

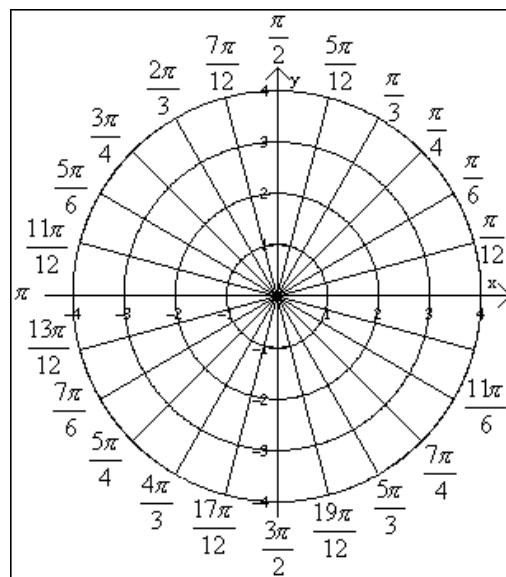
Unit 1.4 Day 1 – Polar Equations

Graphing Polar Equations

Name: _____

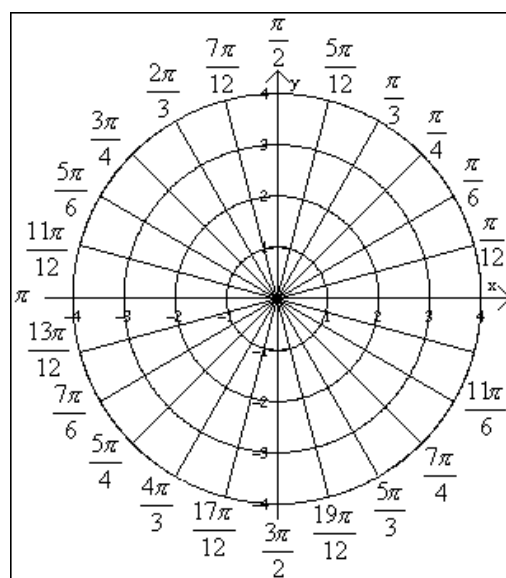
1. Graph each point.

- $(2, 120^\circ)$
- $(-3, \frac{\pi}{4})$
- $(4, -165^\circ)$
- $(-1, -\frac{4\pi}{3})$

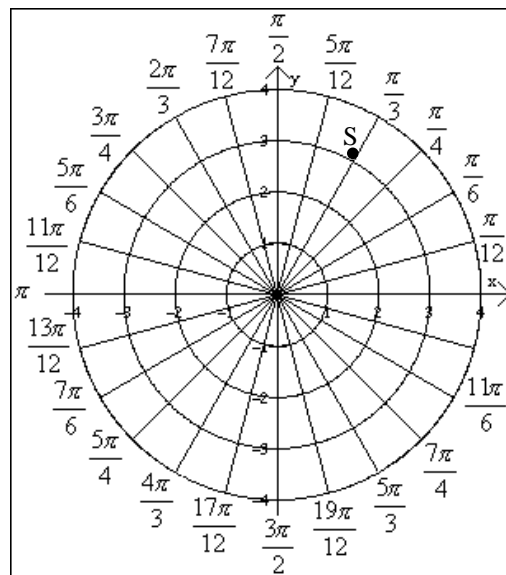


2. Graph each equation.

- $\theta = -\frac{5\pi}{6}$
- $r = 2.5$
- $\theta = 150^\circ$
- $r = -3$



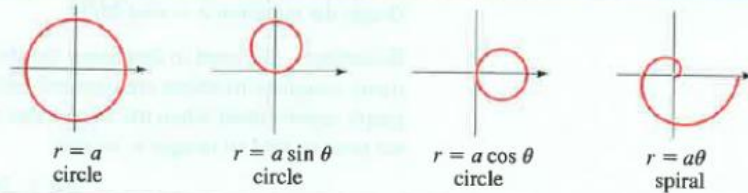
3. Name the four pairs of polar coordinates for point S.



A **polar graph** is the set of all points whose coordinates (r, θ) satisfy a given polar equation.

Some Common Polar Curves

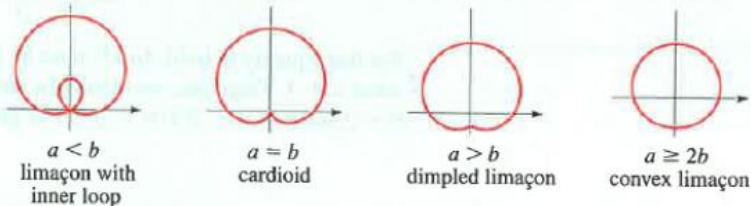
Circles and Spiral



Limaçons

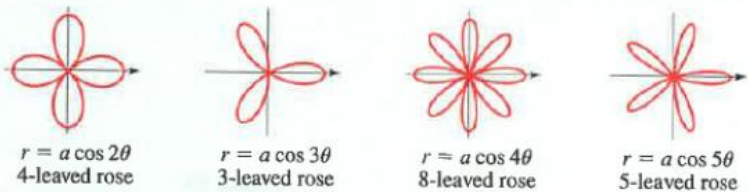
$r = a \pm b \sin \theta$
 $r = a \pm b \cos \theta$
 $(a > 0, b > 0)$

Orientation depends on the trigonometric function (sine or cosine) and the sign of b .



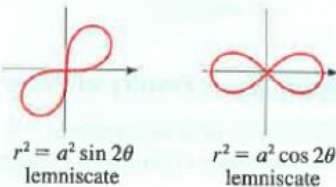
Roses

$r = a \sin n\theta$
 $r = a \cos n\theta$
 n -leaved if n is odd
 $2n$ -leaved if n is even



Lemniscates

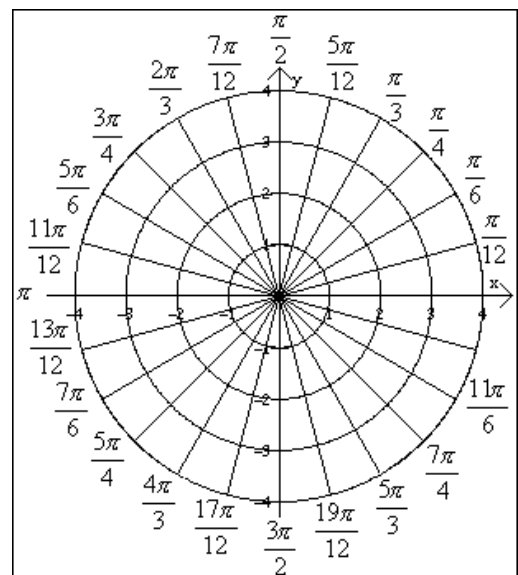
Figure-eight-shaped curves



For #4 to #6, use your calculator to fill in the table of values. You don't need to find every single value. Just find enough so you know the "path" of the graph as you go from $\theta = 0$ to $\theta = 2\pi$. Graph the ordered pairs and connect them with a smooth curve.

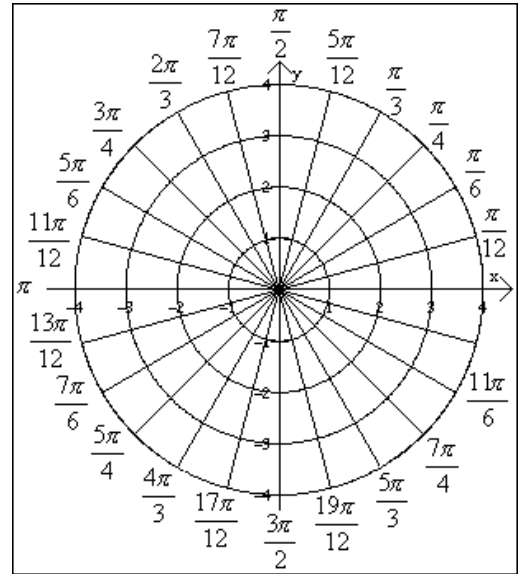
4. $r = 3 \sin \theta$

θ	$3 \sin \theta$	(r, θ)
0		
$\pi/6$		
$\pi/4$		
$\pi/3$		
$\pi/2$		
$2\pi/3$		
$3\pi/4$		
$5\pi/6$		
π		
$7\pi/6$		
$5\pi/4$		
$4\pi/3$		
$3\pi/2$		
$5\pi/3$		
$7\pi/4$		
$11\pi/6$		
2π		



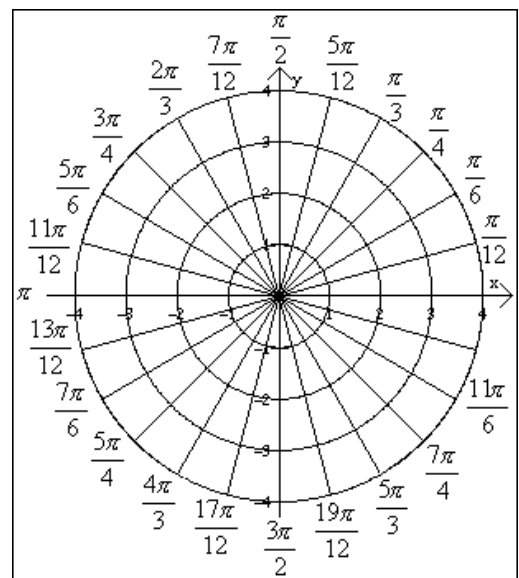
5. $r = 1 - 2 \sin \theta$

θ	$1 - 2 \sin \theta$	(r, θ)
0		
$\pi/6$		
$\pi/4$		
$\pi/3$		
$\pi/2$		
$2\pi/3$		
$3\pi/4$		
$5\pi/6$		
π		
$7\pi/6$		
$5\pi/4$		
$4\pi/3$		
$3\pi/2$		
$5\pi/3$		
$7\pi/4$		
$11\pi/6$		
2π		

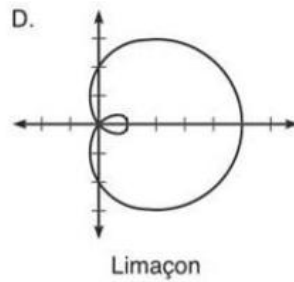
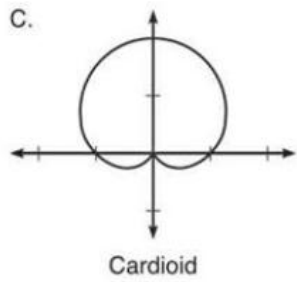
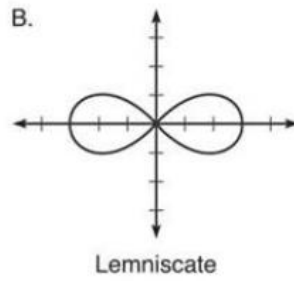
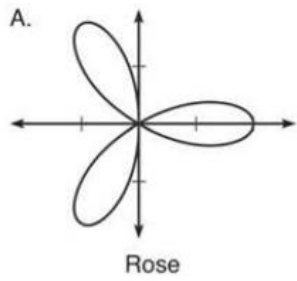


6. $r = 3 - 2 \cos 4\theta$

θ	$3 - 2 \cos 4\theta$	(r, θ)
0		
$\pi/6$		
$\pi/4$		
$\pi/3$		
$\pi/2$		
$2\pi/3$		
$3\pi/4$		
$5\pi/6$		
π		
$7\pi/6$		
$5\pi/4$		
$4\pi/3$		
$3\pi/2$		
$5\pi/3$		
$7\pi/4$		
$11\pi/6$		
2π		



7. Below are examples of common polar curves. Match the graphs to the correct equations below.



I. $r = 1 + \sin \theta$

II. $r = 2 + 3 \cos \theta$

III. $r^2 = 2 + 3 \cos \theta$

IV. $r = 2 \cos 3\theta$

8. Make a quick sketch of how you think the graph will look like. Check using your calculator

a. $r = 5 \sin 5\theta$

b. $r = 5 \cos 2\theta$

c. $r = 1 + 3 \sin \theta$

d. $r = 1 - 3 \cos \theta$

e. $r = 3 - 3 \sin \theta$

f. $r = 4 + 3 \cos \theta$

g. $r = \sin 5\theta - 3$

h. $r = 1 + 3 \cos 5\theta$

i. $r = 1 - 3 \sin 4\theta$