LESSON MAKER PRO

Find the Shortcut

Use right triangles to find lengths you cannot measure directly.

GRADE 8 · PA.GM.1.1

PA.GM.1.1 "Justify the Pythagorean theorem using measurements, diagrams, or dynamic software to solve problems in two dimensions involving right triangles."

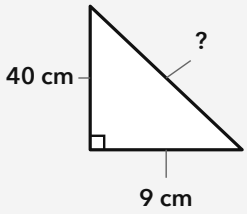
NAME _____ DATE _____

THE RIGHT-TRIANGLE RULE

The two sides that meet at a right angle are the legs. The side across from the right angle is the hypotenuse. For every right triangle, $a^2 + b^2 = c^2$, where a and b are the legs and c is the hypotenuse.

WORKED EXAMPLE

Find the missing side of the right triangle.

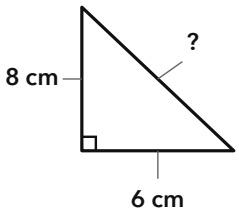


1. The missing side is across from the right angle, so it is the hypotenuse.
2. $9^2 + 40^2 = x^2$
3. $81 + 1600 = 1681$, so $x^2 = 1681$.
4. $x = 41$ because $41^2 = 1681$.

Answer: 41 cm

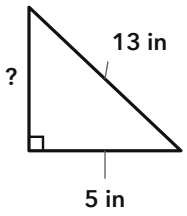
PRACTICE 6 problems

1 Find the missing side.



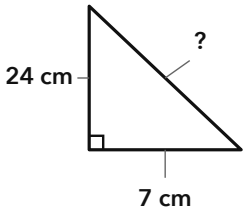
ANSWER _____

2 Find the missing leg.



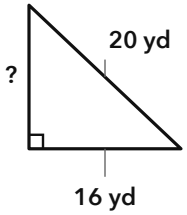
ANSWER _____

3 Find the length of the side across from the right angle.



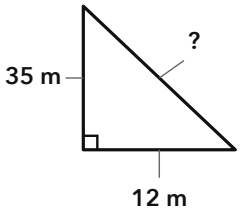
ANSWER _____

4 Find the missing leg.



ANSWER _____

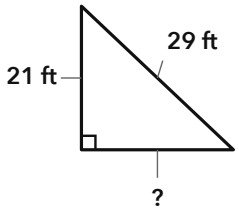
5 Which side is the hypotenuse? Find its length.



ANSWER _____

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6 Find the missing side. Write an equation that shows why your answer is correct.

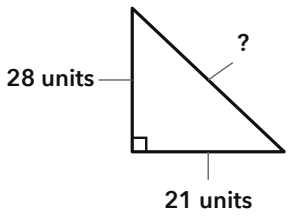


ANSWER _____

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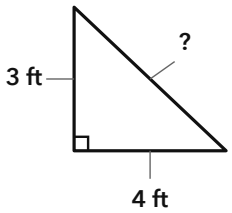
APPLY IT Show your work

1 A game character can follow the two marked legs to reach a treasure chest or take the direct route across the triangle. How many game units shorter is the direct route?



ANSWER _____

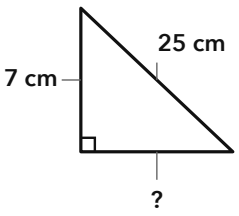
2 A skate park is building the ramp shown. How long will the sloped surface be?



ANSWER _____

CHALLENGE One step up

Find the perimeter of the triangle. Show how the right angle helps you find the missing side.



WORK SPACE AND ANSWER

ANSWER KEY

Find the Shortcut

GRADE 8 · PA.GM.1.1

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the missing side.	**10 cm**
2	Find the missing leg.	**12 in**
3	Find the length of the side across from the right angle.	**25 cm**
4	Find the missing leg.	**12 yd**
5	Which side is the hypotenuse? Find its length.	**The unlabeled side is the hypotenuse; it is 37 m.**
6	Find the missing side. Write an equation that shows why your answer is correct.	**20 ft; $20^2 + 21^2 = 29^2$.**

PART 2 · APPLY IT

1. **14 game units shorter** The direct route is $\sqrt{(21^2 + 28^2)} = 35$ units. Following both legs is $21 + 28 = 49$ units, so the direct route saves 14 units.
2. **5 ft** The sloped surface is the hypotenuse. Its length is $\sqrt{(4^2 + 3^2)} = 5$ ft.

CHALLENGE

The missing leg is 24 cm because $24^2 + 7^2 = 25^2$. The perimeter is $24 + 25 + 7 = 56$ cm.

Accept an equivalent correct Pythagorean equation for problem 6. For the challenge, students should identify 25 cm as the hypotenuse and include all three sides in the perimeter.