

WARM UP

Solve the equation. Write your answer in simplest form.

$$1. \frac{8}{\sqrt{2}} = x\sqrt{2}$$

$$x = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = \boxed{4\sqrt{2}}$$

$$2. 1.5 = \frac{x\sqrt{3}}{\sqrt{3}}$$

$$x = \frac{1.5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{1.5\sqrt{3}}{3} = \boxed{\frac{\sqrt{3}}{2}}$$

$$3. \frac{2x}{2} = \frac{8\sqrt{7}}{2}$$

$$\boxed{x = 4\sqrt{7}}$$

$$4. \frac{5\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{3}x}{\sqrt{3}}$$

$$x = \frac{5\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{5\sqrt{6}}{3}}$$

$$5. \frac{9}{2} = \frac{x\sqrt{3}}{\sqrt{3}}$$

$$x = \frac{9}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{9\sqrt{3}}{6} = \boxed{\frac{3\sqrt{3}}{2}}$$

$$6. \frac{8.4}{\sqrt{2}} = \frac{\sqrt{2}x}{\sqrt{2}}$$

$$x = \frac{8.4}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8.4\sqrt{2}}{2} = \boxed{4.2\sqrt{2}}$$

ESSENTIAL QUESTION

How are the properties of the Pythagorean Theorem related in special right triangles?

NEEDED VOCAB:

► **Special Right Triangles**

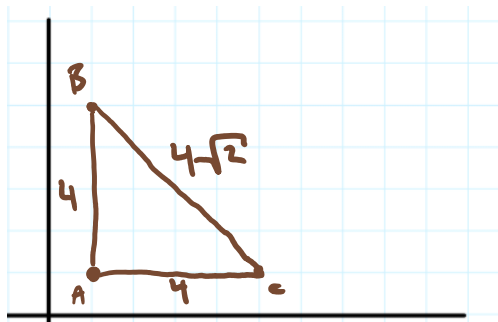
GOAL: "I CAN..."

Use the patterns of special right triangles to solve for variables or the lengths of sides."

In your table groups, plot the points and find the length of all the sides in reduced radical form.

→ A(1,1), B(1,5), C(5,1)

→ D(2,-1), E(5,-1), F(2,-4)

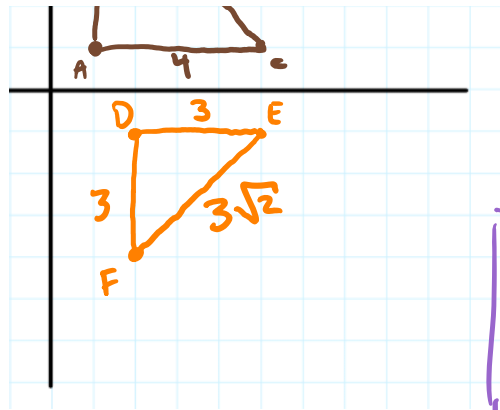


$m\angle A = 90^\circ$
 $m\angle B = 45^\circ$
 $m\angle C = 45^\circ$

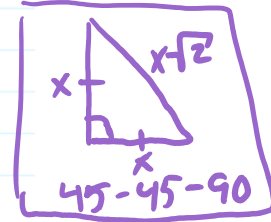
$m\angle D = 90^\circ$

What are the angles of the

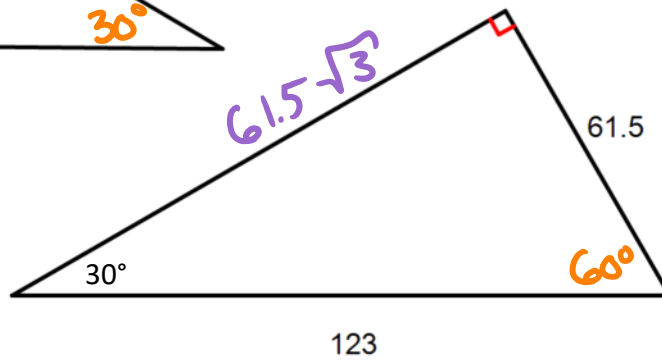
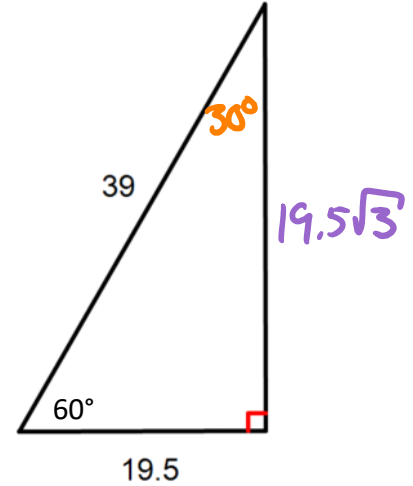
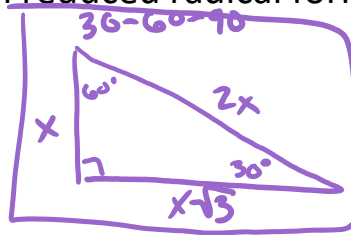
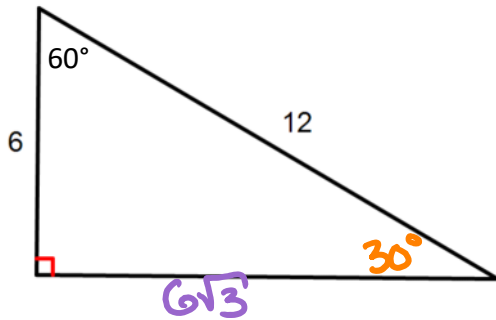
What are the angles of the triangles?



$m\angle D = 90^\circ$
 $m\angle E = 45^\circ$
 $m\angle F = 45^\circ$



Find the missing side lengths, in reduced radical form.



EXAMPLE 1

A. To satisfy safety regulations, the distance from the wall to the base of a ladder should be at least one-fourth the length of the ladder. Did Drew set up the ladder correctly?

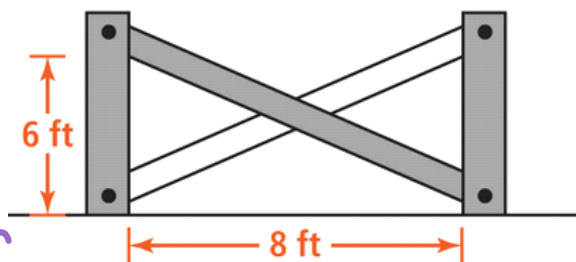


$x \approx 9.34$
 $\frac{1}{4}x \approx 2.34$

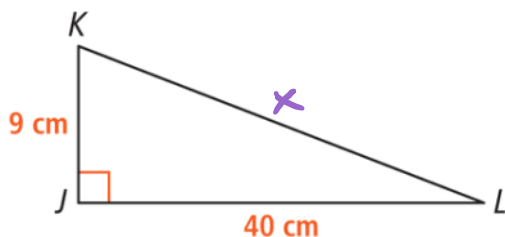
Ladder is set up correctly

B. The length of each crosspiece of the fence is 10 ft. Why would a rancher build this fence with the measurements shown?

6, 8 and 10 are nice round #'s that satisfy the Pythagorean Theorem. This makes the fence strong, the posts \perp to the ground and, with round #'s, easy to make.

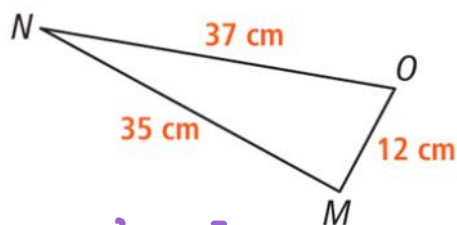


a. What is KL ?



$$\begin{aligned} 9^2 + 40^2 &= x^2 \\ 81 + 1600 &= x^2 \\ 1681 &= x^2 \\ \boxed{41} &= x \end{aligned}$$

b. Is $\triangle MNO$ a right triangle? Explain.

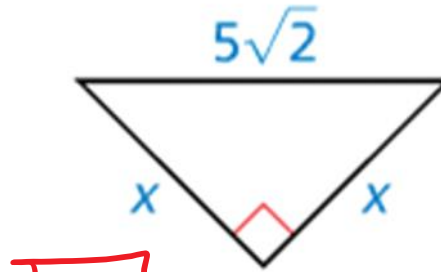


$$\begin{aligned} 35^2 + 12^2 &= 1225 + 144 = 1369 \\ 37^2 &= 1369 \\ \boxed{\text{Yes it's right}} \end{aligned}$$

EXAMPLE 2 Find the value of x . Answers in reduced radical form.

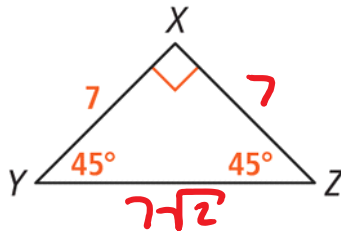


$$x = 8\sqrt{2}$$

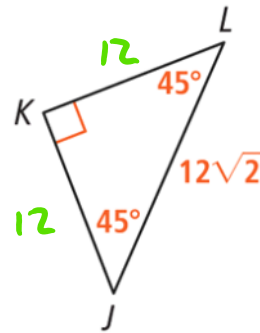


$$x = 5$$

a. What are XZ and YZ ?

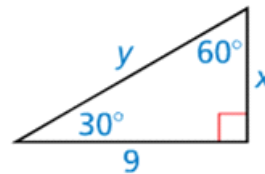


b. What are JK and LK ?



EXAMPLE 3

Find the values of x and y . Write your answer in simplest form.



$$x\sqrt{3} = 9$$

$$x = \frac{9}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{9\sqrt{3}}{3} = \boxed{3\sqrt{3}} = x$$

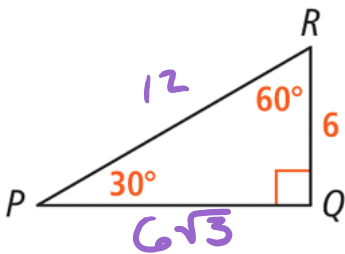
$$y = 2x$$

$$y = 2x$$

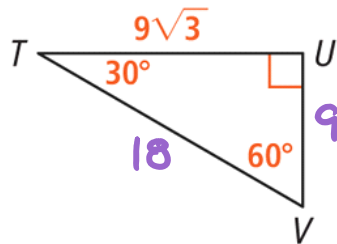
$$y = 2(3\sqrt{3})$$

$$y = 6\sqrt{3}$$

a. What are PQ and PR ?

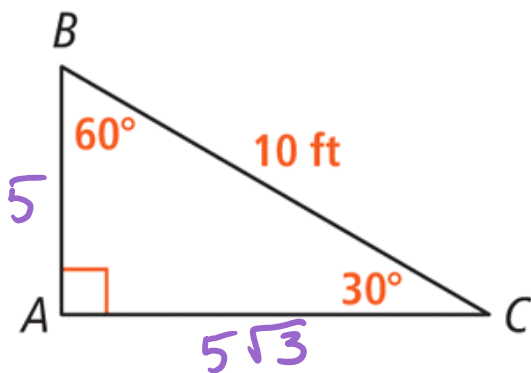


b. What are UV and TV ?

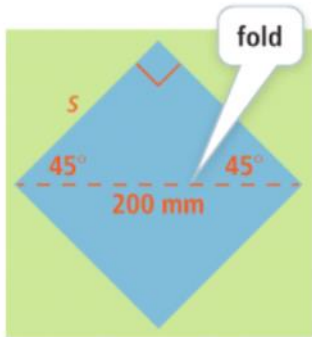


EXAMPLE 4

A. Alejandro needs to make both the horizontal and vertical supports, \overline{AC} and \overline{AB} , for a ramp. Is one 12-foot board long enough for both supports? Explain.



B. Olivia starts an origami paper crane by making the 200-mm diagonal fold. What are the side length and area of the paper square?



$$200 = s\sqrt{2}$$

$$s = \frac{200}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{200\sqrt{2}}{2}$$

$$s = 100\sqrt{2}$$

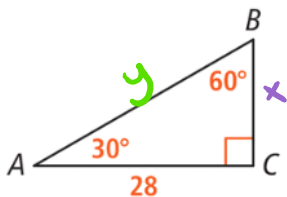
$$A = s^2$$

$$A = (100\sqrt{2})^2$$

$$A = 100^2 \cdot 2$$

$$A = 20000$$

a. What are AB and BC?



$$28 = x\sqrt{3}$$

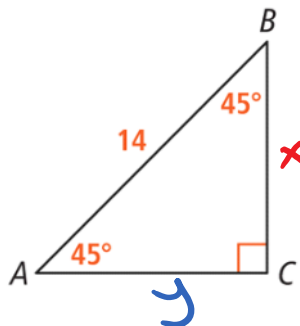
$$x = \frac{28}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$x = \frac{28\sqrt{3}}{3}$$

$$y = 2x \quad y = \left(\frac{28\sqrt{3}}{3}\right)^2$$

$$y = \frac{56\sqrt{3}}{3}$$

b. What are AC and BC?



$$y = x$$

$$y = 7\sqrt{2}$$

$$14 = x\sqrt{2}$$

$$x = \frac{14}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{14\sqrt{2}}{2}$$

$$x = 7\sqrt{2}$$

<https://tinyurl.com/vwf8olb>



HOMework

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