect measurements. Students develop properties of isosceles and 30-60-90 right-angle triangles, and use properties of similar triangles to develop their understanding of trigonometric ratios. These ideas are then applied to find unknown lengths and angle measurements.	**6,8**	**√Ancient Ruins** **√Sightseeing Walk**		**15**		

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Polygons (3 weeks)										
Properties and attributes of polygons	1.5 weeks	G.5 G.9 G.11	G.5A; G.5B; G.9B; G.11A; G.11B	In this topic students learn about the parts and characteristics of polygons. They classify polygons according to the number of sides and whether they are convex or concave, and they apply what they know about triangles to investigate measures of interior and exterior angles of polygons.	6,8	√Wearable Art		16		
Quadrilaterals	1.5 weeks	G.1 G.3 G.7 G.9	G.1A; G.3A; G.3C; G.3E; G.7A; G.7B; G.9B	This topic expands students' understanding of polygons as it focuses on quadrilaterals. Students learn to classify quadrilaterals by exploring their properties. They apply the properties of different quadrilaterals to construct coordinate proofs, and they investigate midlines of triangles and trapezoids.	7			17		
Circles (2 weeks)										
Basic concepts of a circle	1 week	G.2 G.3 G.5 G.9	G.2A; G.2B; G.3B; G.3C; G.5A; G.9C	This topic connects the geometric definition of a circle with its coordinate plane representation. Students review the basic characteristics of a circle as they construct equations of circles and apply the equations to solve problems. The idea of a "curve of constant width" is introduced and explored through circles and Reuleaux triangles.	6,7			18		

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Chords, arcs, and inscribed angles	0.5 weeks	G.2 G.3 G.5 G.9	G.2A; G.2B; G.3B; G.3C; G.5A; G.5B; G.9C	This topic examines special relationships among chords, arcs, and angles in a circle. Relationships between chords and radii and between chords and their intercepted arcs are explored. The relationship between the measures of inscribed angles and their intercepted arcs is also discussed, as are the various relationships among the measures of angles and arcs formed when two lines intersect a circle in various ways.	6			19		
Lines and segments on circles	0.5 weeks	G.2 G.3 G.5 G.9	G.2A; G.2B; G.3B; G.3C; G.5A; G.5B; G.9C	This topic focuses on properties of chords, tangents, and secants on circles. Among the tangent line properties discussed is the relationship between a tangent and a radius. Connections are also made between tangents, secants, and the lengths of related segments that they form with regard to a circle.	6			20		
Area and perimeter (3 weeks)										
Area formulas	1 week	G.8	G.8A	This topic discusses the basic concept of area. It investigates familiar mathematical formulas through shearing figures between two parallel lines, and slicing figures and rearranging the pieces. The idea of using known areas of familiar shapes to estimate areas of unfamiliar or irregular regions is also explored.	8			21		
Circumference and arc length	1 week	G.8	G.8B	This topic presents the familiar formulas for circumference and arc length of a circle by connecting it to the ideas of similarity and proportionality. Some interesting properties of circumference are investigated, and the idea of circumference as a limit of perimeters of polygons is explored.	8	**√Walking the Archimedean Walk**		22		

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Area of circles, segments, and sectors	1 week	G.8	G.8B	This topic develops the familiar formula for area of a circle by relating the circle to approximating parallelograms. Related formulas for areas of sectors and segments of circles are presented, and connections between sectors and cones are explored.	**8**			**23**		
Shapes in space (6 weeks)										
Representations using 3-D coordinate geometry	1 week	G.7	G.7A	This topic connects what students know about representing points and objects in a 2-dimensional coordinate system to representing objects in a 3-dimensional coordinate system. Students learn how to plot points in a right-handed 3-D coordinate system and to describe location by naming octants. They also connect what they know about representing lines in a plane to representing planes in space.	**7**		*High School Geometry: Supporting TEKS and TAKS:* 3.4.3	**24**		
Prisms and cylinders	1 week	G.6 (Dimensionality and the geometry of location. The student analyzes the relationship between three-dimensional geometric figures and related two-dimensional representations and uses these representations to solve problems.) G.8 G.9	G.6A; G.6B; G.8D; G.9D	This topic explores prisms and cylinders. Students learn basic terminology and develop basic formulas for volume and surface area and see how these formulas generalize across different kinds of prisms.	**7,8**			**25**		
Pyramids and cones	1 week	G.2 G.6 G.8 G.9	G.2B; G.6A; G.6B; G.8D; G.9D	In this topic, students investigate pyramids and cones. They develop strategies and formulas for computing volume and surface area, and see how these are connected not only to each other but also to the work they have already done with cylinders and prisms.	**6,7,8**			**26**		

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Spheres	1 week	G.2 G.6 G.8 G.9	G.2B; G.6B; G.8D; G.9D	This topic presents the basic characteristics and terminology associated with spheres. Students investigate strategies and formulas to compute volumes and surface areas and make connections among the formulas for cylinders, cones, and spheres. Students also learn about the surface area/volume "efficiency" of the sphere when compared to other three-dimensional shapes.	**7,8**			**27**		
Relating 2-D and 3-D objects	1 week	G.2 G.3 G.6 G.9	G.2A; G.2B; G.3B; G.6A; G.6B; G.6C; G.9D	Making two-dimensional representations of the three-dimensional world requires some skill. In this topic, students learn to represent three-dimensional objects using different two-dimensional techniques, including nets, plane and cross sections, and orthogonal and isometric drawings. As they explore these different representations, students deepen their understanding of the three-dimensional objects they represent.	**7**	**Different Views*		**28**		
Analyzing dimensional changes	1 week	G.11	G.11D	In this topic, students explore the effect of altering dimensions on the surface area and volume of a three-dimensional figure. They also see how comparing certain aspects of a figure leads to a new kind of function—a rational function.	**8**		*High School Geometry: Supporting TEKS and TAKS:*5.2.1,5.2.2	**29**		

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Special topics in geometry (5 weeks)										
Non-Euclidean geometry	2 weeks	G.1	G.1A; G.1B; G.1C	Euclidean Geometry is the focus of most high school geometry courses. By accepting certain terms, definitions, and postulates, Euclidean Geometry can be applied to understand the world. What if a different set of terms, definitions, and postulates were accepted as a starting point? This topic begins to explore other geometries.			*High School Geometry: Supporting TEKS and TAKS:* 1.1(all),3.1.1	**30**		
Special lines and points in triangles	1 week	G.2 G.3 G.11	G.2A; G.3B; G.11A	Some of the greatest discoveries in mathematics were made because someone took a simple idea, pattern, or concept and studied it deeply. This topic invites students to experience this joy of exploration by facilitating a deep study of medians and altitudes leading to some special points on a triangle—the incenter, the circumcenter, the centroid, and the orthocenter—and how they are related to one another.	**8,10**			**31**		
Fractals	2 weeks	G.1 G.5	G.1B; G.5C	This topic shows how fractals can be generated from collage and from randomness as it explores such famous examples as the Sierpinski Triangle, the Chaos game, the Cantor Set, the Koch Snowflake, and the Mandelbrot Set.	**6**			**32**		

[1]Standards in italics are middle school TEKS.

[2]TAKS objectives shown in brackets do not explicitly include the TEKS addressed in the topic but these TEKS provide the foundation for the indicated TAKS objective.

[3]This column includes *Assessments* that are incorporated into topics, as well as those related to topic content. Titles in bold and marked with a √ reflect assessments that are incorporated into the content of a topic. Italic titles marked with * indicate assessments for which students will be well prepared upon completion of a topic.

[4]The referenced TEXTEAMS activities provide professional development to support teachers in the delivery of the topic content.