LESSON MAKER PRO

Diagonal Detectives

Use right triangles to find missing distances in 2-D and 3-D.

GRADE 8 · NY-8.G.7

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

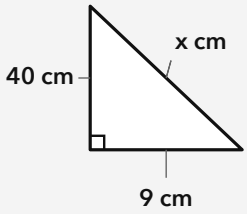
NAME _____ DATE _____

THE PYTHAGOREAN THEOREM

In a right triangle, square the two leg lengths and add. That total equals the square of the hypotenuse, the side across from the right angle. To find a missing length, use the equation and take a square root when needed.

WORKED EXAMPLE

Use the right triangle shown to find x.

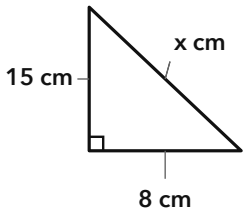


1. $9^2 + 40^2 = x^2$
2. $81 + 1600 = x^2$
3. $1681 = x^2$, so $x = 41$

Answer: 41 cm

PRACTICE 6 problems

1 Use the right triangle shown to find x.



ANSWER _____

2 A right triangle has a hypotenuse of 25 cm and one leg of 7 cm. Find the other leg length x.

ANSWER _____

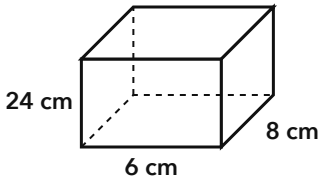
3 The legs of a right triangle are 20 m and 21 m. Find the hypotenuse x.

ANSWER _____

4 A right triangle has a hypotenuse of 53 units and one leg of 28 units. Find the other leg length x.

ANSWER _____

5 Use the dimensions shown on the rectangular prism. Find the length x of a space diagonal from one vertex to the opposite vertex.



ANSWER _____

6 The legs of a right triangle are 12 inches and 35 inches. Find the hypotenuse x.

ANSWER _____

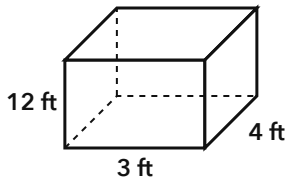
APPLY IT Show your work

1 A student is designing a rectangular banner for a gaming club. The banner is 14 inches tall and 48 inches wide. What is the distance from one corner of the banner to the opposite corner?

WORK SPACE

ANSWER _____

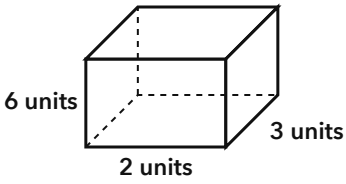
2 A maker club builds the rectangular equipment case shown. A charging cable runs directly inside the case from one bottom corner to the opposite top corner. How long is the cable?



ANSWER _____

CHALLENGE One step up

Use the rectangular prism shown. Find the direct distance from one vertex to the opposite vertex. Explain how you used the Pythagorean Theorem twice.



WORK SPACE AND ANSWER

ANSWER KEY # Diagonal Detectives

GRADE 8 · NY-8.G.7

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the right triangle shown to find x.	**17 cm**
2	A right triangle has a hypotenuse of 25 cm and one leg of 7 cm. Find the other leg length x.	**24 cm**
3	The legs of a right triangle are 20 m and 21 m. Find the hypotenuse x.	**29 m**
4	A right triangle has a hypotenuse of 53 units and one leg of 28 units. Find the other leg length x.	**45 units**
5	Use the dimensions shown on the rectangular prism. Find the length x of a space diagonal from one vertex to the opposite vertex.	**26 cm**
6	The legs of a right triangle are 12 inches and 35 inches. Find the hypotenuse x.	**37 inches**

PART 2 · APPLY IT

1. **50 inches** Treat the height and width as the legs of a right triangle. The diagonal is sqrt($14^2 + 48^2$) = sqrt(2500) = 50.
2. **13 ft** First find the base diagonal, sqrt($3^2 + 4^2$) = 5. Then use that diagonal and the height: sqrt($5^2 + 12^2$) = 13.

CHALLENGE

7 units; first find a face diagonal of sqrt($2^2 + 3^2$) = sqrt(13) units, then find sqrt((sqrt(13))$^2 + 6^2$) = 7 units.

Accept equivalent work that correctly identifies the hypotenuse or space diagonal. For 3-D items, students may find either face diagonal first before applying the theorem a second time.