

Common Core Mathematics Lesson Plan

| Lesson Title: Use trigonometric ratios and Pythagorean Theory to solve problems with triangles | |
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| <p>Learning Objective(s): Students will be able to use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. (G.SRT.8)</p> | <p>Materials: Calculators</p> |
| <p>Topic Source (page numbers): Common Core Mathematics, Integrated Pathway Mathematics 2, Unit 5 Core publishers)</p> | <p>Key Vocabulary: sine, cosine, right angle, right triangle, Pythagorean Theorem</p> |
| <p>Prerequisite / Background Knowledge: Understanding of triangles, angles, and ratios; introduction to sine and cosine, understanding of Pythagorean Theorem</p> | |
| Teacher Actions | Student Actions |
| <p>Introduction (5 minutes): Intro, definition of purpose, demonstrations, etc. -</p> <p>Teacher begins with a review of right triangles.</p> <p>Teacher reviews “soh cah toa” and definitions of sine and cosine as ratios of lengths of sides of the right triangle.</p> | <p>None</p> |
| <p>Guided Practice (20 minutes): include questioning tactics, engagement strategies and feedback methods -</p> <p>Teacher draws a 30-60-90 triangle with the length of the shortest side being 10cm and demonstrates using sine and cosine functions to calculate the lengths of the other side (17cm) and the hypotenuse (20cm).</p> <p>Teacher draws a flag pole on the board with a 50m rope angling down to the ground, touching 40m away from the base on the flag pole. Teacher demonstrates using Pythagorean Theorem to calculate the height of the flag pole (30m)</p> | <p>Students repeat the example problems using various measures and questions, such as:</p> <ol style="list-style-type: none"> 1. Right triangle, 45 degree angle, length of one side 10. (other angle 45, other side 10, hypotenuse 14) 2. Right triangle, one side 5, other side 12 (hypotenuse 13, angle1 22.6, angle2 67.4) 3. At 50 feet away, building’s top is at 25 degrees above horizon (hypotenuse 55.2, height 23.4, other angle 65) |
| <p>Monitor: checks for understanding / assessments</p> <p>Teacher has students work a problem on their own.</p> | <p>Students calculate the height of a tree when the tip of its shadow is 40m away from its base and the sun is at a 45 degree angle with the horizon (40m). Students also calculate the length of the hypotenuse (56m).</p> |

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| <p>Adjust / re-teach / additional practice (5 minutes):</p> <p>If needed, teacher walks through another example.</p> | <p>Additional examples as needed.</p> |
| <p>Independent practice / extensions (5 minutes):</p> <p>Teacher discusses the use of trigonometric functions in the physical sciences, discussing the application of a right triangle to vector quantities. One example: an airplane with forward thrust of x encountering a side wind with a thrust of y, and the need for the airline to calculate the resultant force on the plane.</p> | <p>None</p> |
| <p>Closure (5 minutes): connect ideas, concepts, and skills together and with lesson objectives</p> <p>Teacher reiterates the usefulness of the sine and cosine functions and the Pythagorean Theorem in calculations related to the physical sciences.</p> | |