Honors Pre-Calc
Practice 6.4 Polar Coordinates

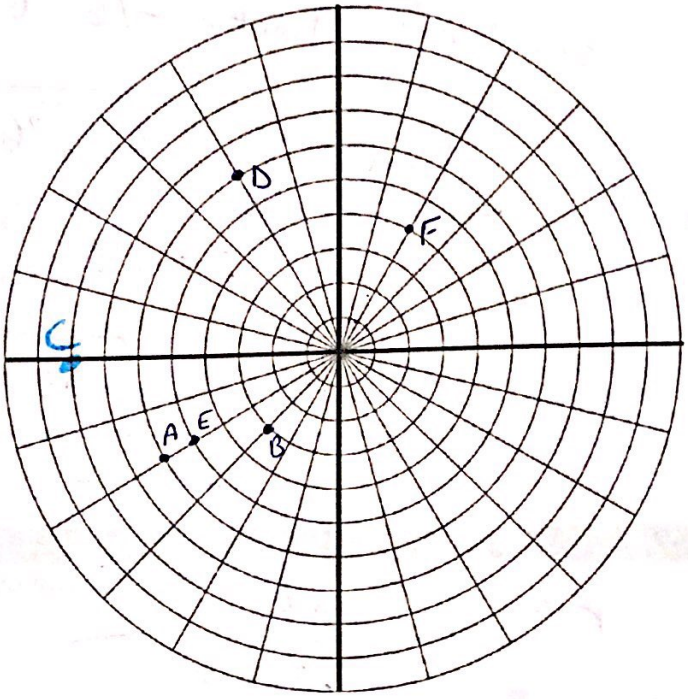
Name_____
Date_____ **Block**____

1. ***Plot the following:***

A. $\left(6,\frac{7\pi}{6}\right)$ B. $\left(3,-\frac{3\pi}{4}\right)$

C. $(8,\pi)$ D. $\left(-6,\frac{5\pi}{3}\right)$

E. $\left(-5,-\frac{11\pi}{6}\right)$ F. $\left(-4,-\frac{2\pi}{3}\right)$



2. ***Find the rectangular coordinates for each of the following polar coordinates:***

A. $\left(4,\frac{5\pi}{6}\right)$ B. $\left(8,-\frac{2\pi}{3}\right)$ C. $(-2,-135^\circ)$ D. $\left(2,-\frac{14\pi}{5}\right)$

$(-2\sqrt{3}, 2)$ $(-4,-4\sqrt{3})$ $(\sqrt{2},\sqrt{2})$ $(-1.62,-1.18)$

3. ***Given the rectangular coordinates below, find the polar coordinates satisfying the conditions given:***

A. $(3,-3)$; $r \geq 0$ and $0 \leq \theta \leq 2\pi$

$r = 3\sqrt{2}$

$\theta = 315, \frac{7\pi}{4}$

$(3\sqrt{2}, \frac{7\pi}{4})$

B. $\left(-5,-5\sqrt{3}\right)$; $r \leq 0$ and $-\pi \leq \theta \leq \pi$

$r = 10$

$\theta = \frac{4\pi}{3}$

$(10, 4\pi/3)$

$(-10, \pi/3)$

C. $\left(4\sqrt{3},4\right)$; $r \leq 0$ and $0 \leq \theta \leq 2\pi$

$r = 8$

$\theta = \frac{\pi}{6}$

$(-8, \frac{7\pi}{6})$

(4) $r = 3\sec\theta$

$r = \frac{3}{\cos\theta}$

$r\cos\theta = 3$

$x = 3$

(5) $r = -4\cos\theta$

$r^2 = -4r\cos\theta$

$x^2 + y^2 = -4x$

$x^2 + 4x + 4 + y^2 = 4$

$(x+2)^2 + y^2 = 4$

(6) $r = 4\cos\theta - 4\sin\theta$

$r^2 = 4r\cos\theta - 4r\sin\theta$

$x^2 + y^2 = 4x - 4y$

$x^2 + 4x + 4 + y^2 - 4y + 4 = 4 + 4$

$(x+2)^2 + (y-2)^2 = 8$

(7) $x^2 + y^2 = 81$

$r^2 = 81$

$r = \pm 9$

$r = 9$

(8) $y = -5$

$r\sin\theta = -5$

$r = \frac{-5}{\sin\theta}$

$r = -5\csc\theta$

(9) $y^2 = 10x$

$(r\sin\theta)^2 = 10r\cos\theta$

$\frac{r^2\sin^2\theta}{r\sin^2\theta} = \frac{10r\cos\theta}{r\sin^2\theta}$

$r = \frac{10\cos\theta}{\sin^2\theta}$ $\quad 10\cot\theta\csc\theta = r$

(10) $3x + 4y = 2$

$3r\cos\theta + 4r\sin\theta = 2$

$r(3\cos\theta + 4\sin\theta) = 2$

$r = \frac{2}{3\cos\theta + 4\sin\theta}$

(11) $y^2 - 8x - 16 = 0$

$(r\sin\theta)^2 - 8r\cos\theta - 16 = 0$

$\sin^2\theta\, r^2 - 8\cos\theta\, r - 16 = 0$ QUAD $ax^2 + bx + c$

$$r = \frac{8\cos\theta \pm \sqrt{64\cos^2\theta - 4(\sin^2\theta)(-16)}}{2\sin^2\theta}$$

$$r = \frac{8\cos\theta \pm \sqrt{64(\cos^2\theta + \sin^2\theta)}}{2\sin^2\theta}$$

$$r = \frac{8\cos\theta \pm 8}{2\sin^2\theta} = \frac{4\cos\theta \pm 4}{\sin^2\theta} = \frac{4\cos\theta \pm 4}{1-\cos^2\theta}$$

$$= \frac{4\cos\theta + 4}{(1+\cos\theta)(1-\cos\theta)} \qquad = \frac{4\cos\theta - 4}{(1+\cos\theta)(1-\cos\theta)}$$

$$= \frac{4(\cancel{\cos\theta} + 1)}{(\cancel{1+\cos\theta})(1-\cos\theta)} \qquad = \frac{4(\cos\theta - 1)}{(1+\cos\theta)(1-\cos\theta)}$$

$$r = \frac{4}{1-\cos\theta} \qquad = \frac{-4(\cancel{1-\cos\theta})}{(1+\cos\theta)(\cancel{1-\cos\theta})}$$

$$r = \frac{-4}{1+\cos\theta}$$

(12) $(x-1)^2 + (y+4)^2 = 17$

$x^2 - 2x + 1 + y^2 + 8y + 16 = 17$

$x^2 - 2x + y^2 + 8y = 0$

$x^2 + y^2 - 2x + 8y = 0$

$r^2 - 2r\cos\theta + 8r\sin\theta = 0$

$r(r - 2\cos\theta + 8\sin\theta) = 0$

~~$r = 0$~~

$r = 2\cos\theta - 8\sin\theta$

(13) $(4mi, 12°) \rightarrow (4\cos 12, 4\sin 12) = (3.913, .832)$

$(2mi, 72°) \rightarrow (2\cos 72, 2\sin 72) = (.618, 1.902)$

$$d = \sqrt{(3.913 - .618)^2 + (.832 - 1.902)^2}$$

$d = 3.46$ miles

(14) $(3mi, 170°) = (3\cos 170, 3\sin 170) = (-2.954, .521)$

$(5mi, 150°) = (5\cos 150, 5\sin 150) = (-4.33, 2.5)$

$$d = \sqrt{(-2.954 + 4.33)^2 + (.521 - 2.5)^2}$$

$d = 2.41$ miles