LESSON MAKER PRO

Right Triangle Routes

Use side ratios and the Pythagorean Theorem.

HIGH SCHOOL · MT.CORE.GEOM.MEAS.3.b

MT.CORE.GEOM.MEAS.3.b "Use similarity to explore and define the sine ratio, cosine ratio, and tangent ratio in terms of right triangles by: Using trigonometric ratios and the Pythagorean Theorem to solve right triangles."

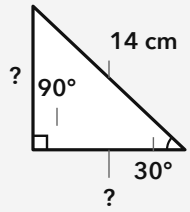
NAME _____ DATE _____

TWO TOOLS

Similar right triangles have the same side ratios for the same acute angle. Use sin θ = opposite/hypotenuse, cos θ = adjacent/hypotenuse, or tan θ = opposite/adjacent. Then use $a^2 + b^2 = c^2$ to find another side.

WORKED EXAMPLE

Find both legs of the triangle.



1. sin 30° = opposite/14 = 1/2.
2. The leg opposite 30° is 7 cm.
3. The other leg satisfies $x^2 + 7^2 = 14^2$, so $x = 7\sqrt{3}$.

Answer: 7 cm opposite 30°; $7\sqrt{3}$ cm adjacent to 30°

PRACTICE 4 problems

1 In a right triangle, sin θ = 3/5 and the hypotenuse is 25 cm. Find the leg opposite θ.

ANSWER _____

2 In a right triangle, cos θ = 5/13 and the hypotenuse is 39 cm. Find the leg adjacent to θ.

ANSWER _____

3 In a right triangle, tan θ = 4/3 and the leg adjacent to θ is 18 cm. Find the opposite leg.

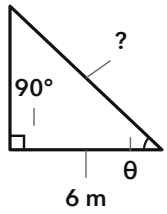
ANSWER _____

4 In a right triangle, sin θ = 8/17 and the opposite leg is 16 cm. Find the hypotenuse and adjacent leg.

ANSWER _____

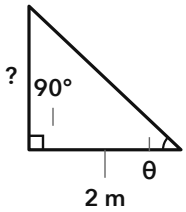
APPLY IT Show your work

1 A skate ramp has tan θ = 1/2. Find its sloped length using the figure.



ANSWER _____

2 A phone is mounted on a wall. From a spot on the floor, cos θ = 4/5. How high is the phone?



ANSWER _____

CHALLENGE One step up

A right triangle has tan θ = 3/4 and a hypotenuse of 35 cm. Find both legs. Explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

Right Triangle Routes

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In a right triangle, sin θ = 3/5 and the hypotenuse is 25 cm. Find the leg opposite θ.	**15 cm**
2	In a right triangle, cos θ = 5/13 and the hypotenuse is 39 cm. Find the leg adjacent to θ.	**15 cm**
3	In a right triangle, tan θ = 4/3 and the leg adjacent to θ is 18 cm. Find the opposite leg.	**24 cm**
4	In a right triangle, sin θ = 8/17 and the opposite leg is 16 cm. Find the hypotenuse and adjacent leg.	**Hypotenuse: 34 cm; adjacent leg: 30 cm**

PART 2 · APPLY IT

1. **$3\sqrt{5}$ m** The rise is (1/2)(6) = 3 m. The sloped length is $\sqrt{(6^2 + 3^2)} = 3\sqrt{5}$ m.
2. **3/2 m** The line of sight is 2 ÷ (4/5) = 5/2 m. The height is $\sqrt{((5/2)^2 - 2^2)} = 3/2$ m.

CHALLENGE

The opposite and adjacent legs are in a 3:4 ratio. The Pythagorean Theorem makes the hypotenuse 5 ratio units, so each unit is 35/5 = 7 cm. The legs are 21 cm opposite θ and 28 cm adjacent to θ.

Accept equivalent exact radical forms. For the challenge, accept any valid explanation that identifies which leg is opposite θ.