LESSON MAKER PRO

Triangle Ratio Quest

Use sine, cosine, and tangent to find missing measures.

HIGH SCHOOL · MA.912.T.1.8

MA.912.T.1.8 "Solve mathematical and real-world problems involving one-variable trigonometric ratios."

NAME _____ DATE _____

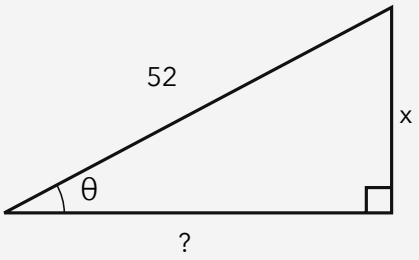
CHOOSE THE RIGHT RATIO

In a right triangle, sin(theta) = opposite/hypotenuse, cos(theta) = adjacent/hypotenuse, and tan(theta) = opposite/adjacent. Choose the ratio that includes the side you know and the side you need, then solve the equation for x.

WORKED EXAMPLE

In the marked triangle $\sin\theta = 5/13$. Identify the known and unknown sides relative to θ, then find x.

Schematic; not to scale



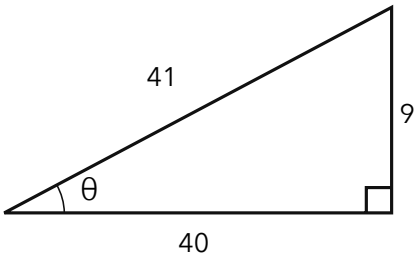
1. sin(theta) = opposite/hypotenuse
2. 5/13 = x/52
3. x = 52(5/13)
4. x = 20

Answer: 20

PRACTICE 6 problems

1 Use the marked triangle. Name the needed sides relative to θ. Find $\sin\theta$.

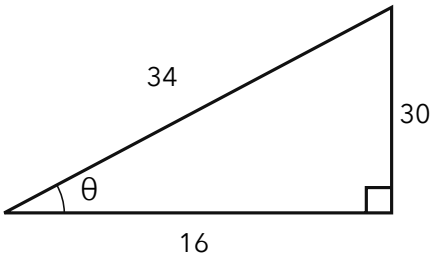
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ANSWER _____

2 Use the marked triangle. Name the needed sides relative to θ. Find $\cos\theta$.

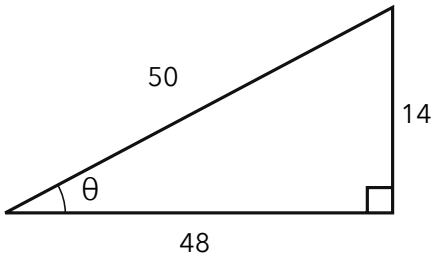
Schematic; not to scale



ANSWER _____

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

Schematic; not to scale



ANSWER _____

_____

4 In a right triangle, tan(theta) = 3/7 and the side adjacent to theta is 35. Find the opposite side, x.

ANSWER _____

5 In a right triangle, cos(theta) = 12/17 and the hypotenuse is 51. Find the adjacent side, x.

ANSWER _____

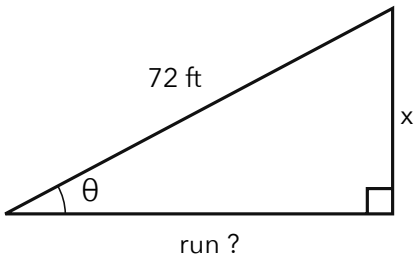
6 In a right triangle, sin(theta) = 4/9 and the opposite side is 28. Find the hypotenuse, x.

ANSWER _____

APPLY IT Show your work

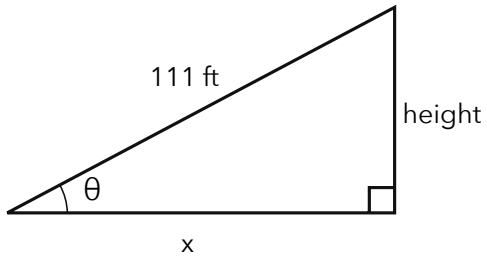
1 A skateboard ramp is 72 feet long. The ramp makes an angle theta with the level ground, and sin(theta) = 3/8. Find the vertical rise of the ramp, x.

Schematic; not to scale



2 A stage-light cable is 111 feet long and makes an angle theta with the theater floor. If cos(theta) = 12/37, find the horizontal distance from the cable's floor anchor to the point directly below the light, x.

Schematic; not to scale



CHALLENGE One step up

A right triangle has tan(theta) = 8/15 and a hypotenuse of 34. Find the opposite and adjacent side lengths. Explain how the ratio helps you find both lengths.

ANSWER KEY

Triangle Ratio Quest

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the marked triangle. Name the needed sides relative to θ. Find sinθ.	**9/41**
2	Use the marked triangle. Name the needed sides relative to θ. Find cosθ.	**8/17**
3	Use the marked triangle. Name the needed sides relative to θ. Find tanθ.	**7/24**
4	In a right triangle, tan(theta) = 3/7 and the side adjacent to theta is 35. Find the opposite side, x.	**15**
5	In a right triangle, cos(theta) = 12/17 and the hypotenuse is 51. Find the adjacent side, x.	**36**
6	In a right triangle, sin(theta) = 4/9 and the opposite side is 28. Find the hypotenuse, x.	**63**

PART 2 · APPLY IT

1. **27 feet** Use sin(theta) = opposite/hypotenuse. Set 3/8 = x/72, so x = 27 feet.
2. **36 feet** Use cos(theta) = adjacent/hypotenuse. Set 12/37 = x/111, so x = 36 feet.

CHALLENGE

Opposite side = 16 and adjacent side = 30. The ratio 8/15 matches an 8-15-17 right triangle, and 34 = 2(17), so multiply both legs by 2.

Accept equivalent unsimplified fractions for the ratio problems. For the challenge, accept any correct explanation that identifies a scale factor of 2 from the 8-15-17 triangle. Require side identification from θ in the figure before substituting a ratio. Figures are explicitly schematic, not scale measurements.