LESSON MAKER PRO

The Missing Side

Use right triangles to find distances and explain the rule.

GRADE 8 · 8.GR.B.4.a

8.GR.B.4.a "Use diagrams, examples, or informal reasoning to explain the Pythagorean Theorem and why it applies to all right triangles."

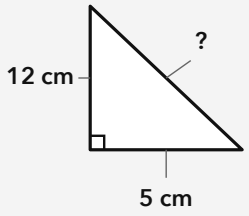
NAME _____ DATE _____

WHY THE RULE WORKS

For a right triangle, the areas of the squares on the legs add to the area of the square on the longest side: $a^2 + b^2 = c^2$. Four copies of any right triangle fit inside a square of side a+b, leaving a square of side c. Comparing their areas shows why the rule works for every right triangle.

WORKED EXAMPLE

Find the missing side of the triangle.



1. $c^2 = 5^2 + 12^2$
2. $c^2 = 25 + 144 = 169$
3. $c = \sqrt{169} = 13$ cm

Answer: 13 cm

PRACTICE 4 problems

1 A right triangle has legs of 6 cm and 8 cm. Find its hypotenuse.

ANSWER _____

2 A right triangle has a hypotenuse of 17 m and a leg of 8 m. Find the other leg and show the subtraction.

ANSWER _____

3 A right triangle has legs of 7 in and 24 in. Find its hypotenuse.

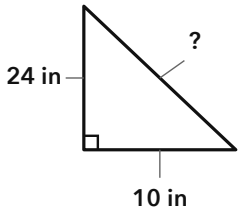
ANSWER _____

4 A right triangle has a hypotenuse of 29 ft and a leg of 20 ft. Find the other leg.

ANSWER _____

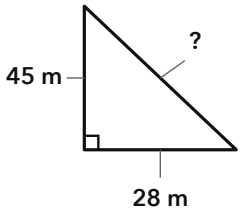
APPLY IT Show your work

1 This right triangle shows a gaming monitor's width, height, and diagonal. Find the diagonal.



ANSWER _____

2 A drone flies east, then north along the paths shown. How far is it from its start?



ANSWER _____

CHALLENGE One step up

A classmate says the rule works only when side lengths are whole numbers. Use the four-copy area idea to explain why it also works when the legs are fractions.

WORK SPACE AND ANSWER

ANSWER KEY

The Missing Side

GRADE 8 · 8.GR.B.4.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A right triangle has legs of 6 cm and 8 cm. Find its hypotenuse.	**10 cm**
2	A right triangle has a hypotenuse of 17 m and a leg of 8 m. Find the other leg and show the subtraction.	**15 m; $17^2 - 8^2 = 225$.**
3	A right triangle has legs of 7 in and 24 in. Find its hypotenuse.	**25 in**
4	A right triangle has a hypotenuse of 29 ft and a leg of 20 ft. Find the other leg.	**21 ft**

PART 2 · APPLY IT

1. **26 in** The diagonal is the hypotenuse. $\sqrt{(10^2 + 24^2)} = \sqrt{676} = 26$ in.
2. **53 m** The straight-line distance is the hypotenuse. $\sqrt{(28^2 + 45^2)} = \sqrt{2809} = 53$ m.

CHALLENGE

The four triangles still fit inside a square of side a+b, with a square of side c left in the center. Their areas give $(a+b)^2 = 4(ab/2) + c^2$, which simplifies to $a^2 + b^2 = c^2$ even when a and b are fractions.

Accept equivalent area explanations for the challenge. For practice problem 2, the subtraction may be shown as 289 - 64 = 225.