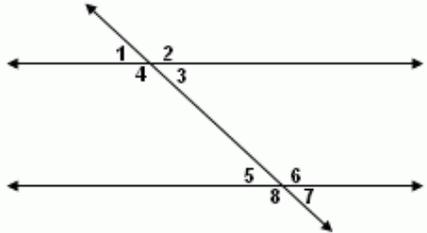
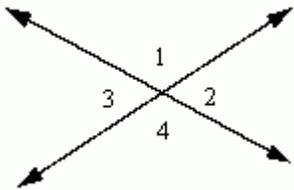
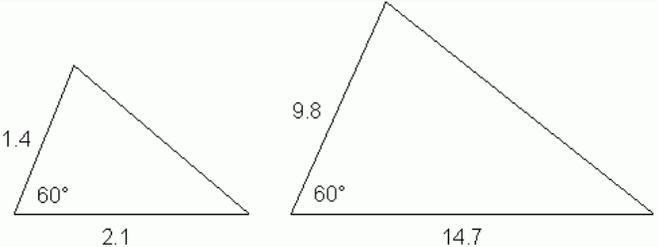


Geometry Examples

Utah Geometry Core	Examples
<p>Standard I: Students will use algebraic, spatial, and logical reasoning to solve geometry problems.</p> <p>Objective 1: Use inductive and deductive reasoning to develop mathematical arguments.</p> <ol style="list-style-type: none"> Write conditional statements, converses, and inverses, and determine the truth value of these statements. Formulate conjectures using inductive reasoning. Prove a statement false by using a counterexample. 	<ul style="list-style-type: none"> What conclusions, if any, can you draw from the following statements? <i>Statement 1: The 2002 Olympic skiing events were held in Utah.</i> <i>Statement 2: John skied in Utah in 2002.</i> What is the if-then form of the statement "Trapezoids have only two parallel sides?" Prove that all right triangles are not isosceles.
<p>Objective 2: Analyze characteristics and properties of angles.</p> <ol style="list-style-type: none"> Use accepted geometric notation for lines, segments, rays, angles, similarity, and congruence. Identify and determine relationships in adjacent, complementary, supplementary, or vertical angles and linear pairs. Classify angle pairs formed by two lines and a transversal. Prove relationships in angle pairs. Prove lines parallel or perpendicular using slope or angle relationships. 	<p>How should Kambry classify $\angle 4$ and $\angle 6$?</p>  <ul style="list-style-type: none"> Prove $\angle 1 \cong \angle 4$. 
<p>Objective 3: Analyze characteristics and properties of triangles.</p> <ol style="list-style-type: none"> Prove congruency and similarity of triangles using postulates and theorems. Prove the Pythagorean Theorem in multiple ways, find missing sides of right triangles using the Pythagorean Theorem, and determine whether a triangle is a right triangle using the converse of the Pythagorean Theorem. Prove and apply theorems involving isosceles triangles. Apply triangle inequality theorems. Identify medians, altitudes, and angle bisectors of a triangle, and the perpendicular bisectors of the sides of a triangle, and justify the concurrency theorems. 	<ul style="list-style-type: none"> Which postulate or theorem would prove these triangles to be similar? 

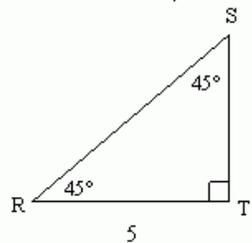
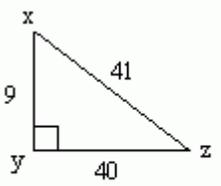
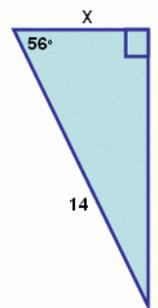
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	<ul style="list-style-type: none"> • In the following figure, which triangles can be proven congruent, and how? <div style="text-align: center;"> </div> <ul style="list-style-type: none"> • From each vertex of a triangle, one can draw a median, and altitude, and an angle bisector. Of these three segments, which one contains the midpoint of the opposite side?
<p>Objective 4: Analyze characteristics and properties of polygons and circles.</p> <ol style="list-style-type: none"> a. Use examples and counterexamples to classify subsets of quadrilaterals. b. Prove properties of quadrilaterals using triangle congruence relationships, postulates, and theorems. c. Derive, justify, and use formulas for the number of diagonals, lines of symmetry, angle measures, perimeter, and area of regular polygons. d. Define radius, diameter, chord, secant, arc, sector, central angle, inscribed angle, and tangent of a circle, and solve problems using their properties. e. Show the relationship between intercepted arcs and inscribed or central angles, and find their measures. 	<p>Circle P has the following dimensions: $BC = 5$ inches, $CE = 4$ inches, and $DE = 3$ inches. What is the length of \overline{AE}?</p> <div style="text-align: center;"> </div> <ul style="list-style-type: none"> • Prove: The diagonals of a rhombus are perpendicular. • What quadrilateral has four congruent sides? • Determine the angle measurement of an interior angle of a regular pentagon.

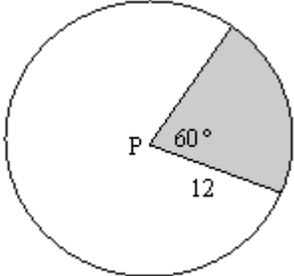
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<p>Objective 5: Perform basic geometric constructions, describing and justifying the procedures used.</p> <ol style="list-style-type: none"> Investigate geometric relationships using constructions. Copy and bisect angles and segments. Construct perpendicular and parallel lines. Justify procedures used to construct geometric figures. Discover and investigate conjectures about geometric properties using constructions. 	<ul style="list-style-type: none"> Construct an equilateral triangle using a compass and straight edge. Construct a square using technology. Demonstrate that the medians of a triangle are concurrent by constructing the medians of a triangle using a compass and straight-edge, technology, or patty paper.
<p>Objective 6: Analyze characteristics and properties of three-dimensional figures.</p> <ol style="list-style-type: none"> Identify and classify prisms, pyramids, cylinders and cones based on the shape of their base(s). Identify three-dimensional objects from different perspectives using nets, cross-sections, and two-dimensional views. Describe the symmetries of three-dimensional figures. Describe relationships between the faces, edges, and vertices of polyhedra. 	<ul style="list-style-type: none"> This is a net of a polyhedron. How should Carlos classify the figure? How many vertices will it have?  <ul style="list-style-type: none"> What is the name of the polyhedron that has two congruent bases that are polygons contained in parallel planes?
<p><i>Standard II: Students will use the language and operations of algebra to explore geometric relationships with coordinate geometry.</i></p> <p>Objective 1: Describe the properties and attributes of lines and line segments using coordinate geometry.</p> <ol style="list-style-type: none"> Verify the classifications of geometric figures using coordinate geometry to find lengths and slopes. Find the distance between two given points and find the coordinates of the midpoint. Write an equation of a line perpendicular or a line parallel to a line through a given point. 	<ul style="list-style-type: none"> How would you classify the geometric figure with vertices at (1,3), (7,3), (9,5) and (7,5)? Find the distance between (-7,9) and (3, -10). Write the equation of a line parallel to $2x-y=-4$, which passes through (3,5)
<p>Objective 2: Describe spatial relationships using coordinate geometry.</p> <ol style="list-style-type: none"> Graph a circle given the equation in the form $(x - h)^2 + (y - k)^2 = r^2$, and write the equation when given the graph. Determine whether points in a set are collinear. 	<ul style="list-style-type: none"> Graph the circle $(x - 1)^2 + (y + 1)^2 = 4$ Determine if the points (2,-5), (-3,0), and (-4,1) are collinear without graphing them.

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<p>Standard III: <i>Students will extend concepts of proportion and similarity to trigonometric ratios.</i></p> <p>Objective 1: Use triangle relationships to solve problems.</p> <ol style="list-style-type: none"> a. Solve problems using the properties of special right triangles, e.g., 30°, 60°, 90° or 45°, 45°, 90°. b. Identify the trigonometric relationships of sine, cosine, and tangent with the appropriate ratio of sides of a right triangle. c. Express trigonometric relationships using exact values and approximations. 	<p>If $RT = 5$ in $\triangle RST$,</p>  <ul style="list-style-type: none"> • what is the length of RS?  <ul style="list-style-type: none"> • what is the $\cos x$?
<p>Objective 2: Use the trigonometric ratios of sine, cosine, and tangent to represent and solve for missing parts of triangles.</p> <ol style="list-style-type: none"> a. Find the angle measure in degrees when given the trigonometric ratio. b. Find the trigonometric ratio given the angle measure in degrees, using a calculator. c. Find unknown measures of right triangles using sine, cosine, and tangent functions and inverse trigonometric functions. 	<ul style="list-style-type: none"> • Given the following triangle, what is the value of x?  <ul style="list-style-type: none"> • What is $\tan 27^\circ$?
<p>Standard IV: <i>Students will use algebraic, spatial, and logical reasoning to solve measurement problems.</i></p> <p>Objective 1: Find measurements of plane and solid figures.</p> <ol style="list-style-type: none"> a. Find linear and angle measures in real-world situations using appropriate tools or technology. b. Develop surface area and volume formulas for polyhedra, cones, and cylinders. c. Determine perimeter, area, surface area, lateral area, and volume for prisms, cylinders, pyramids, cones, and spheres when given the formulas. d. Calculate or estimate the area of an irregular region. 	<ul style="list-style-type: none"> • Elena is making a candle in the shape of a cone. The diameter of the base is 8 inches. The height is 9 inches. The sides of the candle, but not the base, will be coated with glitter. What is the best estimate of the area of the candle that will be covered with glitter? • What is the area of the shaded region?

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<p>e. Find the length of an arc and the area of a sector when given the angle measure and radius.</p>	
<p>Objective 2: Solve real-world problems using visualization and spatial reasoning.</p> <ol style="list-style-type: none"> Solve problems using the Pythagorean Theorem and its converse. Solve problems using the distance formula. Solve problems involving trigonometric ratios. Solve problems involving geometric probability. 	<ul style="list-style-type: none"> Salmon habitat occupies 1,500 square miles in a certain area of ocean. Within the salmon habitat, there is a 600-square-mile area of seal habitat. What is the probability that a location selected at random in the salmon habitat zone is also in the seal habitat? Points A, B, and C form a triangle. If Morgan was to use the distance formula to find the lengths of the sides, how would she classify triangle ABC? A(-2,1) B(3,3) C(3, -1)