LESSON MAKER PRO

Triangle Truth Test

Use square areas to test right triangles.

GRADE 8 · 8.G.B.6

CCSS.Math.Content.8.G.B.6 "Explain a proof of the Pythagorean Theorem and its converse."

NAME _____ DATE _____

SQUARE AREA CONNECTION

For a right triangle, the squares of the two leg lengths add to the square of the hypotenuse length. An area proof puts four matching right triangles inside one large square, then compares the large square's area with the areas of the four triangles and the center square. The converse is also true: if the side-length squares fit this equation, the triangle is a right triangle.

WORKED EXAMPLE

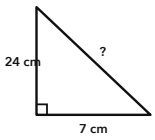
A right triangle has legs 8 cm and 15 cm. Find the hypotenuse length.

1. $8^2 + 15^2 = 64 + 225$
2. $64 + 225 = 289$
3. The square root of 289 is 17.

Answer: 17 cm

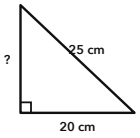
PRACTICE 6 problems

1 Find the hypotenuse of the right triangle.



ANSWER _____

2 A right triangle has a hypotenuse of 25 cm and one leg of 20 cm. Find the other leg.



ANSWER _____

3 The triangle has side lengths 9 cm, 40 cm, and 41 cm. Is it a right triangle?



ANSWER _____

4 A triangle has side lengths 10 cm, 24 cm, and 25 cm. Is it a right triangle?

ANSWER _____

5 A triangle has side lengths 12 cm, x cm, and 37 cm. The 37 cm side is the hypotenuse. Find x.

ANSWER _____

6 A triangle has side lengths 11 cm, 60 cm, and 61 cm. Use the converse of the Pythagorean Theorem to decide whether it is a right triangle.

ANSWER _____

APPLY IT Show your work

1 A gaming monitor has a rectangular display that is 18 inches wide and 24 inches tall. What is the length of the diagonal across the display?

WORK SPACE

ANSWER _____

2 Three paths at a skate park form a triangle with side lengths 16 meters, 30 meters, and 34 meters. Do the paths form a right triangle?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Four congruent right triangles each have legs 20 cm and 21 cm and hypotenuse 29 cm. They fill a large square with side length 41 cm, leaving a center square with side length 29 cm. Use areas to explain why $20^2 + 21^2 = 29^2$.

WORK SPACE AND ANSWER

ANSWER KEY

Triangle Truth Test

GRADE 8 · 8.G.B.6

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the hypotenuse of the right triangle.	**25 cm**
2	A right triangle has a hypotenuse of 25 cm and one leg of 20 cm. Find the other leg.	**15 cm**
3	The triangle has side lengths 9 cm, 40 cm, and 41 cm. Is it a right triangle?	**Yes. $9^2 + 40^2 = 41^2$.**
4	A triangle has side lengths 10 cm, 24 cm, and 25 cm. Is it a right triangle?	**No. $10^2 + 24^2 = 676$, but $25^2 = 625$.**
5	A triangle has side lengths 12 cm, x cm, and 37 cm. The 37 cm side is the hypotenuse. Find x.	**35 cm**
6	A triangle has side lengths 11 cm, 60 cm, and 61 cm. Use the converse of the Pythagorean Theorem to decide whether it is a right triangle.	**Yes. $11^2 + 60^2 = 61^2$.**

PART 2 · APPLY IT

1. **30 inches** Use the width and height as the legs: $18^2 + 24^2 = 324 + 576 = 900$. The square root of 900 is 30.
2. **Yes, the paths form a right triangle.** Check the converse: $16^2 + 30^2 = 256 + 900 = 1156$, and $34^2 = 1156$.

CHALLENGE

The large square has area $41^2 = 1681$ cm^2. The four triangles have total area $4(1/2 \times 20 \times 21) = 840$ cm^2, and the center square has area $29^2 = 841$ cm^2. Since $840 + 841 = 1681$, $20^2 + 21^2 = 400 + 441 = 841 = 29^2$.

Accept equivalent statements that correctly show the two squared leg lengths and the squared longest side. For right-triangle decisions, students should state both the conclusion and a correct square comparison.