Key

7.03 Quiz Review: Date _____

Polar Coordinates, Equations, and Distance

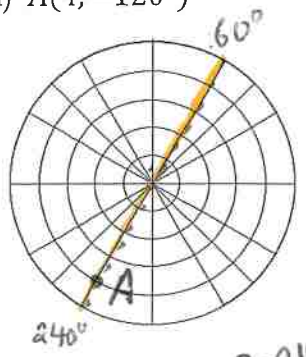
1) Graph each point on the polar grid. Find three other pairs of polar coordinates that name the point

if $-360° \le \theta \le 360°$ if $-2\pi \le \theta \le 2\pi$

$\theta = -120 + 360 = 240°$

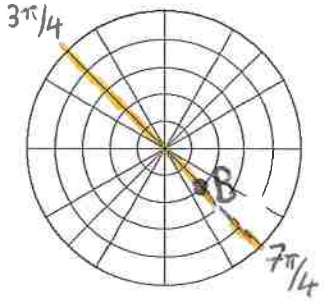
$\frac{7\pi}{4} - 2\pi \rightarrow \frac{7\pi}{4} - \frac{8\pi}{4} = -\pi/4$

a) $A(4, -120°)$



$(4, 240°)$
$(-4, 60°)$ $-360°$
$(-4, -300°)$

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

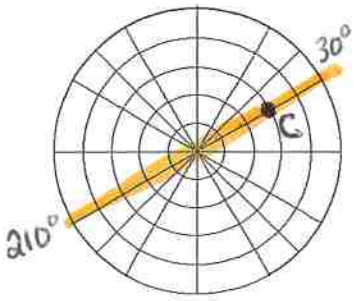


$(2, -\pi/4)$
$(-2, 3\pi/4)$ -2π
$(-2, -5\pi/4)$

$\theta = 210 - 360 = -150°$

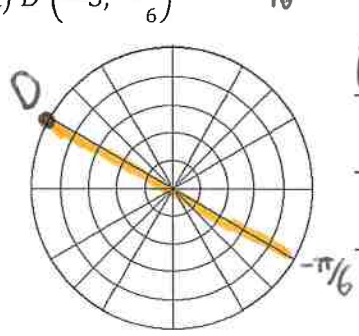
$-\pi/6 + 2\pi = 11\pi/6$

c) $C(-3, 210°)$



$(-3, -150°)$
$(3, 30°)$ $-360°$
$(3, -330°)$

d) $D\left(-5, -\frac{\pi}{6}\right)$



$(-5, \frac{11\pi}{6})$
$(5, 5\pi/6)$ -2π
$(5, -7\pi/6)$

2) Given the polar distance formula between two points A (r_1, θ_1) and B (r_2, θ_2):

$AB = \sqrt{r_1^2 + r_2^2 - 2r_1r_2\cos(\theta_2 - \theta_1)}$, find the distance between A and B.

a) $A(4, 200°)$ $B(-3, 60°)$ $r_1\ \theta_1$ $r_2\ \theta_2$ *degree mode

$= \sqrt{4^2 + 3^2 - 2(4)(-3)\cos(60 - 200)}$

$= \sqrt{25 + 24\cos(-140)}$

a) AB = 2.572 units

b) $A\left(-7, \frac{5\pi}{6}\right)$ $B\left(2, -\frac{4\pi}{3}\right)$ $r_1\ \theta_1$ $r_2\ \theta_2$ *Radian Mode

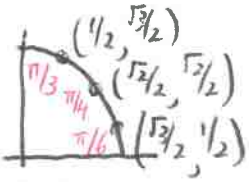
$= \sqrt{7^2 + 2^2 - 2(-7)(2)\cos\left(-\frac{4\pi}{3} - \frac{5\pi}{6}\right)}$

$= \sqrt{53 + 28\cos\left(\frac{-13\pi}{6}\right)}$

b) AB = 8.789 units

$(r\cos\theta, r\sin\theta)$ (x, y)

10



$(\cos\theta, \sin\theta)$

3) Find the rectangular coordinates for each point with the given polar coordinates. Answer in exact form.

a) $(5, \frac{5\pi}{3})$ $(5\cos\frac{5\pi}{3}, 5\sin\frac{5\pi}{3})$ $(5(\frac{1}{2}), 5(\frac{-\sqrt{3}}{2}))$

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

b) $(-6, \frac{3\pi}{4})$ $\left(-6\cos(\frac{3\pi}{4}), -6\sin(\frac{3\pi}{4})\right)$ $\left(-6(\frac{-\sqrt{2}}{2}), -6(\frac{\sqrt{2}}{2})\right)$

b) $(3\sqrt{2}, -3\sqrt{2})$

c) $(8, \frac{7\pi}{6})$ $(8\cos\frac{7\pi}{6}, 8\sin\frac{7\pi}{6})$ $(8(\frac{-\sqrt{3}}{2}), 8(\frac{-1}{2}))$

c) $(-4\sqrt{3}, -4)$

d) $(-12, -\frac{3\pi}{2})$ $\theta = -\frac{3\pi}{2} + 2\pi = \frac{\pi}{2}$ $(-12\cos\frac{\pi}{2}, -12\sin\frac{\pi}{2}) \rightarrow (-12(0), -12(1))$

d) $(0, -12)$

A

4) Find four unique polar coordinates for each point given as rectangular coordinates. Use $-360° \le \theta \le 360°$. Round to the nearest thousandths.

Q2 x y

a) (-1, 5) $r = \sqrt{1^2+5^2} = \sqrt{26}$

Q2 $\theta = \tan^{-1}(\frac{5}{-1}) = -78.69 + 180 = 101.309°$

Q4

b) (3, -7) $r = \sqrt{3^2+7^2} = \sqrt{58}$

$\theta = \tan^{-1}(\frac{-7}{3}) = -66.801° + 360$

$\theta = 293.198°$

a) $(\sqrt{26}, 101.309)$ $(\sqrt{26}, -258.691°)$ $(-\sqrt{26}, 281.309°)$ $(-\sqrt{26}, -78.691°)$

b) $(\sqrt{58}, 293.198°)$ $(\sqrt{58}, -66.802°)$ $(-\sqrt{58}, 113.198°)$ $(-\sqrt{58}, -246.802°)$

Use $-2\pi \le \theta \le 2\pi$. Round to the nearest thousandths.

Q3 c) $(-5\sqrt{3}, -5)$ $r = \sqrt{(5\sqrt{3})^2+5^2} = \sqrt{100}$

$r = 10$

$\theta = \tan^{-1}(\frac{-5}{-5\sqrt{3}}) = 0.524 + \pi = 3.665$

Q1 d) (4, 3) $r = \sqrt{4^2+3^2} = 5$

$\theta = \tan^{-1}(\frac{3}{4}) = 0.643$

c) $(10, 3.665)$ $(10, -2.618)$ $(-10, 0.524)$ $(-10, -5.760)$

d) $(5, 0.644)$ $(5, -5.640)$ $(-5, 3.785)$ $(-5, -2.498)$