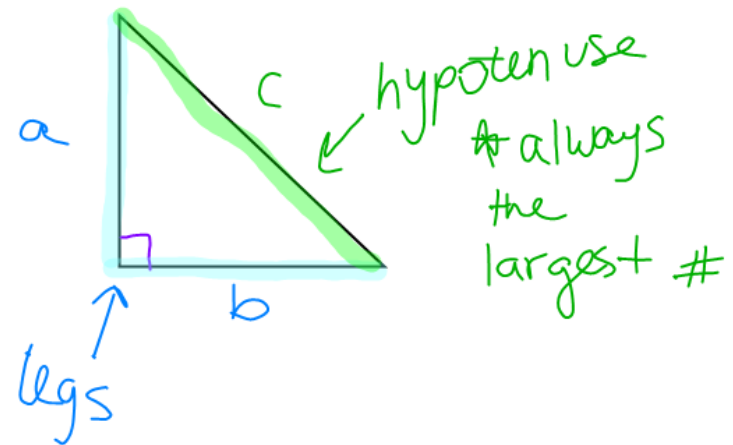


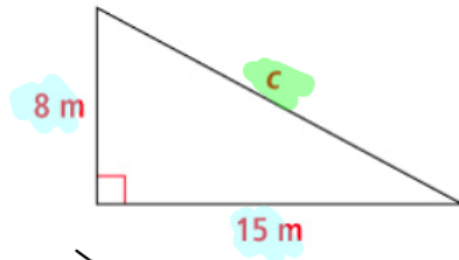
3.9 - Pythagorean Theorem = $a^2 + b^2 = c^2$

Vocabulary:

- hypotenuse
- perfect squares



1 EXAMPLE What is the length of the hypotenuse of this triangle?



$$5^2 = 25$$

$$\sqrt{5^2} = 5$$

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

$$8^2 + 15^2 = c^2$$

$$64 + 225 = c^2$$

$$\sqrt{289} = \sqrt{c^2}$$

$$17 = c$$

Use the triangle at the right. Find the length of the missing side. If necessary, round to the nearest tenth.

1. $a = 6, b = 8$

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

$$6^2 + 8^2 = c^2$$

$$36 + 64 = c^2$$

$$\sqrt{100} = \sqrt{c^2}$$

$$10 = c$$

2. $a = 15, b = 20$

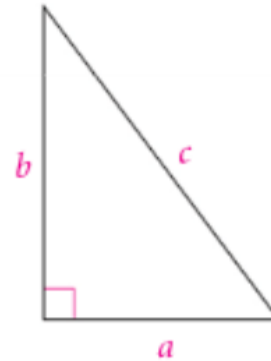
$$a^2 + b^2 = c^2$$

$$15^2 + 20^2 = c^2$$

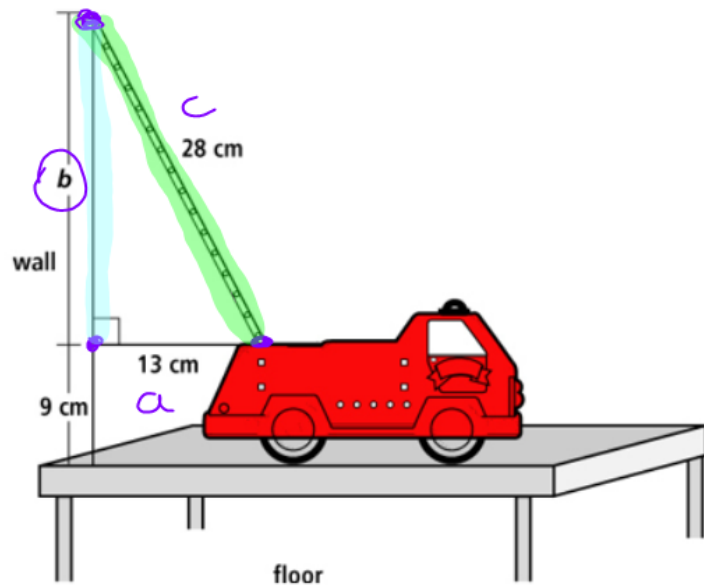
$$225 + 400 = c^2$$

$$\sqrt{625} = \sqrt{c^2}$$

$$25 = c$$



2 EXAMPLE A toy fire truck is near a toy building on a table such that the base of the ladder is 13 cm from the building. The ladder is extended 28 cm to the building. How high above the table is the top of the ladder?



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

$$13^2 + b^2 = 28^2$$

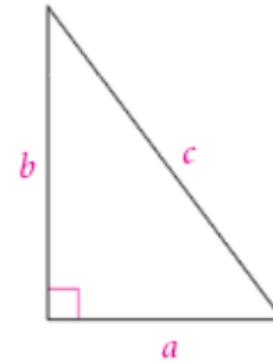
$$\cancel{169} + b^2 = \cancel{784}$$

$$-169 \quad -169$$

$$\sqrt{b^2} = \sqrt{615}$$

$$b = 24.8 \text{ cm}$$

Use the triangle at the right. Find the length of the missing side. If necessary, round to the nearest tenth.



11. $a = 5, c = 9$

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

$$5^2 + b^2 = 9^2$$

$$\begin{array}{r} \cancel{25} + b^2 = 81 \\ -25 \quad -25 \end{array}$$

$$\sqrt{b^2} = \sqrt{56}$$

$$b = 7.48$$

$$\boxed{b = 7.5}$$

12. $a = 0.8, c = 1$

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

$$0.8^2 + b^2 = 1^2$$

$$\begin{array}{r} \cancel{0.64} + b^2 = 1 \\ -0.64 \quad -0.64 \end{array}$$

$$\sqrt{b^2} = \sqrt{0.36}$$

$$\boxed{b = 0.6}$$

3 EXAMPLE Determine whether the given lengths are sides of a right triangle.

a. 5 in., 5 in., and 7 in.

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

$$5^2 + 5^2 = 7^2$$

$$25 + 25 = 49$$

$$50 \neq 49$$

NO

b. 10 cm, 24 cm, and 26 cm

$$10^2 + 24^2 = 26^2$$

$$100 + 576 = 676$$

$$676 = 676$$

yes

Determine whether the given lengths can be sides of a right triangle.

17. 1 in., 2 in., 3 in.

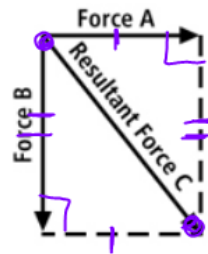
$$1^2 + 2^2 = 3^2$$

$$1 + 4 = 9$$

$$5 \neq 9$$

NO

4 EXAMPLE If two forces pull at right angles to each other, the resultant force is represented as the diagonal of a rectangle, as shown in the diagram. The diagonal forms a right triangle with two of the perpendicular sides of the rectangle.



Physics Determine whether the forces in each pair are pulling at right angles to each other.

23. 3.5 lb, 6.2 lb, resultant force 9.1 lb

$$3.5^2 + 6.2^2 = 9.1^2$$

$$12.25 + 38.44 = 82.81$$

$$50.69 \neq 82.81$$

NO

Homework: pg. 184 #4, 8, 14, 16, 20, 24, 36, 41, 43, 68, 76