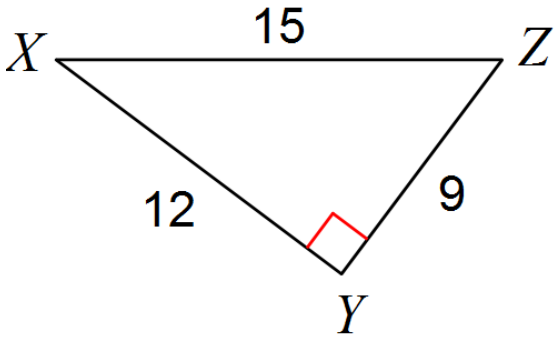
Warm Up:

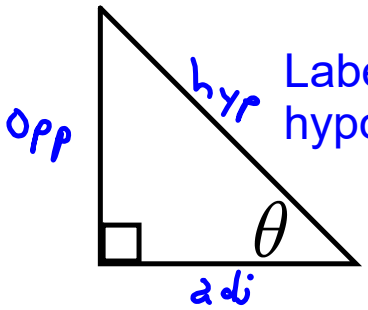
Write the following ratios using the triangle at right:



$\sin X = \frac{9}{15}$ $\cos Z = \frac{9}{15}$

$\cos X = \frac{12}{15}$ $\sin Z = \frac{12}{15}$

$\tan x = \frac{9}{12}$



Label the opposite, adjacent and hypotenuse for the right trianle.

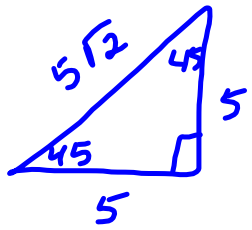
Learning Goal: Today I will learn about special right triangles.

Success Criteria: I am able to determine triangle side lengths based on a pattern.

8.2 Special Right Triangles

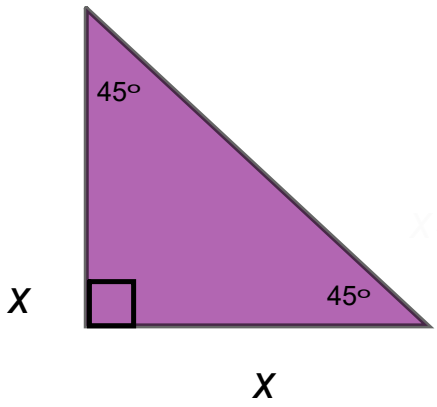
45 - 45 - 90

s - s - $s\sqrt{2}$



$10\sqrt{2}$

Special Right Triangles



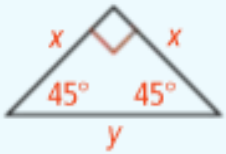
Essential Understanding Certain right triangles have properties that allow you to use shortcuts to determine side lengths without using the Pythagorean Theorem.

The acute angles of a right isosceles triangle are both 45° angles. Another name for an isosceles right triangle is a 45°-45°-90° triangle. If each leg has length x and the hypotenuse has length y, you can solve for y in terms of x.

$x^2 + x^2 = y^2$ Use the Pythagorean Theorem.

$2x^2 = y^2$ Simplify.

$x\sqrt{2} = y$ Take the positive square root of each side.



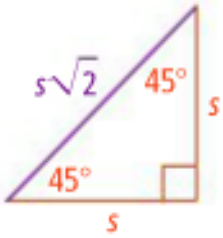
You have just proved the following theorem.

take note

Theorem 8-5 45°-45°-90° Triangle Theorem

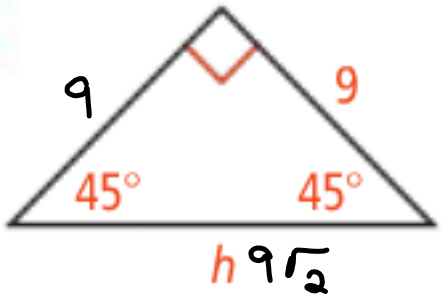
In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg.

$$\text{hypotenuse} = \sqrt{2} \cdot \text{leg}$$



Special Right Triangles

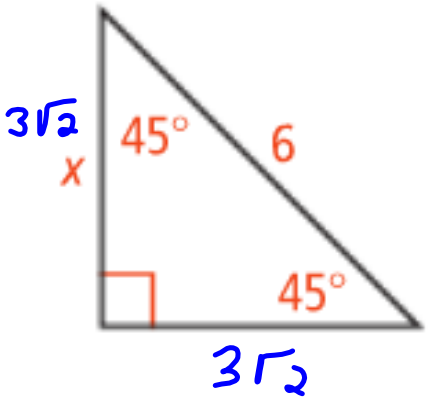
Find the missing values



Special Right Triangles

Find the missing values

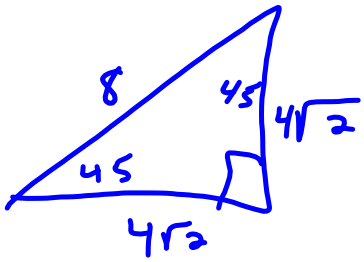
45 45 90
S S S√2



$\frac{S\sqrt{2}}{\sqrt{2}} = \frac{6}{\sqrt{2}}$

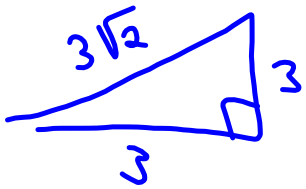
$S = \frac{6}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{2}$

$3\sqrt{2}$

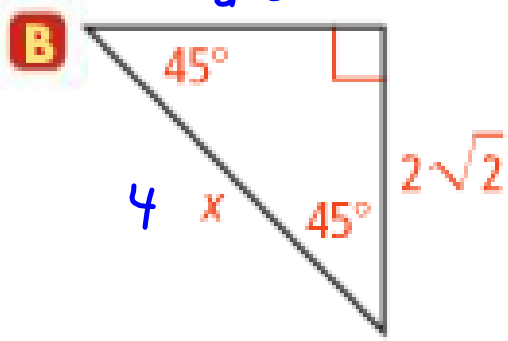


$\frac{8}{\sqrt{2}} = \frac{s\sqrt{2}}{\sqrt{2}}$

$\frac{4\sqrt{2}}{2} = 4\sqrt{2}$



B



$2\sqrt{2}$

$2\sqrt{2} \cdot \sqrt{2}$

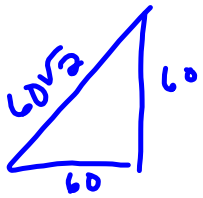
$2 \cdot 2$

5 5 $5\sqrt{2}$

Softball **A high school softball diamond is a square. The distance from base to base is 60 ft. To the nearest foot, how far does a catcher throw the ball from home plate to second base?**

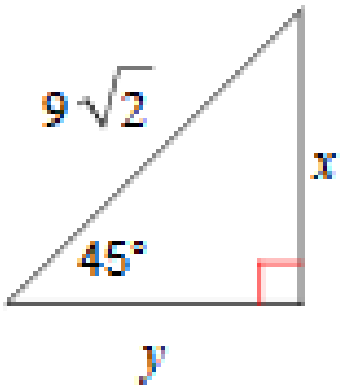
The distance d is the length of the hypotenuse of a $45°$-$45°$-$90°$ triangle.

$d = 60\sqrt{2}$	hypotenuse $= \sqrt{2} \cdot$ leg
$d \approx 84.85281374$	Use a calculator.



The catcher throws the ball about 85 ft from home plate to second base.

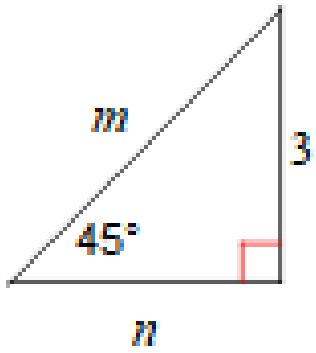
1)



$x = 9, \quad y = 9$

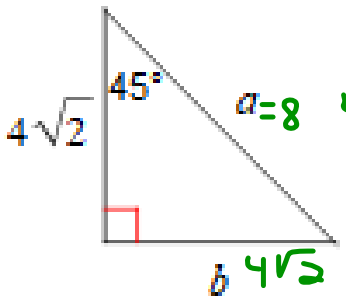
$\frac{9\sqrt{2}}{\sqrt{2}} = \frac{9\sqrt{2}}{\sqrt{2}}$

2)



$m = 3\sqrt{2}, \quad n = 3$

3)

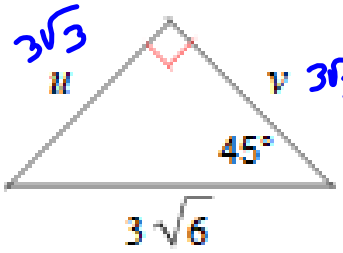


5 5 $5\sqrt{2}$

4 $\sqrt{3}$. $\sqrt{2}$

$a = 8,\ b = 4\sqrt{2}$

4)



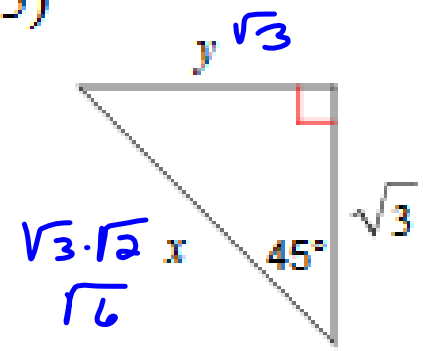
$\frac{5\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{6}}{\sqrt{2}}$

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

$3\sqrt{3}$

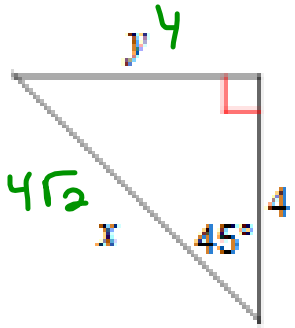
$u = 3\sqrt{3},\ v = 3\sqrt{3}$

5)



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

6)



$x = 4\sqrt{2},\ y = 4$

Closure: Today I learned how to use the patterns with special right triangles to solve for unknown sides.

Quiz Time

Work on worksheet when you are finished with the quiz.