LESSON MAKER PRO

Triangle Ratio Quest

Use right-triangle ratios to find missing values.

HIGH SCHOOL · MA.912.T.1

MA.912.T.1 "Define and use trigonometric ratios, identities or functions to solve problems."

NAME _____ **DATE** _____

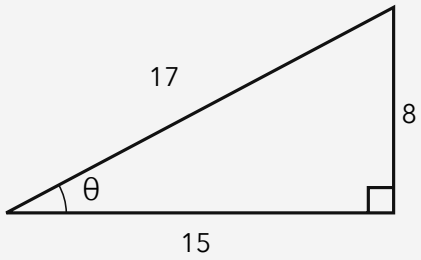
RIGHT-TRIANGLE RATIOS

For an acute angle theta in a right triangle, sin(theta) = opposite/hypotenuse, cos(theta) = adjacent/hypotenuse, and tan(theta) = opposite/adjacent. Identify the sides relative to theta, substitute their lengths, and simplify the fraction when possible.

WORKED EXAMPLE

Use the marked right triangle to identify the side opposite θ and the hypotenuse, then find sinθ.

Schematic; not to scale



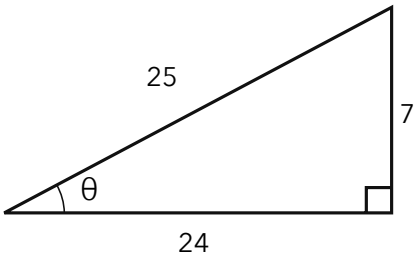
1. Use sin(theta) = opposite/hypotenuse.
2. Substitute: sin(theta) = 8/17.

Answer: 8/17

PRACTICE 6 problems

1 Use the marked triangle. Name the needed sides relative to θ. Find sinθ.

Schematic; not to scale

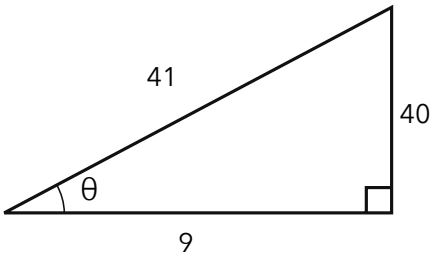


ANSWER _____

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2 Use the marked triangle. Name the needed sides relative to θ. Find cosθ.

Schematic; not to scale

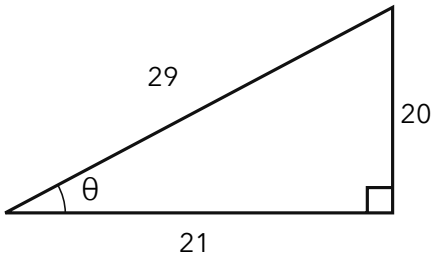


ANSWER _____

_____

3 Use the marked triangle. Name the needed sides relative to θ. Find tanθ.

Schematic; not to scale



ANSWER _____

4 If sin(theta) = 3/5 and the hypotenuse is 30, find the length of the side opposite theta.

ANSWER _____

5 If cos(theta) = 12/13 and the hypotenuse is 26, find the length of the side adjacent to theta.

ANSWER _____

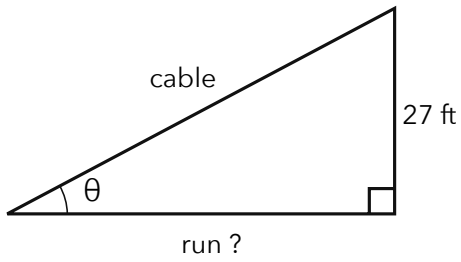
6 A right triangle has legs of 14 and 48. For the acute angle theta opposite the leg of 14, find tan(theta).

ANSWER _____

APPLY IT Show your work

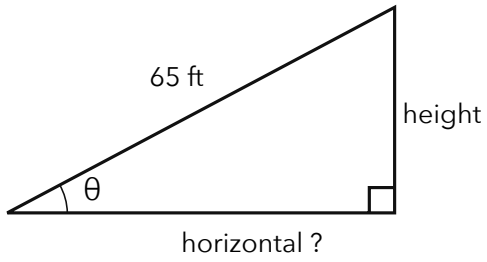
1 At a concert, a lighting cable makes an angle theta with the ground. The cable rises 27 feet to a light, and tan(theta) = 3/4. How far is the ground anchor from the point directly below the light?

Schematic; not to scale



2 During a basketball game, a student films a point on the level court from an upper seat. The line of sight from the camera to that point is 65 feet, and cos(theta) = 12/13, where theta is the angle between the line of sight and the horizontal. What is the horizontal distance from the point directly below the camera to the court point being filmed? The schematic uses the equal angle at the ground point (parallel horizontal lines).

Schematic; not to scale



CHALLENGE One step up

A right triangle has tan(theta) = 7/24 and a hypotenuse of 75. Find the opposite side, the adjacent side, sin(theta), and cos(theta).

ANSWER KEY

Triangle Ratio Quest

HIGH SCHOOL · MA.912.T.1

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the marked triangle. Name the needed sides relative to θ. Find sinθ.	**7/25**
2	Use the marked triangle. Name the needed sides relative to θ. Find cosθ.	**9/41**
3	Use the marked triangle. Name the needed sides relative to θ. Find tanθ.	**20/21**
4	If sin(theta) = 3/5 and the hypotenuse is 30, find the length of the side opposite theta.	**18**
5	If cos(theta) = 12/13 and the hypotenuse is 26, find the length of the side adjacent to theta.	**24**
6	A right triangle has legs of 14 and 48. For the acute angle theta opposite the leg of 14, find tan(theta).	**7/24**

PART 2 · APPLY IT

1. **36 feet** Use tan(theta) = rise/run. Set 27/x = 3/4, so x = 36 feet.
2. **60 feet** Use cos(theta) = horizontal distance/line of sight. The horizontal distance is (12/13)(65) = 60 feet.

CHALLENGE

Opposite side: 21; adjacent side: 72; sin(theta) = 7/25; cos(theta) = 24/25

Accept equivalent ratios, but require fractions to be simplified. For the challenge, accept the four results in any clear order. Require side identification from θ in the figure before substituting a ratio. Figures are explicitly schematic, not scale measurements.