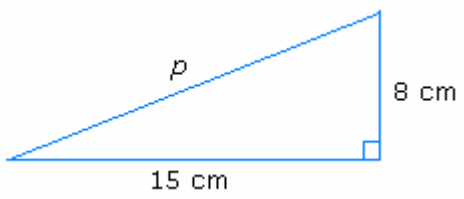
CHAPTER 8: Measurement Relationships
8.1 Apply the Pythagorean Theorem
Applying the Pythagorean Theorem

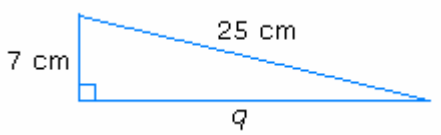
An algebraic model representing the Pythagorean theorem is $c^2 = a^2 + b^2$, where c represents the length of the hypotenuse and a and b represent the lengths of the two shorter sides.

Example:

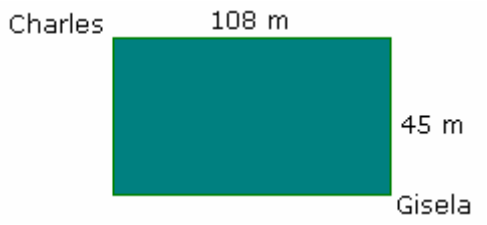
a) Find the measure of the unknown hypotenuse of the triangle shown.



b) Find the measure of the unknown side of the triangle shown.



c) Charles entered the northwest corner of a park as shown. He spied his friend Gisela at the southeast corner. Charles walked across the park, directly towards Gisela. How far must he walk to meet her?



Solution:

a) $c^2 = a^2 + b^2$

$p^2 = 8^2 + 15^2$

$p^2 = 64 + 225$

$p^2 = 289$

$p = 17$

The hypotenuse of the triangle measures 17 cm.

b) $c^2 = a^2 + b^2$

$25^2 = 7^2 + q^2$

$625 = 49 + q^2$

$625 - 49 = 49 + q^2 - 49$

$576 = q^2$

$24 = q$

The unknown side of the triangle measures 24 cm.

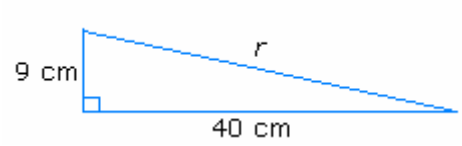
c) Let d represent the distance that Charles must walk along the diagonal.

$$c^2 = a^2 + b^2$$
$$d^2 = 45^2 + 108^2$$
$$d^2 = 2025 + 11\,664$$
$$d^2 = 13\,689$$
$$d = 117$$

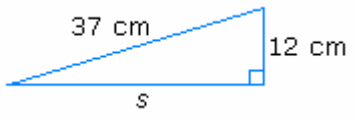
Charles must walk 117 m.

Practice:

1. a) Find the measure of the unknown hypotenuse of the triangle shown.



b) Find the measure of the unknown side of the triangle shown.



c) Burt needed to fence off a triangular area of garden, as shown. How much fencing did he need?

Answers:

1. a) 41 cm b) 35 cm c) 30 m