LESSON MAKER PRO

Diagonal Detective

Use right triangles to find missing lengths.

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."

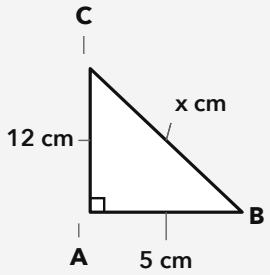
NAME _____ DATE _____

THE PYTHAGOREAN THEOREM

For a right triangle with legs a and b and hypotenuse c, use $a^2 + b^2 = c^2$. The hypotenuse is opposite the right angle. To find a missing leg, subtract the known leg squared from the hypotenuse squared, then take the square root.

WORKED EXAMPLE

The shown right triangle has legs 5 cm and 12 cm. Find its hypotenuse x.

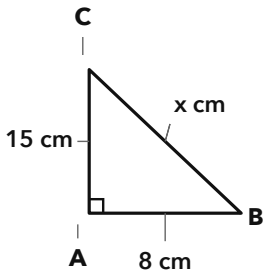


1. $5^2 + 12^2 = x^2$
2. $25 + 144 = x^2$
3. $x = \sqrt{169} = 13$

Answer: x = 13 cm

PRACTICE 6 problems

1 The shown right triangle has legs 8 cm and 15 cm. Find its hypotenuse x.



ANSWER _____

2 A right triangle has legs that are 7 cm and 24 cm long. Find the hypotenuse x.

ANSWER _____

3 A right triangle has legs that are 9 m and 40 m long. Find the hypotenuse x.

ANSWER _____

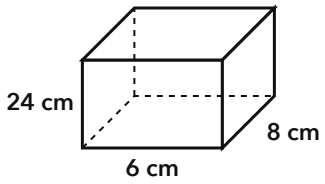
4 A right triangle has a hypotenuse of 25 yd and one leg of 7 yd. Find the other leg x.

ANSWER _____

5 A right triangle has a hypotenuse of 17 in. One leg is 8 in. Find the other leg x.

ANSWER _____

6 The shown rectangular prism has length 6 cm, width 8 cm and height 24 cm. Find its space diagonal, from one vertex to the opposite vertex through the inside.



ANSWER _____

APPLY IT Show your work

1 A skate park ramp rises 30 inches over a horizontal distance of 16 inches. A straight support bar runs from the bottom of the ramp to the top. How long is the support bar?

WORK SPACE

ANSWER _____

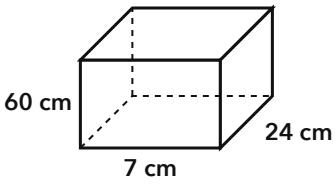
2 For a gaming display, Nia puts an LED strip inside a rectangular light box. The box is 6 inches long, 8 inches wide, and 24 inches high. The strip runs straight from one inside corner to the opposite inside corner. How long is the strip?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The rectangular prism shown has a floor that is 7 cm by 24 cm and a height of 60 cm. Find the diagonal across the floor. Then find the space diagonal from a bottom corner to the opposite top corner. Explain your two steps.



WORK SPACE AND ANSWER

ANSWER KEY # Diagonal Detective

GRADE 8 · 8.G.B.7

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The shown right triangle has legs 8 cm and 15 cm. Find its hypotenuse x.	**x = 17 cm**
2	A right triangle has legs that are 7 cm and 24 cm long. Find the hypotenuse x.	**x = 25 cm**
3	A right triangle has legs that are 9 m and 40 m long. Find the hypotenuse x.	**x = 41 m**
4	A right triangle has a hypotenuse of 25 yd and one leg of 7 yd. Find the other leg x.	**x = 24 yd**
5	A right triangle has a hypotenuse of 17 in. One leg is 8 in. Find the other leg x.	**x = 15 in**
6	The shown rectangular prism has length 6 cm, width 8 cm and height 24 cm. Find its space diagonal, from one vertex to the opposite vertex through the inside.	**26 cm**

PART 2 · APPLY IT

1. **34 inches** Treat the rise and horizontal distance as the legs of a right triangle. $16^2 + 30^2 = 34^2$.
2. **26 inches** First find the base diagonal, $\sqrt{(6^2 + 8^2)} = 10$. Then use 10 and 24 as legs: $\sqrt{(10^2 + 24^2)} = 26$.

CHALLENGE

The floor diagonal is 25 cm, since $7^2 + 24^2 = 25^2$. Then $25^2 + 60^2 = 65^2$, so the space diagonal is 65 cm.

Accept equivalent correct work and correct units. For the challenge, accept an explanation that first finds the floor diagonal and then uses it with the height to find the space diagonal.