Pythagorean Theorem Review

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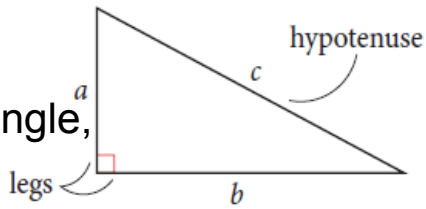
Nov 9-16:00

In a right triangle the two shorter sides are called **legs**. The **hypotenuse** is the side opposite the right angle; it is the longest side.

The **Pythagorean Theorem** states that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the legs.



Legs: the two shorter sides of a right triangle, the sides adjacent to the right angle.

Hypotenuse: the longest side of a right triangle, the side opposite the right angle.

Pythagorean theorem: the square of the hypotenuse is equal to the sum of the squares of the legs, for a right triangle with legs *a* and *b* and hypotenuse *c*, $c^2 = a^2 + b^2$

Sep 26-10:29

To find the HYPOTENUSE (longest):

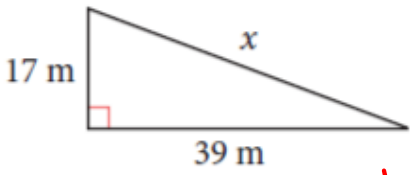
1. Square them
2. **Add** them
3. Find the square root

To find a "LEG" (short):

1. Square them
2. **Subtract** them
3. Find the square root

Nov 8-1:18 PM

Examples



x = hypotenuse

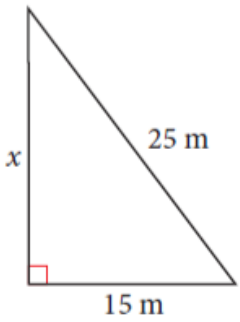
$\Rightarrow x^2 = 17^2 + 39^2$

$x^2 = 289 + 1521$

$x^2 = 1810$

$x = \sqrt{1810}$

$x = 42.5\text{ m}$



x = leg

$\Rightarrow x^2 = 25^2 - 15^2$

$x^2 = 625 - 225$

$x^2 = 400$

$x = \sqrt{400}$

$x = 20\text{m}$

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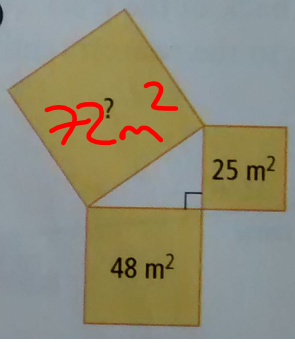
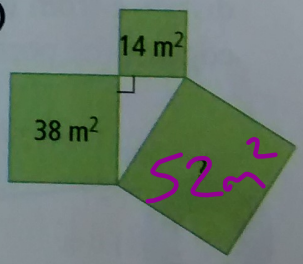
3. State the Pythagorean relationship. Explain why it is useful.

4. Find the area of the square on the hypotenuse of each right triangle.

a)



b)



The square of the hypotenuse equals the sum of the square of the other two sides.
We can use it as a test to see a triangle has a right angle.

$48 + 25 = 73\ m^2$

$38 + 14 = 52\ m^2$

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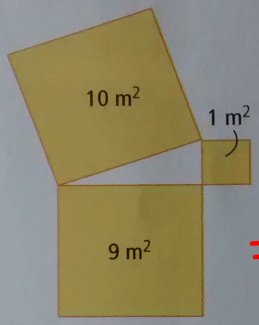
5. Three squares are placed together to form a triangle. Determine whether each triangle is a right triangle.

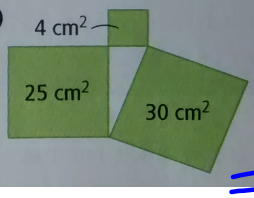
a)



$9 + 1 = 10$ ✓

$\Rightarrow$ Right $\triangle$

b)



$4 + 25 \neq 30$ ×

$\Rightarrow$ Not a right $\triangle$

If the two small areas add to make the large area then we have a right $\triangle$

Nov 9-16:07

8. A can of spray paint says it will cover an area of 12 m^2. Answer the following to the nearest tenth.

a) If the can is empty after spraying a square area, what is the length of each side of the square?

b) If three cans are needed to paint a square area, what is the length of each side of this square?

a) x Area $= 12m^2$ side length $= \sqrt{12}$

$= 3.5m$

b) one can $= 12m^2$

three cans $= 3 \times 12$

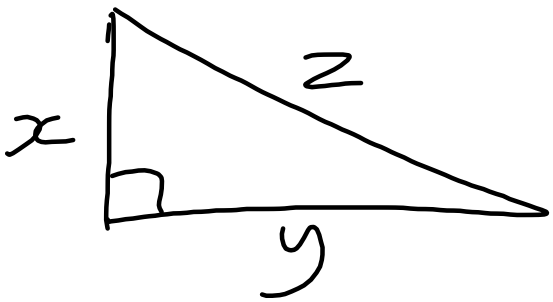
$= 36m^2$

y Area $= 36m^2$

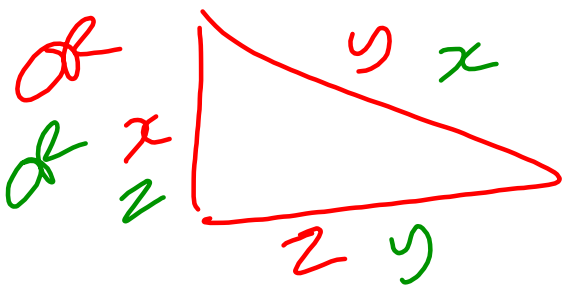
side $= \sqrt{36} = 6m$

Nov 10-09:08

9. Draw a diagram of a right triangle and label its sides x, y, and z. Write the Pythagorean equation for this triangle.



$z^2 = x^2 + y^2$



$y^2 = x^2 + z^2$

$x^2 = y^2 + z^2$

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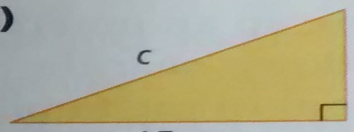
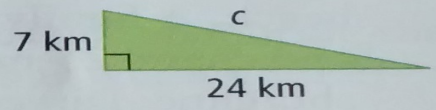
10. Find the length of the hypotenuse in each.

a)



b)



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

$c^2 = 225 + 64$

$c^2 = 289$

$c = \sqrt{289}$

$c = 17\text{cm}$

b) $c^2 = 7^2 + 24^2$

$c^2 = 49 + 576$

$c^2 = 625$

$c = \sqrt{625}$

$c = 25\text{km}$

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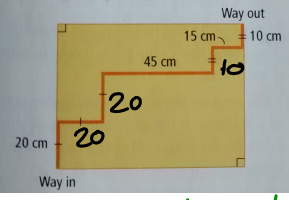
11. Ria used a large cardboard box to build a maze for her pet mouse to run around in. There are only two openings located across the diagonal from each other. The route travelled by the mouse is shown in the diagram.

a) Find the length and the width of the box.

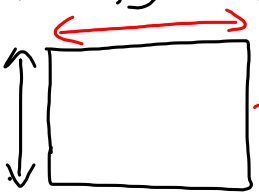
b) Find the length of the diagonal of the box.

c) How much farther did the mouse run compared to a straight path from opening to opening?



Use the dashes (|, ||) to identify distances.

a)



$20+20+10+10$

$= 60\text{cm}$ and 80cm

b) Find the hypotenuse

$\Rightarrow c^2 = 60^2 + 80^2$

$c^2 = 3600 + 6400$

$c^2 = 10{,}000$

$c = \sqrt{10{,}000}$

$c = 100\text{cm}$

c) Extra distance

$= (20+20+20+45+10+15+10) - 100$

$= 140 - 100$

$= 40\text{cm}$

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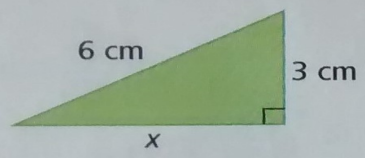
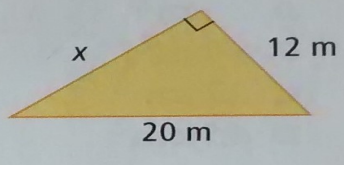
12. Find the missing side length. Round to the nearest tenth, if necessary.

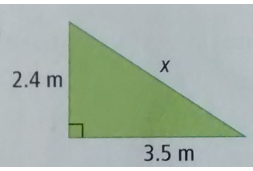
a)



b)



c)



a) Find a leg

$x^2 = 6^2 - 3^2$

$x^2 = 36 - 9$

$x^2 = 27$

$x^2 = \sqrt{27}$

$x = 5.2\text{cm}$

b) Find a leg

$x^2 = 20^2 - 12^2$

$x^2 = 400 - 144$

$x^2 = 256$

$x = \sqrt{256}$

$x = 16\text{m}$

c) Find hypotenuse

$x^2 = 2.4^2 + 3.5^2$

$x^2 = 5.76 + 12.25$

$x^2 = 18.01$

$x = \sqrt{18.01} = 4.2\text{m}$

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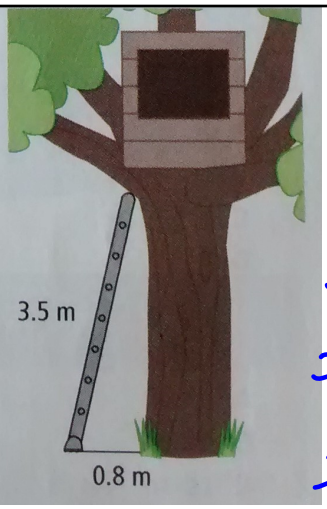
13. Avi uses a 3.5-m ladder to climb up to his tree house. The foot of the ladder is 0.8 m from the tree. How far up the tree does the ladder reach?



Trying to find a leg.

$x^2 = 3.5^2 - 0.8^2$

$x^2 = 12.25 - 0.64$

$x^2 = 11.61$

$x = \sqrt{11.61}$

$x = 3.4\text{m}$

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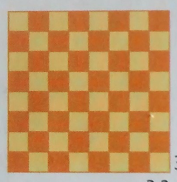
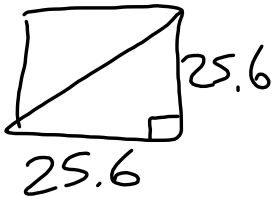
14. On a chessboard, each of the 64 small squares measures 3.2 cm by 3.2 cm.



a) What is the length of the diagonal across the chessboard?

b) Solve part a) in another way.

$8 \times 3.2 = 25.6$



$c^2 = 25.6^2 + 25.6^2$

$c^2 = 655.36 + 655.36$

$c^2 = 1310.72$

$c = \sqrt{1310.72} = 36.2 \text{ cm}$

b) Find diagonal of one square then multiply it by 8.

Nov 10-09:13