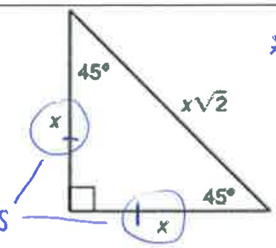
Geometry A
Section 7.4 Special Right Triangles 45-45-90

Name : Key
Date : ______________ Period : ____

LEARNING TARGETS

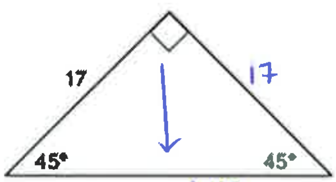
- I can apply special right triangle ratios to find unknown side lengths.
- I can use special right triangles in real world situations.

Theorem	Diagram
45° – 45°– 90° Triangle Theorem In a 45° – 45°– 90°, both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg	 * when both legs are the same # or variable, the Δ is a 45-45-90 hyp = leg · $\sqrt{2}$

Example 1: Find lengths in a 45° – 45°– 90° triangle

Find the value of x. Leave answer in simplest radical form.

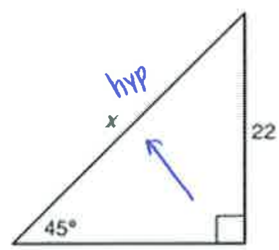
a.



hyp = leg · $\sqrt{2}$

$\boxed{x = 17\sqrt{2}}$

b.

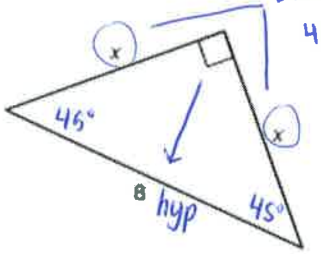


hyp = leg · $\sqrt{2}$

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

c.

both legs ≅ so 45°-45°-90°

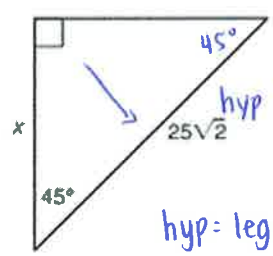


hyp = leg · $\sqrt{2}$

$8 = x\sqrt{2}$

$x = \frac{8}{\sqrt{2}} = \left(\frac{8\sqrt{2}}{2}\right) = \boxed{4\sqrt{2}}$

d.



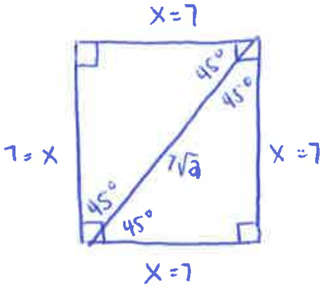
hyp = leg · $\sqrt{2}$

$\frac{25\sqrt{2}}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$

$\boxed{x = 25}$

Example 2: Apply 45° – 45°– 90° Triangle Theorem

Find the perimeter and area of the square whose diagonal is $7\sqrt{2}$ inches long.



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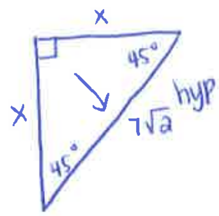


$hyp = leg \cdot \sqrt{2}$

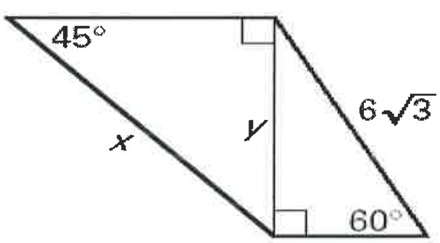
$\frac{7\cancel{\sqrt{2}}}{\cancel{\sqrt{2}}} = \frac{x\cancel{\sqrt{2}}}{\cancel{\sqrt{2}}}$

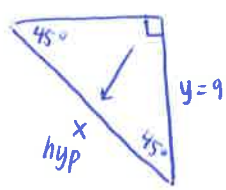
$x = 7$

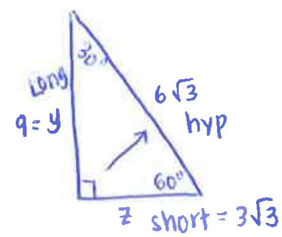
$$\boxed{\begin{array}{l} \text{Perimeter} = 7+7+7+7 = 28\text{ in} \\ \text{Area} = l \times w = (7)(7) = 49\text{ in}^2 \end{array}}$$

Example 3: Apply 45° – 45°– 90° and 30° – 60°– 90° Triangle Theorem

Solve for x and y in the diagram below. * Separate the two triangles!







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

$x = y \cdot \sqrt{2}$

$\boxed{x = 9\sqrt{2}}$

$hyp = short \cdot 2$

$\frac{6\sqrt{3}}{2} = \frac{z \cdot \cancel{2}}{\cancel{2}}$

$z = \frac{6\sqrt{3}}{2} = 3\sqrt{3}$

$long = short \cdot \sqrt{3}$

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

$y = 3\sqrt{9}$

$y = 3(3)$

$\boxed{y = 9}$