LESSON MAKER PRO

Right Triangle Routes

Find missing lengths in flat and solid shapes.

GRADE 8 · 8.G.B.7

CCSS.Math.Content.8.G.B.7 "Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions."

NAME _____ DATE _____

THE PYTHAGOREAN THEOREM

In a right triangle, the squares of the two legs add to the square of the hypotenuse: a^2 + b^2 = c^2. The hypotenuse is opposite the right angle. If a leg is missing, subtract the known leg square from the hypotenuse square.

WORKED EXAMPLE

A right triangle has legs of 11 cm and 60 cm. Find the hypotenuse, x.

1. 11^2 + 60^2 = x^2
2. 121 + 3600 = x^2
3. 3721 = x^2, so x = 61

Answer: 61 cm

PRACTICE 6 problems

1 A right triangle has legs of 6 units and 8 units. Find the hypotenuse, x.

ANSWER _____

2 A right triangle has a hypotenuse of 17 units and one leg of 8 units. Find the other leg, x.

ANSWER _____

3 A right triangle has legs of 9 units and 40 units. Find the hypotenuse, x.

ANSWER _____

4 A right triangle has a hypotenuse of 13 units and one leg of 5 units. Find the other leg, x.

ANSWER _____

5 A rectangular prism is 3 units long, 4 units wide, and 12 units high. Find the length of its space diagonal, x.

ANSWER _____

6 A square has a diagonal of 10 units. Find the length of one side, x.

ANSWER _____

APPLY IT Show your work

1 A skateboard ramp is 15 feet long and reaches a platform 9 feet above the ground. How far is the bottom of the ramp from the platform along the ground?

WORK SPACE

ANSWER _____

2 The robotics club has a rectangular display case that is 2 feet deep, 3 feet wide, and 6 feet tall. A support rod runs straight from one bottom corner to the opposite top corner. How long is the rod?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A rectangular prism is 5 units long, 12 units wide, and 16 units high. A cable runs from one bottom corner straight to the opposite top corner. Find the exact length of the cable. Explain why you can use the Pythagorean Theorem twice.

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ANSWER KEY

Right Triangle Routes

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A right triangle has legs of 6 units and 8 units. Find the hypotenuse, x.	**10 units**
2	A right triangle has a hypotenuse of 17 units and one leg of 8 units. Find the other leg, x.	**15 units**
3	A right triangle has legs of 9 units and 40 units. Find the hypotenuse, x.	**41 units**
4	A right triangle has a hypotenuse of 13 units and one leg of 5 units. Find the other leg, x.	**12 units**
5	A rectangular prism is 3 units long, 4 units wide, and 12 units high. Find the length of its space diagonal, x.	**13 units**
6	A square has a diagonal of 10 units. Find the length of one side, x.	**5sqrt2 units**

PART 2 · APPLY IT

1. **12 feet** Treat the ramp as the hypotenuse of a right triangle. The ground distance is sqrt(15^2 - 9^2) = sqrt144 = 12.
2. **7 feet** Use the three dimensions to find the space diagonal: x^2 = 2^2 + 3^2 + 6^2 = 49. Therefore, x = 7.

CHALLENGE

5sqrt17 units; first find the base diagonal, 13 units, then use 13^2 + 16^2 = x^2, so x = sqrt425 = 5sqrt17.

Accept correct units and equivalent exact radical forms. For example, sqrt50 is equivalent to 5sqrt2, and sqrt425 is equivalent to 5sqrt17.