LESSON MAKER PRO

Square Side Test

Find missing lengths and test for right angles.

GRADE 8 · 8A.GM.A.48

8A.GM.A.48 "Informally justify the Pythagorean Theorem and its converse."

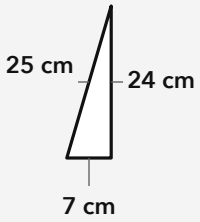
NAME _____ DATE _____

SQUARES TELL THE STORY

For a right triangle, the areas of the squares on the two shorter sides add to the area of the square on the longest side: $a^2 + b^2 = c^2$. The converse works too: if three side lengths pass this test, the triangle has a right angle. Always use the longest side for c.

WORKED EXAMPLE

Does this triangle have a right angle?

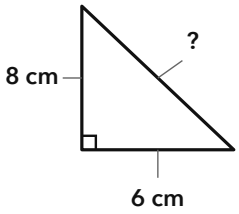


1. The longest side is 25 cm, so compare $7^2 + 24^2$ with 25^2.
2. $7^2 + 24^2 = 49 + 576 = 625$.
3. $25^2 = 625$. The square areas match.

Answer: Yes. By the converse, the triangle has a right angle.

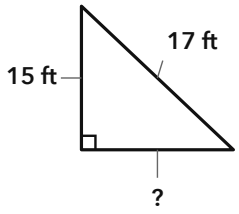
PRACTICE 6 problems

1 Find the missing side length.



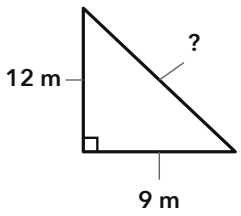
ANSWER _____

2 Find the missing side length.



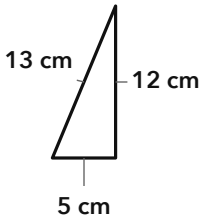
ANSWER _____

3 Find the missing side length.



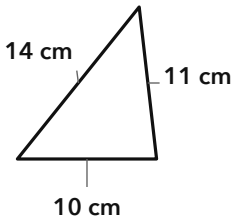
ANSWER _____

4 Does this triangle have a right angle? Show the square-area test.



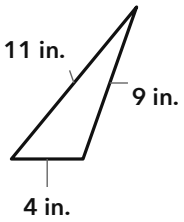
ANSWER _____

5 Does this triangle have a right angle? Show the square-area test.



ANSWER _____

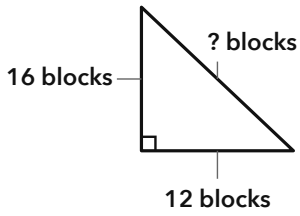
6 Does this triangle have a right angle? Show the square-area test.



ANSWER _____

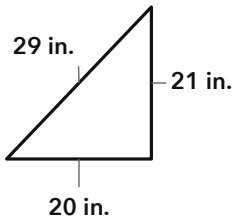
APPLY IT Show your work

1 On a game map, your character moves along two paths shown in the figure. How long is the straight path from start to finish? Explain why the Pythagorean Theorem applies.



ANSWER _____

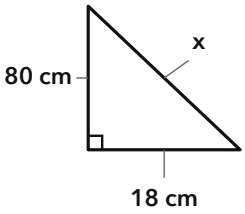
2 A maker club cuts three rods for a triangular bike-ramp frame. Could the frame have a right angle? Use the side lengths in the figure to justify your answer.



ANSWER _____

CHALLENGE One step up

A triangle has two sides shown in the figure. Side x is the longest side, and the triangle has a right angle. Find x, then use square areas to explain why your answer works.



WORK SPACE AND ANSWER

ANSWER KEY

Square Side Test

GRADE 8 · 8A.GM.A.48

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the missing side length.	**10 cm**
2	Find the missing side length.	**8 ft**
3	Find the missing side length.	**15 m**
4	Does this triangle have a right angle? Show the square-area test.	**Yes. $5^2 + 12^2 = 25 + 144 = 169 = 13^2$.**
5	Does this triangle have a right angle? Show the square-area test.	**No. $10^2 + 11^2 = 221$, but $14^2 = 196$.**
6	Does this triangle have a right angle? Show the square-area test.	**No. $4^2 + 9^2 = 97$, but $11^2 = 121$.**

PART 2 · APPLY IT

1. **20 blocks. The paths meet at a right angle, so $12^2 + 16^2 = 400 = 20^2$.** The two known paths are perpendicular legs. Their squares add to 400, so the straight path is 20 blocks.
2. **Yes. $20^2 + 21^2 = 400 + 441 = 841 = 29^2$.** Compare the sum of the squares of the shorter rods with the square of the longest rod. They are equal, so the converse shows the frame has a right angle.

CHALLENGE

x = 82 cm. The squares on the shorter sides have areas $18^2 + 80^2 = 324 + 6{,}400 = 6{,}724$ cm^2, which equals 82^2.

For right-angle tests, accept any correct comparison of the two shorter sides' squared lengths with the longest side's squared length. Answers to length problems must include units.