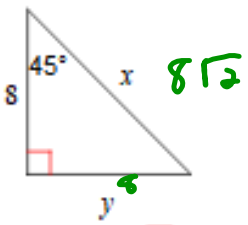
# Warm Up:

Fill in the patterns for the given special triangles:

45 45 90
5 5 $5\sqrt{2}$

**Find the missing side lengths. Leave your answers as radicals in simplest form.**

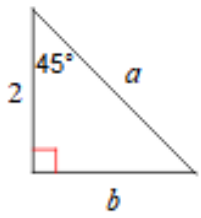
1)




$8\sqrt{2}$

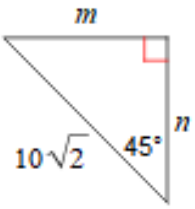
$x = 8\sqrt{2},\ y = 8$

2)




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

3)

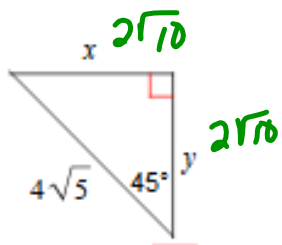



$m = 10,\ n = 10$

$\frac{10\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{\sqrt{2}}$

$10 =$

4)




$2\sqrt{10}$

$2\sqrt{10}$

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

$\frac{4\sqrt{5}\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{4\sqrt{10}}{2}$

$2\sqrt{10}$

$x = 2\sqrt{10},\ y = 2\sqrt{10}$

Learning Goal: Today I will review special right triangles.

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

# 8.2 Special Right Triangles

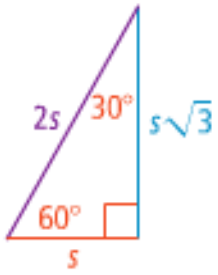
30 - 60 - 90

$s - s\sqrt{3} - 2s$

take note

## Theorem 8-6 30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, the length of the hypotenuse is twice the length of the shorter leg. The length of the longer leg is $\sqrt{3}$ times the length of the shorter leg.

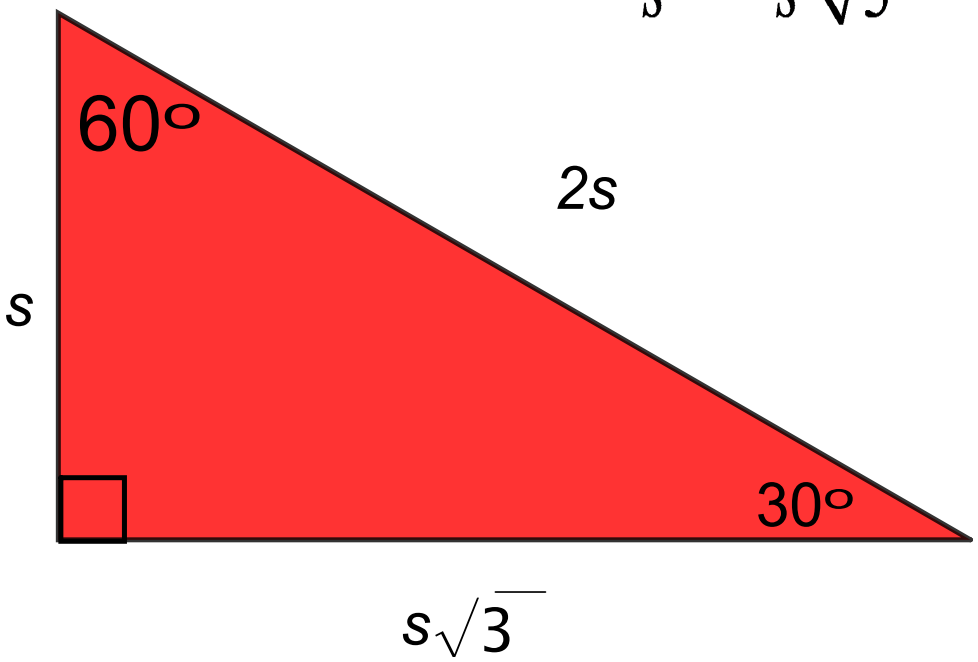



hypotenuse = 2 · shorter leg

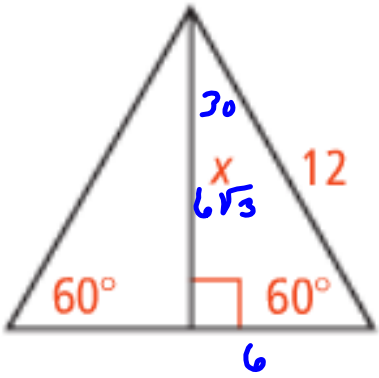
longer leg = $\sqrt{3}$ · shorter leg

# Special Right Triangles

$s - s\sqrt{3} - 2s$



Find the missing values



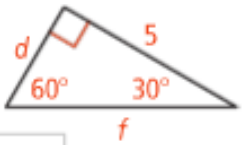

$$s \quad s\sqrt{3} \quad 2s$$

$\frac{2s}{2} = \frac{12}{2}$

$s = 6$

## Problem 4 Using the Length of One Side

**Algebra** What is the value of $d$ in simplest radical form?




**Think**

In a 30°-60°-90° triangle, the leg opposite the 60° angle is the longer leg. So $d$ represents the length of the shorter leg. Write an equation relating the legs.

**Write**

$$\text{longer leg} = \sqrt{3} \cdot \text{shorter leg}$$

$$5 = d\sqrt{3}$$

Divide each side by $\sqrt{3}$ to solve for $d$.

$$d = \frac{5}{\sqrt{3}}$$

The value of $d$ is not in simplest radical form because there is a radical in the denominator. Multiply $d$ by a form of 1.

$$\frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{3}$$

$$\text{So } d = \frac{5\sqrt{3}}{3}.$$

# Special Right Triangles

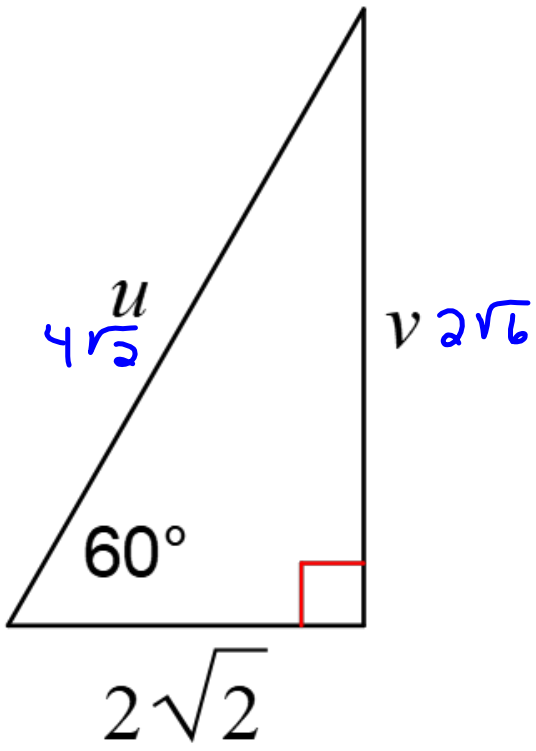
Find the missing values

$s - s\sqrt{3} - 2s$

$2\sqrt{2}$

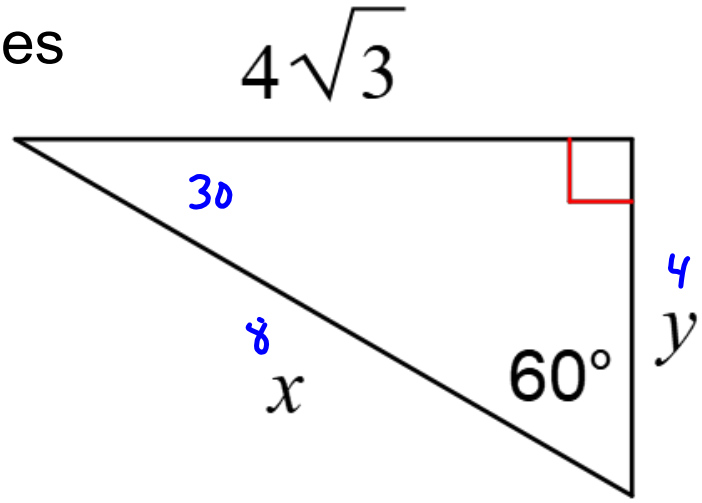
$2\sqrt{2} \cdot \sqrt{3}$

$2\sqrt{2} \cdot 2$



# Special Right Triangles

Find the missing values




$\frac{4\sqrt{3}}{\sqrt{3}} = \frac{s\sqrt{3}}{\sqrt{3}}$

$s = 4$

$s \quad s\sqrt{3} \quad 2s$

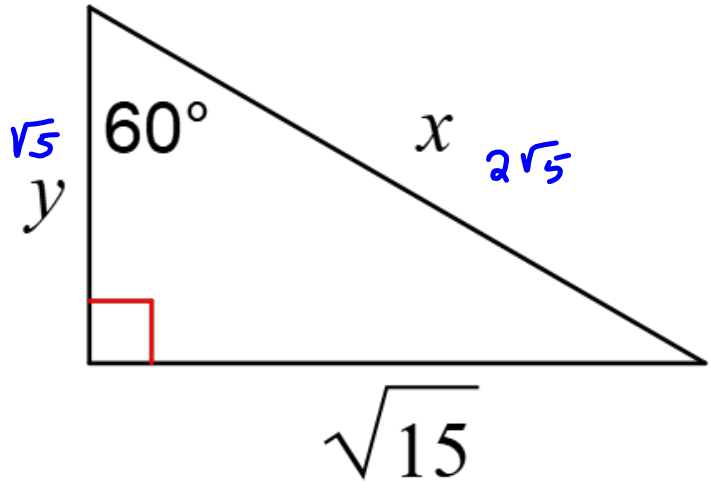
8

4

# Special Right Triangles

s $s\sqrt{3}$ 2s

Find the missing values



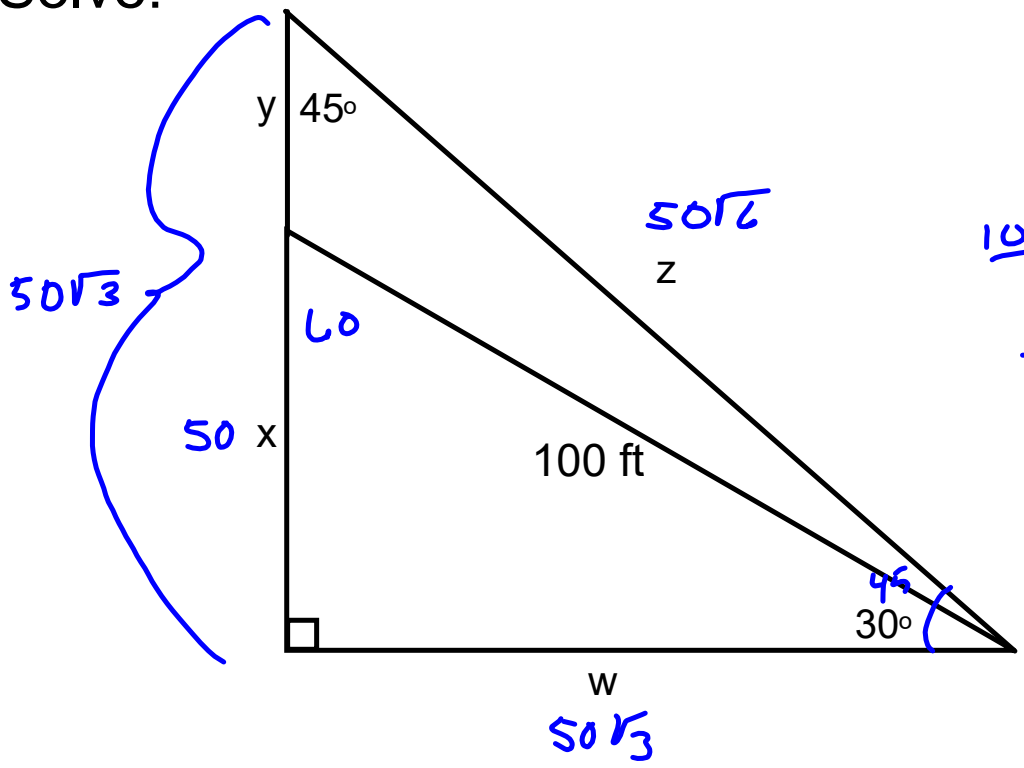

$\sqrt{5}$

$2\sqrt{5}$

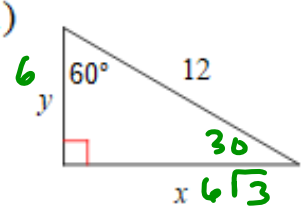
$\frac{s\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{15}}{\sqrt{3}} = \sqrt{\frac{15}{3}} = \sqrt{5}$

# Example

Solve:



1)




$\frac{12}{2} = \frac{2s}{2}$

$s = 6$

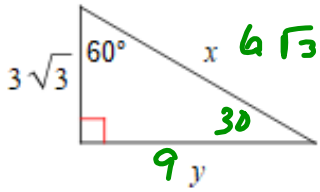
$s - s\sqrt{3} - 2s$

$3\sqrt{3}\sqrt{3}$

$3 \cdot 3$

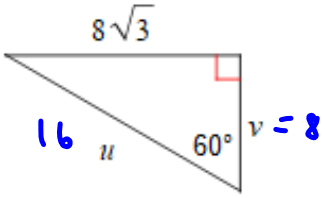
$x = 6\sqrt{3},\ y = 6$

2)




$x = 6\sqrt{3},\ y = 9$

3)

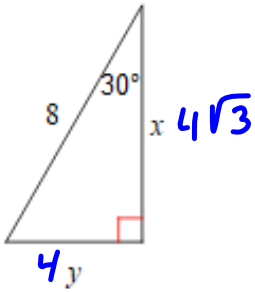



$\frac{s\sqrt{3}}{\sqrt{3}} = \frac{8\sqrt{3}}{\sqrt{3}}$

$s = 8$

$u = 16,\ v = 8$

4)

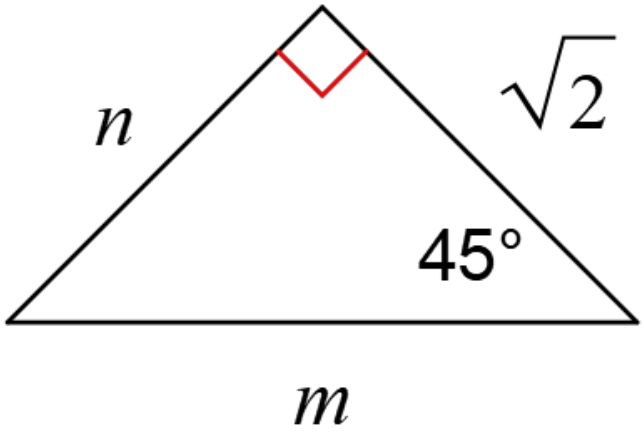



$x = 4\sqrt{3},\ y = 4$

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

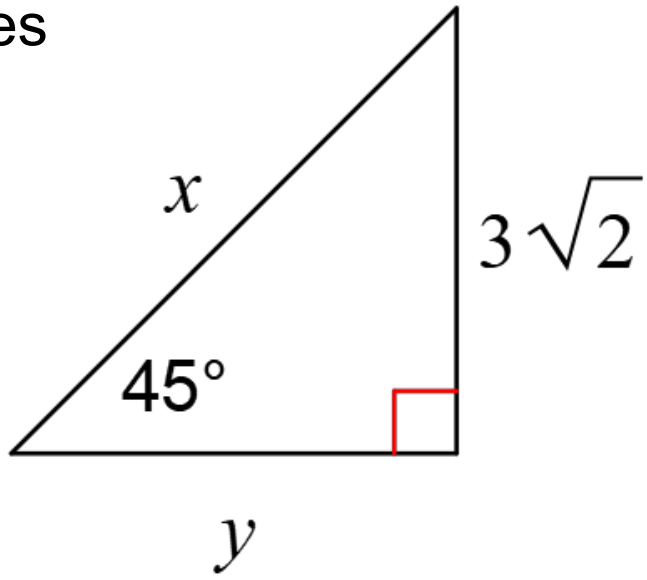
# Special Right Triangles

Find the missing values



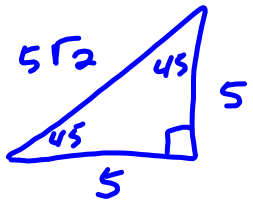
# Special Right Triangles

Find the missing values



# 45-45-90

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




# 30-60-90

s- $s\sqrt{3}$ -2s