

Right Triangle Detectives

Use the Pythagorean theorem to find missing sides.

GRADE 8 • 8.MG.4.d

8.MG.4.d "Determine the measure of a side of a right triangle, given the measures of the other two sides."

NAME _____

DATE _____

THE BIG IDEA

In a right triangle, the hypotenuse is the longest side and is across from the right angle. Use $a^2 + b^2 = c^2$, where c is the hypotenuse. To find a leg, subtract the known leg's square from the hypotenuse's square, then find the square root.

WORKED EXAMPLE

A right triangle has legs 9 units and 40 units. Find the hypotenuse c .

1. $c^2 = 9^2 + 40^2$

2. $c^2 = 81 + 1600 = 1681$

3. $c = \sqrt{1681} = 41$

Answer: $c = 41$ units

PRACTICE 6 problems

- 1** A right triangle has legs 5 units and 12 units. Find the hypotenuse.

ANSWER _____

- 2** A right triangle has legs 8 units and 15 units. Find the hypotenuse.

ANSWER _____

- 3** A right triangle has a hypotenuse of 25 units and one leg of 7 units. Find the other leg.

ANSWER _____

- 4** A right triangle has a hypotenuse of 26 units and one leg of 10 units. Find the other leg.

ANSWER _____

- 5** A right triangle has legs 20 units and 21 units. Find the hypotenuse.

ANSWER _____

- 6** A right triangle has a hypotenuse of 37 units and one leg of 35 units. Find the other leg.

ANSWER _____

APPLY IT Show your work

- 1** A student is designing a rectangular phone wallpaper that is 18 cm wide and 24 cm tall. How long is the diagonal from one corner to the opposite corner?

WORK SPACE

ANSWER _____

- 2** At a skate park, a support cable reaches from a point 15 ft from a ramp's base to a point 36 ft up the vertical ramp. How long is the cable?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A right triangle has a hypotenuse of 65 cm and one leg of 33 cm. Find the other leg. Show an equation and explain why you subtract to solve.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A right triangle has legs 5 units and 12 units. Find the hypotenuse.	13 units
2	A right triangle has legs 8 units and 15 units. Find the hypotenuse.	17 units
3	A right triangle has a hypotenuse of 25 units and one leg of 7 units. Find the other leg.	24 units
4	A right triangle has a hypotenuse of 26 units and one leg of 10 units. Find the other leg.	24 units
5	A right triangle has legs 20 units and 21 units. Find the hypotenuse.	29 units
6	A right triangle has a hypotenuse of 37 units and one leg of 35 units. Find the other leg.	12 units

PART 2 • APPLY IT

- 30 cm** The width and height are the legs of a right triangle. $\sqrt{18^2 + 24^2} = \sqrt{900} = 30$.
- 39 ft** The ground distance and ramp height are the legs. $\sqrt{15^2 + 36^2} = \sqrt{1521} = 39$.

CHALLENGE

$x^2 + 33^2 = 65^2$, so $x^2 = 3136$ and $x = 56$. Subtract because the hypotenuse's square equals the sum of both leg squares.

Accept correct equations and answers with appropriate units. For the challenge, accept equivalent explanations that show the known leg's square is subtracted from the hypotenuse's square.