Right Triangle Theorem

A. Determine whether or not the following are right triangles:

1.

2.

3.
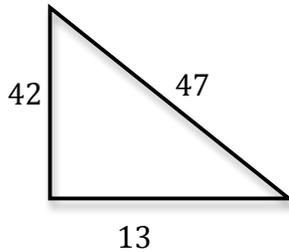
$c^2 = a^2 + b^2$

$47^2 = 42^2 + 13^2$

$2209 = 1764 + 169$

$2209 \neq 1933$

not a right Δ
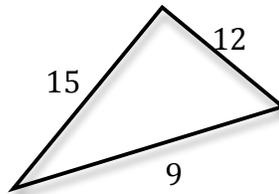
$c^2 = a^2 + b^2$

$15^2 = 12^2 + 9^2$

$225 = 144 + 81$

$225 = 225$

yes, a right Δ
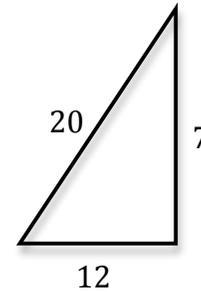
$c^2 = a^2 + b^2$

$20^2 = 12^2 + 7^2$

$400 = 144 + 49$

$400 \neq 193$

not a right Δ

4. Having dimensions 16, 30 and 34

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

$34^2 = 30^2 + 16^2$

$1156 = 900 + 256$

$1156 = 1156$

yes, a right Δ

5. Having dimensions 35, 33, 2

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

$35^2 = 33^2 + 2^2$

$1225 = 1089 + 4$

$1225 \neq 1093$

not a right Δ

6. Having dimensions 10, 12, 20

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

$20^2 = 12^2 + 10^2$

$400 = 144 + 100$

$400 \neq 244$

not a right Δ

B. Problem solving:

1. A building lot is in the shape of a right triangle. One side (not the hypotenuse) of the lot borders along a sidewalk and it is 16.8 m long. The hypotenuse is 23.52 m long. The third side is perpendicular to the sidewalk. Find its length.

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

$$23.52^2 = 16.8^2 + b^2$$

$$553.1904 = 282.24 + b^2$$

$$270.9504 = b^2$$

$$b = 16.46m$$
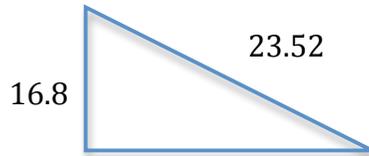
2. A section of flooring is to be carpeted is in the shape of a right triangle. One side of the floor is 6.0 m long. The hypotenuse is 8.4 m long. Determine the length of the third side of the floor.

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

$$8.4^2 = 6^2 + b^2$$

$$70.56 = 36 + b^2$$

$$34.56 = b^2$$

$$b = 5.87m$$
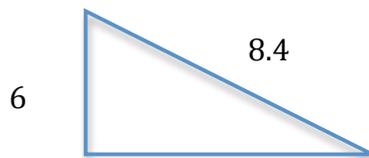
3. A house sits on a lot that is in the shape of a right triangle. One side of the lot borders along main street of town, and that side of the triangle is 11.0 m. The other side is 15.4 m long. Find the length of the hypotenuse.

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

$$c^2 = 11^2 + 15.4^2$$

$$c^2 = 121 + 237.16$$

$$c^2 = 358.16$$

$$c = 18.92m$$
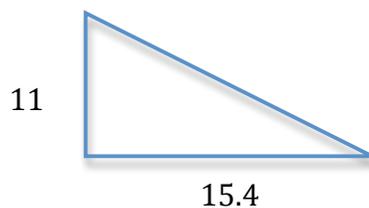
4. The sail of Jan's model sail boat is in the shape of a right triangle. The horizontal side of the sail is 56.30 cm long. The hypotenuse is 78.80 cm long. Find the length of the vertical side of the sail.

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

$$78.8^2 = 56.3^2 + b^2$$

$$6209.44 = 3169.69 + b^2$$

$$3039.75 = b^2$$

$$b = 55.13cm$$
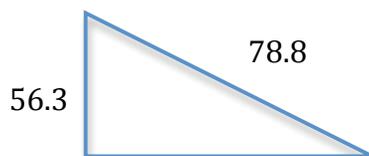
5. A section of farm to be plowed is in the shape of a right triangle. One side of the farm is 48.6 m long. The hypotenuse is 68.00 m long. Determine the length of the third side of the farm.

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

$$68^2 = 48.6^2 + b^2$$

$$4624 = 2361.96 + b^2$$

$$2262.04 = b^2$$

$$b = 47.56m$$
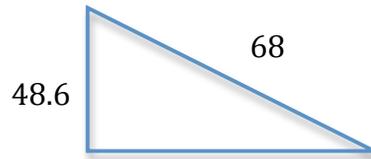
6. A 8.2 m ladder is resting against a wall. If the wall is 7.5 m high, how far from away from the wall is the ladder?

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

$$8.2^2 = 7.5^2 + b^2$$

$$67.24 = 56.25 + b^2$$

$$10.89 = b^2$$

$$b = 3.3m$$
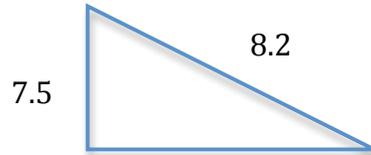
7. John wants to paint the top of a statue that is 14 m high. If the ladder is to be placed 5 m from the base of the statue, how long is the ladder?

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

$$c^2 = 14^2 + 5^2$$

$$c^2 = 196 + 25$$

$$c^2 = 221$$

$$c = 14.86m$$