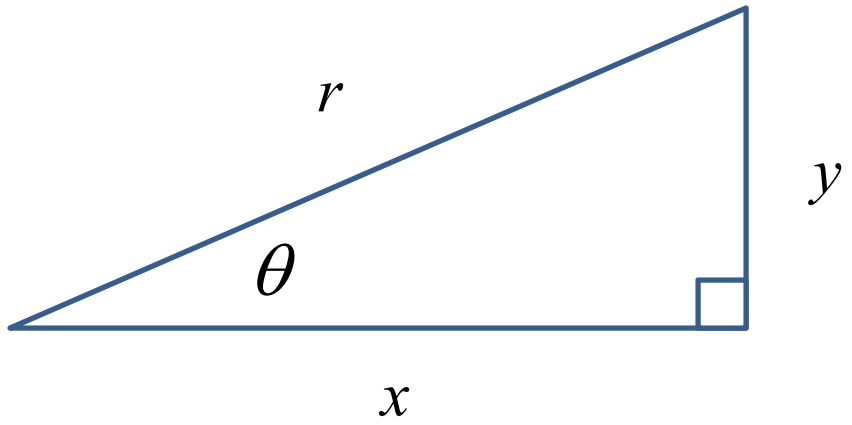
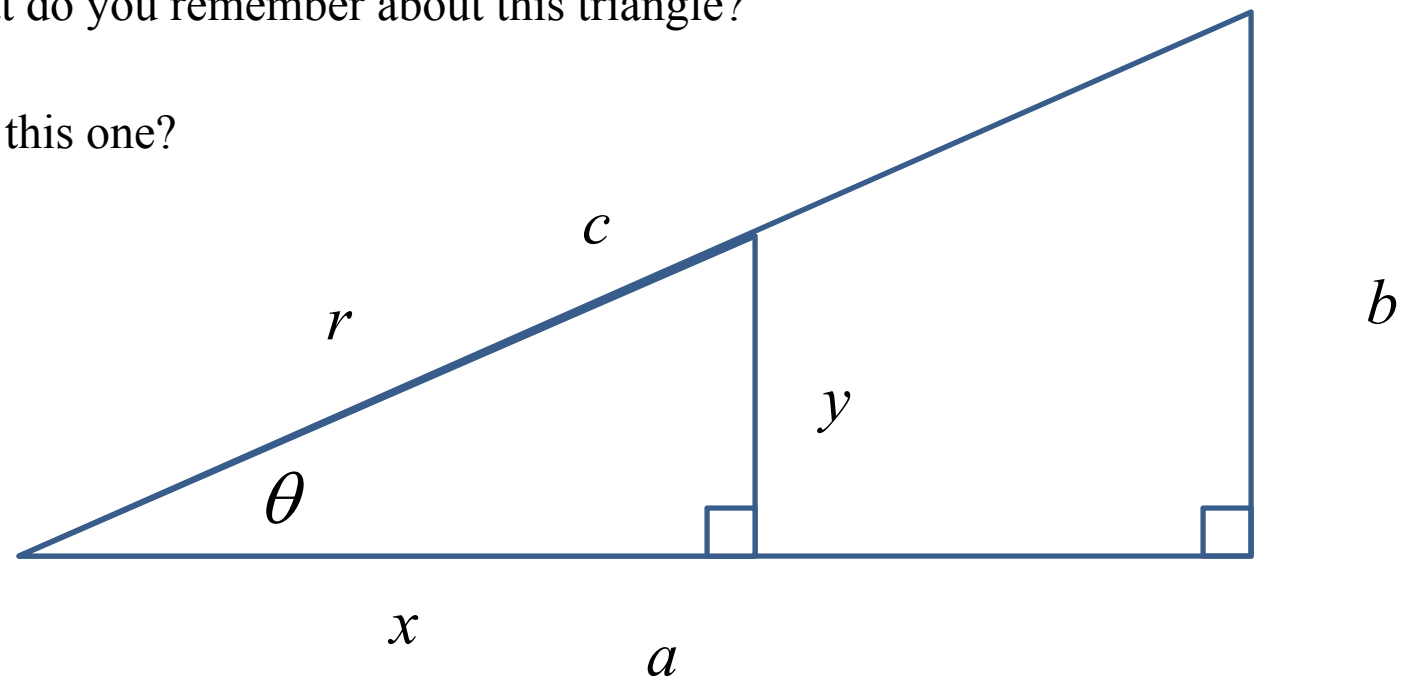


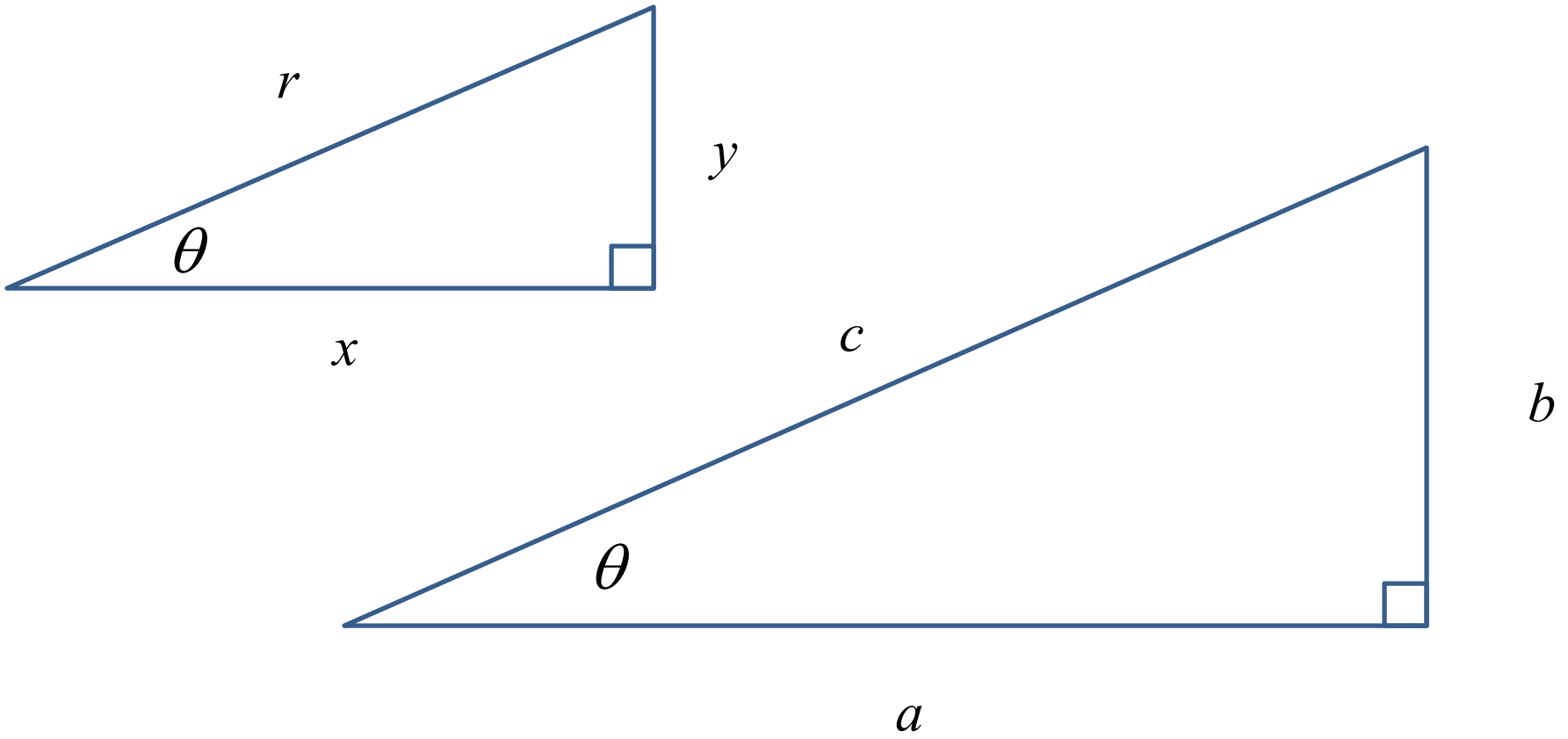
$\frac{y}{r}$ $\frac{x}{r}$ $\frac{y}{x}$

What do you remember about this triangle?

And this one?

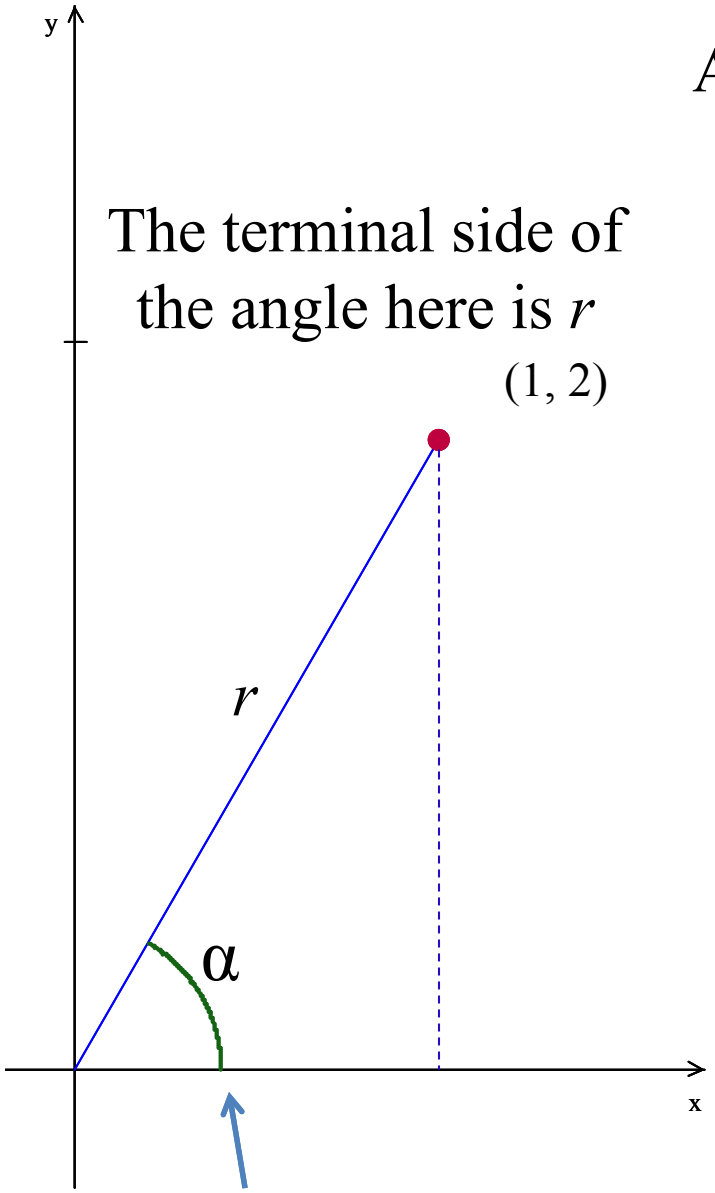


$$\frac{y}{r} = \frac{b}{c} \qquad \frac{x}{r} = \frac{a}{c} \qquad \frac{y}{x} = \frac{b}{a}$$



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

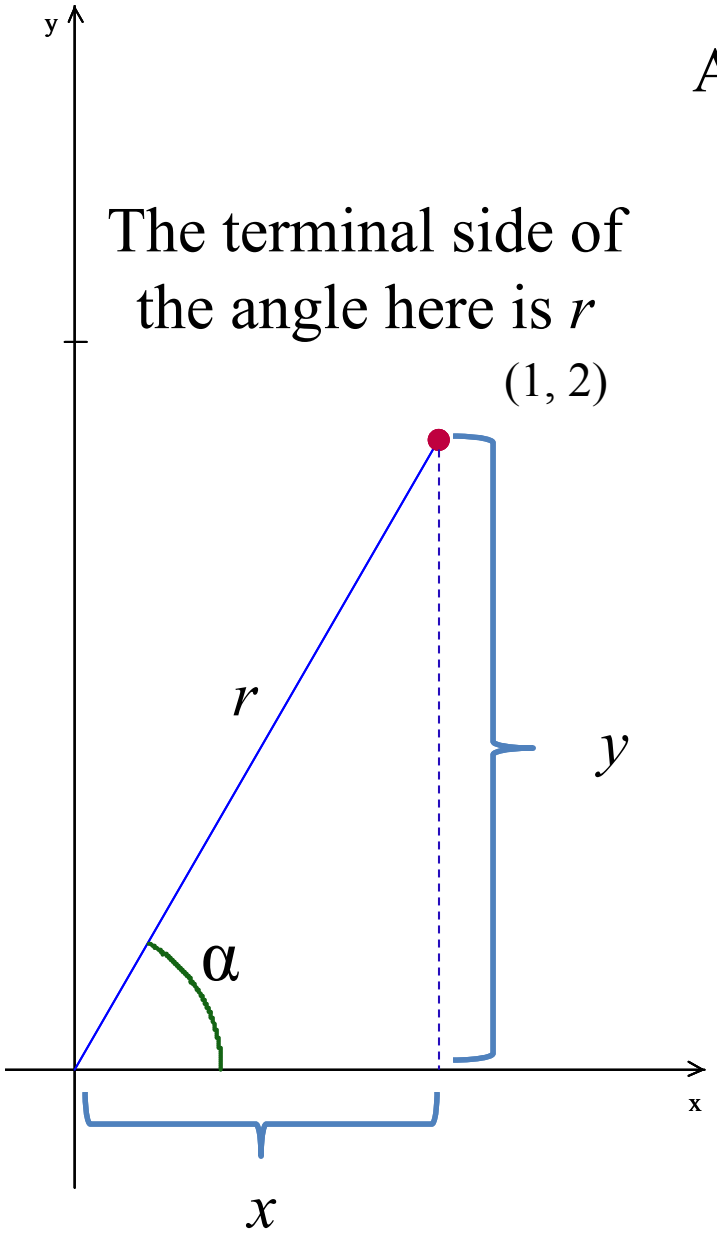
$\frac{b}{c}$ $\frac{a}{c}$ $\frac{b}{a}$



And *r* can be found by…

The terminal side of the angle here is *r*

Starting α from the positive *x*-axis is called <u>Standard Position</u>



The terminal side of the angle here is r

And r can be found by...

$$r^2 = x^2 + y^2$$

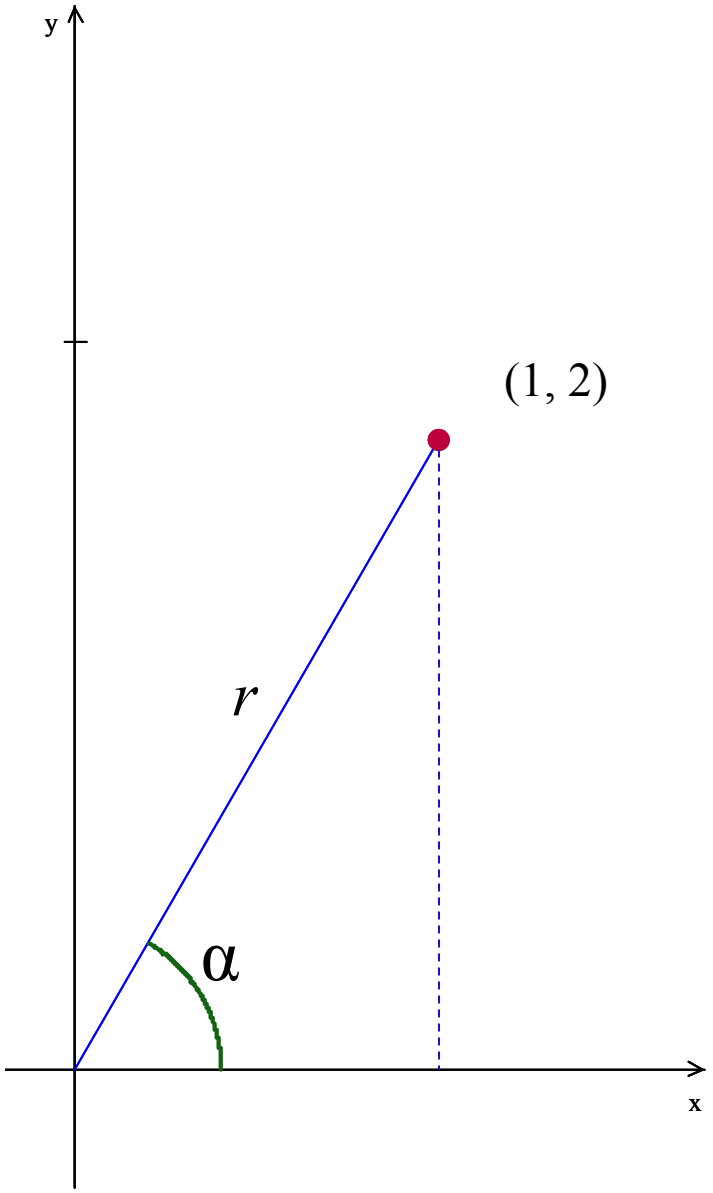
$$r^2 = 1^2 + 2^2$$

$$r = \sqrt{5}$$

Important Note: the value of r will <u>always</u> be positive

$$\sin\alpha = ?$$

$$\sin\alpha = \frac{y}{r}$$



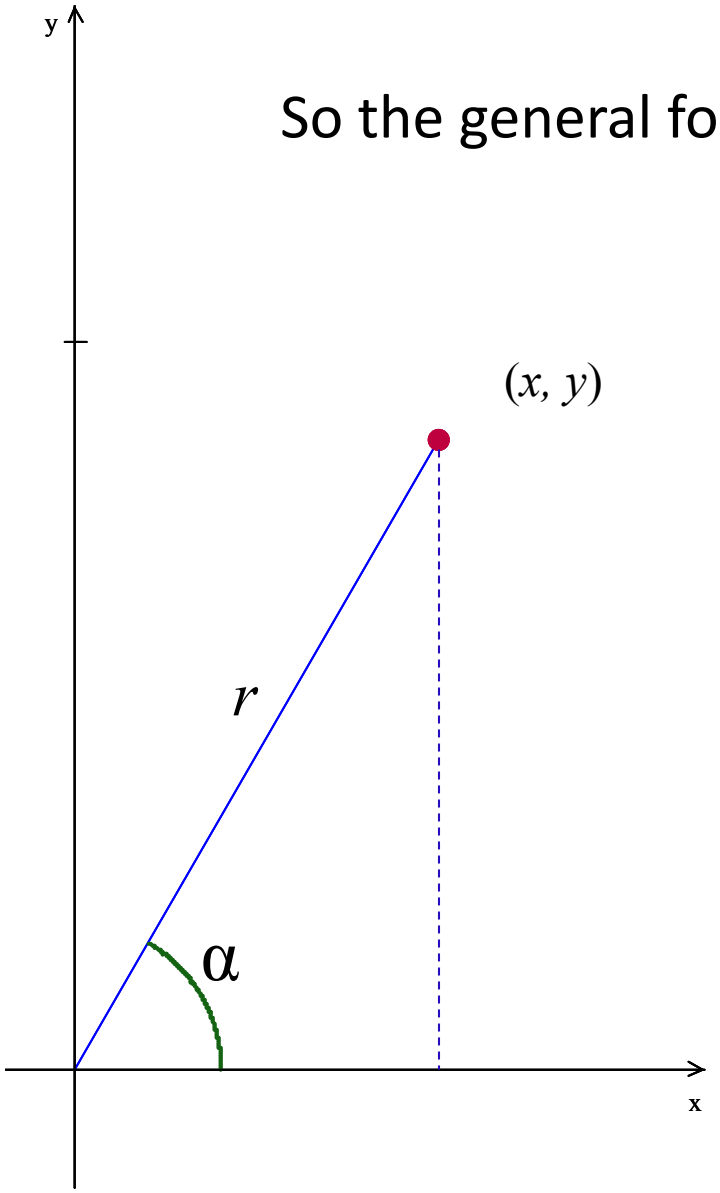
$$r = \sqrt{5}$$

$$\sin\alpha = \frac{2}{\sqrt{5}} \qquad \csc\alpha = \frac{\sqrt{5}}{2}$$

$$\cos\alpha = \frac{1}{\sqrt{5}} \qquad \sec\alpha = \sqrt{5}$$

$$\tan\alpha = 2 \qquad \cot\alpha = \frac{1}{2}$$

So the general formulas look like this:



$$\sin\alpha = \frac{y}{r} \qquad \csc\alpha = \frac{r}{y}$$

$$\cos\alpha = \frac{x}{r} \qquad \sec\alpha = \frac{r}{x}$$

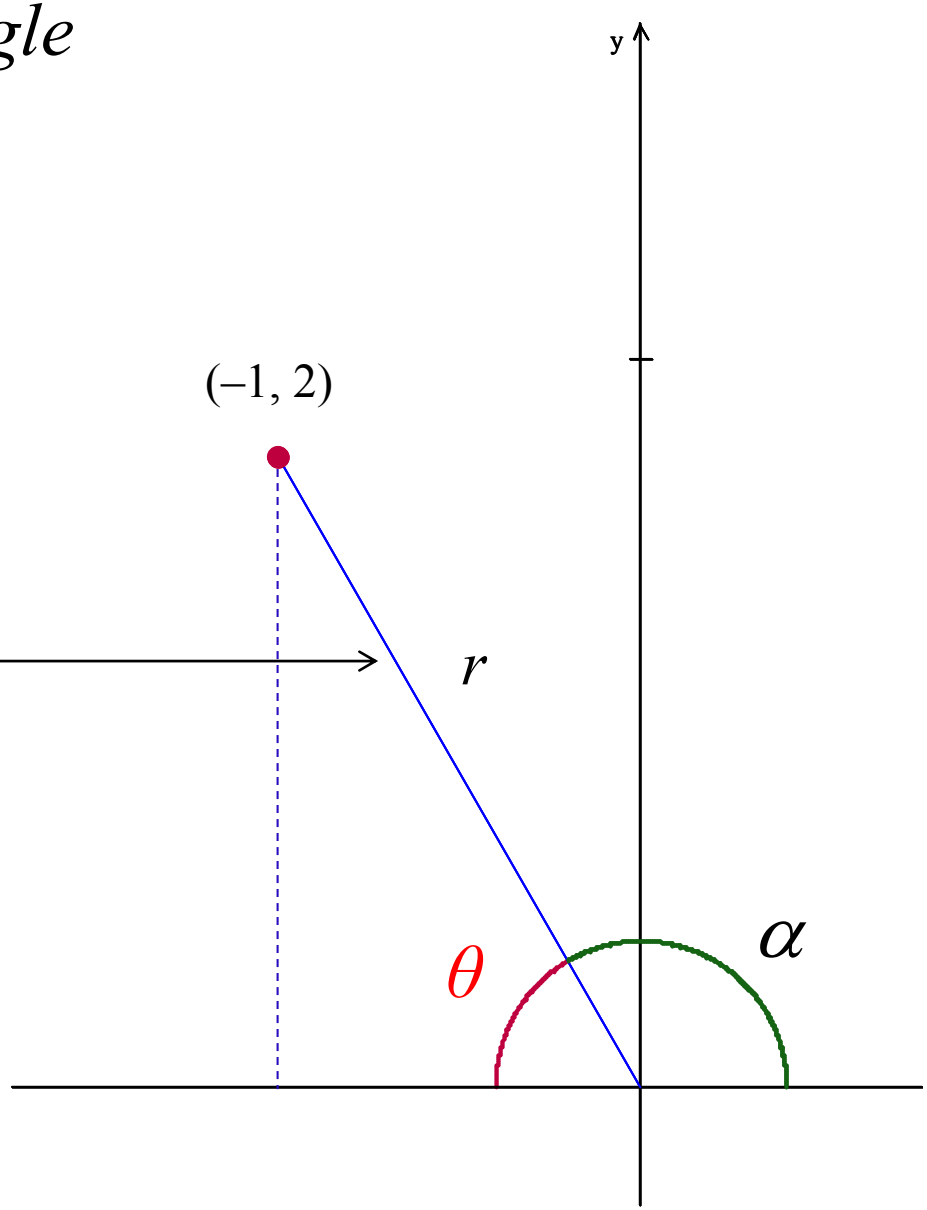
$$\tan\alpha = \frac{y}{x} \qquad \cot\alpha = \frac{x}{y}$$

θ is called the *reference angle*

reference angle

The acute angle made between the terminal side (r) and the x-axis

More on this later

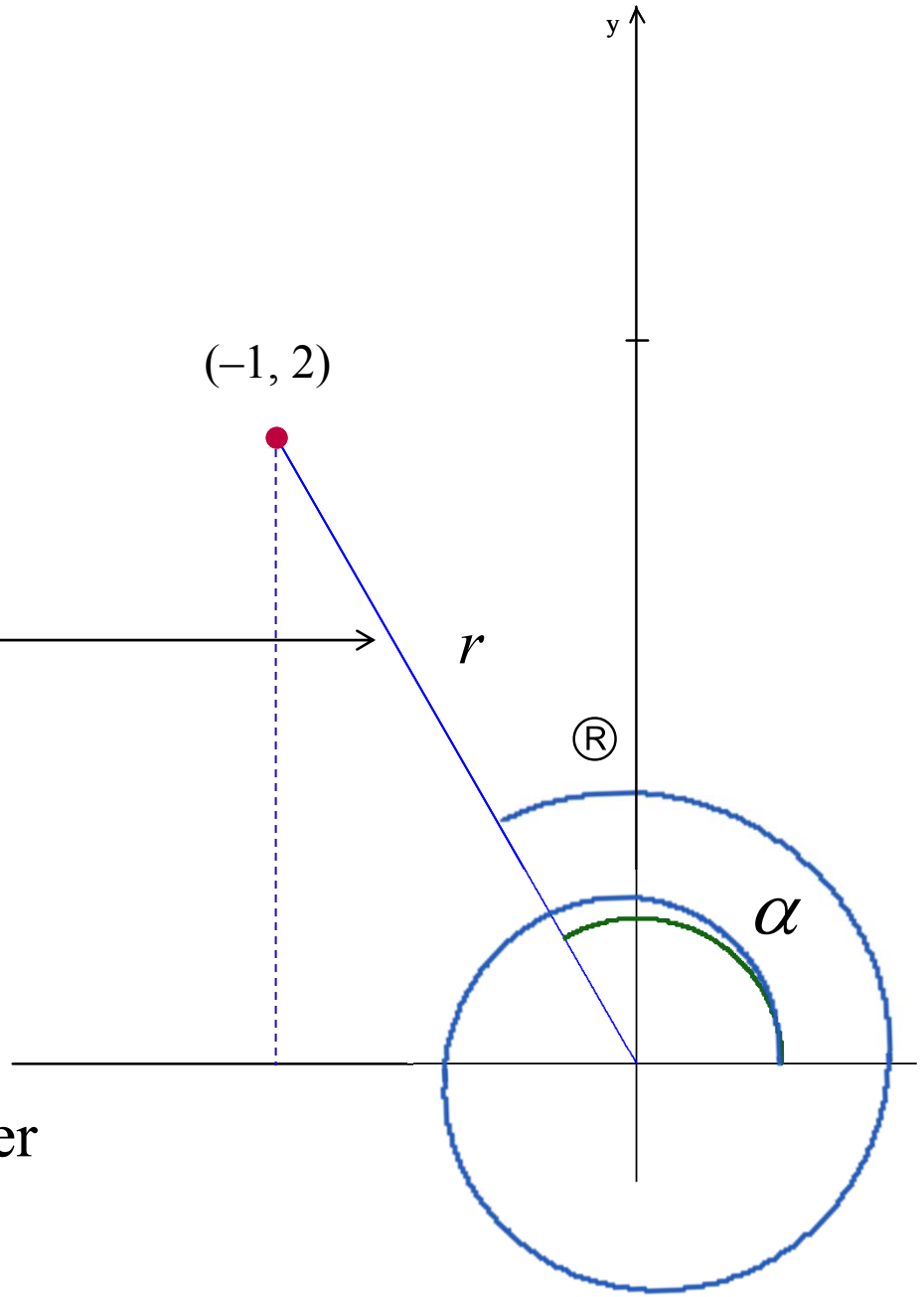


Co-terminal angles

Angles that have the same initial and terminal sides

α and ®are examples of co-terminal angles.

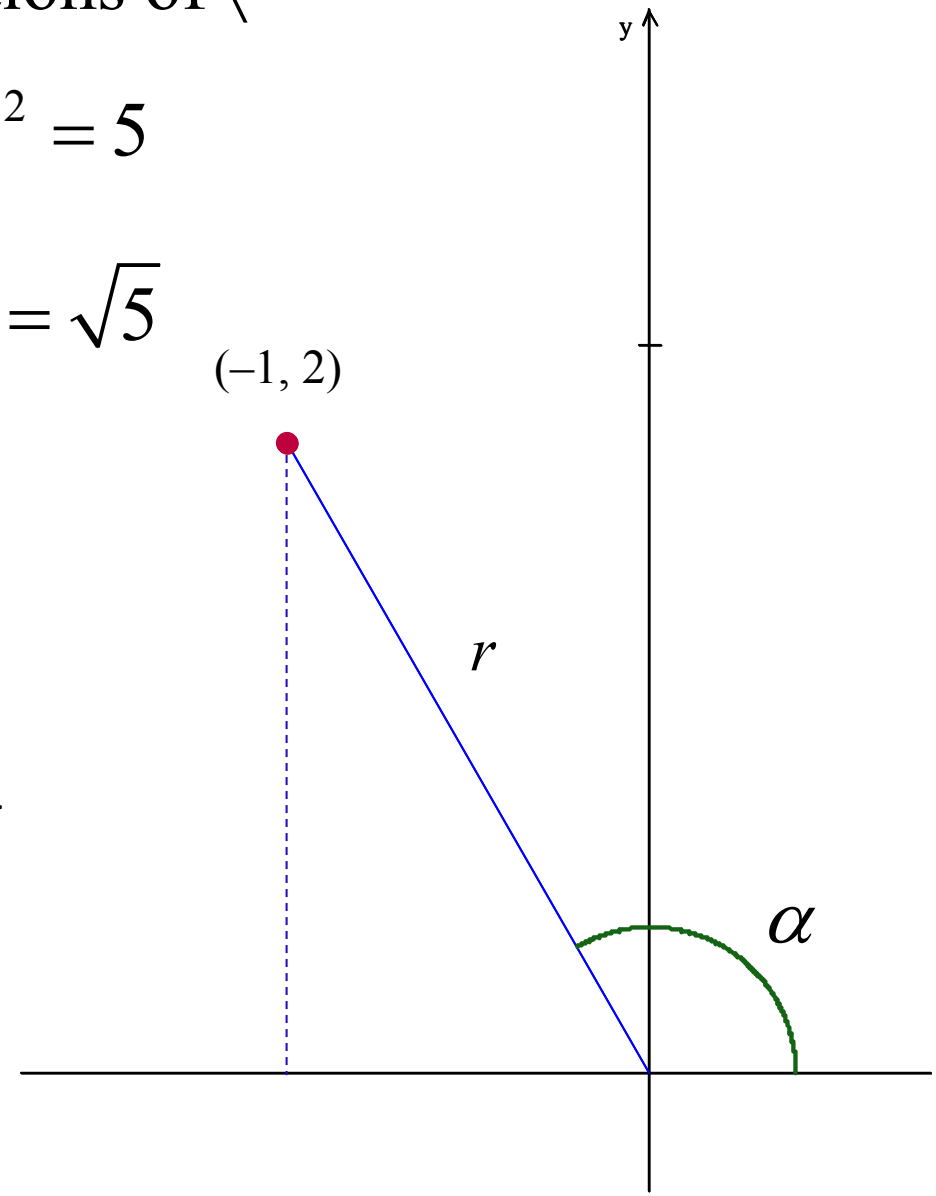
Co-terminal angles always differ by multiples of 360°



Find all of the trig functions of $\langle$

$$x^2 + y^2 = r^2 \qquad r^2 = 5$$

$$(-1)^2 + (2)^2 = r^2 \qquad r = \sqrt{5}$$



$$\sin\alpha = \frac{2}{\sqrt{5}} \qquad \csc\alpha = \frac{\sqrt{5}}{2}$$

$$\cos\alpha = -\frac{1}{\sqrt{5}} \qquad \sec\alpha = -\sqrt{5}$$

$$\tan\alpha = -2 \qquad \cot\alpha = -\frac{1}{2}$$

Find all of the trig functions of $\langle$ given a terminal side through the point (–5, –12)

$$x^2 + y^2 = r^2 \qquad r^2 = 169$$

$$(-5)^2 + (-12)^2 = r^2 \qquad r = 13$$

$$\sin\alpha = -\frac{12}{13} \qquad \csc\alpha = -\frac{13}{12}$$

$$\cos\alpha = -\frac{5}{13} \qquad \sec\alpha = -\frac{13}{5}$$

$$\tan\alpha = \frac{12}{5} \qquad \cot\alpha = \frac{5}{12}$$

Find all of the trig functions of θ given that

$$\sin\theta = -\frac{24}{25} \qquad \csc\theta = -\frac{25}{24}$$

$$\cos\theta = \frac{7}{25} \qquad \sec\theta = \frac{25}{7}$$

$$\tan\theta = -\frac{24}{7} \qquad \cot\theta = -\frac{7}{24}$$

…and θ is in Quadrant IV