

Geometry

Time on Task: 3.5 hours per week

Course Philosophy

Mathematics demonstrates God’s order even in an abstract world, gradually building a base of knowledge and skills beginning with the simplest concepts to the more complex. In mathematics, the student will see the order and truth that God created. Just as the Bible says, “precept upon precept, line upon line....” (Isaiah 23:10) The sequential mastery of mathematical concepts is the primary objective.

Course Description

Foundation concepts for high school mathematics. As presented in Grades K-8, the basic understandings of number, operation, and quantitative reasoning; patterns, relationships, and algebraic thinking; geometry; measurement; and probability and statistics are essential foundations for all work in high school mathematics. Students continue to build on this foundation as they expand their understanding through other mathematical experiences.

<p>Goals and Objectives Texas Essential Knowledge and Skills (TEKS)</p> <p>§111.34. Geometry (One Credit). (a) Basic understandings.</p> <p>(1) Foundation concepts for high school mathematics. As presented in Grades K-8, the basic understandings of number, operation, and quantitative reasoning; patterns, relationships, and algebraic thinking; geometry; measurement; and probability and statistics are essential foundations for all work in high school mathematics. Students continue to build on this foundation as they expand their understanding through other mathematical experiences.</p> <p>(2) Geometric thinking and spatial reasoning. Spatial reasoning plays a critical role in geometry; geometric figures provide powerful ways to represent mathematical situations and to express generalizations about space and spatial relationships. Students use geometric thinking to understand generalizations about space and spatial relationships. Students use geometric thinking to understand mathematical concepts and the relationships among them.</p>	<p>Scope and Sequence Geometry Foundations</p> <ul style="list-style-type: none"> • Points, Lines, and Planes • Segments • Angles • Postulates and Theorems about Points, Lines, and Planes • More Theorems about Lines and Planes • Identifying Pairs of Angles • Using Formulas in Geometry • Transversals and Angle Relationships • Proving Lines Parallel <p>Logic and Reasoning</p> <ul style="list-style-type: none"> • Using Inductive Reasoning • Using Conditional 	<p>Spiritual Goals God’s intended purpose for mathematics:</p> <ol style="list-style-type: none"> 1. To teach the child that there is logic and order in arithmetic and that there is logic and order in God’s plan. 2. To teach that God cares for numbers and has recorded many for our information. 3. To teach that God commanded men to count, measure, and record information. 4. To teach the child that God is concerned that we be accurate and orderly in our use of weights, measure, and numbers. 5. To teach the child not to place too much confidence in the size. 6. To teach the child the concept of measurement to express men’s failure and His plans for man.
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<p>(3) Geometric figures and their properties. Geometry consists of the study of geometric figures of zero, one, two, and three dimensions and the relationships among them. Students study properties and relationships having to do with size, shape, location, direction, and orientation of these figures.</p> <p>(4) The relationship between geometry, other mathematics, and other disciplines. Geometry can be used to model and represent many mathematical and real-world situations. Students perceive the connection between geometry and the real and mathematical worlds and use geometric ideas, relationships, and properties to solve problems.</p> <p>(5) Tools for geometric thinking. Techniques for working with spatial figures and their properties are essential in understanding underlying relationships. Students use a variety of representations (concrete, pictorial, numerical, symbolic, graphical, and verbal), tools, and technology (including, but not limited to, calculators with graphing capabilities, data collection devices, and computers) to solve meaningful problems by representing and transforming figures and analyzing relationships.</p> <p>(6) Underlying mathematical processes. Many processes underlie all content areas in mathematics. As they do mathematics, students continually use problem-solving language and communication, connections within and outside mathematics, and reasoning (justification and proof). Students also use multiple representations, technology, applications and modeling, and numerical fluency in problem solving contexts.</p>	<p>Statements</p> <ul style="list-style-type: none"> • Disproving Conjectures with Counterexamples • More conditional Statements • Interpreting Truth Tables • Laws of Detachment and Syllogism • Algebraic Proofs • Two-Column Proofs • Flowchart and Paragraph Proofs • Introduction to Coordinate Proofs • Indirect Proofs • Patterns <p>Construction</p> <ul style="list-style-type: none"> • Congruent Segments and Angles • Perpendicular Line Through a Point on a Line • Perpendicular Bisectors and Angle bisectors • Parallel Line Through a Point • Congruent Triangles • Circle Through Three Noncollinear Points • Perpendicular Through a Point Not on a Line • Tangent to a Circle • Regular Polygons <p>Coordinate Geometry</p> <ul style="list-style-type: none"> • Finding Length: Distance Formula • Finding Midpoints 	<p>7. To develop skills in reasoning which reveal truth.</p> <p>8. To understand that God has given man the ability to observe reality.</p> <p>9. To understand that God has given man the ability to explore and to formulate relationships.</p> <p>10. To understand that human reasoning is a reflection of the divine.</p> <p>11. To appreciate the structure, form, and beauty of God’s creation.</p> <p>12. To appreciate the complexity and precision of God’s creation</p> <p>13. To improve the student’s reasoning skills to help hi think less like the world and more like God.</p> <p>14. To cultivate preciseness in Calculations and reasoning powers.</p> <p>15. To develop an appreciation for correctness of procedure and accuracy in dealing with facts.</p> <p>16. To make him aware of his own limitations and need to depend upon the Lord for understanding.</p> <p>17. To develop skills in thrift and good stewardship to prepare him for successful living in the world.</p> <p>Biblical Integration Truth Statements</p> <p>1. <i>What is prime reality, the really real?</i> God exists and is the ultimate reality. (Psalm 90:2, Revelation 22:13)</p> <ol style="list-style-type: none"> a. God designed, created, and sustains His creation. (Genesis 1:1-31) b. God is good, holy, and loving.
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	<ul style="list-style-type: none"> • Finding Slopes and Equations of Lines • Writing Equations of Parallel and Perpendicular Lines • Finding Distance from a Point to a Line • Graphing and Solving Linear Systems • Graphing and Solving Linear Inequalities • Equations of Circles: Translating and Dilating • Introduction to Coordinate Space • Non-Euclidean Geometry • Finding Distance and Midpoint in Three Dimensions • Solving and Graphing Systems of Inequalities • Determining Line of Best Fit • Technology: Determining Line of Best Fit Using a Graphing Calculator <p>Triangles: Congruence and Similarity</p> <ul style="list-style-type: none"> • Introduction to Triangles • Triangle Theorems • Triangle Congruence: SSS • Triangle Congruence: SAS • Triangle Congruence: ASA and AAS 	<p>(Luke 18:19, 1 John 4:16, 1 Peter 1:16, Psalm 145:12)</p> <ul style="list-style-type: none"> c. God is omniscient – all knowing. (Romans 11:33-36, Psalm 147:5) d. God is sovereign – nothing is beyond His ultimate interest, control, and authority. (Daniel 4:25) e. God is personal and also triune- He is coequally and coeternally God the Father, God the Son, Jesus, and God the Holy Spirit. (Hebrews 1:3) <p>2. <i>What is the nature of external reality, that is, the world around us?</i></p> <ul style="list-style-type: none"> a. God is the source of everything and created the universe out of nothing. (Genesis 1:1) b. The universe was created by God to be orderly. (Isaiah 45:18, Psalm 147:4) c. God is constantly involved in the unfolding pattern of the ongoing operation of the universe. (Psalm 24:1-2, Psalm 32:13-15) d. The universe reflects His glory. (Psalm 8:1, Psalm 19:1) <p>3. <i>What is a human being?</i></p> <ul style="list-style-type: none"> a. God created humans to know Him intimately and to have a loving relationship with Him. (Psalm 100:3) b. Human beings are created in the image of God with the capacity to choose. (Genesis 1:27, Proverbs 8:10) c. Adam and Eve chose
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	<ul style="list-style-type: none"> • Altitudes and Medians of Triangles • Perpendicular and Angle Bisectors of Triangles • Inequalities in a Triangle • Inequalities in Two Triangles • Triangle Similarity: AA SSS, SAS • Properties of Equilateral and Isosceles Triangles <p>Polygons</p> <ul style="list-style-type: none"> • Introduction to Polygons • Exploring Angles of Polygons • Finding Perimeters and Areas of Composite Figures • Ratios, Proportions, and Similarity • Applying Similarity • Finding Perimeter and Area with Coordinates • Proportionality Theorems • Geometric Probability • Finding Perimeters and Areas of Regular Polygons • Area Ratios of Similar Figures • Tessellations • Effects of Changing Dimensions on Perimeter and Area • Fractals • Maximizing Area • Technology: 	<p>disobedience and brought death to themselves and sin entered the world. (Romans 5:12)</p> <ul style="list-style-type: none"> d. All human beings have a choice and all have chosen sin that brings separation from God. (Romans 3:23) e. Sin is rebellion against God's wishes and ways and this destroys our relationship with God. (Romans 8:7-8) f. God provides a way back to Himself through the death of His son Jesus (the second person of the Trinity), on the cross. (John 3:16, Romans 6:23) g. Human beings must respond to God with repentance of our sins, receiving forgiveness, and accepting Jesus as our Savior. (Romans 10:9-10) <p>4. <i>What happens to a person at death?</i></p> <ul style="list-style-type: none"> a. For each person death is either the gate to life with God and His people or the gate to eternal separation from God. (1 Corinthians 50:52) b. After death, your soul will continue to exist in an eternal way and there is a final judgment by God. (Revelation 20:12) c. Everyone chooses to honor and love Him by accepting Jesus as our Lord and Savior or makes a choice to reject Jesus and grasp for self-fulfillment and personal glory. (Romans 6:23) d. Those who received Jesus as
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	<p>Maximizing Area Using Geometry Software</p> <ul style="list-style-type: none"> Finding Areas of Polygons Using Matrices <p>Quadrilaterals</p> <ul style="list-style-type: none"> Introduction to Quadrilaterals Finding Areas of Quadrilaterals Properties of Parallelograms Properties of Rectangles, Rhombuses, and Squares Determining if a Quadrilateral is a Parallelogram Distinguishing Types of Parallelograms Properties of Trapezoids and Kites Quadrilaterals on the Coordinate Plane Technology: Distinguishing Types of Quadrilaterals Using Geometry Software Golden Ratio <p>Right Triangles and Trigonometry</p> <ul style="list-style-type: none"> Proving the Pythagorean Theorem Using the Pythagorean Theorem Converse of the Pythagorean Theorem Right Triangle Congruence Theorems 	<p>Savior will spend eternity in Heaven with God. (Philippians 4:10-21)</p> <ul style="list-style-type: none"> Those who rejected Jesus as Savior will spend eternity in Hell without God. (Hebrews 10:26-27) <p>5. Why is it possible to know anything at all?</p> <ul style="list-style-type: none"> Human beings can both know the world around them and God Himself because God has built within them the capacity to do so and because He takes an active role in communicating with them. (John 16:13) God's own intelligence is the basis of human intelligence. Knowledge is possible because there is something to be known (God and His creation) and someone to know (God and human beings made in His image). (Genesis 1:27) God reveals, Himself to us in two basic ways: by general revelation and by special revelation. (Exodus 3:2, Psalm 19:1-4) In general revelation, God speaks through the creation of the universe and through His word, the Bible. (2 Samuel 22:31, Psalm 19:1) <ul style="list-style-type: none"> The Bible is internally consistent and unified in its principles and claims. There is tremendous
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	<ul style="list-style-type: none"> • Geometric Mean • 45°-45°-90° Right Triangles • 30°-60°-90° Right Triangles • Introduction to Vectors • Introduction to Trigonometric Ratios • Trigonometric Ratios • Applying Trigonometry: Angles of Elevation and Depression • More Applications of Trigonometry • Vector Addition • Vector Decomposition • Introduction to Trigonometric Identities • Law of Sines • Law of Cosines • Secant, Cosecant, and Cotangent • Polar Coordinates <p>Circles</p> <ul style="list-style-type: none"> • Introduction to Circles • Central Angles and Arc Measure • Finding Arc Lengths and Areas of Sectors • Chords, Secants, and Tangents • Circles and Inscribed Angles • Tangents and Circles, Part 1 • Angles Interior to Circles 	<p>coherence across the many authors and centuries during which the various books were written and in which its stories unfold.</p> <ul style="list-style-type: none"> ➤ It is relevant to all the cultures of the world <p>e. Special revelation is God revealing Himself through supernatural ways. Jesus Christ is the ultimate special revelation. He showed us what God is like more fully than any other form of revelation can. Because Jesus was also completely human, he spoke more clearly to us than any other form of revelation can. (John 14:7)</p> <p>6. <i>How do we know what is right and wrong?</i></p> <ul style="list-style-type: none"> a. Ethics or the knowledge of right and wrong is based on the character of God as good (holy and loving). (Psalm 33:4) b. There is an absolute standard by which all moral judgments are measured and God Himself – His character of goodness (holiness and love) – is the standard. (1 Samuel 2:3) c. As a result of sin, morally, we have become less able to discern good and evil and less able to know God as He truly is. (Proverbs 1:7) d. God has revealed His standard in the various laws and principles
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	<ul style="list-style-type: none"> • Tangents and Circles, Part 2 • Writing the Equation of a Circle • Angles Exterior to Circles • Determining Chord Length • Technology: Intersecting Chords Using Geometry Software • Concentric Circles • Determining Lengths of Segments Intersecting Circles • Technology: Exploring Secant Segments Using Geometry Software • Relating Arc Lengths and Chords • Circumscribed and Inscribed Figures • Finding Areas of Circle Segments <p>Solids</p> <ul style="list-style-type: none"> • Introduction to Solids • Nets • Representing Solids • Finding Surface Areas and Volumes of Prisms • Finding Surface Areas and Volumes of cylinders • Finding Surface Areas and Volumes of Pyramids • Finding Surface Areas and Volumes of Cones 	<p>expressed in the Bible. (Psalm 111:10)</p> <ul style="list-style-type: none"> ➤ He has dictated absolute moral truth to us. ➤ Every truth must conform to Biblical principles. ➤ Every choice must reflect God’s moral truth. ➤ We must promote, defend, and teach these truths to others. <p>7. <i>What is the meaning of human history?</i></p> <ol style="list-style-type: none"> a. History is a meaningful sequence of events leading to the fulfillment of God’s purposes for humanity. (Psalm 22:27-28, Psalm 47:3) b. History is going somewhere, directed toward a known end. (Matthew 25:34) c. History is a form of revelation, not only does God reveal Himself in history, but the very sequence of events is revelation. (Psalm 33:13-14, Psalm 47:9) d. History has meaning because God is behind all events, not only sustaining all things by His powerful word but also in all things working for the good of those who love Him. (Psalm 40:5, Romans 8:28) <p><i>What should our response be to God?</i> <i>What were we made for?</i></p> <p>We were made to Love – Matthew 22:37, Worship – Romans 12:1,</p>
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	<ul style="list-style-type: none"> • Finding Surface Areas and Volumes of spheres • Cross Sections of Solids • Representing Solids: Orthographic Views • Volume Ratios of Similar Solids • Frustums of cones and Pyramids • Symmetry of Solids and Polyhedra • Finding Surface Areas and Volumes of composite Solids • Platonic Solids <p>Transformations</p> <ul style="list-style-type: none"> • Introduction to Transformations • Translations • Reflections • Symmetry • Rotations • Dilations • Composite Transformations • Transformation Matrices • Dilations in the Coordinate Plane • Rotations and Reflections in the Coordinate Plane • Scale Drawings and Maps • Topology 	<p>Obey – 2 John 6, and Give Glory – Psalm 96:3.</p>
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<p>figures and their properties;</p> <p>(C) use logical reasoning to prove statements are true and find counter examples to disprove statements that are false;</p> <p>(D) use inductive reasoning to formulate a conjecture; and</p> <p>(E) use deductive reasoning to prove a statement.</p> <p>(4) Geometric structure. The student uses a variety of representations to describe geometric relationships and solve problems. <i>The student is expected to</i> select an appropriate representation (concrete, pictorial, graphical, verbal, or symbolic) in order to solve problems.</p> <p>(5) Geometric patterns. The student uses a variety of representations to describe geometric relationships and solve problems. <i>The student is expected to:</i></p> <p>(A) use numeric and geometric patterns to develop algebraic expressions representing geometric properties;</p> <p>(B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles;</p> <p>(C) use properties of transformations and their compositions to make connections between mathematics and the real world, such as tessellations; and</p> <p>(D) identify and apply patterns from right triangles to solve meaningful problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.</p> <p>(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. <i>The student is expected to:</i></p>	<p>Lessons 7, 10, 14, 17 20, 21, 24, 27</p> <p>Lesson 7</p> <p>Lesson 7</p> <p>Lessons 7-112</p> <p>Lessons 24, 27, 31, 45, 48, Inv 8</p> <p>Lessons 13-18, 25, 28, 41, 44, 46</p> <p>Lessons 67, 71, 74, 76, 78, 84, 90 100, 102, 105, 110, 120</p> <p>Lessons 20, 33, 36, 50, 53, 56</p>	
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<p>solve problems in real-world situations.</p> <p>(9) Congruence and the geometry of size. The student analyzes properties and describes relationships in geometric figures. <i>The student is expected to:</i></p> <p>(A) formulate and test conjectures about the properties of parallel and perpendicular lines based on explorations and concrete models;</p> <p>(B) formulate and test conjectures about the properties and attributes of polygons and their component parts based on explorations and concrete models;</p> <p>(C) formulate and test conjectures about the properties and attributes of circles and the lines that intersect them based on explorations and concrete models; and</p> <p>(D) analyze the characteristics of polyhedra and other three-dimensional figures and their component parts based on explorations and concrete models.</p> <p>(10) Congruence and the geometry of size. The student applies the concept of congruence to justify properties of figures and solve problems. <i>The student is expected to:</i></p> <p>(A) use congruence transformations to make conjectures and justify properties of geometric figures including figures represented on a coordinate plane; and</p> <p>(B) justify and apply triangle congruence relationships.</p> <p>(11) Similarity and the geometry of shape. The student applies the concepts of similarity to justify properties of figures and solve problems. The student is expected to:</p> <p>(A) use and extend similarity properties and transformations to explore and justify conjectures about geometric figures;</p> <p>(B) use ratios to solve problems involving similar figures;</p> <p>(C) develop, apply, and justify triangle similarity relationships, such as right triangle ratios, trigonometric ratios, and Pythagorean triples using a variety of methods; and</p> <p>(D) describe the effect on perimeter, area, and volume</p>	<p>Lesson 37</p> <p>Lesson 15, Inv 3, Lesson 60</p> <p>Lessons 23, 43, 58, 72</p> <p>Lesson 113</p> <p>Lessons 25, 28, 30 Lessons 67, 71, 74, 76, 78, 84 Lessons 25, 28, 30</p> <p>Lessons 46, 67, 71, 74, 76, 78</p> <p>Lesson 87</p> <p>Lessons 46, 68, 73, 91, 94, 98, 116</p> <p>Lessons 87, 99</p>	
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<p>when one or more dimensions of a figure are changed and apply this idea in solving problems.</p>	<p>Student Activities Cooperative Learning Drawing Manipulatives</p> <p>Teaching Strategies Direct Instruction Open-ended Questions Discussion Demonstration Brainstorming Problem Solving Read Aloud Facilitating Cooperative Learning</p> <p>Evaluation Procedures Observation Class Participation Quizzes/Tests</p> <p>Other Resources and Bibliography None</p>	
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