

Workplace Math 10 –

Lesson 7: Applications of Trigonometry: Using Sin, Cos, Tan to Solve for Sides in Right Triangles

Grade/Class	Workplace Math 10	Unit: 3-Trigonometry
Duration	70 minutes	
Big Ideas	Curricular Competencies	Learning Objectives
Proportional reasoning is used to make sense of multiplicative relationships.	Communicating & Representing: Explain and justify mathematical ideas and decisions in many ways.	-Students will be able to apply trigonometric ratios to solve real-world problems to measure heights of otherwise difficult to measure objects.
Materials	- Rulers, protractors, calculators - Measuring tape or string (for ground measurements) - To make DIY clinometers: straw, string, tape, plasticine	

Lesson Components

Component	Details
Hook (15 min)	The Height of a Building - Begin with a question: <i>How could we measure the height of a tall building without climbing it?</i> Have students work in groups of 3-4 on a vertical erasable surface.

	Ask students to draw out and identify what measurements are required to use right triangles to get the height of a far away and large object. Brainstorm what are different ways to get these measurements. Demonstrate how a clinometer can measure the angle of elevation to the top of an object. Go over their findings and outline the key measurements they need (if any were missed in their brainstorming)
Revision (5 min)	Using Sin, Cos, Tan to Solve for Sides - Review SOH CAH TOA and explain how these ratios can be rearranged to solve for unknown sides - Provide examples of solving for sides, using diagrams and calculations, to show how real-world measurements relate to triangles.
Activity Prep (10 min)	Show students how to make clinometers with the provided supplies. Play Video Distribute handout
Outdoor Activity (30 min)	Tree Height Measurement - Take students outside to measure the height of various trees using trigonometric ratios. 1. Form groups of 3-4. 2. Each group measures the same 5 chosen trees 3. They use a measuring tape or a phone measuring app to find the horizontal distance from the base of the tree to the measuring point. 4. They use the clinometer they made to measure the angle of elevation to the top of the tree. 5. Apply sine, cosine, or tangent to calculate the height of each of the 5 trees. - Groups record their data and calculations in workbooks. Teacher should move from group to group, checking their process, thinking, help with any obstacles. Focus on how the students are getting to their results, how are they thinking?
Wrap-Up (10 min)	Reflection and Discussion - Gather the class and discuss the results: - <i>What challenges did you face during the measurements?</i> - <i>How accurate do you think your calculations are? Why?</i>

	Encourage critical thinking: Ask students to analyze the relationship between their measurements and the calculated results, question the accuracy of their methods, and refine their thinking to improve problem-solving. Compare Accuracy: Have students compare their calculated tree heights to a baseline measurement taken with professional tools (if available). - Reinforce how trigonometry connects to real-world applications, such as architecture or forestry. - Encourage students to reflect on how the principles they used today could be applied in other scenarios.
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Assessment

- Observe participation in the outdoor activity and group collaboration.
 - Review worksheets for correct use of trigonometric ratios and clear calculations.
 - Assess reflective responses during the wrap-up discussion for understanding of concepts.
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Post-Lesson Notes/Feedback