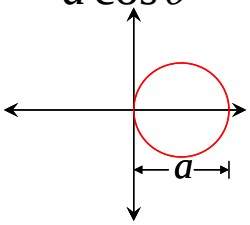
Notes 21 **Name** _____

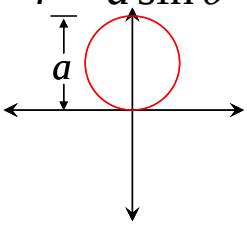
Polar Graphs (6.4)

Graphs of Circles

$r = a\cos\theta$



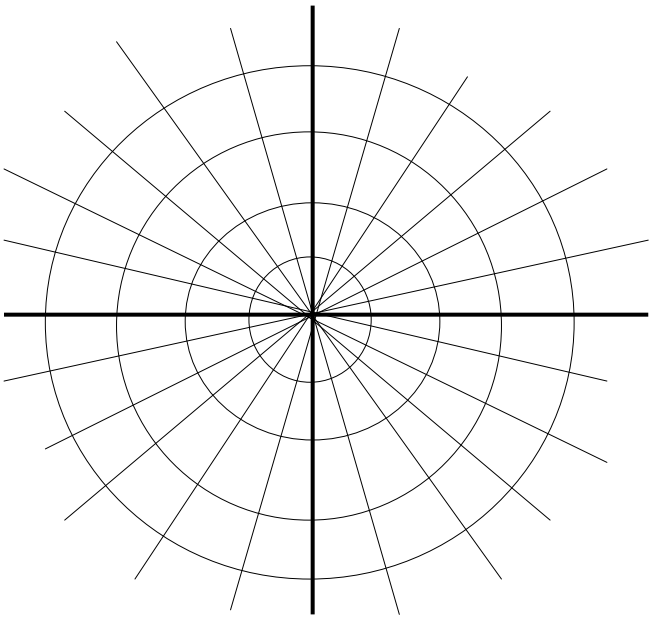
$r = a\sin\theta$



Graphing Using the Point-Plotting Method: Graph the polar equation.

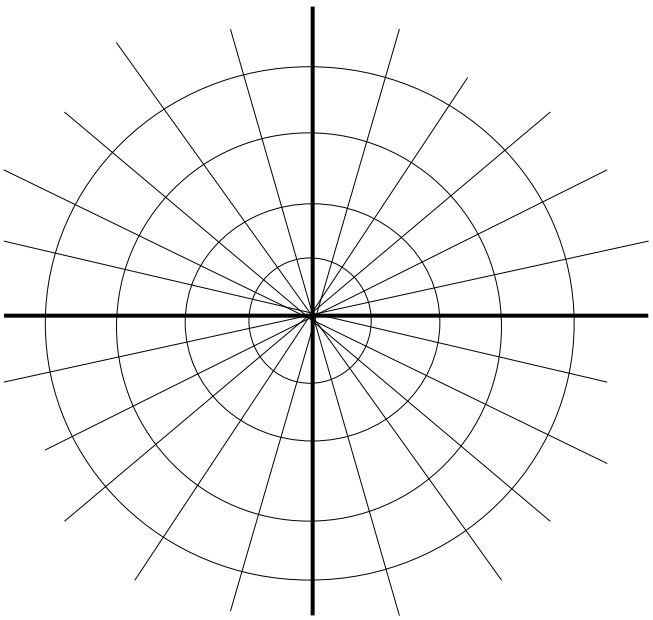
1. $r = 4\sin\theta$

θ	$r = 4\sin\theta$	(r,θ)



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

θ		(r,θ)



Even and Odd Trig Functions

$\cos(-\theta) =$ $\sin(-\theta) =$

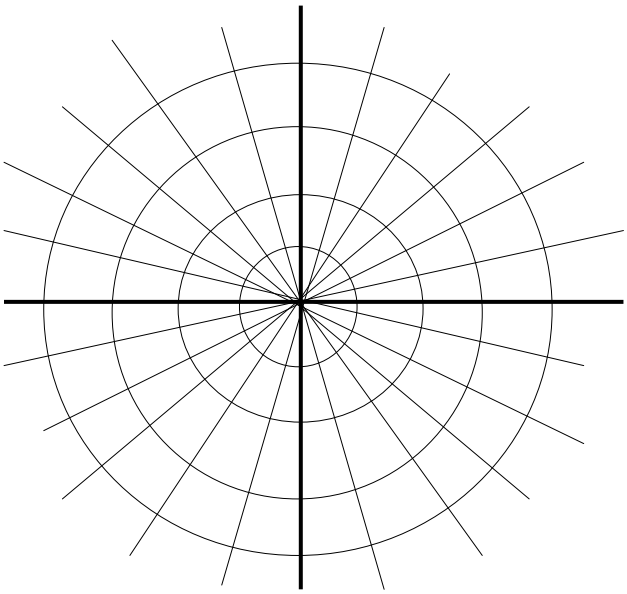
Symmetry in Polar Equations

x-axis Symmetry y-axis Symmetry Origin Symmetry

Graphing Polar Equations: Test for symmetry and then graph the polar equation.

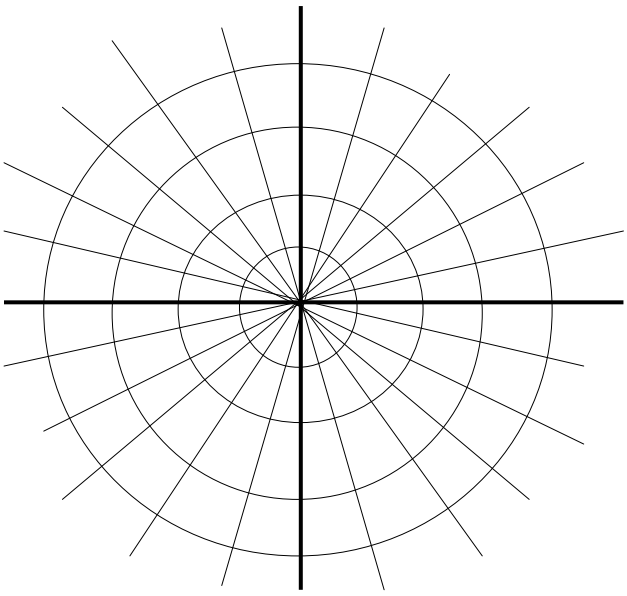
3. $r = 1 - \cos\theta$ **Symmetry:**

θ		(r,θ)



4. $r = 1 + 2\cos\theta$ **Symmetry:**

θ		(r,θ)



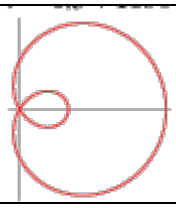
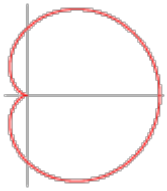
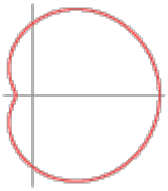
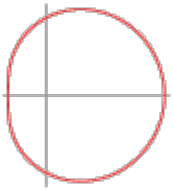
Graphing Limacons (lē-mə-ˈsō^{n})

The graphs of

$r = a + b\sin\theta$ $\quad$ $r = a - b\sin\theta$

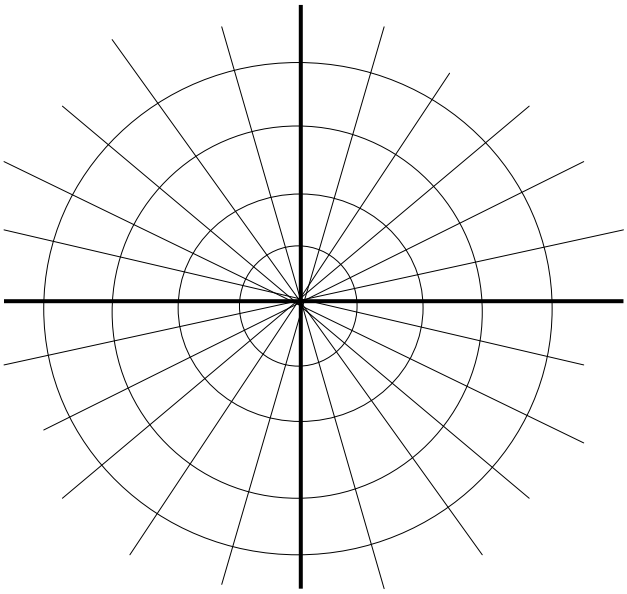
$r = a + b\cos\theta$ $\quad$ $r = a - b\cos\theta$

are called limacons. The ratio of $\frac{a}{b}$ determines a limacon's shape.

Inner loop	Heart-shaped	Dimple	Flat
$\frac{a}{b} < 1$	$\frac{a}{b} = 1$	$1 < \frac{a}{b} < 2$	$\frac{a}{b} \geq 2$
			

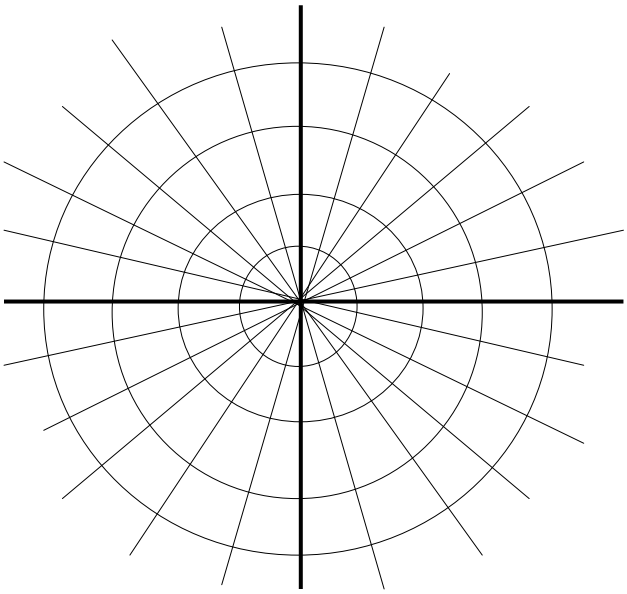
5. $r = 1 + 2\sin\theta$ **Symmetry:** **Shape:**

θ		(r,θ)



6. $r = 2 - 1\cos\theta$ **Symmetry:** **Shape:**

θ		(r,θ)

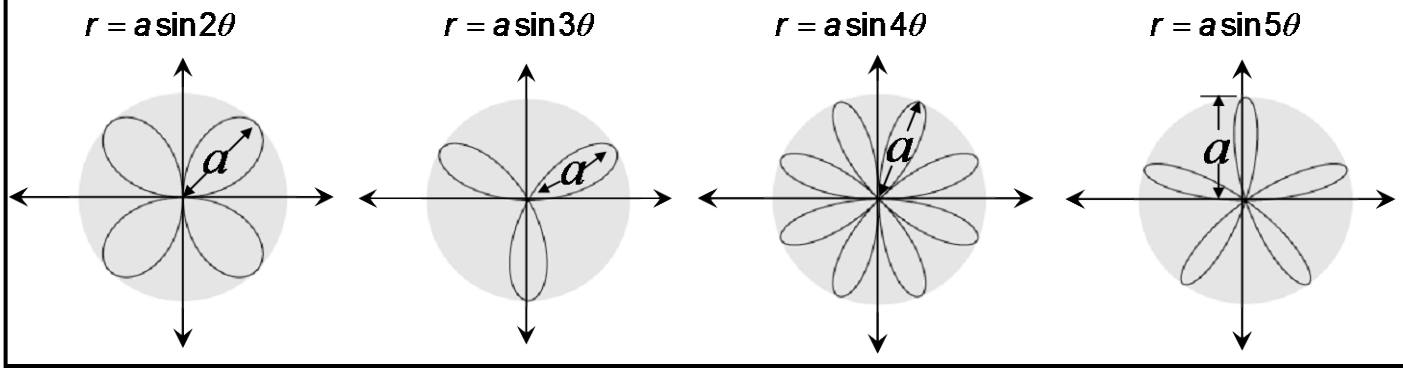


Graphing Rose Curves

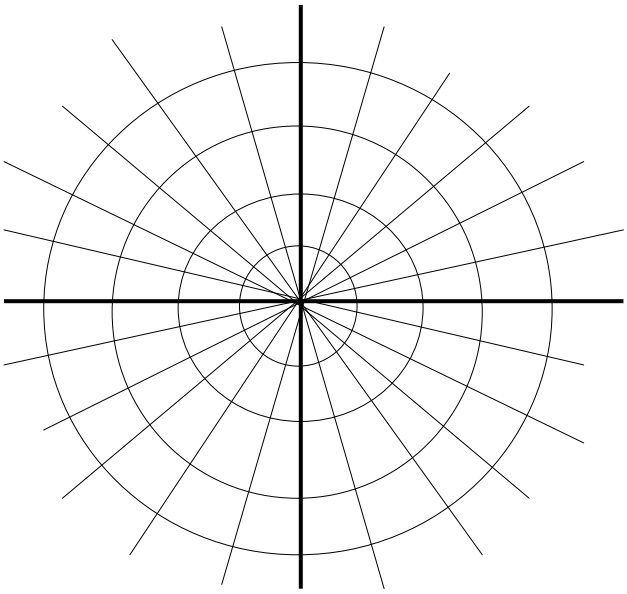
The graphs of

$$r = a\sin n\theta \quad \text{and} \quad r = a\cos n\theta, \ a \neq 0$$

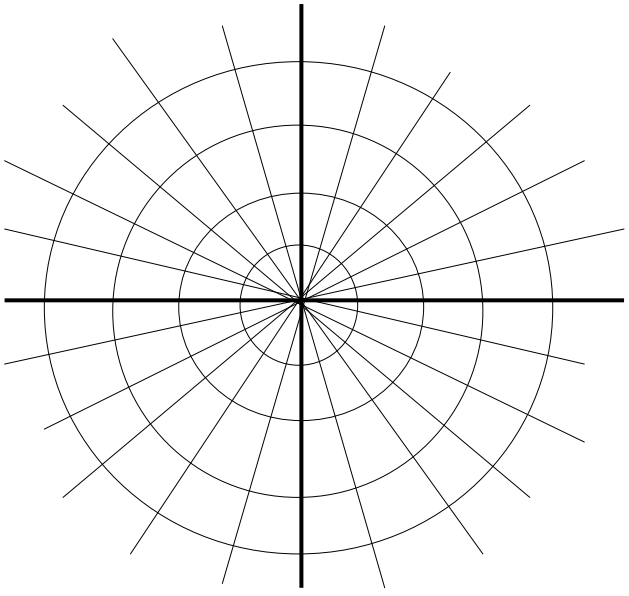
are called rose curves. If n is even, the rose has $2n$ petals. If n is odd, the rose has n petals.



7. $r = 4\sin 2\theta$ **Symmetry:** **Petals:**



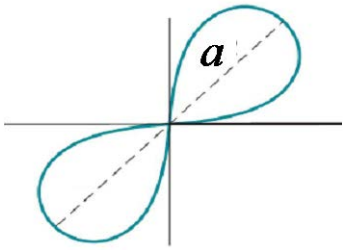
8. $r = 2\cos 3\theta$ **Symmetry:** **Petals:**



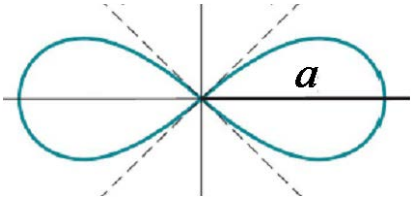
Graphing Lemniscates (lem-nis-kət)

$r^2 = a^2 \sin 2\theta$ and $r^2 = a^2 \cos 2\theta$, $a \neq 0$

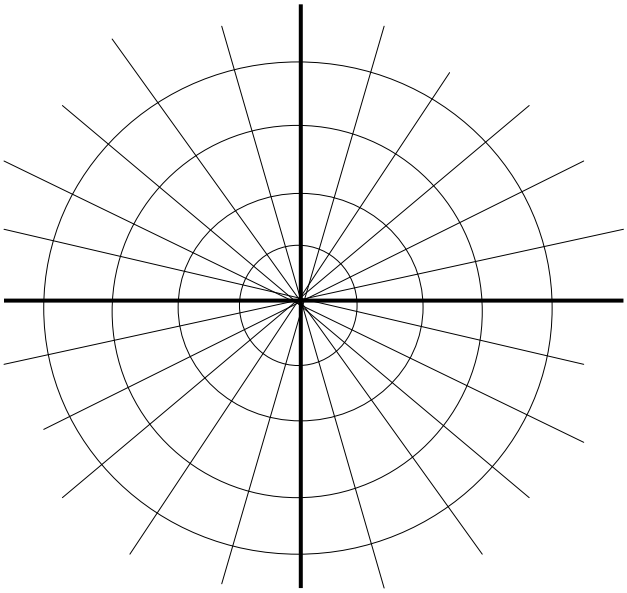
$r^2 = a^2 \sin 2\theta$
symmetric with respect to the pole



$r^2 = a^2 \cos 2\theta$
symmetric with respect to the polar axis, $\theta = \frac{\pi}{2}$, and the pole



9. $r^2 = 9\sin 2\theta$ **Symmetry:**



10. $r^2 = 4\cos 2\theta$ **Symmetry:**