1-1 Standards

- 1a - Use the Pythagorean Theorem to find missing sides in a right triangle
- 1b - Use the sine, cosine, and tangent functions to find missing sides in a right triangle.
- 1c - Use the inverse sine, cosine, and tangent functions to find missing angles in a right triangle.
- 1d - Apply Standards 1a, 1b, and 1c to solve mathematical models involving right triangles (real-world problems)

Pythagorean Theorem
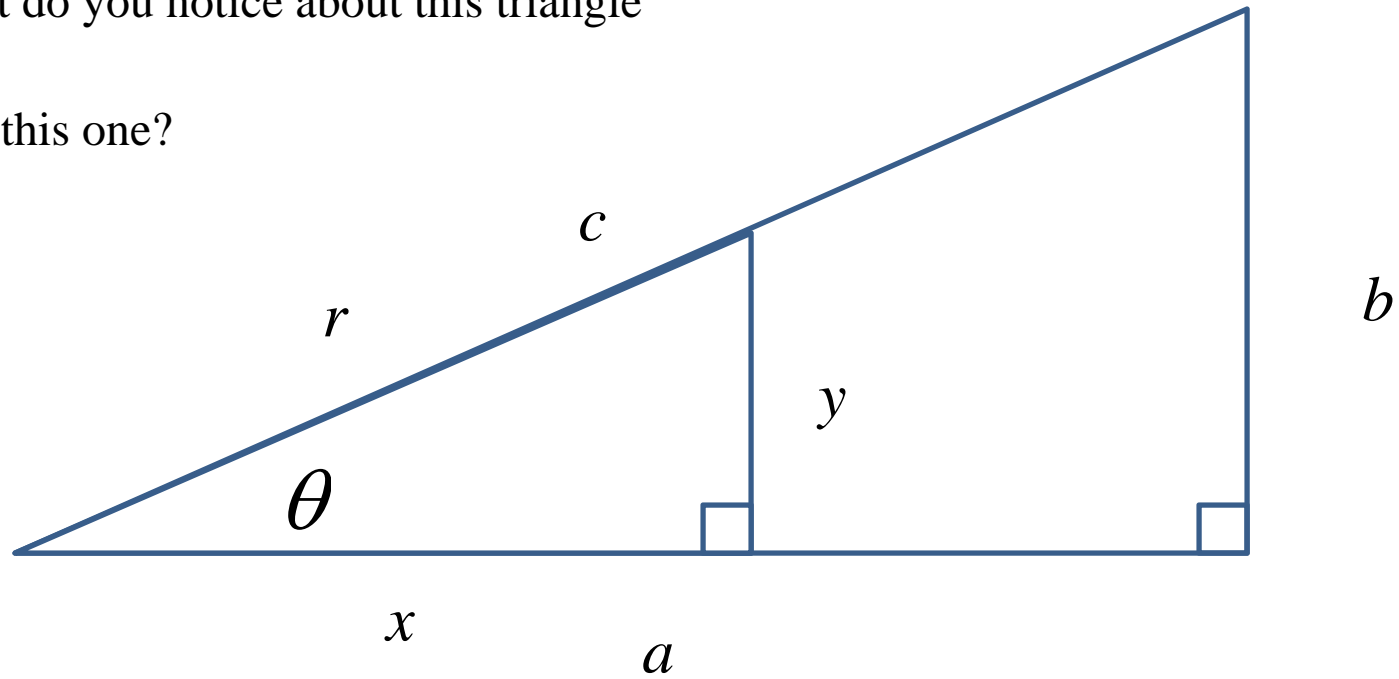
$$a^2 + b^2 = c^2$$

SOHCAHTOA

$$\sin e = \frac{opposite}{hypotenuse} \qquad \text{cosine} = \frac{adjacent}{hypotenuse}$$

$$tangent = \frac{opposite}{adjacent}$$

What do you notice about this triangle

And this one?
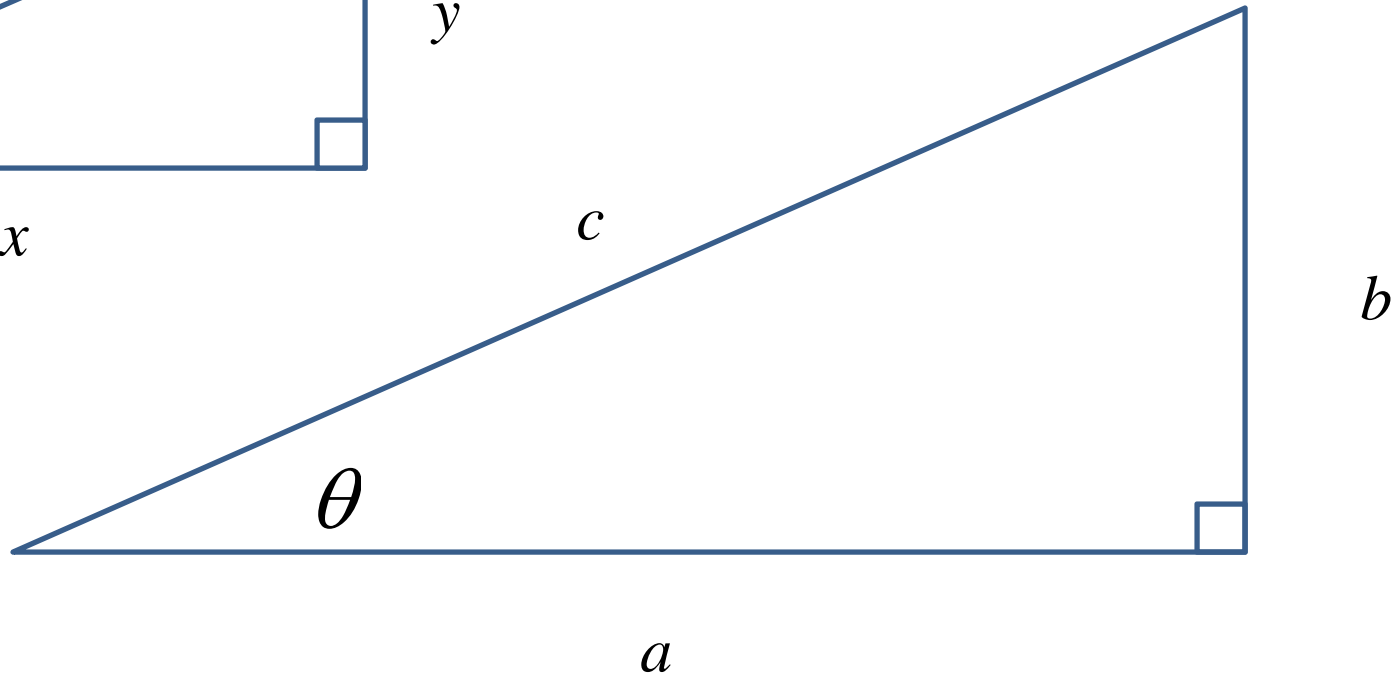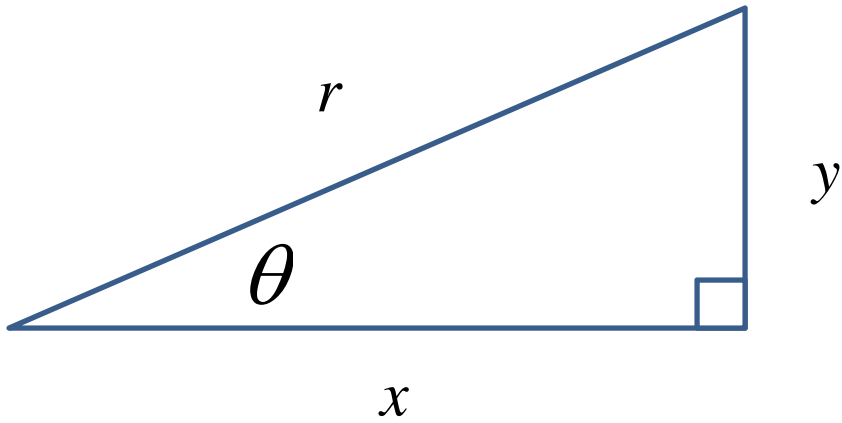

$$\frac{y}{r} \qquad \frac{x}{r} \qquad \frac{y}{x}$$

$$\frac{y}{r} = \frac{b}{c} \qquad \frac{x}{r} = \frac{a}{c} \qquad \frac{y}{x} = \frac{b}{a}$$

Triangle 1 (upper): sides labeled r (hypotenuse), y (opposite), x (adjacent), with angle θ and a right angle.

Triangle 2 (lower): sides labeled c (hypotenuse), b (vertical), a (horizontal), with angle θ and a right angle.
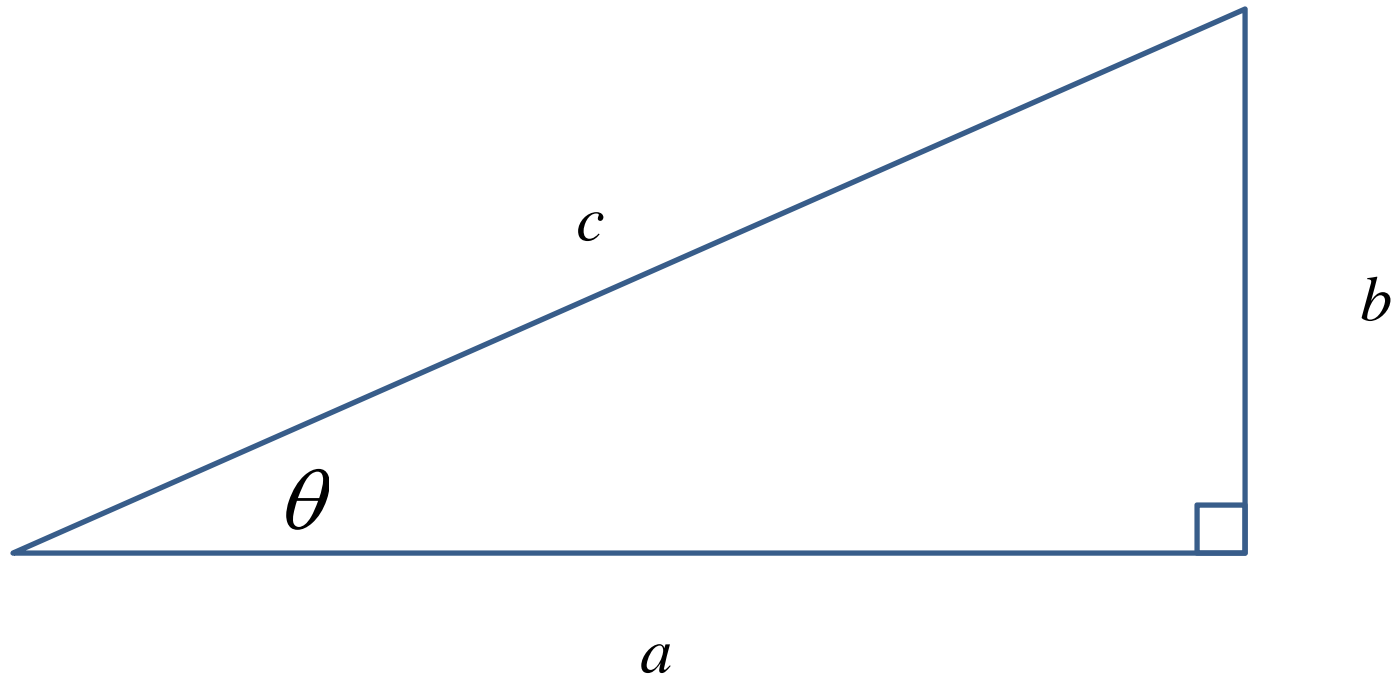
$$\frac{y}{r} \qquad\qquad \frac{x}{r} \qquad\qquad \frac{y}{x}$$

$$\frac{b}{c} \qquad\qquad \frac{a}{c} \qquad\qquad \frac{b}{a}$$

Find x and y

$\sin 30° =$

$r = 10$

y

$30°$

x

$$\sin 30° = \frac{y}{r} = \frac{y}{10}$$

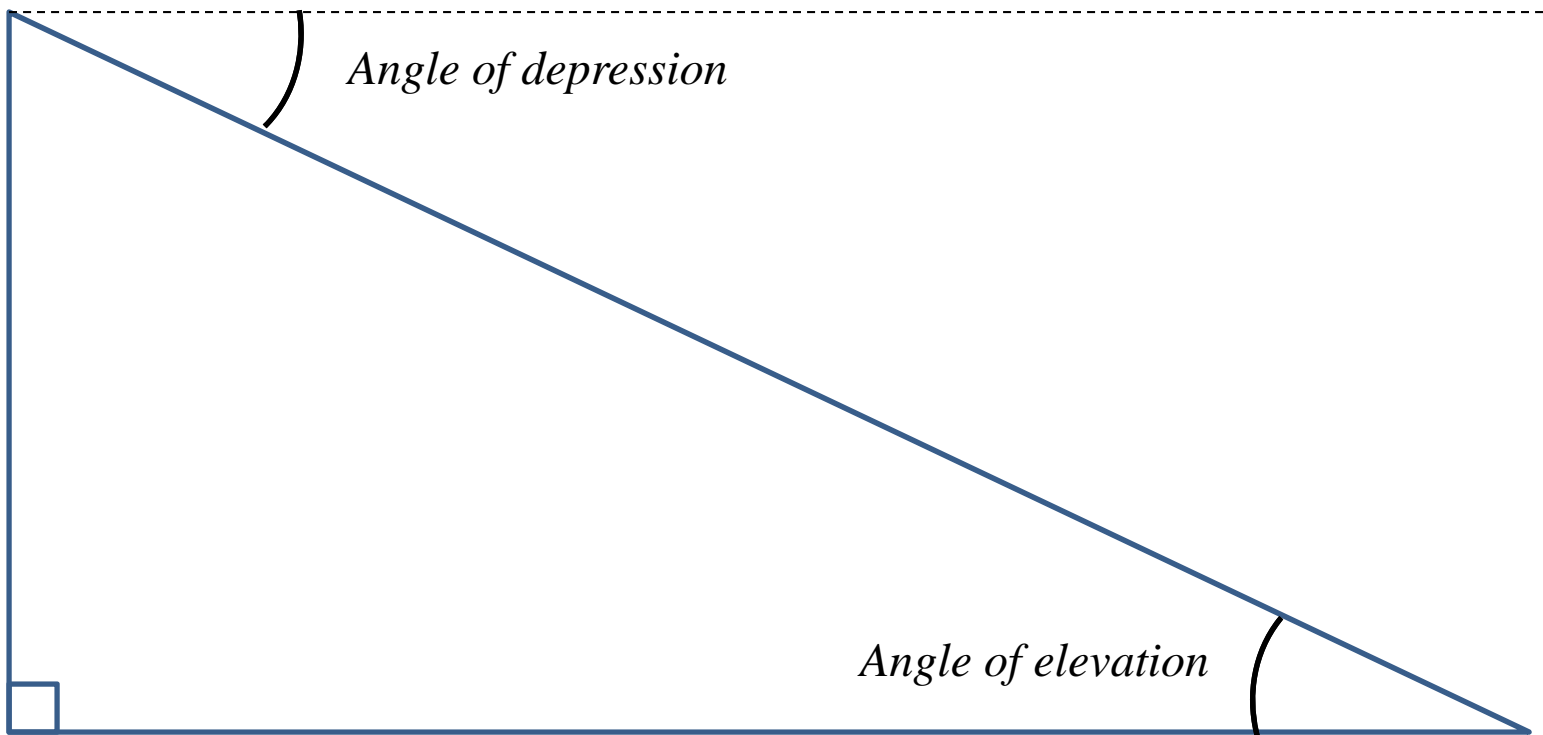$$\frac{1}{2} = \frac{y}{10}$$

$$y = 5$$

$r = 10$

$y = 5$

$30°$

x
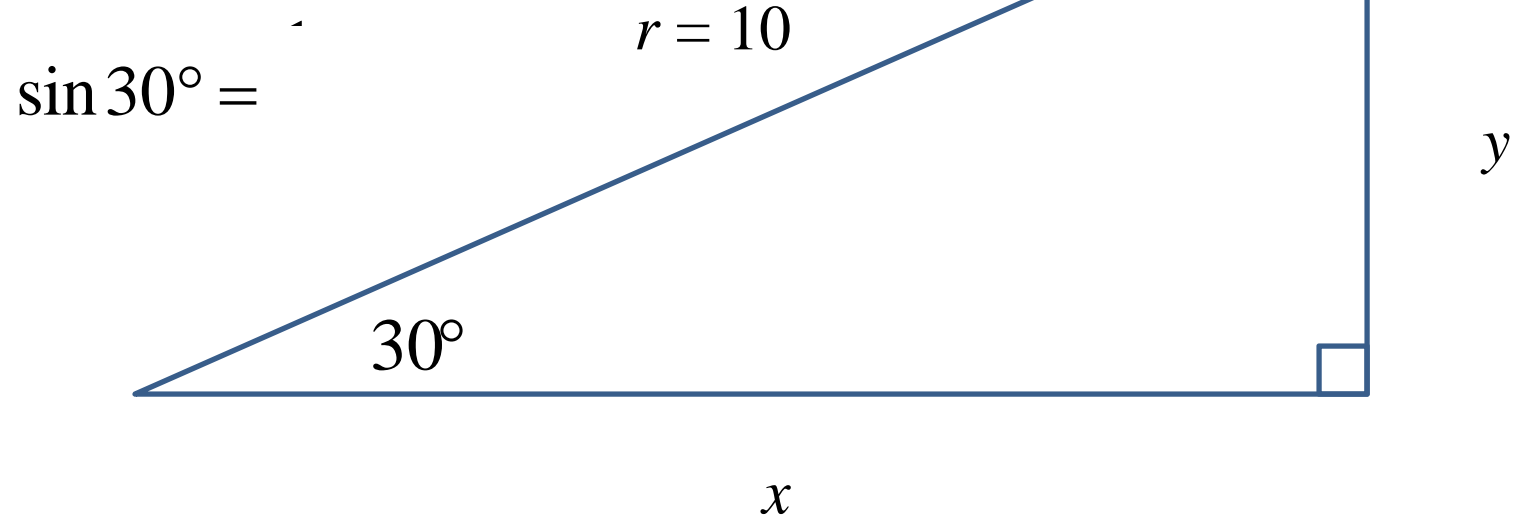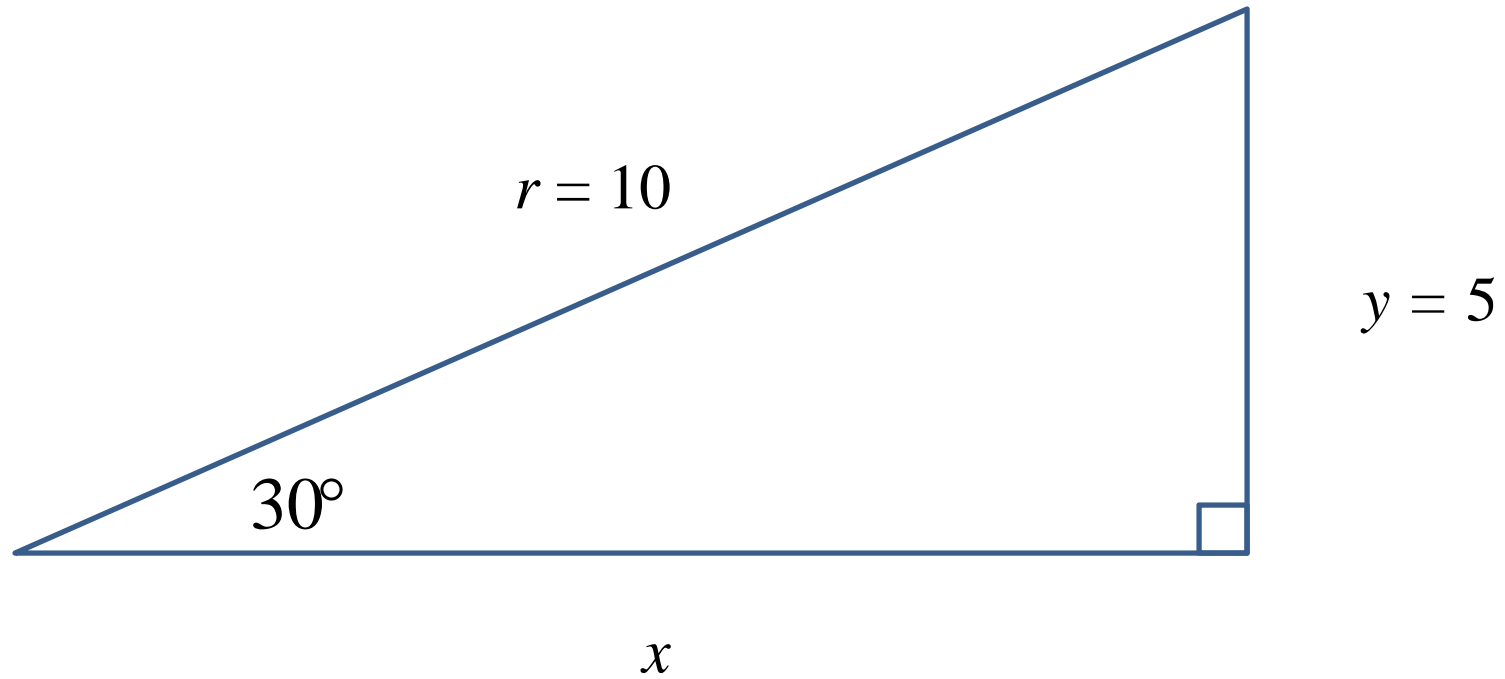
$x^2 + 5^2 = 10^2$

$x^2 + 25 = 100$

$x^2 = 75$

$x = 5\sqrt{3}$

Angle of depression

Angle of elevation

Inverse Trig Functions

$$\sin 30° = \quad \longrightarrow \quad \sin^{-1} \frac{1}{2} =$$

These functions are also expressed in another way:

$$\sin^{-1} \Rightarrow \arcsin$$

$$\cos^{-1} \Rightarrow \arccos$$

…etc.