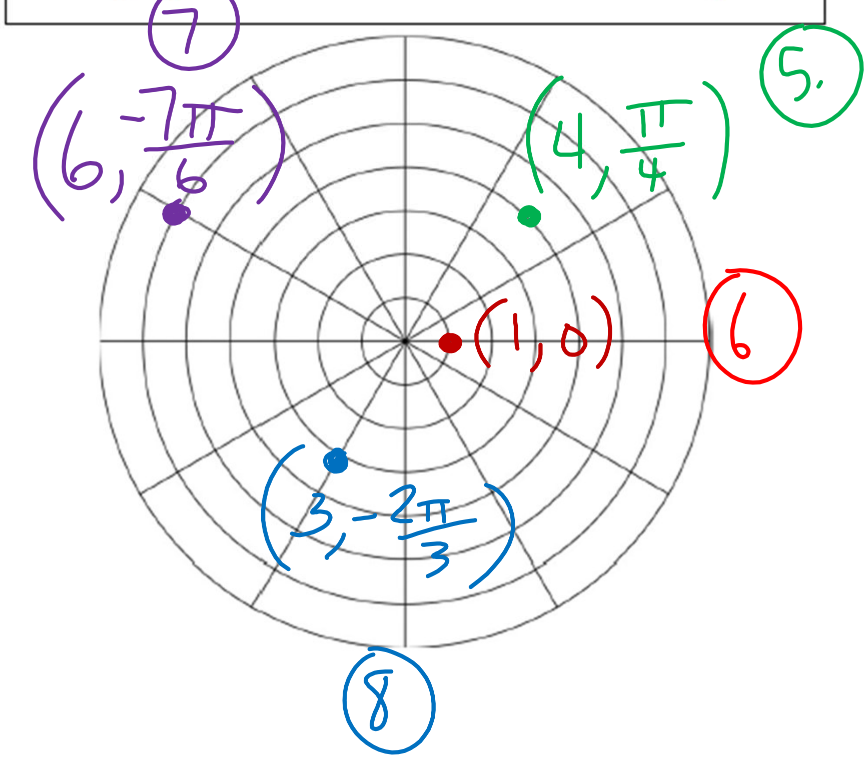
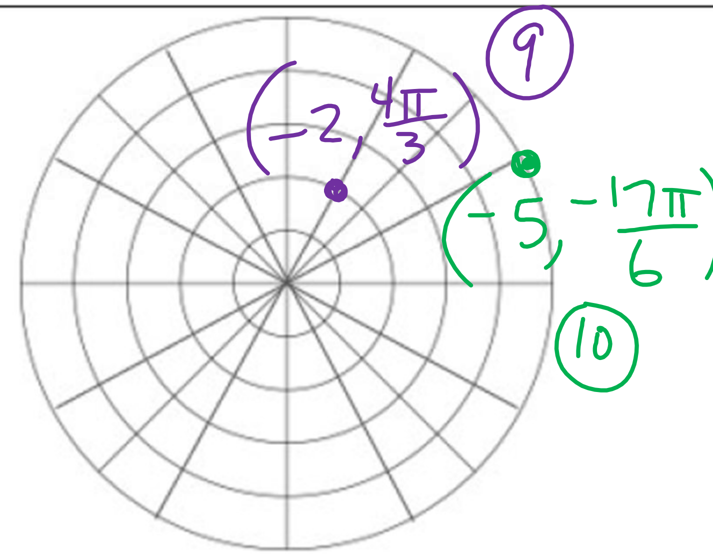
CHECK YOUR ANSWERS:

8.1 #5-10, 12,14

#5-8 graph, label coordinates next to each point

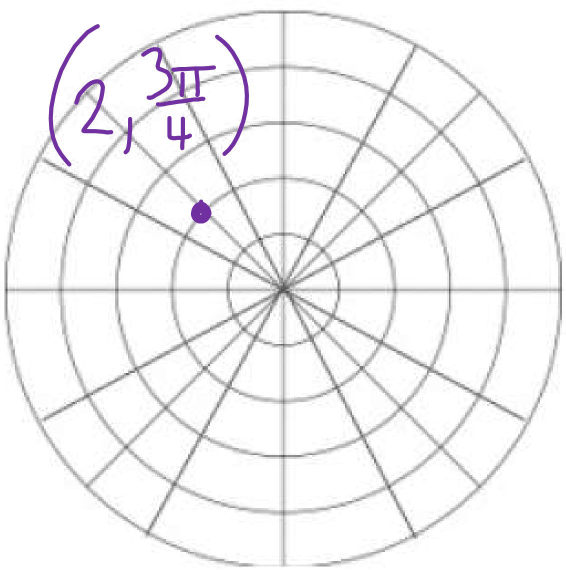


#9-10 graph, label coordinates next to each point



CHECK YOUR ANSWERS:

#12 plot point, label given coordinates, then list **three** other possible coordinates for the same point where $-2\pi \le \theta \le 2\pi$

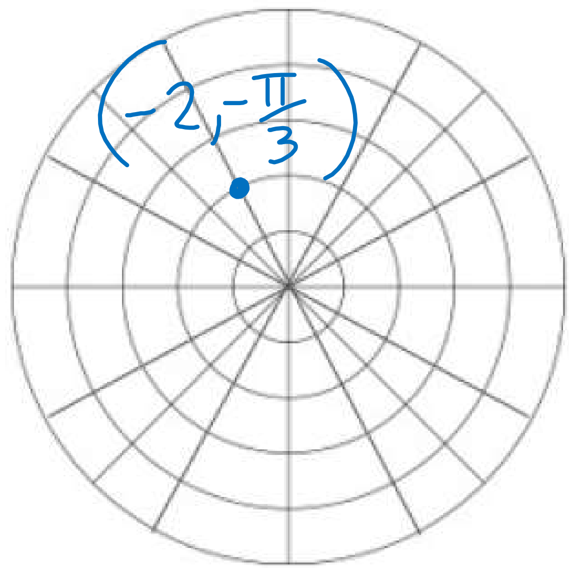


$\left(2, -\frac{5\pi}{4}\right)$

$\left(-2, -\frac{\pi}{4}\right)$

$\left(-2, -\frac{7\pi}{4}\right)$

#14 plot point, label given coordinates, then list **three** other possible coordinates for the same point where $-2\pi \le \theta \le 2\pi$



$\left(-2, \frac{5\pi}{3}\right)$

$\left(2, \frac{2\pi}{3}\right)$

$\left(2, -\frac{4\pi}{3}\right)$

over →

8.1 #17-22: write given coordinates, then identify point

18 R 20. P 22 Q

CHECK EVEN BOOK ANSWERS:
(#12,14,18,20,22,26,28)

$\left(2,\frac{2\pi}{3}\right)$ $\left(-2,\frac{5\pi}{3}\right)$ $\left(3,\frac{3\pi}{2}\right)$ $\left(-\sqrt{3},1\right)$

$\left(2,-\frac{4\pi}{3}\right)$ $\left(2,-\frac{5\pi}{4}\right)$ $\left(-2,-\frac{\pi}{4}\right)$ $\left(-2,\frac{7\pi}{4}\right)$

P Q R

8.1 #25-28 show all steps on a separate sheet of paper!

reminder: $x = r\cos\theta$, $y = r\sin\theta$, $r^2 = x^2 + y^2$, $\tan\theta = \frac{y}{x}$

Review of Unit Circle and Complex Numbers (see notes 1.6)

1. Complex numbers ***(show work on a separate sheet of paper!)***

A. $(2 - 3i)(7 - 4i)$ B. $(1 + 4i)^2$

C. $(2 - 3i) + (7 - 4i)$ D. $(2 - 3i) - (7 - 4i)$

E. $\frac{2+i}{1+2i}$ (hint: use conjugate) F. $\frac{3-2i}{-4-i}$ (hint: use conjugate)

CHECK ANSWERS#1, 3-5

I I II IV $\frac{\sqrt{3}}{3}$ $-\frac{\sqrt{3}}{2}$

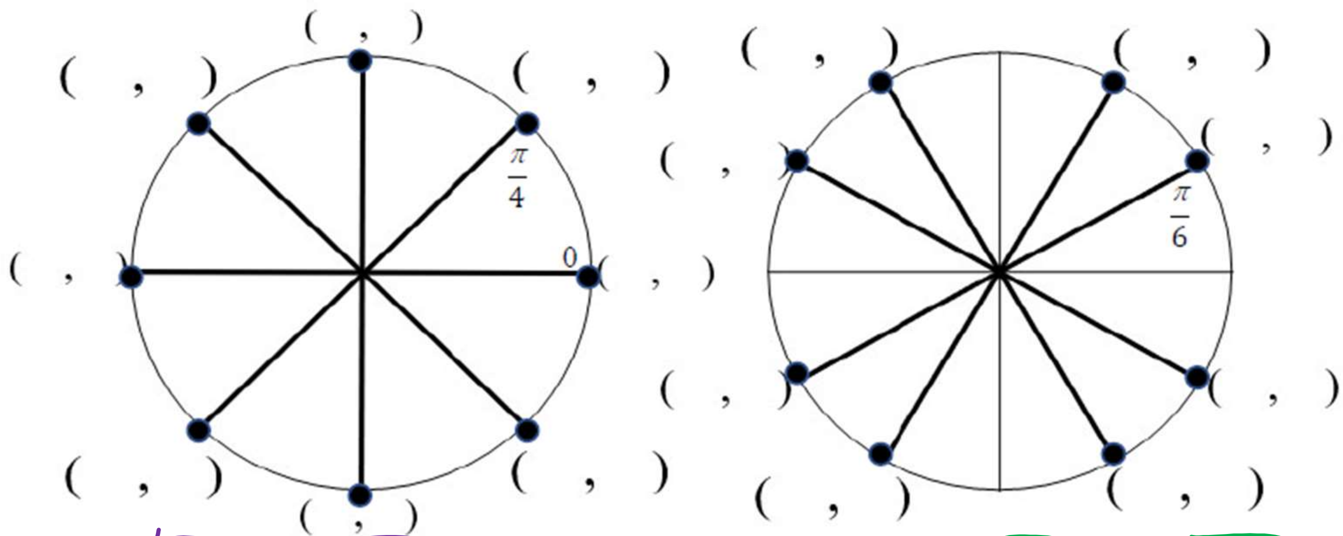
$\frac{y}{x}$ $\frac{x}{y}$ $\frac{1}{x}$ $\frac{1}{y}$ x y

$\frac{1}{2}$ $\frac{\pi}{2}$ $\frac{\pi}{4}$ $\frac{7\pi}{4}$ $\sqrt{3}$

$-15 + 8i$ $-5 + i$ $-\frac{10}{17}+\frac{11}{17}i$

$\frac{4}{5}-\frac{3}{5}i$ $2 - 29i$ $9 - 7i$

2. **Label all radian values AND coordinates of each given terminal point.**
(You will need to have this information memorized again for the ch.8 test!)



3. **Define each function in terms of x and y (based on the unit circle with r = 1)**

$\sin\theta =$ y $\csc\theta =$ $\frac{1}{y}$ $\cos\theta =$ x $\sec\theta =$ $\frac{1}{x}$ $\tan\theta =$ $\frac{y}{x}$ $\cot\theta =$ $\frac{x}{y}$

4. **Principal Values (see notes from chapter 5.)**

To find a ***unique*** solution for Sinθ and Tanθ, refer only to Quadrant I or IV.

To find a ***unique*** solution for Cosθ, refer only to Quadrant I or II.

5. **Evaluate using the unit circle. Use principal values when finding the inverse, $0 \le \theta < 2\pi$. <u>No calculator!</u>**

A. $\text{Arcsin}\left(-\frac{\sqrt{2}}{2}\right)$ $\frac{7\pi}{4}$

hint: rewrite as $\sin\theta = -\frac{\sqrt{2}}{2}$

B. $\text{Arctan}(1)$ $\frac{\pi}{4}$

C. $\text{Cos}^{-1}0$ $\frac{\pi}{2}$

D. $\sin\left(\frac{13\pi}{6}\right)$ $\frac{1}{2}$

E. $\cot\left(-\frac{5\pi}{3}\right)$ $\frac{\sqrt{3}}{3}$

F. $\sin[\text{Arctan}(-\sqrt{3})]$

$\sin\frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$

Show all steps for F and G

G. $\cot(\text{Cos}^{-1}(-1) + \text{Sin}^{-1}\frac{1}{2})$

$\cot\left(\pi + \frac{\pi}{6}\right)$

$\cot\left(\frac{7\pi}{6}\right) = \sqrt{3}$

Reminder from 8.1

$(r, \theta) \rightarrow (x, y)$

Conversion from Polar Coordinates to Rectangular Coordinates

$$x = r\cos\theta, \quad y = r\sin\theta$$

These relationships can also be used to convert <u>equations</u> to polar and rectangular form

Conversion from Rectangular Coordinates to Polar Coordinates

$(x, y) \rightarrow (r, \theta)$

$$r = \sqrt{x^2 + y^2} \quad or \quad r^2 = x^2 + y^2$$

$$\tan\theta = \frac{y}{x} \quad (x \neq 0)$$

EXAMPLE:

Convert the equation to polar form.

A. $x^2 + y^2 = 81$

substitute

$r^2 = 81$

$r = 9$

Apply square root to both sides.

The goal is to get r = or θ = form.

Or, end with a combination of r and θ.

Basically, x and y both need to be eliminated.

$x = r\cos\theta$

$y = r\sin\theta$

$r = \sqrt{x^2 + y^2}$

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

$\tan\theta = \frac{y}{x} \quad (x \neq 0)$

Note: The equation $x^2 + y^2 = 81$ on a rectangular grid produces the same shape as r = 9 on a polar grid. (Both are circles.)

EXAMPLE:

Convert the equation to polar form.

B. $y = 81$

substitute

$$r\sin\theta = 81$$

Divide both sides by sin θ.

The goal is to get r = or θ = form.

Or, end with a combination of r and θ.

Basically, x and y both need to be eliminated.

$$r = \frac{81}{\sin\theta}$$

Rewrite sinθ using a reciprocal identity

$$r = 81\csc\theta$$

$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$r = \sqrt{x^2 + y^2}$$

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

$$\tan\theta = \frac{y}{x} \quad (x \neq 0)$$

EXAMPLE:

Convert the polar equation to rectangular form.

(coordinates)

C. $r = 12$

substitute

$$\sqrt{x^2 + y^2} = 12$$

Square both sides. The goal is to get x = or y = form.

Or, end with some sort of combination of x and y.

Basically, r and θ both need to be eliminated.

$$x^2 + y^2 = 144$$

Our math book uses both terms. Technically we are getting a new form of the equation, not coordinates!

$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$r = \sqrt{x^2 + y^2}$$

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

$$\tan\theta = \frac{y}{x} \quad (x \neq 0)$$

EXAMPLE:

Convert the polar equation to rectangular form.

(*coordinates*)

D. $r = 12\sec\theta$

divide both sides by secθ since there aren't any equations that involve secθ

Our math book uses both terms. Technically we are getting a new form of the equation, not coordinates!

$$\frac{r}{\sec\theta} = 12$$

Rewrite secθ using reciprocal identity

$$r\cos\theta = 12$$

Now substitute

$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$r = \sqrt{x^2 + y^2}$$

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

$$\tan\theta = \frac{y}{x} \quad (x \neq 0)$$

$$x = 12$$

Example 1:

Polar Coordinates to Rectangular Coordinates Find the rectangular coordinates for the point whose polar coordinates are given.

$(6, 2\pi/3)$

Example 2:

■ **Rectangular Coordinates to Polar Coordinates**

Convert the rectangular coordinates to polar coordinates with $r > 0$ and $0 \leq \theta < 2\pi$.

$(3\sqrt{3}, -3)$

See 8.1 video under "Classwork" tab in Google Classroom for step-by-step solutions for Example #1 and #2