Warm-Up

One of the other rules of simplifying radicals is that you do not leave radicals in the denominator. To remove this radical, you can multiply the numerator and denominator by the radical that appears in the denominator, then simplify the result.

Example: $\frac{2}{\sqrt{5}} = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$ $\frac{1}{2} \cdot \frac{5}{5} = \frac{5}{10}$

Now you try. Simplify the following quotients.

1. $\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$

2. $\frac{4}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{4\sqrt{6}}{6} = \frac{2\sqrt{6}}{3}$

$\frac{5}{\sqrt{25}} = \frac{5}{5} = 1$

$\frac{4}{\sqrt{20}} \cdot \frac{\sqrt{20}}{\sqrt{20}} = \frac{4\sqrt{20}}{20} = \frac{\sqrt{20}}{5} = \frac{2\sqrt{5}}{5}$

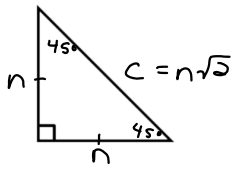
$\frac{4}{\sqrt{20}} = \frac{4}{2\sqrt{5}} = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$\sqrt{20} = 2\sqrt{5}$

Complete the investigation with your group.

Special Right Triangles Investigation

Suppose the triangle below is an **isosceles right triangle**. Answer each of the following questions.



a. What is true about the sides of the triangle?

The two legs are congruent

b. What are the angle measurements of the triangle? Label them on the triangle.

45°, 45°, 90°

c. If we call the two congruent sides of the triangle "n", solve for the third side of the triangle using the Pythagorean Theorem. Your answer should be in terms of "n." Don't forget to simplify your solution if possible.

$n^2 + n^2 = c^2$

$2n^2 = c^2$

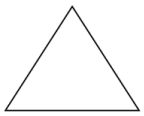
$\sqrt{2n^2} = c$

$2 \wedge n^2$

$n \cdot n$

$n\sqrt{2} = c$

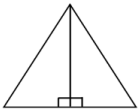
Suppose the triangle below is an **equilateral triangle**. Answer each of the following questions.



a. What is true about the sides of the triangle?

b. What are the angle measurements of the triangle? Label them on the triangle.

c. If we divide the equilateral triangle above into two triangles as shown below, which congruence theorem or postulate would prove that the two triangles are congruent?



d. If we consider only half of the equilateral triangle above, what would be the angle measurements be in this triangle? Label them on the triangle.

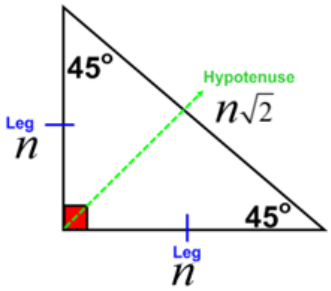
If we call the hypotenuse of the triangle "2n", solve for the other two sides of the triangle.

Section 10.2
Special Right Triangles

45° – 45° – 90° Triangle Theorem

Hypotenuse = Leg $\cdot \sqrt{2}$

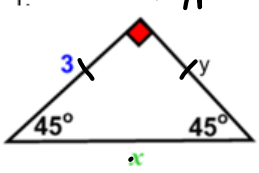
$\frac{Hyp}{\sqrt{2}} = Leg$



Examples

Find the value of the missing variables. If necessary, leave your answer in simplest radical form.

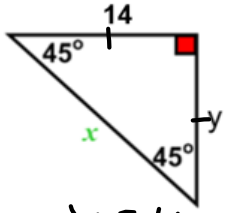
1. $Hyp = leg \cdot \sqrt{2}$



$y = 3$

$x = 3\sqrt{2}$

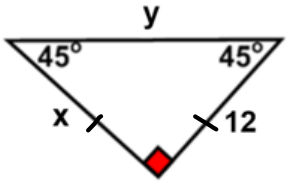
2.



$y = 14$

$x = 14\sqrt{2}$

3.

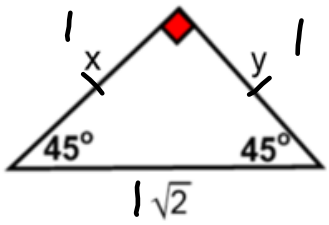


$x = 12$

$y = 12\sqrt{2}$

Find the value of the missing variables. If necessary, leave your answer in simplest radical form.

4.

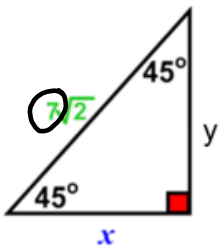


$Leg = \frac{Hyp}{\sqrt{2}}$

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

$y = 1$

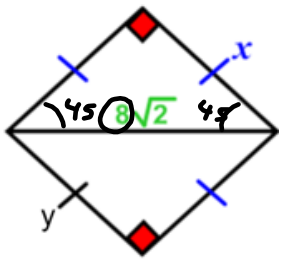
5.



$x = 7 \quad y = 7$

$leg = \frac{7\sqrt{2}}{\sqrt{2}}$

6.



$x = 8$

$y = 8$

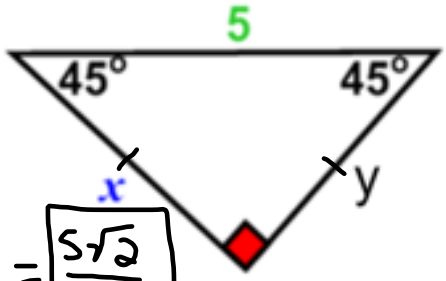
$leg = \frac{hyp}{\sqrt{2}}$

Find the value of the missing variables. If necessary, leave your answer in simplest radical form.

Note: In addition to removing any perfect squares, "simplest radical form" also means removing any radicals in the denominator of fractions.

7.

$leg = \frac{hyp}{\sqrt{2}}$



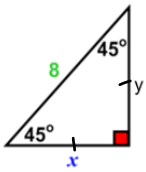
$x = \frac{5}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{2}$

$y = \frac{5\sqrt{2}}{2}$

Find the value of the missing variables. If necessary, leave your answer in simplest radical form.

Note: In addition to removing any perfect squares, "simplest radical form" also means removing any radicals in the denominator of fractions.

8.

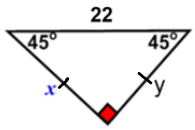


$leg = \frac{hyp}{\sqrt{2}}$

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

$y = 4\sqrt{2}$

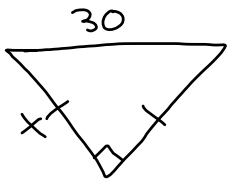
9.



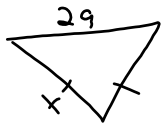
~~$x = 22\sqrt{2}$~~

$x = \frac{22}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{22\sqrt{2}}{2}$

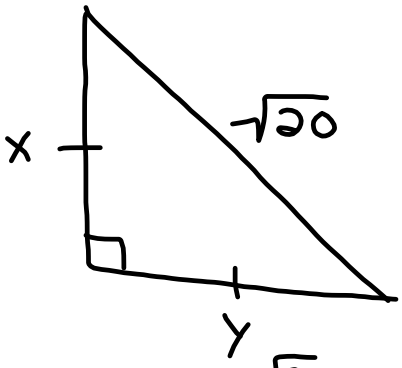
$= 11\sqrt{2}$



$x = 15\sqrt{2}$



$x = 14.5\sqrt{2}$

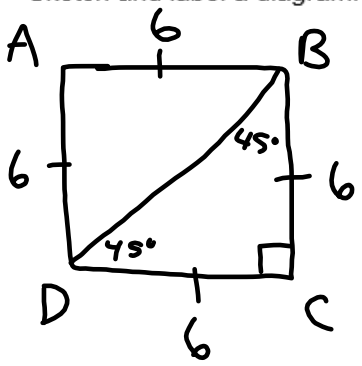


$leg = \frac{\sqrt{20}}{\sqrt{2}} = \sqrt{10}$

$x = \sqrt{10}$

For # 10 – 11, use your Special Right Triangle Relationships to find the missing lengths. Leave your answers in simplest radical form.

10. ABCD is a square with a perimeter of 24 inches. Find the length of segments BC and BD. Sketch and label a diagram.



$Hyp = Leg \cdot \sqrt{2}$

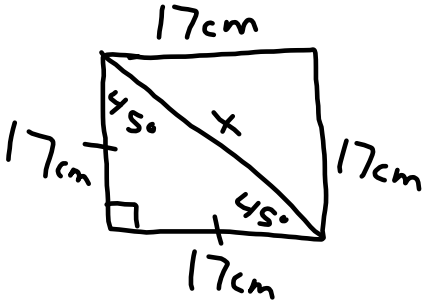
$Leg = \frac{Hyp}{\sqrt{2}}$

BC = 6

BD = $6\sqrt{2}$

For # 10 – 11, use your Special Right Triangle Relationships to find the missing lengths. Leave your answers in simplest radical form.

11. A square piece of paper 17 cm on a side is folded along a diagonal. What is the length of the diagonal? Sketch and label a diagram.

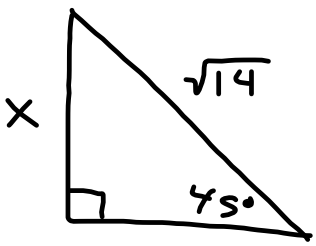


$Hyp = Leg \cdot \sqrt{2}$

$x = 17\sqrt{2}$

$17\sqrt{2}$ cm

3.



$$x = \frac{\sqrt{14}}{\sqrt{2}} = \sqrt{7}$$

Learning Targets

10.2 Special Right Triangles

I can use the relationships among the side lengths of a 45-45-90 and 30-60-90 triangle to solve for unknown side lengths.

Homework - 10.2 Special Right Triangles Day 1 HW