

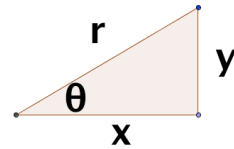
Rectangular coordinates (x,y) relate to polar coordinates $[r,\theta]$ as follows:

$$x = r \cos \theta$$

$$y = r \sin \theta$$

$$\tan \theta = \frac{y}{x}$$

$$r^2 = x^2 + y^2$$



1. Convert each of the following polar equations to a rectangular (x,y) equation, and describe what the graph of the equation looks like.

a) $r \cos \theta = 5$

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

c) $r^2 = 4r \sin \theta$

d) $r = -6 \sin \theta$ (Hint: multiply both sides by r .)

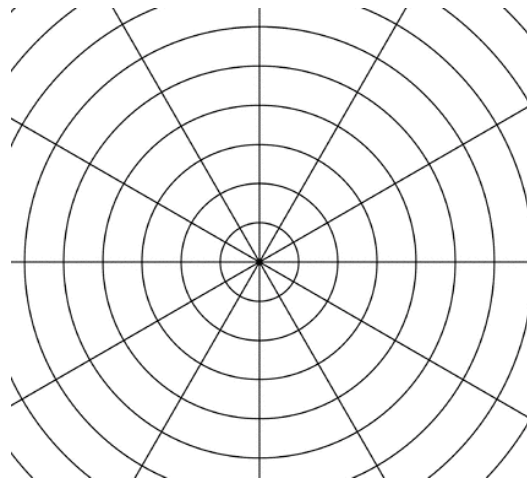
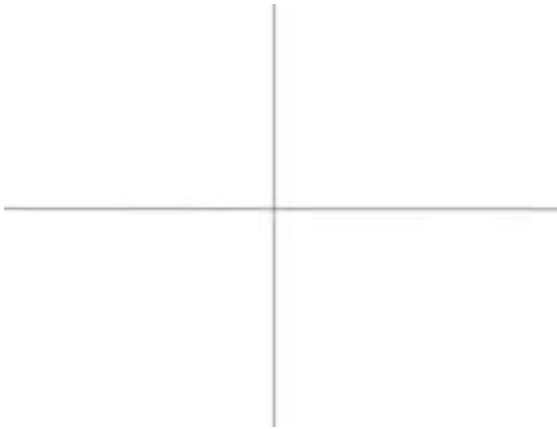
e) $r = \frac{\tan \theta}{\cos \theta}$ (Hint: cross-multiply.)

f) $r = 4\sin\theta - 12\cos\theta$ (Hint: multiply both sides by r .)

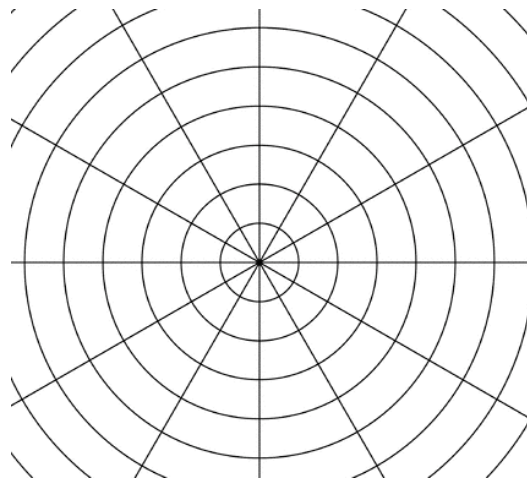
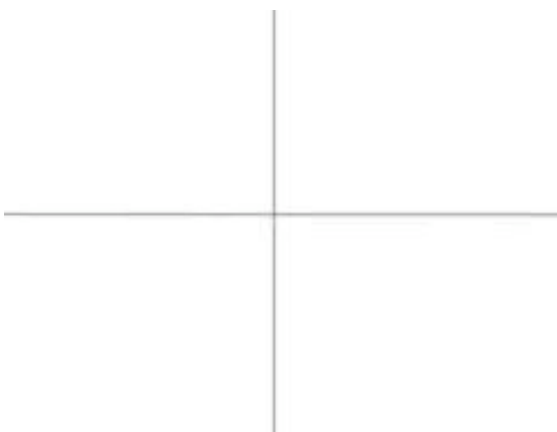
g) $6 = r^2 \sin(2\theta)$ (Hint: use the double angle formula.)

2. Sketch each of the following equations. Draw a wave graph first, then plot key points from the waves on the polar graph paper.

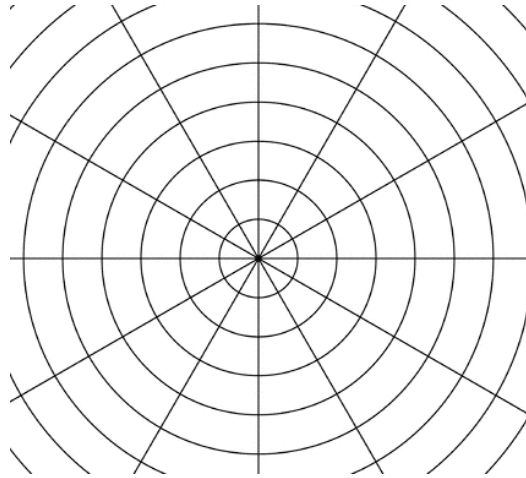
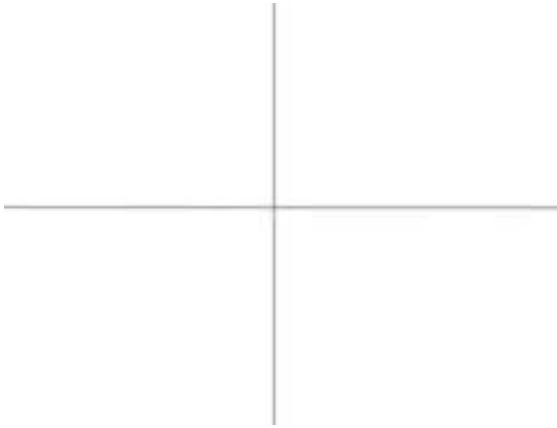
a) $r = 4\sin\theta$



b) $r = 2\cos(3\theta)$



c) $r = 1 - \cos \theta$



d) $r = 3 + 3\sin \theta$

