HOW Reminders

- **Preparedness:**
  - Be in the classroom when the bell rings
  - Have something to write with, a calculator, and your notebook

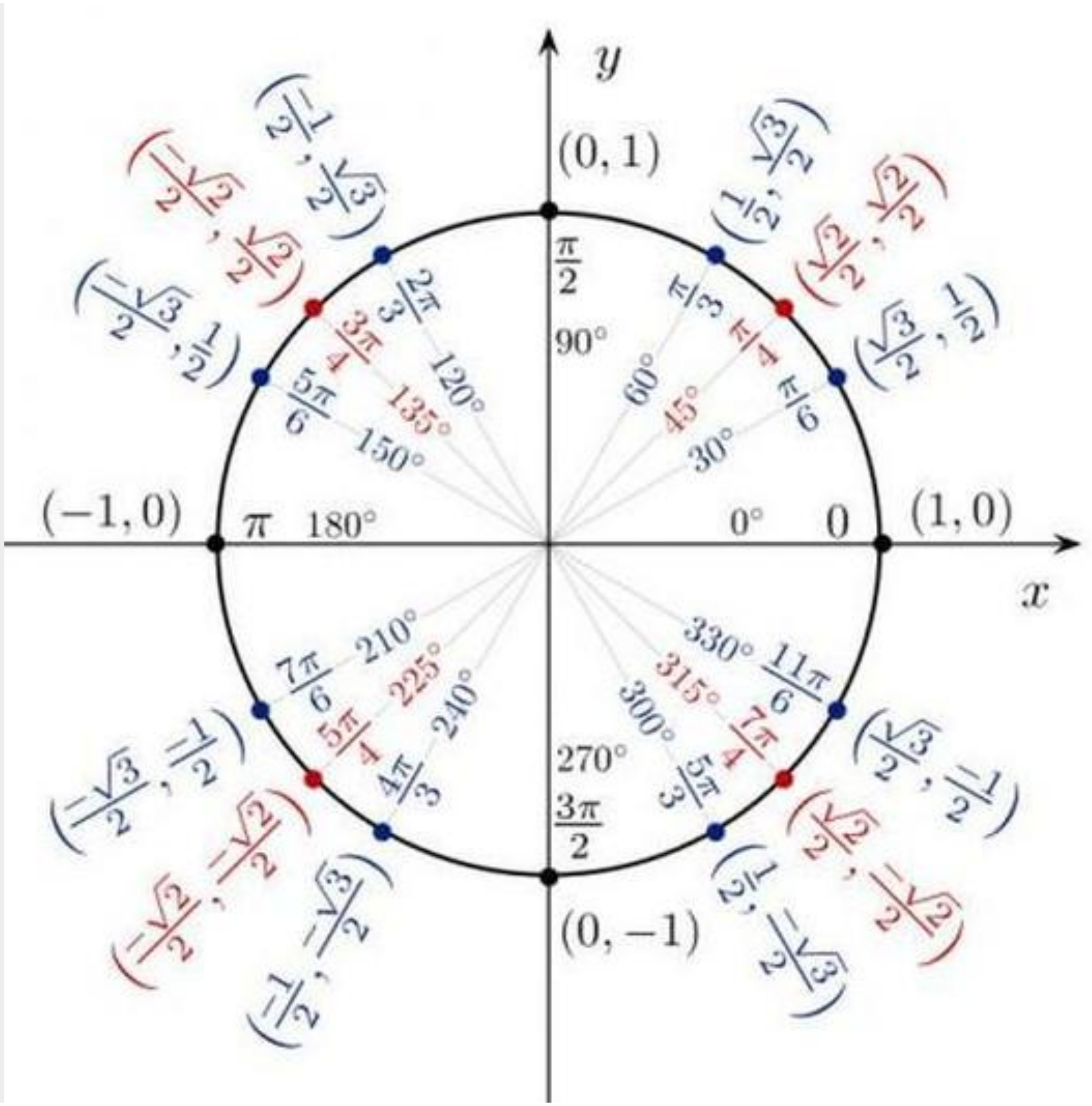
Engagement:

- Have your phone and computer put away

Warm-Up

Wait for it…you'll love it.

In the meantime, have your homework out and ready to be checked.



y
x
(0, 1)
(1, 0)
(−1, 0)
(0, −1)
π/2
90°
π
180°
0°
0
3π/2
270°
π/3
60°
π/4
45°
π/6
30°
2π/3
120°
3π/4
135°
5π/6
150°
7π/6
210°
5π/4
225°
4π/3
240°
5π/3
300°
7π/4
315°
11π/6
330°
(1/2, √3/2)
(√2/2, √2/2)
(√3/2, 1/2)
(−1/2, √3/2)
(−√2/2, √2/2)
(−√3/2, 1/2)
(−√3/2, −1/2)
(−√2/2, −√2/2)
(−1/2, −√3/2)
(1/2, −√3/2)
(√2/2, −√2/2)
(√3/2, −1/2)

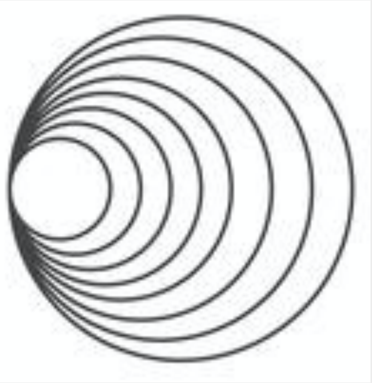
7-3 Notes

When the $r \neq 1$.

Learning Targets:

- To evaluate trig functions of any angle
- Use reference angles to evaluate trig functions.
- Evaluate trig functions of real number.

So many circles



The Unit Circle

- Radius $= 1$
- $\cos\theta = x$-coordinate
- $\sin\theta = y$-coordinate
- $\tan\theta = \frac{y}{x}$

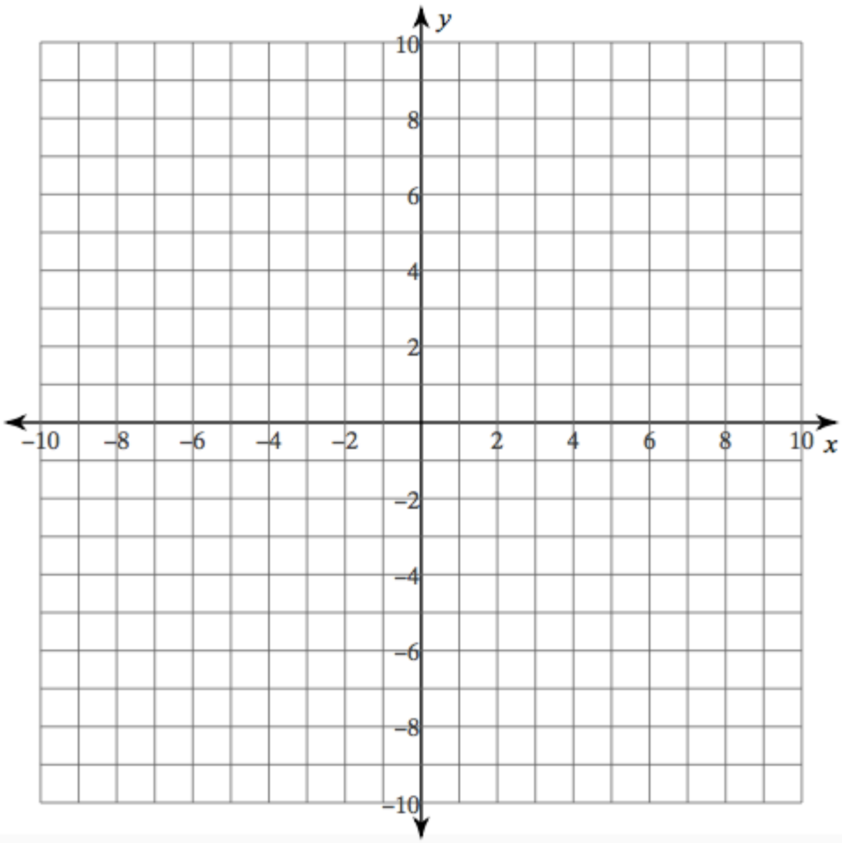
Not the Unit Circle

- Radius $\neq 1$
- $\cos\theta = ???$
- $\sin\theta = ???$
- $\tan\theta = ???$

Not the Unit Circle

Use your given points to come up with a general rule for finding cos θ, sin θ, and tan θ when we're NOT dealing with the Unit Circle.

1)



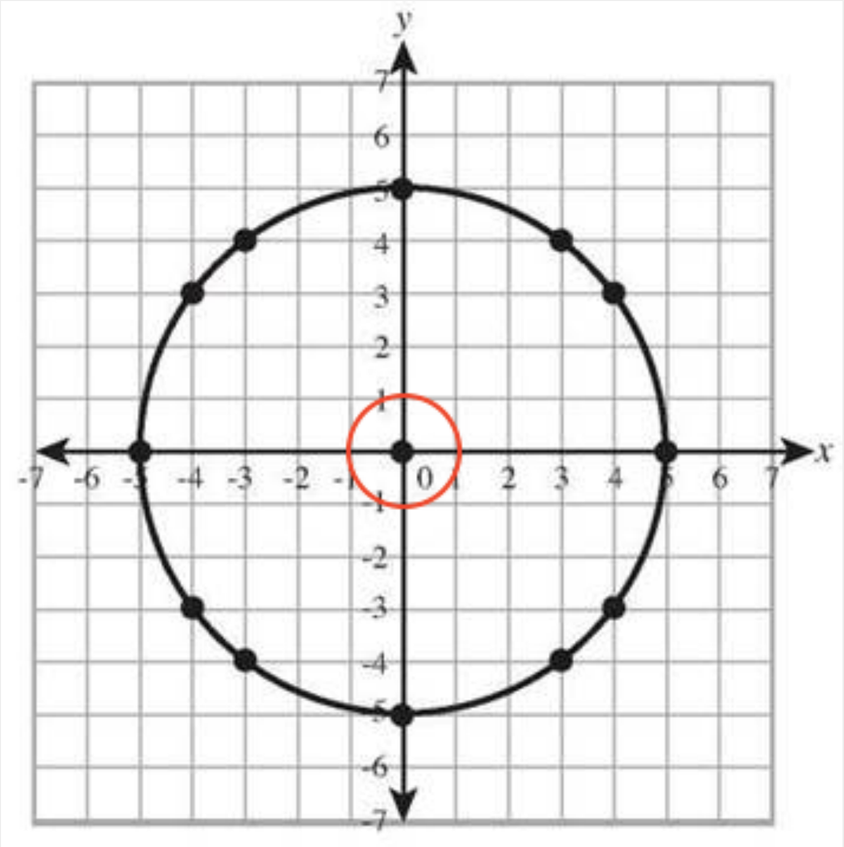
Beyond the Unit Circle…

When we're finding values of trig functions beyond the unit circle ($r \neq 1$), then:

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

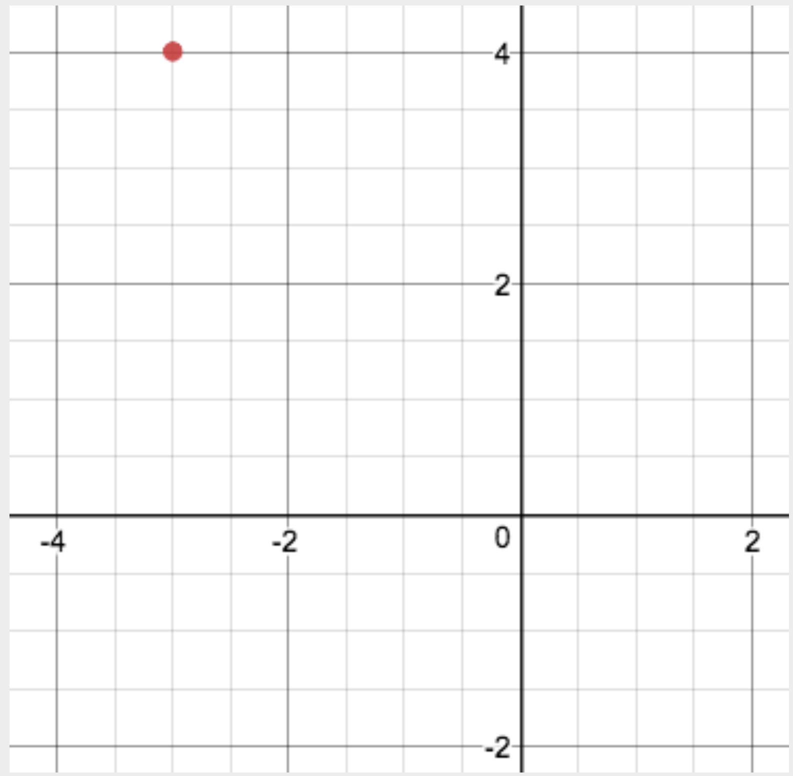
$$\cos\theta = \frac{x}{r} \qquad \sec\theta = \frac{r}{x}$$

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



Example 1:

Let (-3, 4) be a point on the terminal side of θ. Find the sine, cosine, and tangent of θ.

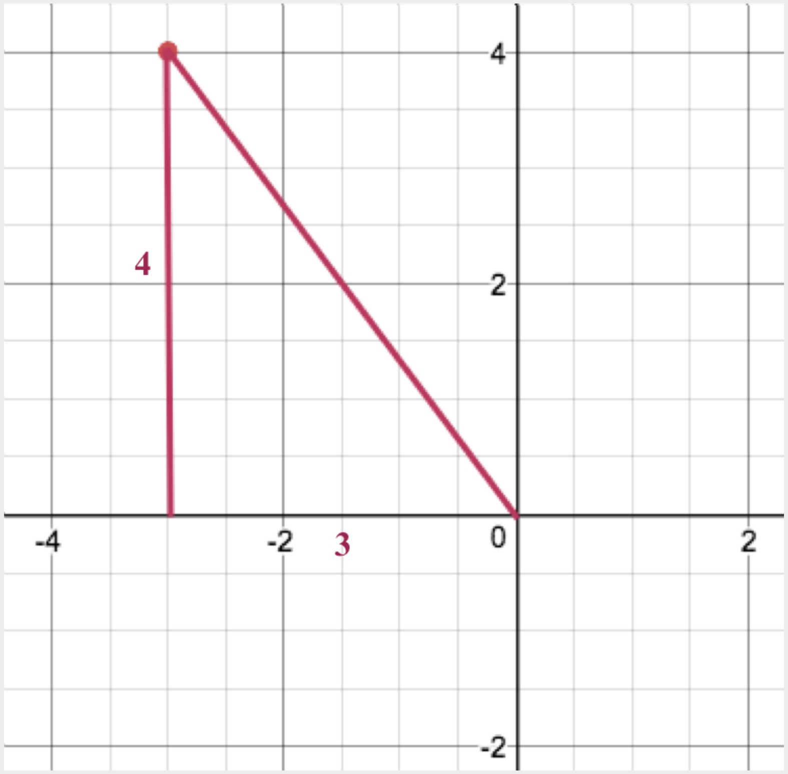


Example 1:

Let (-3, 4) be a point on the terminal side of θ. Find the sine, cosine, and tangent of θ.

Let's make a right triangle from this point.

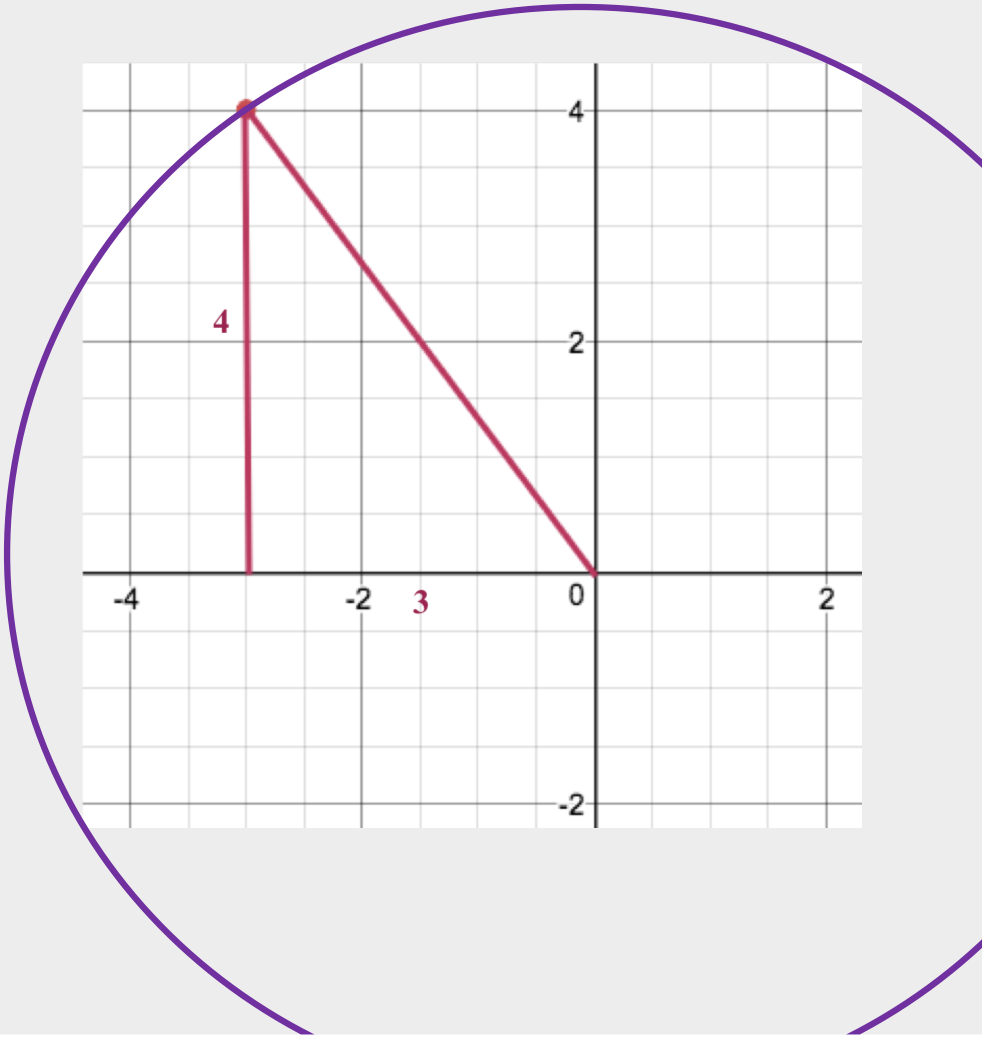
We know the legs have lengths 3 and 4 (from the coordinate of our point).



Example 1:

Let (-3, 4) be a point on the terminal side of θ. Find the sine, cosine, and tangent of θ.

If we drew a circle whose center was the origin and had our coordinate (-3,4) on its edge, the hypotenuse of our triangle would be the radius of the circle.

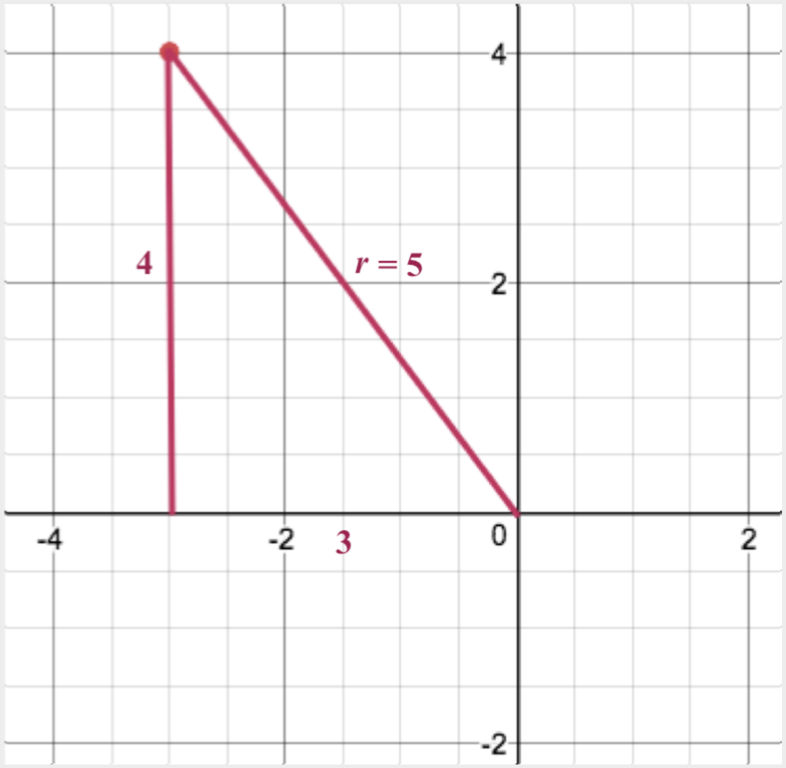


Example 1:

Let (-3, 4) be a point on the terminal side of θ. Find the sine, cosine, and tangent of θ.

We can use the Pythagorean Theorem to find the length of the hypotenuse.

$$3^2 + 4^2 = r^2$$
$$9 + 16 = r^2$$
$$25 = r^2$$
$$5 = r$$



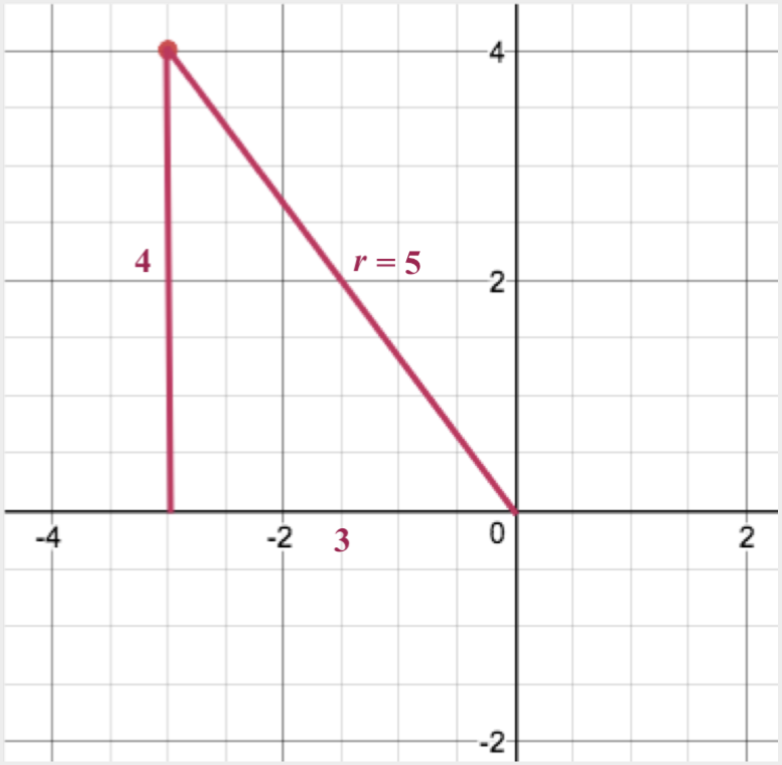
Example 1:

Let (-3, 4) be a point on the terminal side of θ. Find the sine, cosine, and tangent of θ.

$$\sin\theta = \frac{4}{5}$$

$$\cos\theta = \frac{-3}{5}$$

$$\tan\theta = \frac{-4}{3}$$



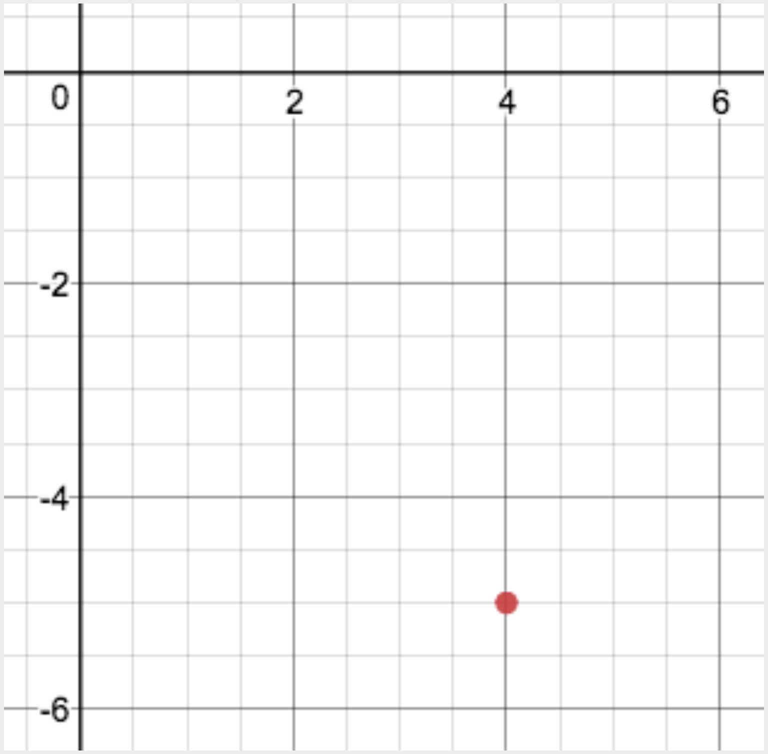
Example 2:

Given $\tan\theta = -\frac{5}{4}$ and $\cos\theta > 0$, find $\sin\theta$ and $\sec\theta$.

First…where would this point be in the coordinate plane?

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{y}{x} \rightarrow \frac{-y}{x} = \frac{-5}{4}$$

So, our point has the coordinate (4, -5).



Example 2:

Given $\tan\theta = -\frac{5}{4}$ and $\cos\theta > 0$, find $\sin\theta$ and $\sec\theta$.

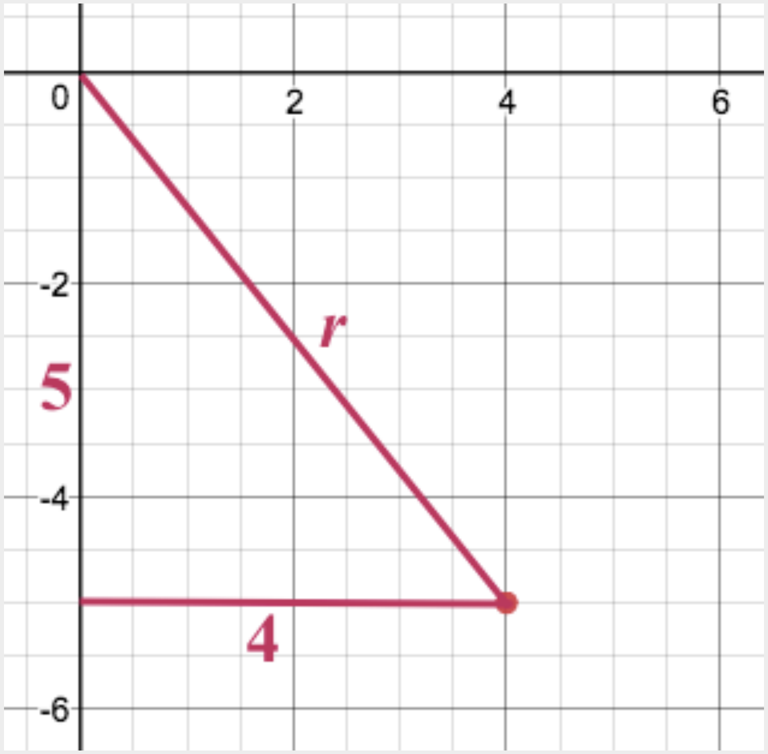
To find $\sin\theta$, we need to have both y and r.

$$5^2 + 4^2 = r^2$$

$$25 + 16 = r^2$$

$$41 = r^2$$

$$\sqrt{41} = r$$

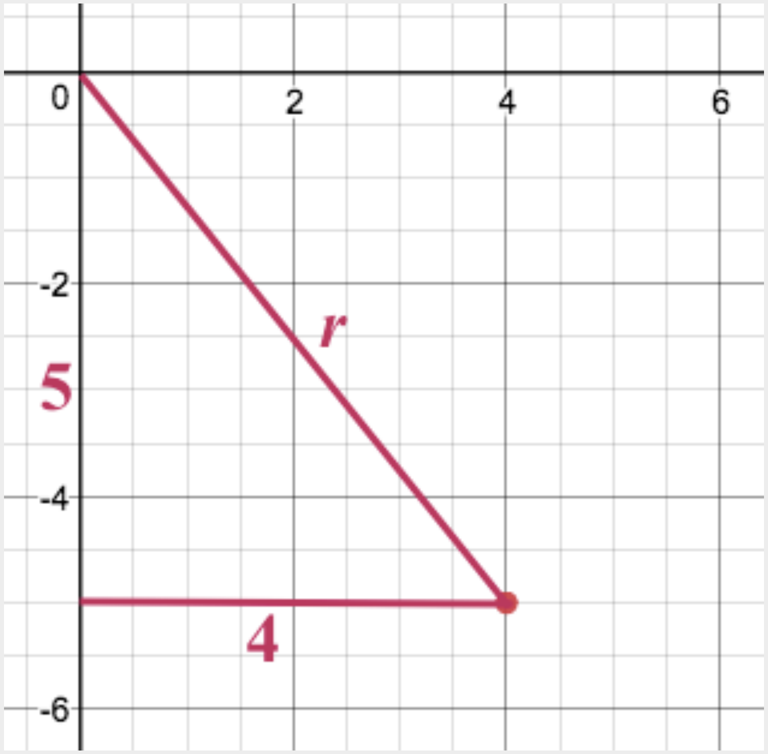


Example 2:

Given $\tan\theta = -\frac{5}{4}$ and $\cos\theta > 0$, find $\sin\theta$ and $\sec\theta$.

$$\sin\theta = \frac{y}{r} = \frac{-5}{\sqrt{41}} = -\frac{5\sqrt{41}}{41}$$

$$\sec\theta = \frac{r}{x} = \frac{\sqrt{41}}{4}$$



Practice Problems

Page 271: Class Exercises #1-4

Page 272: Written Exercises #13-20