

9-1 Day 2

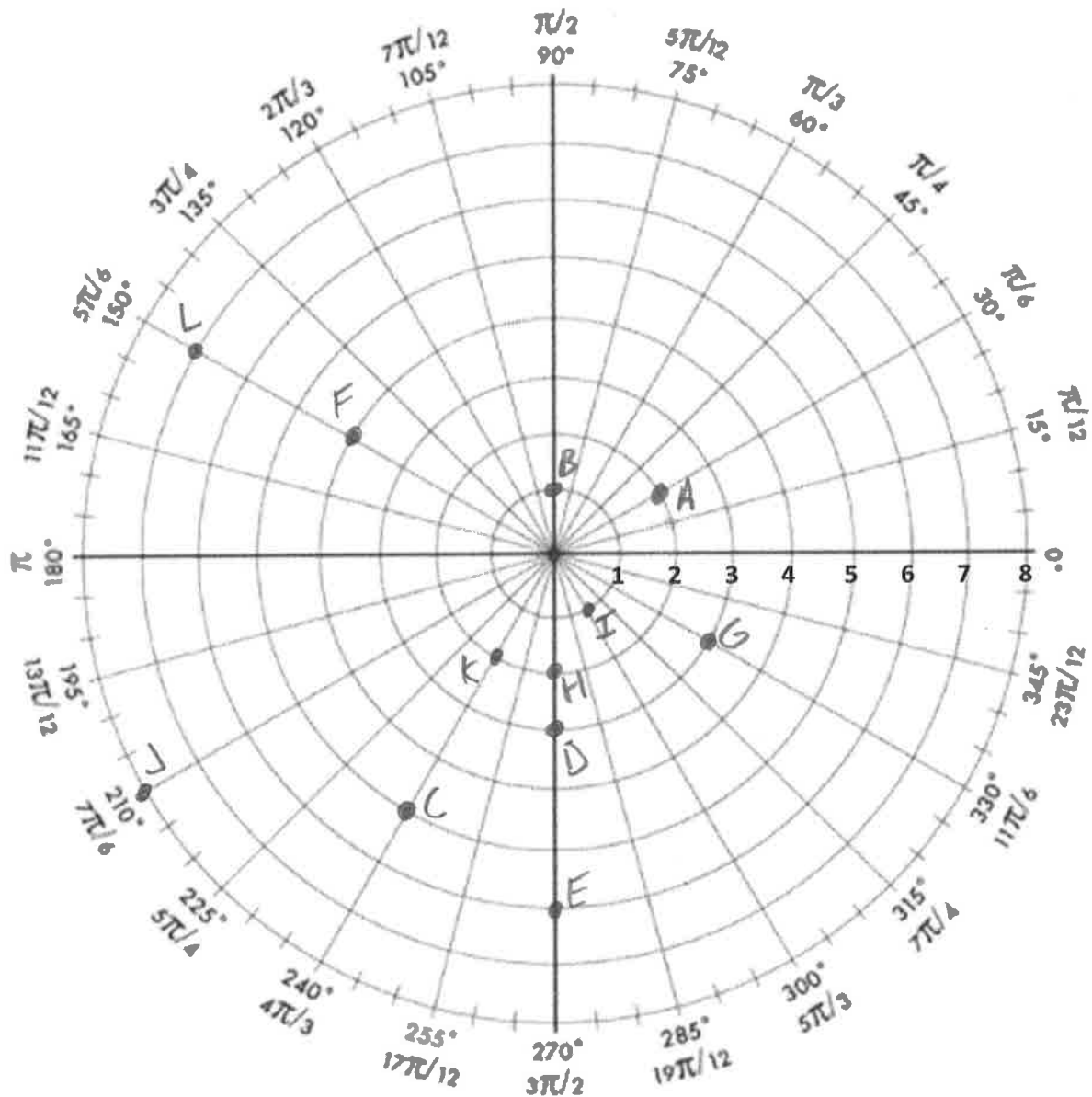
Objective(s):

- Convert between polar and rectangular coordinates.

Warm-up:

Plot and label each of the following points on the polar coordinate plane.

- | | | | |
|------------------------|---------------------------|--------------------------|------------------------|
| $A(2, 30^\circ)$ | $B(1, \frac{\pi}{2})$ | $C(5, 240^\circ)$ | $D(3, \frac{3\pi}{2})$ |
| $E(6, -\frac{\pi}{2})$ | $F(4, -210^\circ)$ | $G(3, -\frac{\pi}{6})$ | $H(2, -90^\circ)$ |
| $I(-1, 120^\circ)$ | $J(-8, -\frac{11\pi}{6})$ | $K(-2, \frac{25\pi}{3})$ | $L(-7, 1050^\circ)$ |



Ex 3: Convert each of the following to polar coordinates.

A.) (2, 2)

$$r = \sqrt{2^2 + 2^2} = \sqrt{8} = 2\sqrt{2}$$

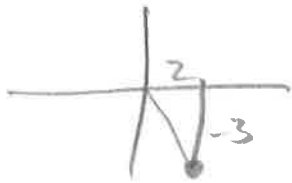


$$\tan \theta = \frac{2}{2}$$

$$\tan \theta = 1 \quad \theta = 45^\circ$$

$$(2\sqrt{2}, 45^\circ)$$

B.) (2, -3)



$$r = \sqrt{2^2 + (-3)^2}$$

$$r = \sqrt{4 + 9}$$

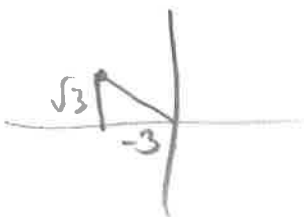
$$r = \sqrt{11}$$

$$\theta = \tan^{-1}\left(-\frac{3}{2}\right)$$

$$\theta \approx -56^\circ \text{ or } 304^\circ$$

$$(\sqrt{11}, 304^\circ)$$

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



$$r = \sqrt{(\sqrt{3})^2 + (-3)^2}$$

$$= \sqrt{3 + 9}$$

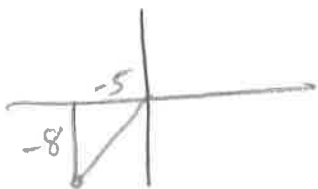
$$= \sqrt{12} = 2\sqrt{3}$$

$$\theta = \tan^{-1}\left(\frac{\sqrt{3}}{-3}\right) = -30^\circ$$

$$\star \frac{+180^\circ}{150^\circ}$$

$$(2\sqrt{3}, 150^\circ)$$

D.) (-5, -8)



$$r = \sqrt{(-8)^2 + (-5)^2}$$

$$r = \sqrt{64 + 25}$$

$$r = \sqrt{89}$$

$$\theta = \tan^{-1}\left(\frac{-8}{-5}\right) = 58^\circ$$

$$\star \frac{180^\circ}{238^\circ}$$

$$(\sqrt{89}, 238^\circ)$$

Check for understanding:

Convert to polar coordinates:

$$r = \sqrt{1^2 + (-\sqrt{3})^2}$$

$$= \sqrt{1 + 3}$$

$$= 2$$

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

$$(2, 300^\circ)$$

$$\theta = \tan^{-1}\left(-\frac{\sqrt{3}}{1}\right) = -60^\circ$$

$$\text{or } 300^\circ$$

