

Student Workbook

Right Triangle Trigonometry

Name: _____

Date: _____

Period: _____

Learning Target: I can use SOH-CAH-TOA to find missing sides and angles in right triangles, including angle of elevation/depression problems.

Vocabulary

Term	Meaning
Opposite / Adjacent	The leg across from, or next to, the reference angle θ .
Angle of Elevation	The angle measured UP from a horizontal line to an object.
Angle of Depression	The angle measured DOWN from a horizontal line to an object.

Key Concept: SOH-CAH-TOA

THE THREE BASIC RATIOS $\sin\theta = \text{opposite/hypotenuse}$ $\cos\theta = \text{adjacent/hypotenuse}$ $\tan\theta = \text{opposite/adjacent}$

EXAMPLE 1 — Find a Missing Side

In a right triangle, angle $A=35^\circ$, hypotenuse=20. Find the opposite side.

$\sin(35^\circ) = \text{opp}/20 \rightarrow \text{opp} = 20\sin(35^\circ) \approx \underline{\hspace{2cm}}$

EXAMPLE 2 — Find a Missing Angle

In a right triangle, opposite=7, adjacent=10. Find θ .

$\tan\theta = 7/10 \rightarrow \theta = \arctan(0.7) \approx \underline{\hspace{2cm}}$

COMMON MISTAKE

To find a MISSING ANGLE, you need the INVERSE trig function (arcsin, arccos, arctan) — not the regular sin/cos/tan!

Key Concept: Angle of Elevation & Depression

EXAMPLE 3

A person standing 50m from a building measures the angle of elevation to the top as 40° . Find the height of the building.

$$\tan(40^\circ) = \text{height}/50 \rightarrow \text{height} = 50\tan(40^\circ) \approx \underline{\hspace{2cm}}$$

EXAMPLE 4

From a lighthouse 30m tall, the angle of depression to a boat is 15° . Find the distance from the boat to the base.

$$\tan(15^\circ) = 30/\text{distance} \rightarrow \text{distance} = 30/\tan(15^\circ) \approx \underline{\hspace{2cm}}$$

Guided Practice — Part A: Which Ratio?

- A1** Given angle $\theta=50^\circ$, hyp=15, find the ADJACENT side. Which ratio?

- A2** Given angle $\theta=25^\circ$, opp=8, find the HYPOTENUSE. Which ratio?

Guided Practice — Part B: Find a Missing Side

- B1** Angle $A=42^\circ$, hypotenuse=18. Find the opposite side.

- B2** Angle $A=55^\circ$, adjacent=10. Find the hypotenuse.

Guided Practice — Part C: Find a Missing Angle

- C1** Opposite=9, hypotenuse=15. Find θ .

C2 Opposite=6, adjacent=11. Find θ .

Guided Practice — Part D: Elevation & Depression

D1 A ladder leans against a wall at a 65° angle with the ground. If the ladder is 12 feet long, how high up the wall does it reach?

D2 From the top of a 100-foot cliff, the angle of depression to a boat is 25° . Find the horizontal distance from the base of the cliff to the boat.

BEFORE YOU MOVE ON

Check with a partner: did you correctly identify which side is opposite vs. adjacent relative to the GIVEN angle?