

# Charlton does Polar

**I** A On your first polar graph locate each point. Rewrite each coordinate into its cartesian form.

- 1)  $(1, \frac{\pi}{6})$       2)  $(2, \frac{\pi}{3})$       3)  $(2, -\frac{\pi}{3})$       4)  $(-2, -\frac{\pi}{3})$       5)  $(-2, \frac{\pi}{3})$   
 6)  $(3, \frac{\pi}{4})$       7)  $(5, \frac{5\pi}{6})$       8)  $(-5, \frac{11\pi}{6})$       9)  $(4, \frac{3\pi}{4})$       10)  $(3, \frac{4\pi}{3})$

**B** On your second polar graph locate each point. Rewrite each coordinate into its cartesian form.

- 1)  $(4, 120^\circ)$       2)  $(5, 75^\circ)$       3)  $(-3, 270^\circ)$       4)  $(2, 150^\circ)$       5)  $(3, 315^\circ)$   
 6)  $(-4, 135^\circ)$       7)  $(3, 60^\circ)$       8)  $(4, 45^\circ)$       9)  $(5, 300^\circ)$       10)  $(4, 180^\circ)$

**C** Rewrite each coordinate into its polar form. Plot on your third polar graph

- 1)  $(3, 4)$       2)  $(-3, 4)$       3)  $(3, -4)$       4)  $(4, 3)$       5)  $(-4, -3)$   
 6)  $(\frac{3}{2}, -\frac{3\sqrt{3}}{2})$       7)  $(-2, 2\sqrt{3})$       8)  $(0, -2)$       9)  $(\frac{3\sqrt{2}}{2}, -\frac{3\sqrt{2}}{2})$       10)  $(\frac{1}{2}, \frac{-\sqrt{3}}{2})$

**D** Rewrite each coordinate into its polar form. Plot on your fourth polar graph.

- 1)  $(\frac{-3}{2}, \frac{-3\sqrt{3}}{2})$       2)  $(2\sqrt{2}, -2\sqrt{2})$       3)  $(3, 5)$       4)  $(-2, 4)$       5)  $(-4, -3)$   
 6)  $(\frac{1}{2}, 4)$       7)  $(5, -2)$       8)  $(0, -2)$       9)  $(2, 3)$       10)  $(\frac{1}{2}, \frac{1}{2})$

**II** For each make a table. Sketch the graph. Convert equation to cartesian form. (2 equations per polar graph.)

- a)  $r = 3 \sin \theta$       b)  $r = 2 \csc \theta$       c)  $r = \frac{3}{4 \cos \theta + 5 \sin \theta}$   
 d)  $r = 4 \cos \theta + 6 \sin \theta$       e)  $r = 2 \sin 2\theta$       f)  $r = 1 + \sin \theta$

**III** Transform each of the following into polar form ( $r = \dots$ ). Sketch on polar graph (2 per axis)

- a)  $y = x^2$       b)  $x + 2y = 3$       c)  $x^2 + y^2 = 3$       d)  $xy = 2$   
 e)  $x^2 + y^2 = 4x$       f)  $x = -2$       g)  $y = 3$       h)  $y = 2x + 1$

**IV** a) State at least three pairs of polar coordinates  $(r, \theta)$  for  $(3, \frac{3\pi}{4})$  where

- 1)  $r > 0$       2)  $r < 0$

b) Sketch the curves  $r = 1 + \cos \theta$  and  $r = 1 - \sin \theta$  on the same axis. What are the *cartesian* coordinates where the two curves intersect? Explain your methods. Explain why there are not three points.

**V** Make a table of values from zero to  $2\pi$  for each. Plot the points and sketch on a polar axis:

- a)  $r = 1 + 2 \cos \theta$       b)  $r = 1 + \frac{1}{2} \cos \theta$       c)  $r = 1 - \cos \theta$       d)  $r = 1 - 2 \cos \theta$