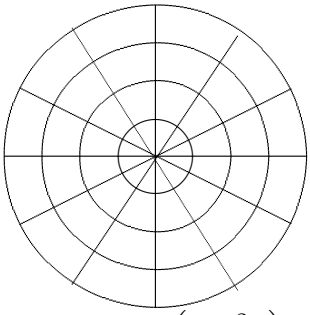
1. 

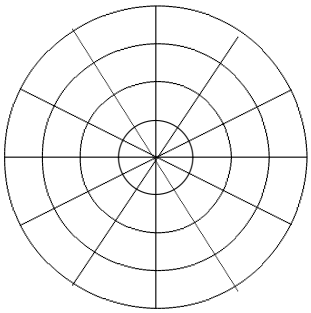
   For the point $\left(-3, \frac{2\pi}{3}\right)$, plot the point and then find other polar coordinates for which

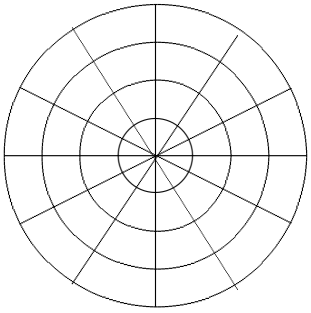
   (a) positive radius, negative angle

   (b) positive radius, positive angle

   (c) negative radius, angle between 2π and 4π

2. Find the rectangular coordinates of

   (a) $\left(-6, \frac{4\pi}{3}\right)$ 

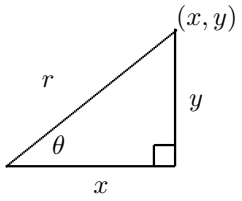
   (b) $(-3, -346°)$ 

3. Find the polar coordinates for
   (a) $(-7, 3)$

   (b) $(-3.4, 2.6)$

Polar Functions and Equations

(x, y) vs (r, θ)
$x^2 + y^2 = r^2$
$x = r\cos\theta$
$y = r\sin\theta$
$\theta = \arctan\dfrac{y}{x}$
Area$= \frac{1}{2}r^2\theta$



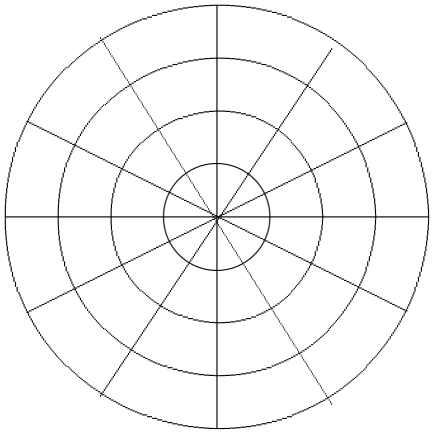
4. Write the equation $x^2 = 2y$ using polar coordinates

5. Write the equation $r = 8\cos\theta$ using rectangular coordinates.

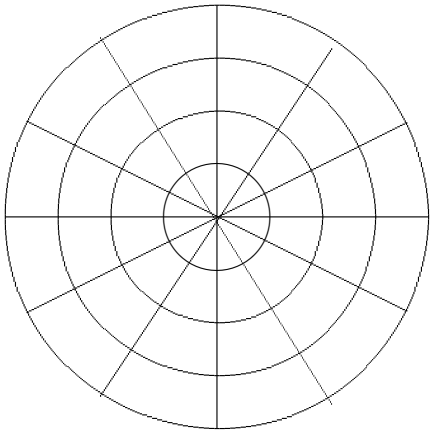
6. Transform the polar equation $r = -3\sin\theta$ to a rectangular equation draw the graph.

7. Graph the following

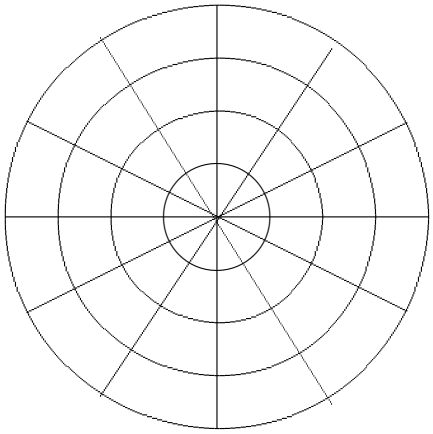
(a) $r = 3 + 3\cos\theta$



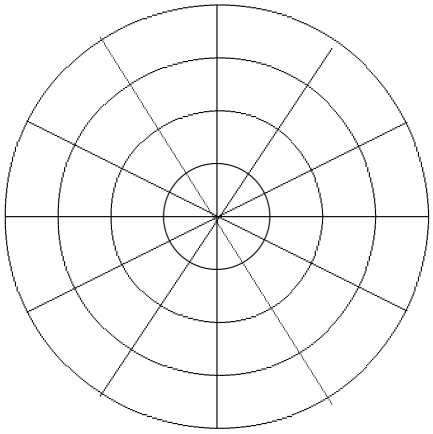
(b) $r = 2 - 3\sin\theta$



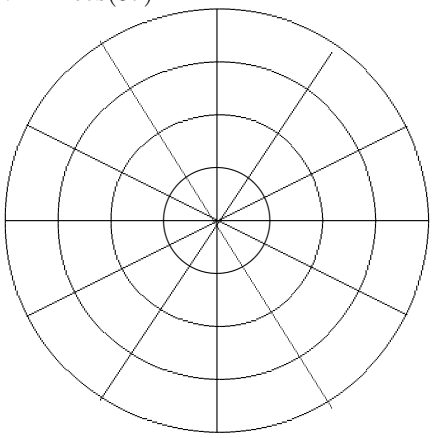
(c) $r = 4 - 3\cos\theta$



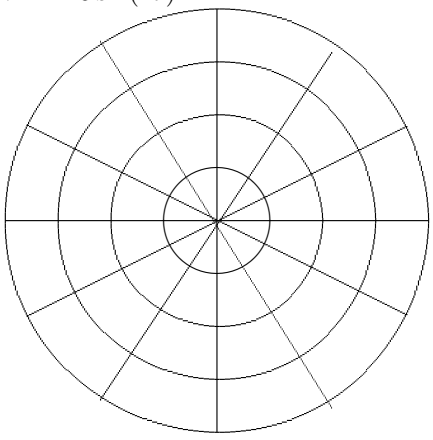
(d) $r = 5\sin(2\theta)$



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



(f) $r^2 = 16\sin(2\theta)$



Answers:

(1a) $\left(3, -\frac{\pi}{3}\right)$ (1b) $\left(3, \frac{5\pi}{3}\right)$ (1c) $\left(-3, \frac{8\pi}{3}\right)$

(2a) $(3, 3\sqrt{3})$ (2b) $(3\cos 14°, 3\sin 14°)$

(3) $\left(\sqrt{68}, \pi - \arctan(\frac{8}{1})\right)$ (4) $2\tan\theta\sec\theta$

(5) $(x-4)^2 + y^2 = 16$ (6) $x^2 + (y+3)^2 = 9$

(7a) Cardioid (7b) Inner-loop Limaçon (7c) One Loop Limaçon

(7d) four-petal rose (7e) five-petal rose (7f) Lemniscate