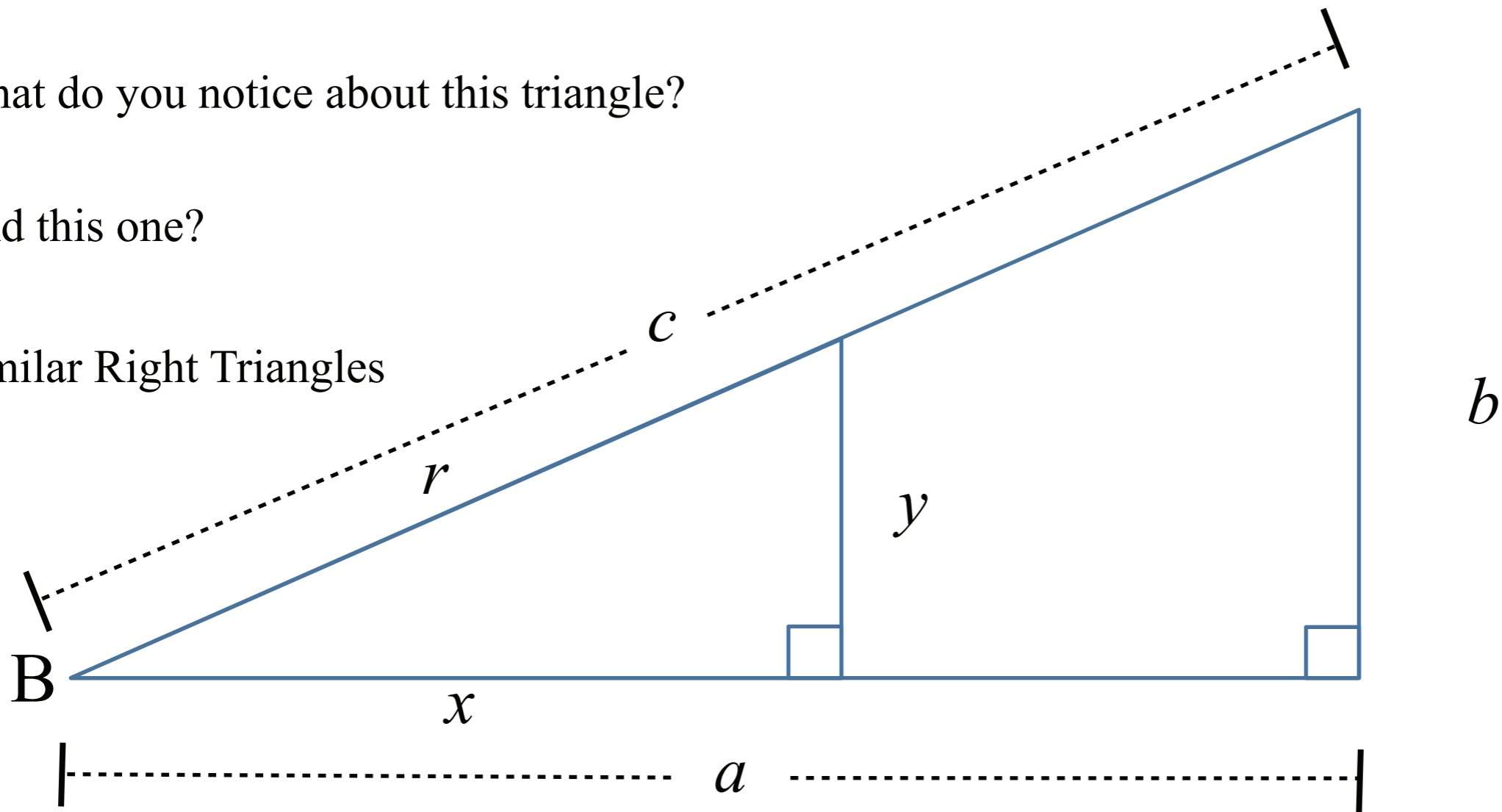


Trigonometric Functions

What do you notice about this triangle?

And this one?

Similar Right Triangles



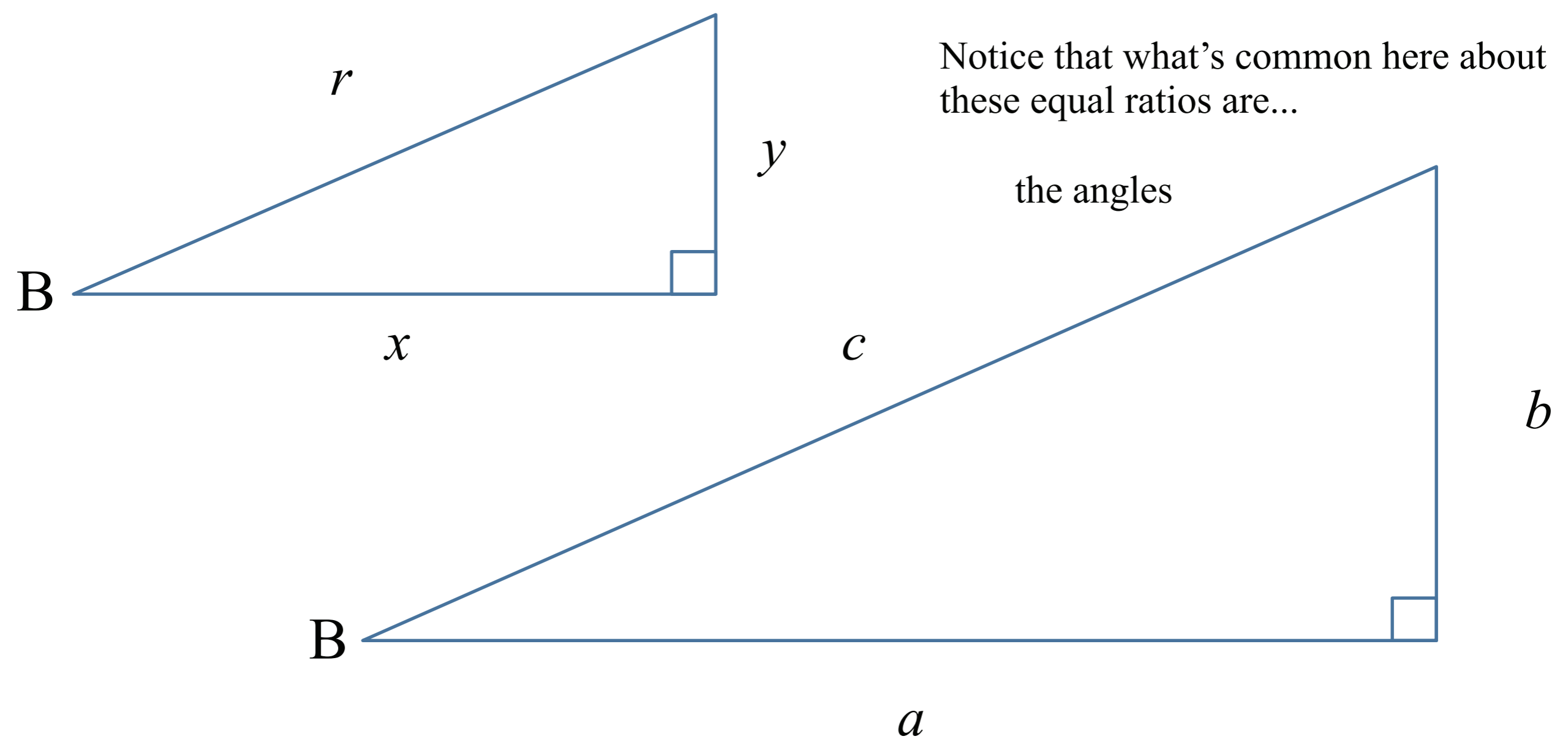
$$\frac{y}{r} = \frac{b}{c}$$

$$\frac{x}{r} = \frac{a}{c}$$

$$\frac{y}{x} = \frac{b}{a}$$

Notice that what's common here about these equal ratios are...

the angles



$\frac{y}{r} = \frac{b}{c}$ are both the ratio of the opposite side from angle B divided by the hypotenuse

$\frac{x}{r} = \frac{a}{c}$ are both the ratio of the adjacent side from angle B divided by the hypotenuse

$\frac{y}{x} = \frac{b}{a}$ are both the ratio of the opposite side from angle B divided by the adjacent side

Through Similar Right Triangles we can see that the ratio of corresponding sides depends upon the angle measure

$$\text{Sine} = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{Cosine} = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\text{Tangent} = \frac{\text{opposite}}{\text{adjacent}}$$

The abbreviation for each of these is

$$\sin B = \frac{\text{opposite}}{\text{hypotenuse}}$$

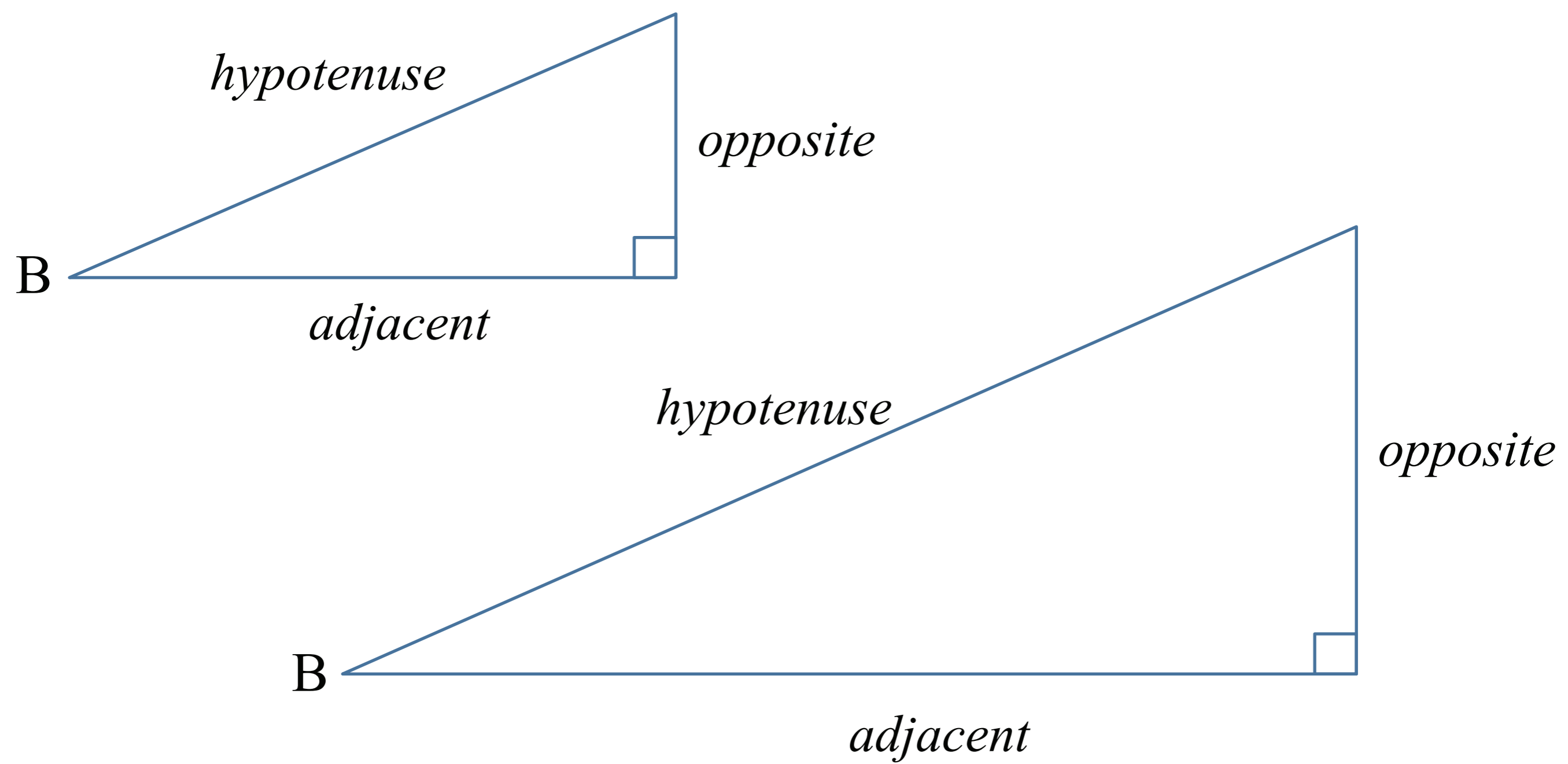
$$\cos B = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan B = \frac{\text{opposite}}{\text{adjacent}}$$

The most common acronym to remember which is which is

SOHCAHTOA

SineOppositeHypotenuseCosineAdjacentHypotenuseTangentOppositeAdjacent



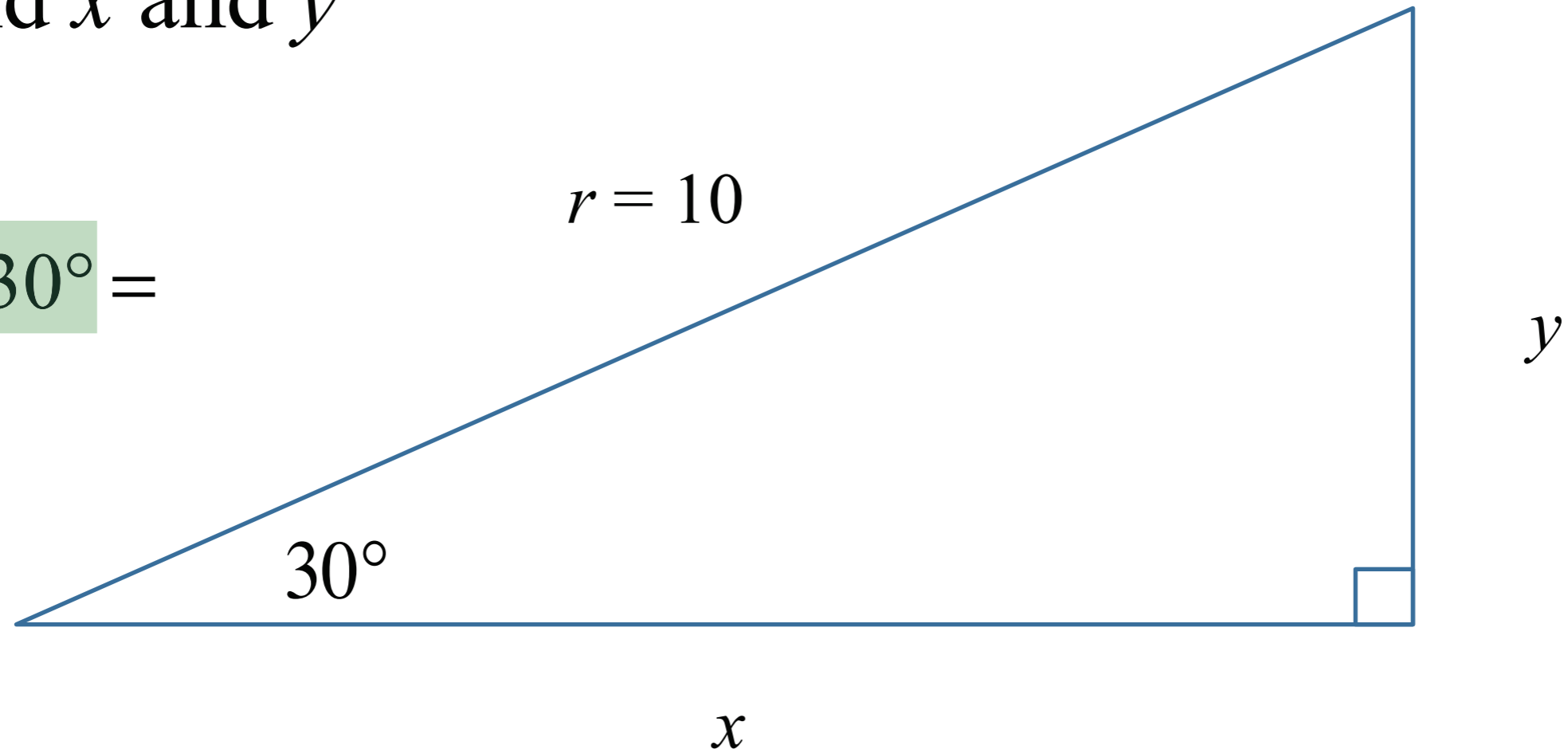
$$\sin B = \frac{y}{r} = \frac{b}{c}$$

$$\cos B = \frac{x}{r} = \frac{a}{c}$$

$$\tan B = \frac{y}{x} = \frac{b}{a}$$

Find x and y

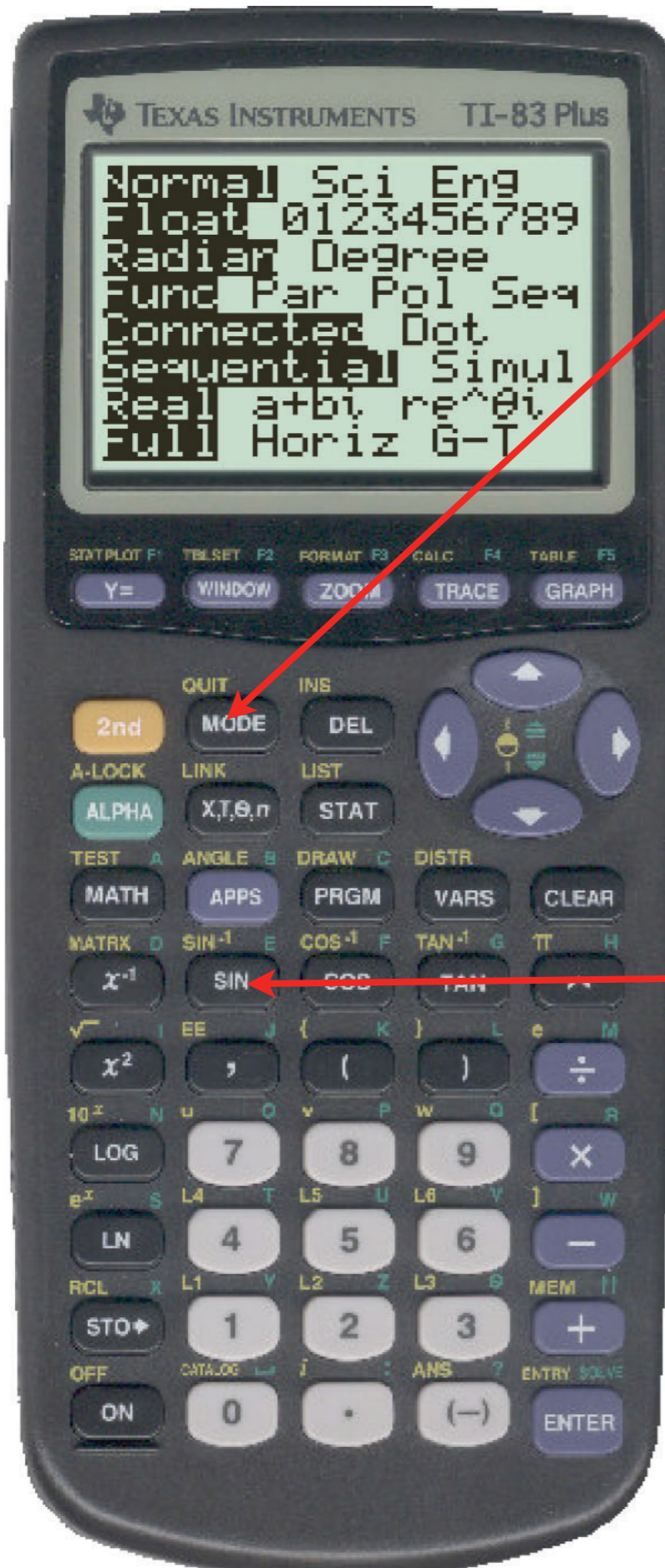
$$\sin 30^\circ =$$



$$\sin 30^\circ = \frac{y}{r} = \frac{y}{10}$$

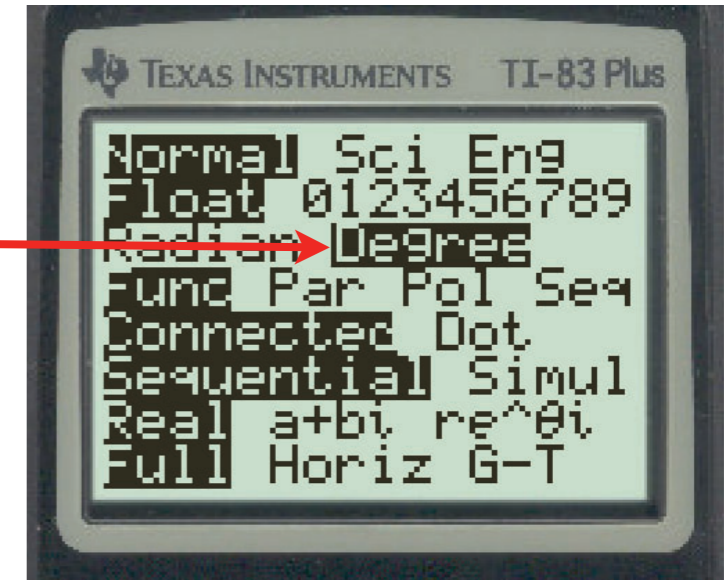
But what is the value of $\sin 30^\circ$?

The default setting on your calculator is for radian measure instead of degrees

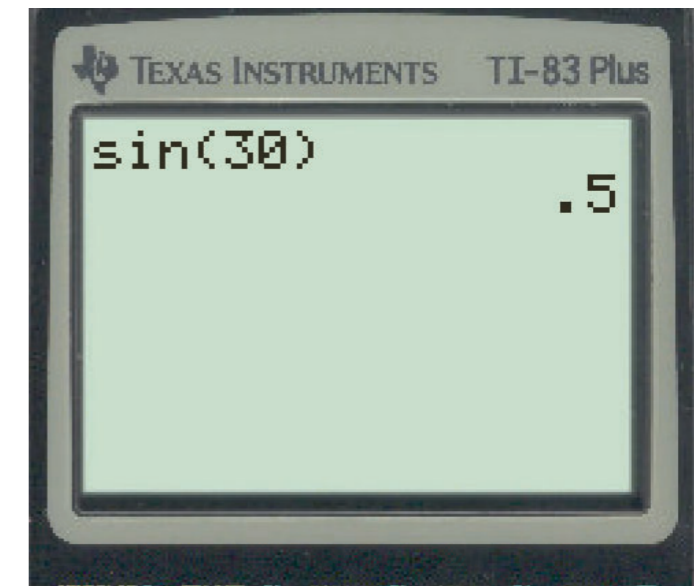


To change it we need to go to the Mode window

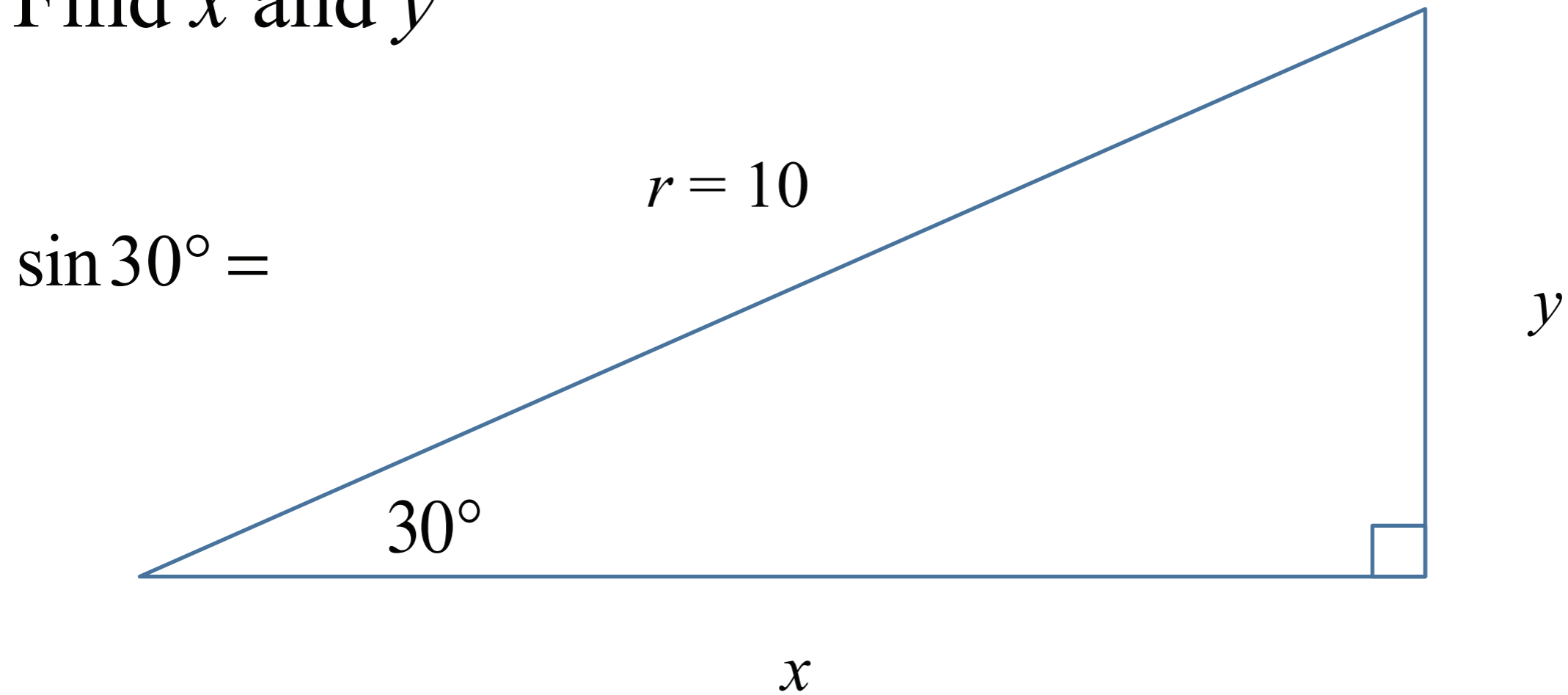
Make this change shown here being sure to hit the Enter key before exiting the Mode window.



Use the sine button to take the sine of 30 degrees



Find x and y

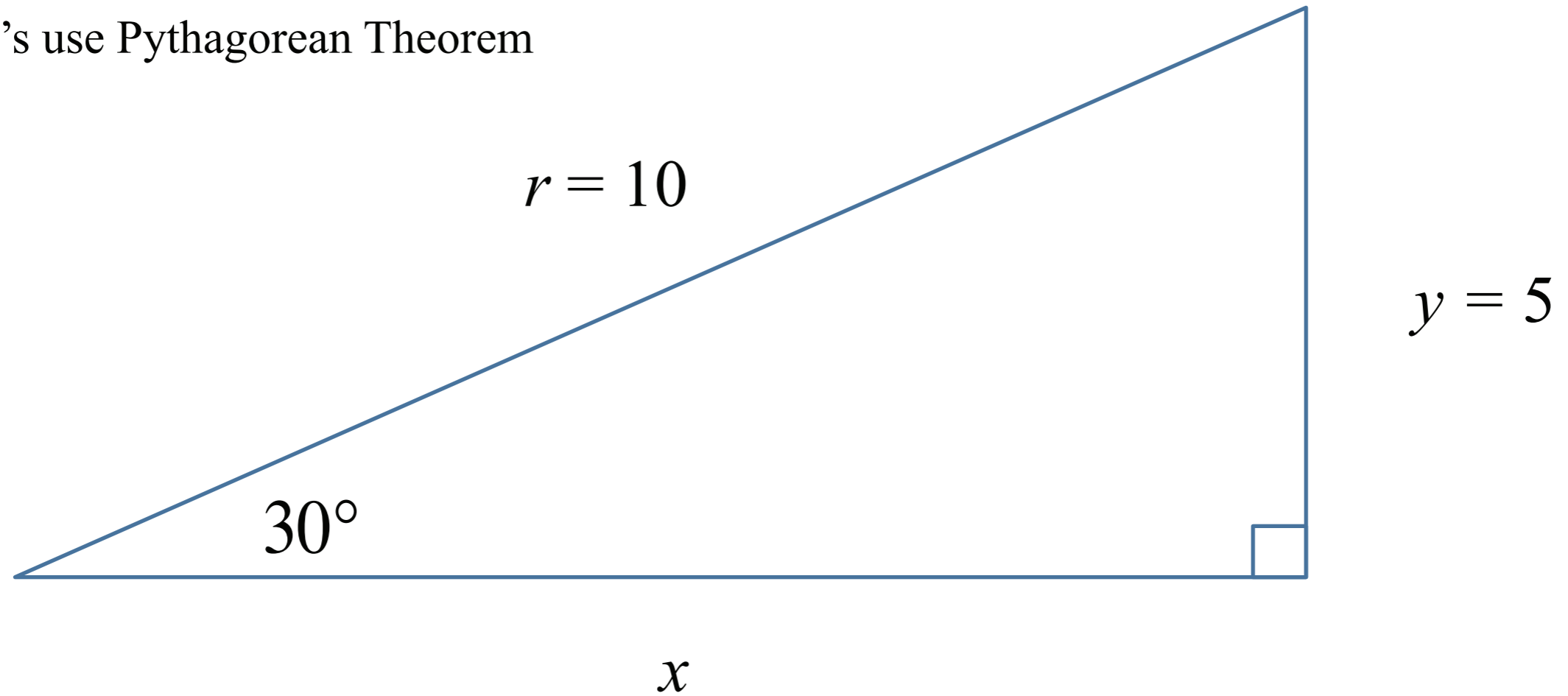


$$\sin 30^\circ = \frac{y}{r} = \frac{y}{10} = \frac{1}{2}$$

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

$$y = 5$$

Now let's use Pythagorean Theorem



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

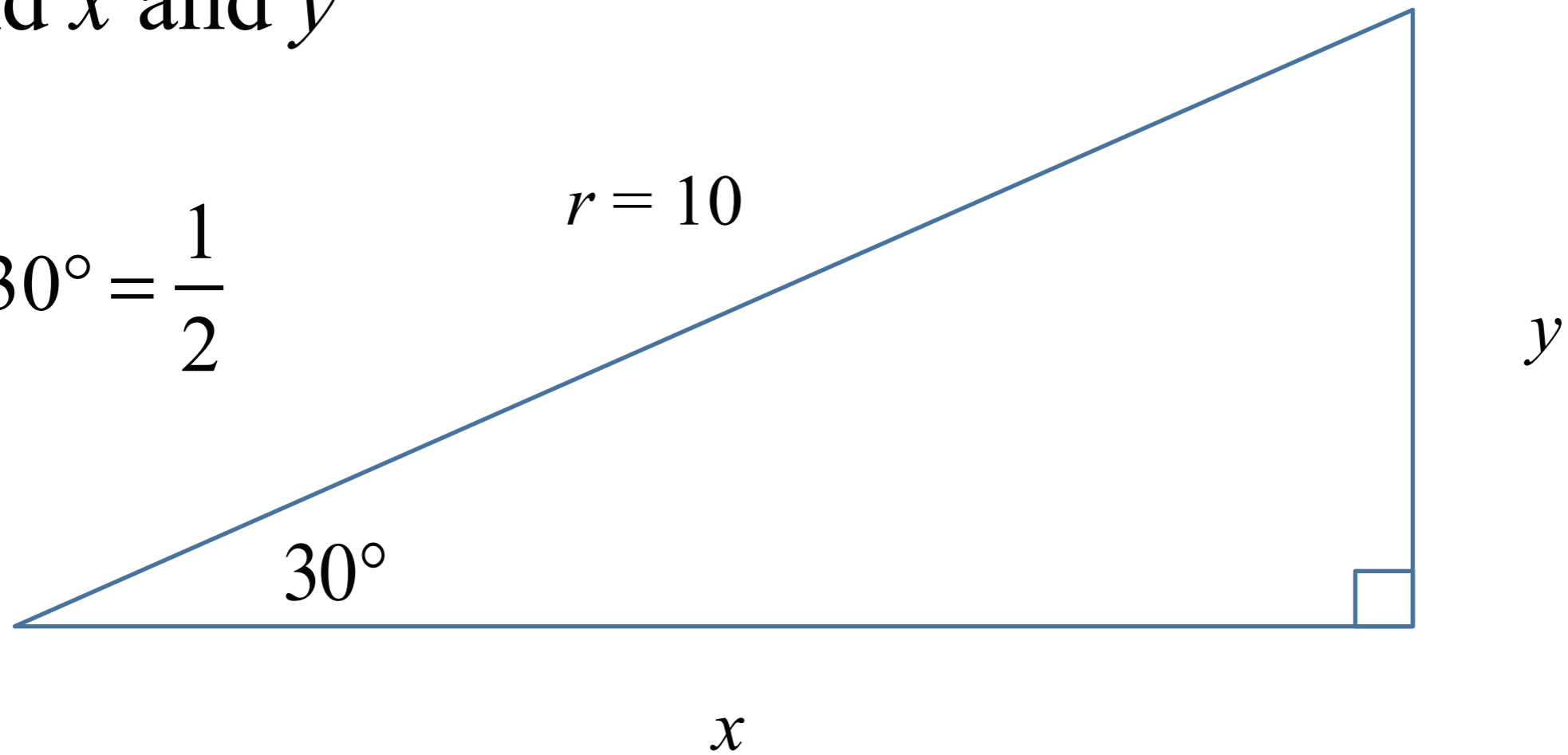
$$x^2 + 25 = 100$$

$$x^2 = 75$$

$$x = \sqrt{75} = 5\sqrt{3}$$

Find x and y

$$\sin 30^\circ = \frac{1}{2}$$



$$y = 5$$

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

Inverse Trig Functions

Much like the square root function inverts squaring a number...

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

The inverse trig functions can be found on the calculator by using the yellow “2nd” (shift) key in the upper left corner

