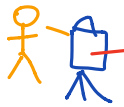Name: _____   Date: _____

Learning Goal 7.2	I can find missing sides or identify right triangles using the Pythagorean Theorem.

One practical application of the Pythagorean Theorem is

Land surveying

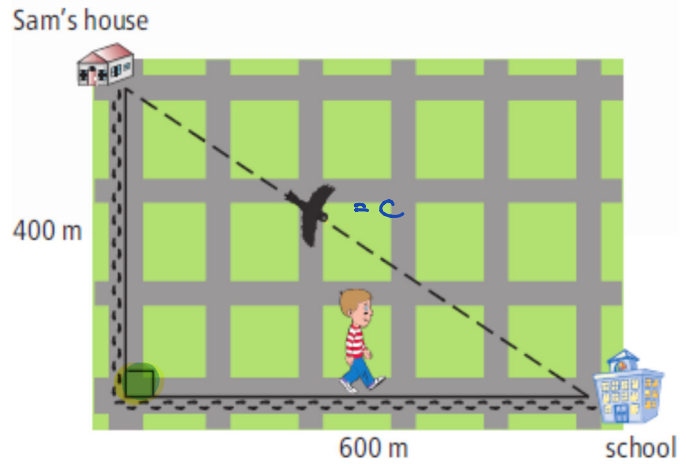← Total Station.

Example The diagram shows Sam's trip to school.

a. What is the distance that the crow travels by flying from the house to the school? Give your answer to the nearest tenth of a metre.

Sam's house

$400^2 + 600^2 = c^2$

$160000 + 360000 = c^2$

$\sqrt{520000} = \sqrt{c^2}$

$721.1 \doteq c$

The crow flies 721.1 m.

400 m

= C

600 m   school

b. What is the distance that Sam walks?

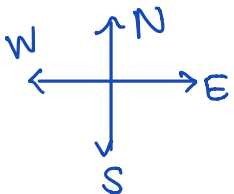$\begin{array}{r} 400 \\ + 600 \\ \hline 1000 \end{array}$

Sam walks 1000 m.

c. How much farther does Sam travel than the crow?

$\begin{array}{r} 1000 \\ - 721.1 \\ \hline 278.9 \end{array}$

Sam travels 278.9 m more than the crow.

Example A ship leaves the Pacific coast of British Columbia and travels west for 10 km. Then, it turns and travels north. Use the Pythagorean relationship to determine the distance the ship travelled north, when the ship is 25 km from its starting point.
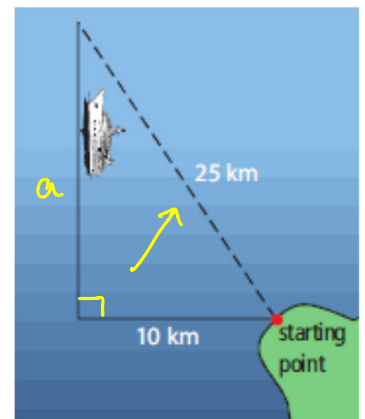
W ← ↑N →E ↓S
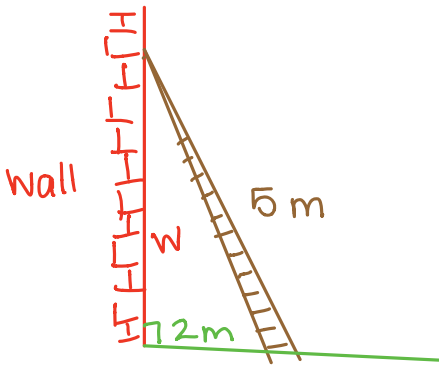
$a^2 + b^2 = c^2$

$a^2 + 10^2 = 25^2$

$a^2 + 100 = 625$

$\begin{array}{r} -100 \quad -100 \end{array}$

$\sqrt{a^2} = \sqrt{525}$

$a = 22.9$

B E D M A S

25 km

a

10 km   starting point

The ship travelled 22.9 km. north.

Example A 5 m long ladder rests against a wall. If the base of the ladder is 2 m away from the base of the wall, how high up the wall does the ladder reach?

$$w^2 + 2^2 = 5^2$$
$$w^2 + 4 = 25$$
$$-4 -4$$
$$\sqrt{w^2} = \sqrt{21}$$
$$w \doteq 4.6$$

B
E
D
M
A
S

5 m

w

Wall

2m

The ladder reaches 4.6 m up the wall.

Example Maggie is trying to install a corner shelf in her bedroom. Since the shelf does not fit properly, she thinks the two walls in her bedroom do not meet at a right angle. She measures a length of 30 cm along the base of each wall away from the corner. Then, she measures the hypotenuse to be 41 cm. Do the walls meet at a right angle? Explain.

30 cm

30 cm

41 cm
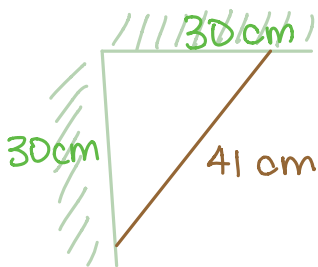
$$30^2 + 30^2 \qquad\qquad 41^2$$
$$= 900 + 900 \qquad\qquad = 1681$$
$$= 1800$$

The walls do not meet at a 90° angle because the measurements do not satisfy the Pythagorean Theorem.