

## SPECIAL RIGHT TRIANGLES TOOLKIT

### SIMPLIFYING Radicals

Radicals can be simplified by factoring out perfect squares from the number inside of the square root.

A radical is completely simplified when you can no longer factor out perfect squares from the number inside of the square root.

After factoring out a perfect square from the number inside of the square root, you can use the following rule:

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

Examples:

$$\begin{aligned} 1. \sqrt{99} &= \sqrt{9(11)} \\ &= \sqrt{9} \cdot \sqrt{11} \\ &= 3\sqrt{11} \end{aligned}$$

$$\begin{aligned} 2. \sqrt{108} &= \sqrt{(36)(3)} \\ &= \sqrt{36} \cdot \sqrt{3} \\ &= 6\sqrt{3} \end{aligned}$$

$$3. \sqrt{30} \leftarrow \text{cant be simplified}$$

$$\begin{array}{c} 30 \\ \swarrow \quad \searrow \\ 3 \quad 10 \\ \quad \swarrow \quad \searrow \\ \quad 5 \quad 2 \end{array}$$

} no factors are perfect squares

### RATIONALIZING Denominators OF FRACTIONS

A number is irrational if it cannot be written as a fraction of two integers.

Irrational numbers are still real numbers.

When solving special right triangles, often times we got solutions where there is an irrational number in the denominator.

We can rewrite these solutions, so that the denominator is rationalized.

Example:  $\frac{4}{\sqrt{2}}$   $\leftarrow$  irrational

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

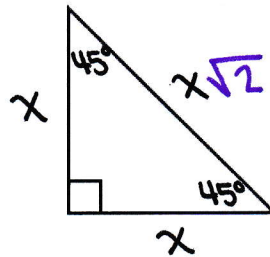
$\leftarrow$  "1" in disguise

45°·45°·90°  
Special Right  
TRIANGLES

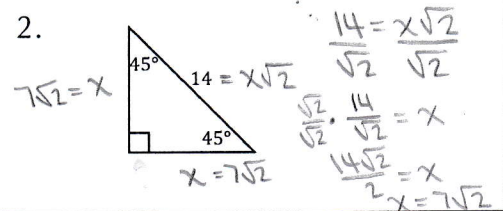
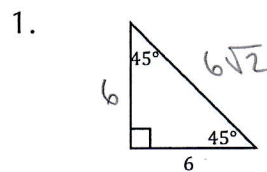
A 45° – 45° – 90° triangle is an isosceles right triangle.

You only need one side length of a 45° – 45° – 90° triangle to determine the remaining two side lengths.

The rule for special right triangles is as follows:



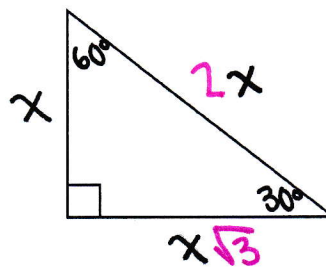
Examples: Solve for the missing side lengths of the triangles below.



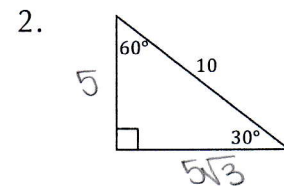
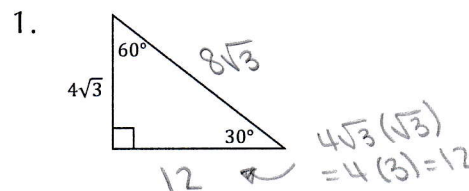
30°·60°·90°  
Special Right  
TRIANGLES

You only need one side length of a 30° – 60° – 90° triangle to determine the remaining two side lengths.

The rule for special right triangles is as follows:



Examples: Solve for the missing side lengths of the triangles below.



\*Hint: **Be careful** on Example #1!! Check your angles.