LESSON MAKER PRO

Right Triangle Routes

Use exact ratios and the Pythagorean Theorem to solve for missing lengths.

HIGH SCHOOL · HSG-SRT.C.8

CCSS.Math.Content.HSG-SRT.C.8 "Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. *"

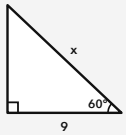
NAME _____ DATE _____

CHOOSE THE RIGHT TOOL

For a right triangle, use $a^2 + b^2 = c^2$, where c is the hypotenuse, to connect side lengths. Use sin, cos, or tan when you know an acute angle and side lengths. Keep square roots in exact form unless the problem asks for a decimal.

WORKED EXAMPLE

Find x in the right triangle shown.

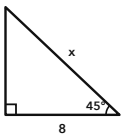


1. cos 60° = 9/x.
2. x = 9/(cos 60°).
3. cos 60° = 1/2, so x = 18.

Answer: x = 18

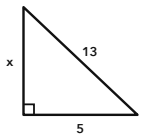
PRACTICE 6 problems

1 Find x in the right triangle shown.



ANSWER _____

2 Find x in the right triangle shown.



ANSWER _____

3 A right triangle has legs of length 20 and 21. Find the hypotenuse x.

ANSWER _____

4 A right triangle has a hypotenuse of 25 and one leg of 7. Find the other leg x.

ANSWER _____

5 In a right triangle, an acute angle measures 30°. The hypotenuse is 28 cm. Find x, the length of the leg opposite the 30° angle.

ANSWER _____

6 In a right triangle, one acute angle measures 45°. The leg adjacent to that angle is 6 m. Find x, the length of the leg opposite the angle.

ANSWER _____

APPLY IT Show your work

1 For a student performance, a stage crew places a support cable from the floor to the top of a vertical backdrop. The top attachment is 16 ft above the floor, and the floor anchor is 30 ft from the backdrop. How long is the cable?

WORK SPACE

ANSWER _____

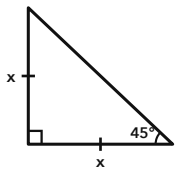
2 A student flies a kite with a taut string that is 14sqrt2 m long. The string makes a 45° angle with level ground. How high is the kite above the ground, assuming the string starts at ground level?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The right triangle shown has an area of 72 square units. Find its perimeter. Explain how you found the side lengths.



WORK SPACE AND ANSWER

ANSWER KEY

Right Triangle Routes

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find x in the right triangle shown.	**x = 8sqrt2**
2	Find x in the right triangle shown.	**x = 12**
3	A right triangle has legs of length 20 and 21. Find the hypotenuse x.	**x = 29**
4	A right triangle has a hypotenuse of 25 and one leg of 7. Find the other leg x.	**x = 24**
5	In a right triangle, an acute angle measures 30°. The hypotenuse is 28 cm. Find x, the length of the leg opposite the 30° angle.	**x = 14 cm**
6	In a right triangle, one acute angle measures 45°. The leg adjacent to that angle is 6 m. Find x, the length of the leg opposite the angle.	**x = 6 m**

PART 2 · APPLY IT

1. **34 ft** The cable is the hypotenuse of a right triangle with legs 16 ft and 30 ft. Use $16^2 + 30^2 = 34^2$.
2. **14 m** The kite height is opposite the 45° angle, and the string is the hypotenuse. Use sin 45° = height/(14sqrt2).

CHALLENGE

24 + 12sqrt2 units; $x^2/2 = 72$ gives x = 12, and the hypotenuse is 12sqrt2.

Accept equivalent exact radical forms, such as 8sqrt2 for problem 1. For the challenge, require both the perimeter and reasoning that the equal legs are 12 and the hypotenuse is 12sqrt2.