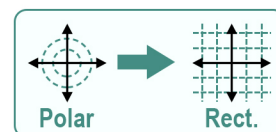


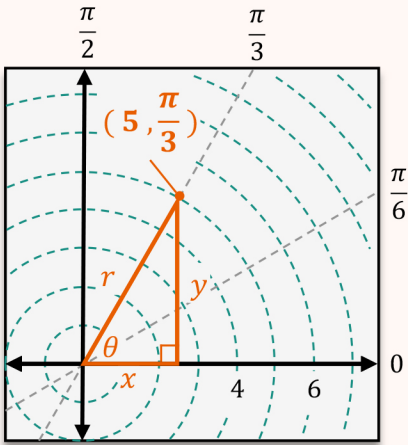
TOPIC: CONVERT POINTS BETWEEN POLAR & RECTANGULAR COORDINATES

Converting Points from Polar to Rectangular

◆ To convert polar coordinates to rectangular, use $\sin$ & $\cos$.



New
Polar → Rectangular Coordinates



$$\cos \theta = \frac{adj}{hyp} \qquad \sin \theta = \frac{opp}{hyp}$$

$$\cos \frac{\pi}{3} = \text{---} \qquad \sin \frac{\pi}{3} = \text{---}$$

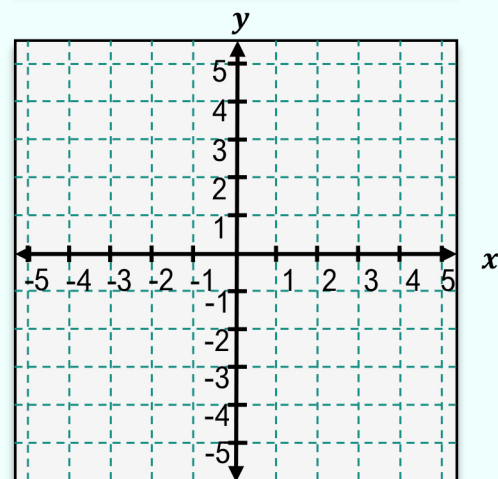
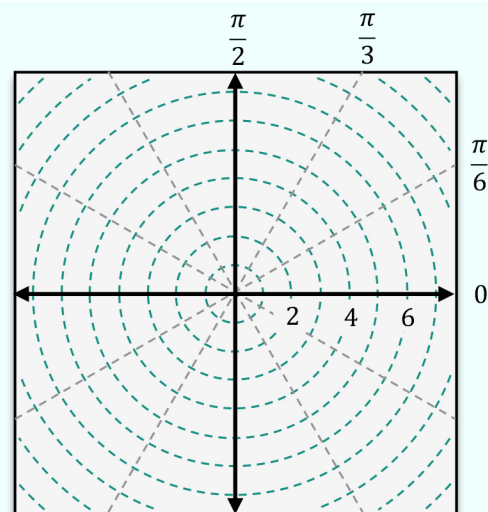
$x = r \text{ --- } \theta \qquad y = r \text{ --- } \theta$

EXAMPLE

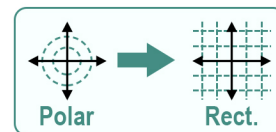
Plot the points on the polar coordinate system, then convert them into rectangular coordinates and plot in the $x - y$ plane.

(A) $\left(-3, \frac{\pi}{6}\right) \rightarrow (\text{---}, \text{---})$

(B) $\left(0, -\frac{\pi}{6}\right) \rightarrow (\text{---}, \text{---})$



TOPIC: CONVERT POINTS BETWEEN POLAR & RECTANGULAR COORDINATES



PRACTICE

Convert the points to rectangular coordinates.

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

(B) $\left(4, \frac{\pi}{6}\right)$

(C) $(-3, 0)$

(D) $\left(0, \frac{7\pi}{4}\right)$

Recall

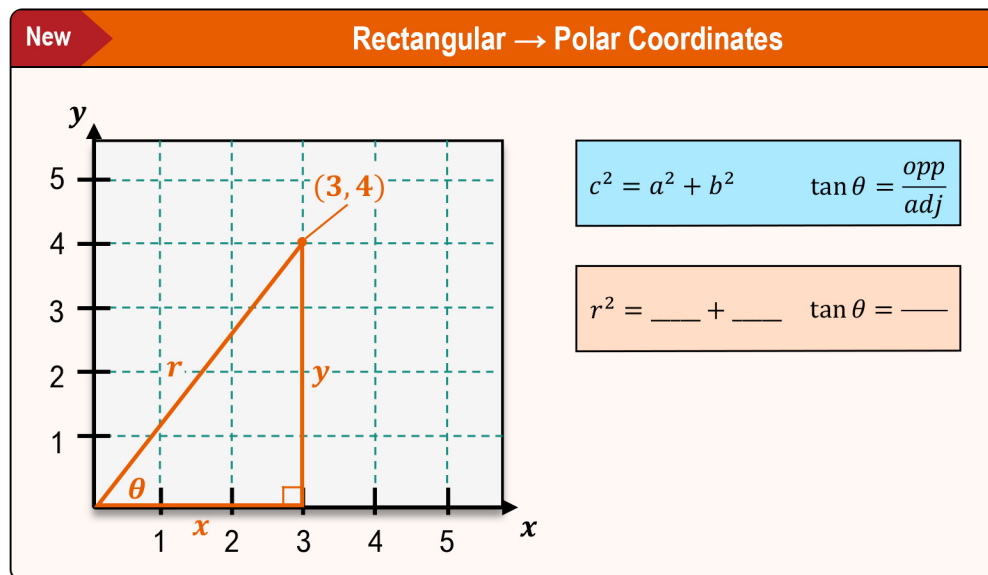
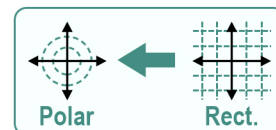
$$x = r \cos \theta$$

$$y = r \sin \theta$$

TOPIC: CONVERT POINTS BETWEEN POLAR & RECTANGULAR COORDINATES

Converting Points from Rectangular to Polar

◆ To convert rectangular coordinates to polar, use the Pythagorean Theorem and tan.

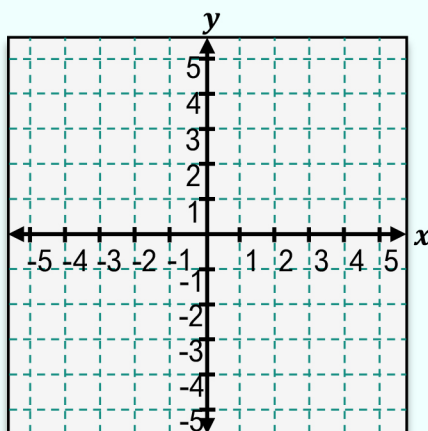


EXAMPLE

Plot the points, then convert them into polar coordinates.

(A) $(-4, 0) \rightarrow (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$

(B) $(-1, \sqrt{3}) \rightarrow (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$



HOW TO: Convert Points Rect. to Polar

1) Plot the point (x, y)

2) Calculate $r = \sqrt{\underline{\hspace{1cm}} + \underline{\hspace{1cm}}}$

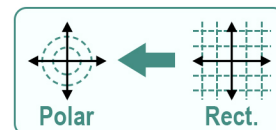
3) Calculate θ . If point is...

On axis: $\theta = [0 \mid \frac{\pi}{2} \mid \pi \mid \frac{3\pi}{2}]$

In Q1 or Q4: $\theta = \tan^{-1}\left(\frac{y}{x}\right)$

In Q2 or Q3: $\theta = \tan^{-1}\left(\frac{y}{x}\right) + \underline{\hspace{1cm}}$

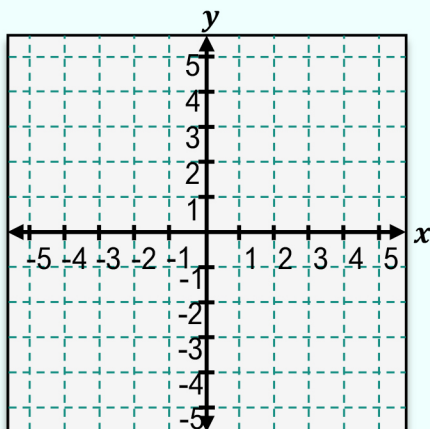
TOPIC: CONVERT POINTS BETWEEN POLAR & RECTANGULAR COORDINATES



EXAMPLE

Convert the point to polar coordinates.

$(3, -3)$



HOW TO: Convert Points Rect. to Polar

- 1) Plot the point (x, y)
- 2) Calculate $r = \sqrt{x^2 + y^2}$
- 3) Calculate θ . If point is...
 - On axis: $\theta = [0 \mid \frac{\pi}{2} \mid \pi \mid \frac{3\pi}{2}]$
 - In Q1 or Q4: $\theta = \tan^{-1}\left(\frac{y}{x}\right)$
 - In Q2 or Q3: $\theta = \tan^{-1}\left(\frac{y}{x}\right) + \pi$

PRACTICE

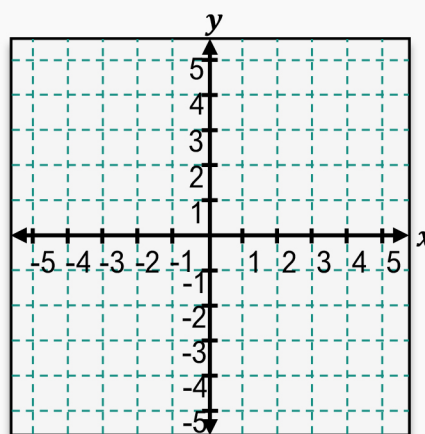
Convert the points to polar coordinates

(A) $(0, 5)$

(B) $(-2, 2)$

(C) $(1, 1)$

(D) $(-1, -\sqrt{3})$



HOW TO: Convert Points Rect. to Polar

- 1) Plot the point (x, y)
- 2) Calculate $r = \sqrt{x^2 + y^2}$
- 3) Calculate θ . If point is...
 - On axis: $\theta = [0 \mid \frac{\pi}{2} \mid \pi \mid \frac{3\pi}{2}]$
 - In Q1 or Q4: $\theta = \tan^{-1}\left(\frac{y}{x}\right)$
 - In Q2 or Q3: $\theta = \tan^{-1}\left(\frac{y}{x}\right) + \pi$