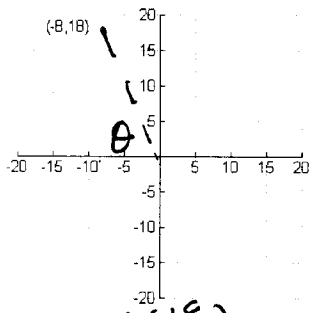
Polar Coordinates and Rectangular Coordinates Name_____

Change to Polar Coordinates

1. (-8,18)

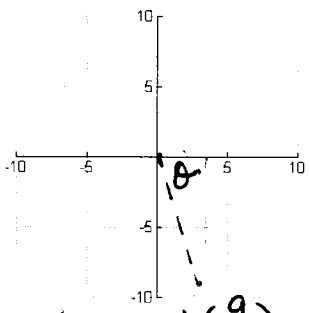


$\tan^{-1}\left(\frac{18}{8}\right)=66.04°$

$\sqrt{8^2+18^2}=\sqrt{388}$

$[\sqrt{388}, 113.96°]$

2. (3, -9)

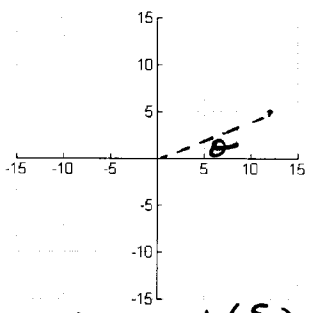


$\tan^{-1}\left(\frac{9}{3}\right)=71.57°$

$\sqrt{3^2+9^2}=\sqrt{90}$

$[\sqrt{90}, -71.57°]$

3. (12, 5)

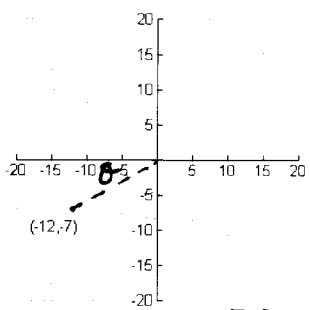


$\tan^{-1}\left(\frac{5}{12}\right)=22.62°$

$\sqrt{12^2+5^2}=13$

$[13, 22.62°]$

4. (-12, -7)



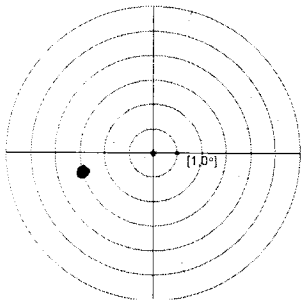
$\tan^{-1}\left(\frac{7}{12}\right)=30.26°$

$\sqrt{12^2+7^2}=\sqrt{193}$

$[\sqrt{193}, 210.26°]$

Graph each polar coordinate and then change it to rectangular coordinates

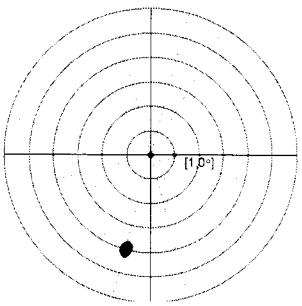
5. [-3,15°]



$(-3\cos 15°, -3\sin 15°)$

$(-2.90, -.78)$

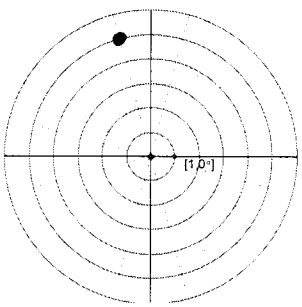
6. [4, -105°]



$(4\cos -105°, 4\sin -105°)$

$(-1.04, -3.86)$

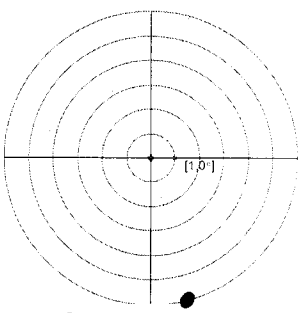
7. [-5,-75°]



$(-5\cos -75°, -5\sin 75°)$

$(-1.29, +4.83)$

8. [6, 285°]

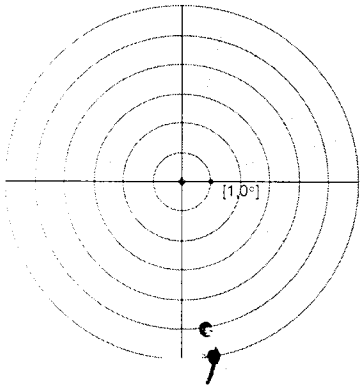


$(6\cos 285°, 6\sin 285°)$

$(1.55, -5.80)$

Graph these polar coordinates and give three more polar names such that $-360° \leq \theta \leq 360°$

9. [5, -80°]

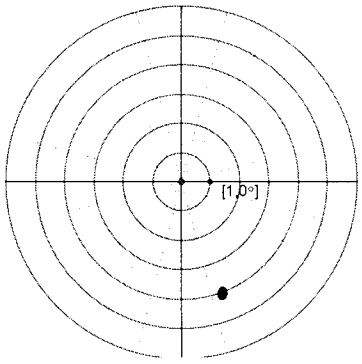


$[5, 280°]$

$[-5, 100°]$

$[-5, -260°]$

10. [-4, 110°]

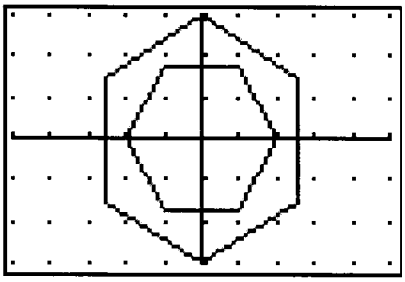


$[-4, -250°]$

$[4, -70°]$

$[4, 290°]$

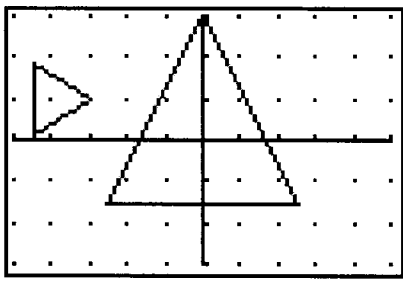
In parametric mode, give the settings needed to produce the following.

11. 

$X_{1T} = 2\cos(T)$
$Y_{1T} = 2\sin(T)$
$X_{2T} = 3\cos(T)$
$Y_{2T} = 3\sin(T)$

$T_{min} = 0$
$T_{max} = 360$
$T_{step} = 60$

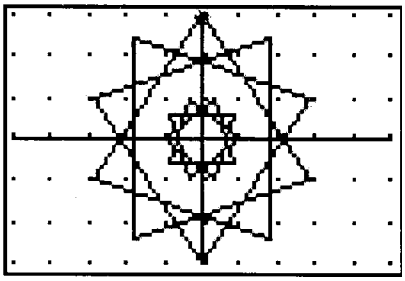
$0 \le t \le 450$
$t\text{step} = 60$

12. 

$X_{1T} = 3\cos(T)$
$Y_{1T} = 3\sin(T)$
$X_{2T} = \cos t + 1$
$Y_{2T} = \sin t + 1$

$T_{min} = 90$
$T_{max} = 450$
$T_{step} = 120$

$0 \le t \le 360$
$t\text{step} = 120$

13. 

$X_{1T} = 3\cos(T)$
$Y_{1T} = 3\sin(T)$
$X_{2T} = \cos(T)$
$Y_{2T} = \sin(T)$

$T_{min} = 90$
$T_{max} = 1170$
$T_{step} = 108$

$0 \le t \le 360 \cdot 3$
$t\text{step} = 108$

14. Rotate triangle ABC around the origin at 160 degrees where A(4,-6) B(-9, 2) C(5, 9)

$$\begin{bmatrix} \cos 160^\circ & -\sin 160^\circ \\ \sin 160^\circ & \cos 160^\circ \end{bmatrix} \begin{matrix} A & B & C \\ \end{matrix} \begin{bmatrix} 4 & -9 & 5 \\ -6 & 2 & 9 \end{bmatrix} = \begin{matrix} A' & B' & C' \\ \end{matrix} \begin{bmatrix} -1.71 & 7.77 & -7.78 \\ 7.01 & -4.96 & -6.75 \end{bmatrix}$$

15. How could you use a matrix to rotate a figure 160 degrees which is NOT centered at the origin?

Translate figure to origin, Rotate using matrices, Translate new figure using the opposite translation.