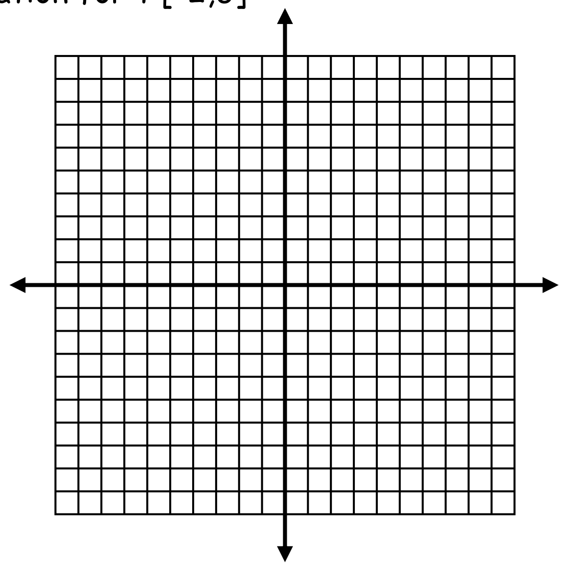
Parametric and Polar Equations Review Name ____________________________

1. Fill in the table and sketch the parametric equation for t [-2,6]

$x = \sqrt{t^2 + 1}$

$y = 2 - t$

t	x	y
-2		
-1		
0		
1		
2		
3		
4		
5		
6		



Problems 2 – 10: Eliminate the parameter to write the parametric equations as a rectangular equation.

2. $x = \dfrac{1}{t - 2}$
   $y = 4t + 5$

3. $x = 6 - t$
   $y = \sqrt{3t - 4}$

4. $x = \frac{1}{2}t + 4$
   $y = t^3$

5. $x = 3 \csc t$
   $y = 3 \cot^2 t$

6. $x = 4 \sin(2t)$
   $y = 2 \cos(2t)$

7. $x = \cos t$
   $y = 2 \sin^2 t$

8. $x = 4 \sec t$
   $y = 3 \tan t$

9. $x = 4 + 2 \cos t$
   $y = -1 + 4 \sin t$

10. $x = -4 + 3\tan^2 t$
    $y = 7 - 2 \sec t$

Write two new sets of parametric equations for the following rectangular equations.

11. $y = (x + 2)^3 - 4$

12. $x = \sqrt{y^2 - 3}$

13. For the parametric equations $x = t$ and $y = t^2$

a) Sketch the graph.
b) Graph $x = t - 1$ and $y = t^2$. How does this compare to the graph in part (a)?
c) Graph $x = t$ and $y = t^2 - 3$. How does this compare to the graph in part (a)?
d) Write parametric equations which will give the graph in part (a) a vertical stretch by a factor of 2 and move the graph 5 units to the right. (Hint: Verify on your calculator!)

14. Do the following sets of parametric equations cross at the same time so they collide or do their paths just intersect? Justify your answer.

a) $x_1 = 3 - t$ and $x_2 = t + 19$
$y_1 = t^2 - 60$ $\quad y_2 = t + 12$

b) $x_1 = 3 - t$ and $x_2 = 3 - 2t$
$y_1 = 2t + 1$ $\quad y_2 = 2 + 3t$

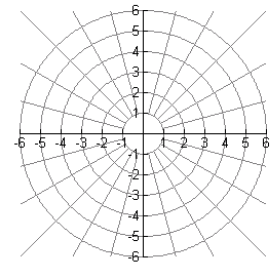
c) $x_1 = 4t$ and $x_2 = 5t - 6$
$y_1 = \frac{1}{2}t + 5$ $\quad y_2 = t + 2$

15. Find the values of t that generated the graph described by the parametric equations:
$x = t - 1$ and $y = \frac{1}{2}t + 2$

t	x	y
	-5	0
	-3	1
	-1	2
	1	3
	3	4

Describe your thought process in solving for t.

Plot the point given in polar coordinates and find two additional polar representations of the point, using -360° < θ < 360°.



16. (4, 150°)

17. (- ½ , -210°)

Find the corresponding rectangular coordinates for the point given in polar coordinates.

18. (5, -$\frac{\pi}{6}$)

19. (-2, 135°)

Find the polar coordinates for 0 < θ < 360°. Pay attention to the quadrant!

20. (-4, -4)

21. (2, $-2\sqrt{3}$)

Convert the rectangular equation to polar form. (solve for r)

22. $x^2 + y^2 - 6y = 0$

23. $5x + 7y = 12$

Convert the polar equation to rectangular form.

24. r = 4 sinθ

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

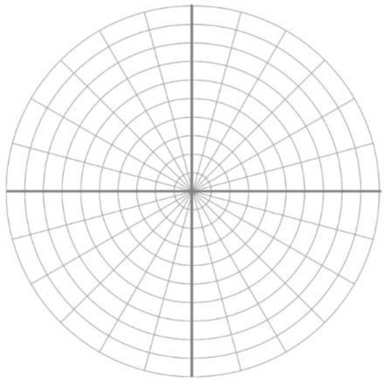
26. ECCENTRICITY – Find the eccentricity and identify the conic section

a. $r = \frac{7}{3-\frac{2}{5}cos\theta}$

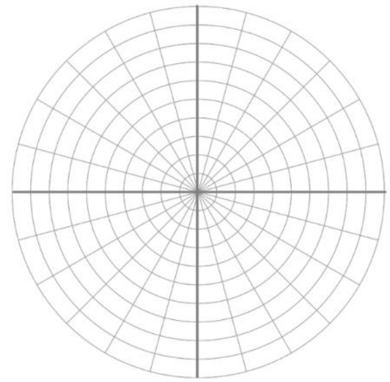
b. $r = \frac{4}{4+\frac{1}{4}sin\theta}$

Graph

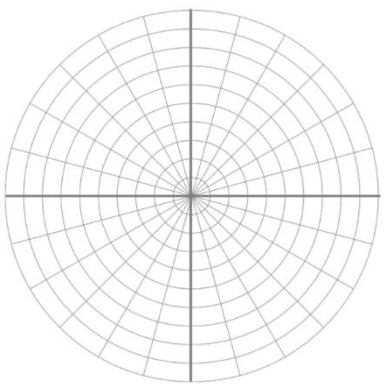
27. $r = 6\sin 2\theta$



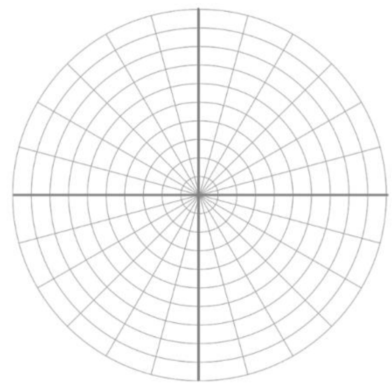
28. $r = -7\cos 3\theta$



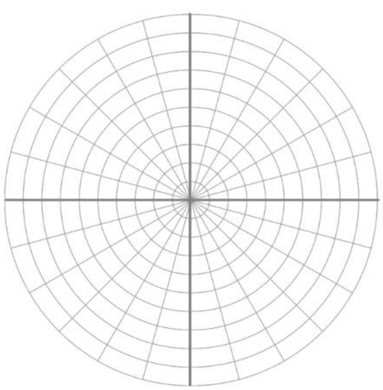
29. $r = -8\cos 2\theta$



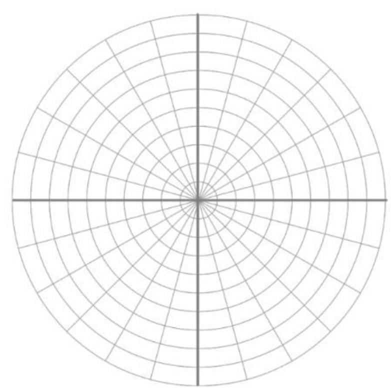
30. $r = 8\sin\theta$



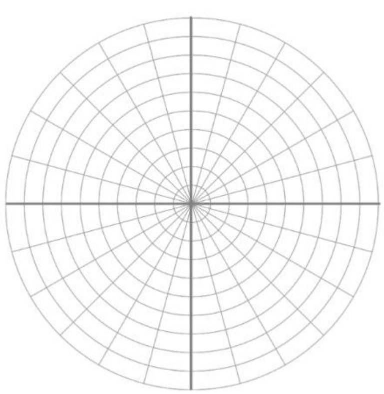
31. $r = 8 + \sin\theta$



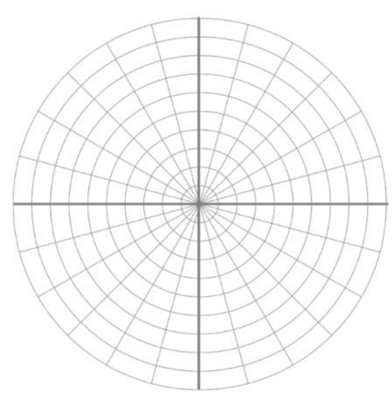
32. $r = 5 + 5\cos\theta$



33. $r = 5 + 4\cos\theta$



34. $r = 3 + 6\sin\theta$



COMPLEX NUMBER PRACTICE

35. Write the complex numbers in polar form (trigonometric form)

(a) $z = 2 - 2i$

(b) $w = -1 - \sqrt{3}i$

(c) $y = 4\sqrt{3} + 4i$

(d) $x = -\sqrt{5} + \sqrt{5}i$

36. Using the complex numbers w-z above, simplify the following using polar form.

a. $z \cdot w$
b. $x \div w$
c. $y \cdot x$
d. z^7
e. w^4

37. Write in simplified polar form.

a. $(3 + 2i)^{30}$

b. $(2 - 6i)^{21}$

EXTRA PRACTICE WITH POLAR

Convert to rectangular coordinates:

38. $\left(-5, -\frac{5\pi}{6}\right)$

Convert to polar coordinates:

39. $\left(-6, 6\sqrt{3}\right)$; $r \le 0$ and $0 \le \theta \le 2\pi$

Change to a rectangular equation:

40. $r = -3\cos\theta$

Change to a polar equation:

41. $x + y = 2x$

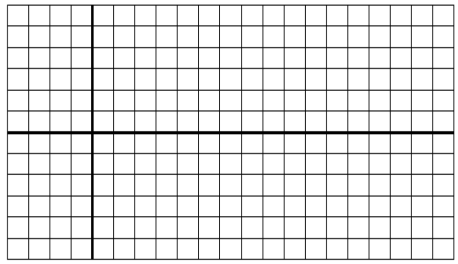
Obtain the rectangular equation by eliminating the parameter.

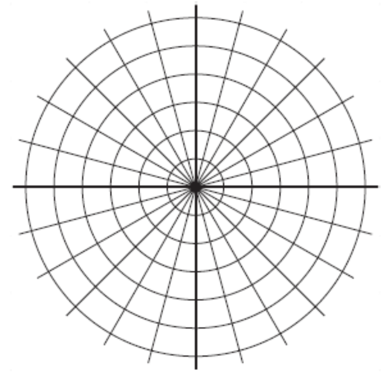
42. $x = 3t - 7$, $y = -6t + 4$

43. $x = -3\cos\theta$, $y = 3\sin^2\theta$

44. Find the interval for θ that creates: (Use graphs if needed)

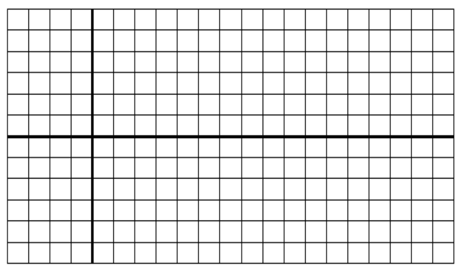
a) The second petal of $r = 4sin3\theta$

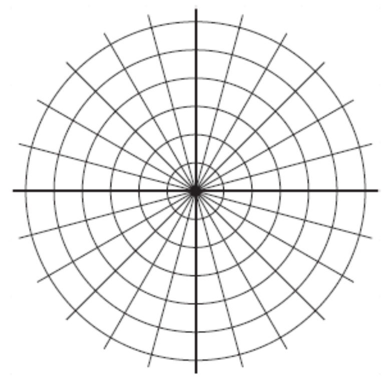




____ $\leq \theta \leq$ ____

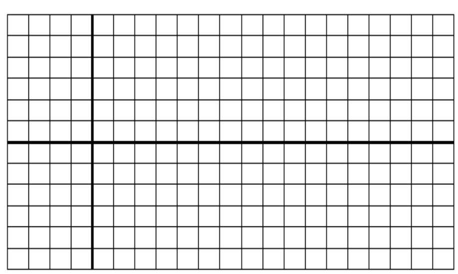
b) The inner loop of $r = 6cos\theta + 3$

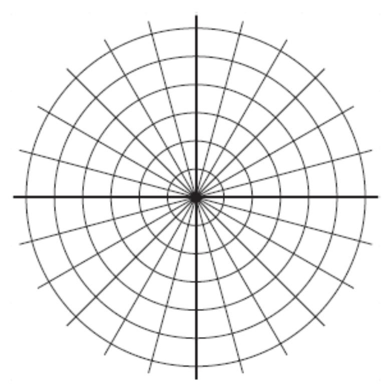




____ $\leq \theta \leq$ ____

c) The outer loop (not inner) of $r = -5cos\theta + 1$





____ $\leq \theta \leq$ ____