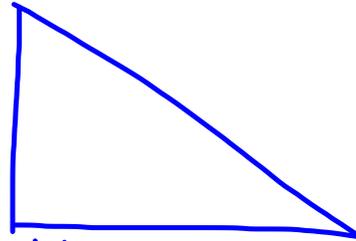


### Unit 4.5 Day 10: Pythagorean Theorem & The Converse

Right Triangle: a triangle with one 90° angle.

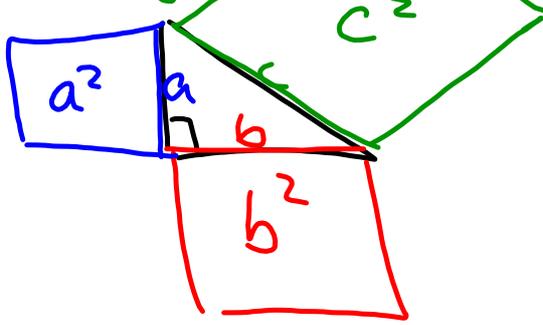


A square marks the 90° angle

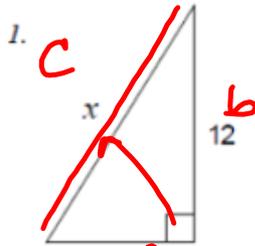


Formula:  $a^2 + b^2 = c^2$   
 find lengths of sides of right triangles

Don't assume it's 90°



Use the Pythagorean theorem to find the 3rd side of the triangle.

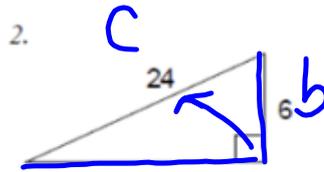


$$a^2 + b^2 = c^2$$

$$9^2 + 12^2 = x^2$$

$$\sqrt{225} = \sqrt{x^2}$$

$$15 = x$$

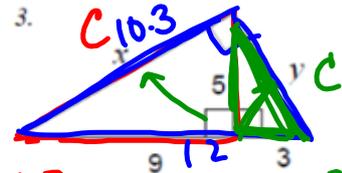


$$a^2 + b^2 = c^2$$

$$x^2 + 6^2 = 24^2$$

$$x^2 + 36 = 576$$

$$\begin{array}{r} -36 \\ \hline \sqrt{x^2} = \sqrt{540} \end{array}$$



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

$$9^2 + 5^2 = x^2$$

$$81 + 25 = x^2$$

$$\sqrt{106} = \sqrt{x^2}$$

$$10.30 = x$$
  

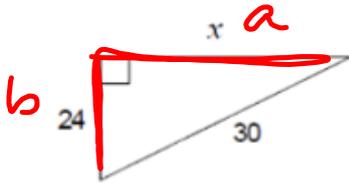
$$5^2 + 3^2 = y^2$$

$$25 + 9 = y^2$$

$$\sqrt{34} = \sqrt{y^2}$$

$$5.9 = y$$

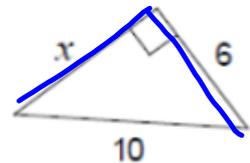
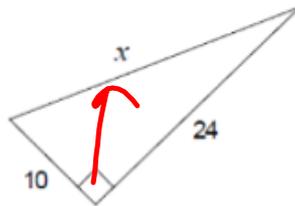
You Try! Solve for x:  $x = 23.24$



$$x^2 + 24^2 = 30^2$$

$$x^2 + 576 = 900$$

$$\begin{array}{r} -576 \\ \hline \sqrt{x^2} = \sqrt{324} \\ x = 18 \end{array}$$



Use the Pythagorean Theorem to Solve Problems

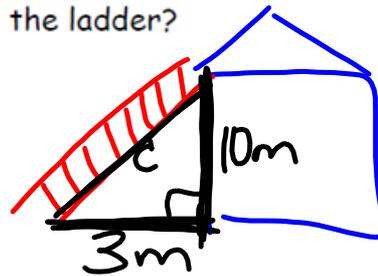
A ladder is leaning against the side of a 10m house. If the base of the ladder is 3m away from the house, how tall is the ladder?

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

$$3^2 + 10^2 = c^2$$

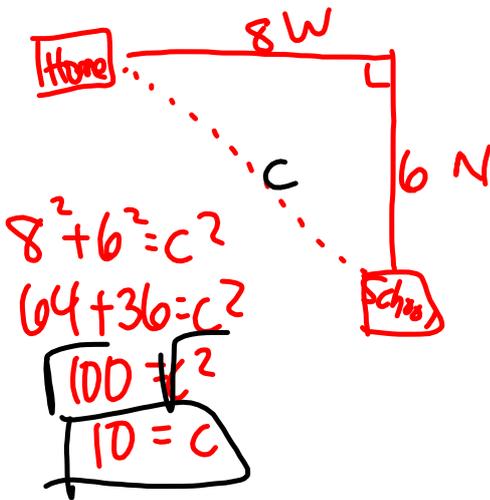
$$9 + 100 = c^2$$

$$\sqrt{109} = c$$

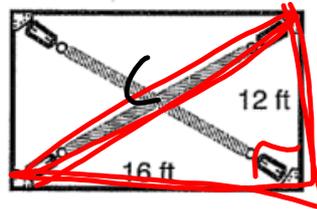


You Try!  $\boxed{10.4 = c}$

John leaves school to go home. He walks 6 blocks North and then 8 blocks West. How far is John from the school?



A builder needs to add diagonal braces to a wall. The wall is 16 feet by 12 feet high. What is the length of each brace?



$$16^2 + 12^2 = c^2$$

$$256 + 144 = c^2$$

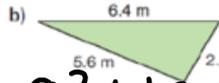
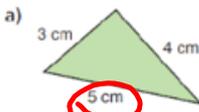
$$\sqrt{400} = c$$

$$\boxed{20 = c}$$

The Converse of the Pythagorean Theorem- If the sum of the squares of two sides of a triangle equal the square of the third side of that triangle, then that triangle MUST be a right triangle.

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

Use the Converse to the Pythagorean Theorem to Determine if These are Right Triangles:



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

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

$$5.6^2 + 2.5^2 = 6.4^2$$

$$31.36 + 6.25 = 40.96$$

$$37.61 = 40.96$$

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

$$12.8^2 + 9.6^2 = 16.0^2$$

$$163.84 + 92.16 = 256$$

$$256 = 256 \checkmark$$

↑  
hypotenuse is longest side

$$3^2 + 4^2$$

$$= 5^2$$

**No** not a right triangle

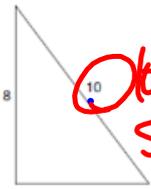
$$9 + 16 = 25$$

$$25 = 25 \checkmark$$

**Yes** it is a right triangle

**Yes** is a right triangle

You Try! Determine if these are right triangles:



longest side

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

$$6^2 + 8^2 = 10^2$$

$$36 + 64 = 100$$

$$100 = 100 \checkmark$$

Yes, it is a right triangle

longest side

$$a = 6.4, b = 12, c = 12.2$$

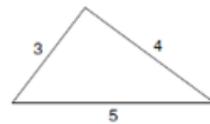
$$a^2 + b^2 = c^2$$

$$6.4^2 + 12^2 = 12.2^2$$

$$40.96 + 144 = 148.84$$

$$184.96 \neq 148.84$$

No, not a right triangle



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

$$3^2 + 4^2 = 5^2$$

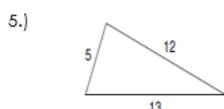
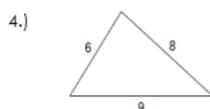
$$9 + 16 = 25$$

$$25 = 25 \checkmark$$

Yes, it is a right triangle

**Closure Day 10**Find the 3<sup>rd</sup> side of each right triangle (if needed, round to the nearest thousandth place)

Determine if the following are right triangles:



6.)  $a = 2.1, b = 7.2, c = 7.5$

Use the Pythagorean theorem to solve these problems:

7.) A helicopter rose vertically 300 miles and then flew west 400 miles. How far away is the helicopter from its starting point?

8.) Anna was flying her kite and used all of the 50 foot string. She noticed that her kite was directly above her friend Emily. If Anna is 35 feet away from Emily, how far is the kite above Emily?