

Right Triangle Detectives

Use squares to find missing sides and test for right angles.

GRADE 8 • 8.MG.4

8.MG.4 "The student will apply the Pythagorean Theorem to solve problems involving right triangles, including those in context. Verify the Pythagorean Theorem using diagrams, concrete materials, and measurement..."

NAME _____

DATE _____

You will need: Pencil; Ruler

THE PYTHAGOREAN THEOREM

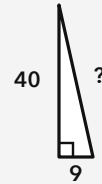
In a right triangle, the hypotenuse is opposite the right angle and is the longest side. If the legs are a and b and the hypotenuse is c , use $a^2 + b^2 = c^2$. To test a triangle, compare the sum of the squares of the two shorter sides to the square of the longest side.

WORKED EXAMPLE

Find the length of the side marked ? in the right triangle shown.

1. Use the two legs: $9^2 + 40^2 = x^2$.
2. Square: $81 + 1600 = x^2$.
3. Add and take the square root: $x = \sqrt{1681} = 41$.

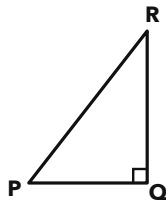
Answer: 41 units



PRACTICE 6 problems

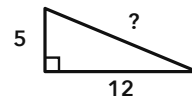
Show your calculation or reasoning. Include units when needed.

- 1** Study the right triangle shown. Name the hypotenuse and the two legs.



ANSWER _____

- 2** Find the length of the side marked ? in the right triangle shown.



ANSWER _____

- 3** A triangle has side lengths 8 cm, 15 cm, and 17 cm. Is it a right triangle? Show the square comparison.

ANSWER _____

- 4** A right triangle has a hypotenuse of 25 in. One leg is 7 in. Find the other leg.

ANSWER _____

- 5** A triangle has side lengths 11 m, 13 m, and 17 m. Is it a right triangle? Show the square comparison.

ANSWER _____

- 6** The legs of a right triangle are 14 ft and 48 ft. Find the hypotenuse.

ANSWER _____

APPLY IT Show your work

- 1** A stage crew makes a triangular support using rods that are 12 ft, 35 ft, and 37 ft long. Does the support make a right triangle? Show how you know.

- 2** At a skate park, a rider travels 20 m east and then 21 m north. What is the straight-line distance from the starting point to the ending point?

CHALLENGE One step up

Use the side measures in the table. Decide whether each set can make a right triangle. Then state which supports can have a square corner. Show a square comparison for each set.

SUPPORT SIDE MEASURES

Support	Side lengths
A	12 cm, 16 cm, 20 cm
B	10 cm, 24 cm, 27 cm
C	20 cm, 21 cm, 29 cm

PRACTICE 3

Yes; $8^2 + 15^2 = 64 + 225 = 289$, and $17^2 = 289$.

PRACTICE 4

24 in.

PRACTICE 5

No; $11^2 + 13^2 = 290$, but $17^2 = 289$.

PRACTICE 6

50 ft

APPLY IT 1

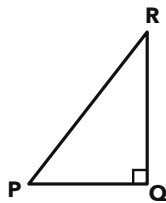
Yes; $12^2 + 35^2 = 144 + 1225 = 1369$, and $37^2 = 1369$. Use the longest rod as the possible hypotenuse. The sum of the squares of the shorter rods equals the square of the longest rod, so the converse shows the triangle is right.

APPLY IT 2

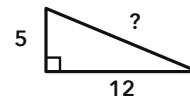
29 m East and north form a right angle, so the two travel distances are legs. Compute $\sqrt{(20^2 + 21^2)} = \sqrt{841} = 29$.

PRACTICE 1

Hypotenuse: PR; legs: PQ and QR.

**PRACTICE 2**

13 units



CHALLENGE

A is right: $12^2 + 16^2 = 144 + 256 = 400 = 20^2$. B is not right: $10^2 + 24^2 = 676$, but $27^2 = 729$. C is right: $20^2 + 21^2 = 400 + 441 = 841 = 29^2$. Supports A and C can have a square corner.

Accept equivalent square comparisons and correctly simplified square roots. For right-triangle tests, students must use the longest side as the possible hypotenuse.

SUPPORT SIDE MEASURES

SUPPORT	SIDE LENGTHS
A	12 cm, 16 cm, 20 cm
B	10 cm, 24 cm, 27 cm
C	20 cm, 21 cm, 29 cm