

Unit E - Right Triangles

Overview

This unit is an exploration of families of right triangles, the Pythagorean theorem, and right triangle trigonometry. It includes the 30-60-90 and 45-45-90 right triangles and the relationship between the lengths of their sides. Word problems focus on angles of elevation and angles of depression.

21st Century Capacities: Analyzing, Synthesizing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP 1 Make sense of problems and persevere in solving them
MP2 Reason abstractly and quantitatively
MP3 Construct viable arguments and critique the reasoning of others

CCSS.MATH.CONTENT.HSN.RN.A.2
 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

CCSS.MATH.CONTENT.HSA.CED.A.1
 Create equations and inequalities in one variable and use them to solve problems.

CCSS.MATH.CONTENT.HSA.REI.A.2
 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

CCSS.MATH.CONTENT.HSA.REI.B.4

Transfer:

Students will be able to independently use their learning in new situations to...

1. Draw conclusions about graphs, shapes, equations, or objects.(Analyzing)
2. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing)
3. Evaluate the accuracy and efficiency of a given solution. (Analyzing)
4. Apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem. (Synthesizing)

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.
2. Mathematicians apply the mathematics they know to solve problems occurring in everyday life.
3. Mathematicians examine relationships to discern a pattern, generalizations, or

ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*

- A. How can understanding a pattern help me?
- B. How can I use what I know to help me find what is missing?
- C. How can constructing and deconstructing help me?

Geometry Level 2 Curriculum

<p>Solve quadratic equations in one variable.</p> <p>CCSS.MATH.CONTENT.HSA.REI.B.4.B Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.</p> <p>CCSS.MATH.CONTENT.HSG.CO.A.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.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.B.4 Prove theorems about triangles.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.C.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.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.C.7 Explain and use the relationship between the sine and cosine of complementary angles.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.C.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems</p>	<p>structure.</p> <p>4. Mathematicians analyze characteristics and properties of geometric shapes to develop mathematical arguments about geometric relationships.</p>	
Acquisition:		
	<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. The Pythagorean Theorem 2. The distance formula 3. Some Pythagorean Triplets (3,4,5)(5,12,13) 4. The ratio (and location) of the sides of 30-60-90 and 45-45-90 triangles 5. The three trigonometric ratios (sine = opp/hyp and cosine = adj/hyp and tangent = opp/adj) 6. The relationship between the sine and the cosine of complementary angles 7. Vocabulary: faces, edges, diagonals solids, base, vertex, altitude, slant height, trigonometry, opposite, adjacent, angle of elevation, angle of depression, 	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> 1. Simplifying rational numbers 2. Multiplying rational numbers 3. Solving quadratic equations 4. Applying the Pythagorean Theorem to 2D and 3D problems 5. Using the converse of the Pythagorean Theorem to classify triangles as acute, right or obtuse 6. Applying the distance formula to solve problems 7. Using Pythagorean triplets to solve triangles 8. Solving problems involving 30-60-90 and 45-45-90 triangles 9. Solving angle of elevation (depression) problems 10. Solve problems using right triangle trigonometry (find a side, find an angle) 11. Use a table or technology to find the inverse of a trigonometric function