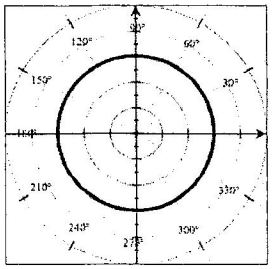
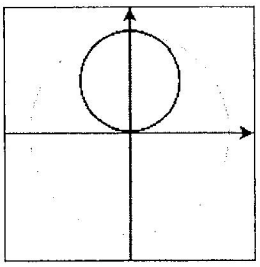
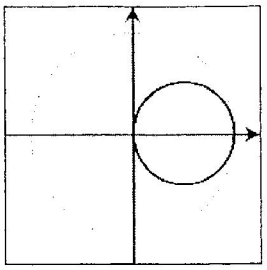


$r = a$

Circle
center at the pole
radius = a

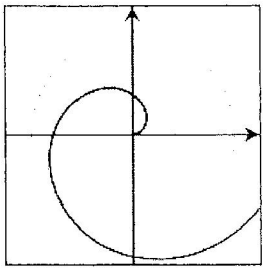


$r = a\sin\theta$



$r = a\cos\theta$

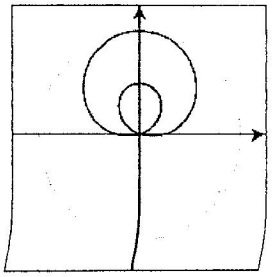
Circles not centered at the pole
a is the diameter
sine curves are symmetric to *y*-axis *cosine* curves are symmetric to *x*-axis



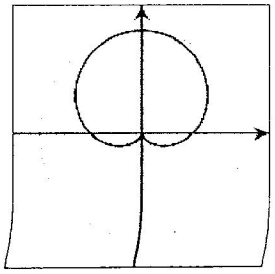
$r = a\theta$

Spiral of Archimides
a controls the width
(must be in radian mode)

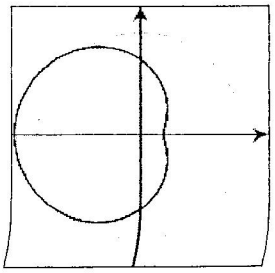
Limaçons are in the form $r = a \pm b\sin\theta$ (symmetric to y-axis) or $r = a \pm b\cos\theta$ (symmetric to x - axis)



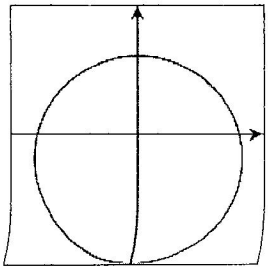
$a < b$
Limaçon with inner loop



$a = b$
Cardioid
(heart shaped)

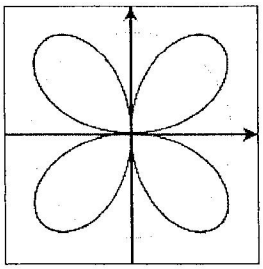


$b < a < 2b$
Dimpled Limaçon

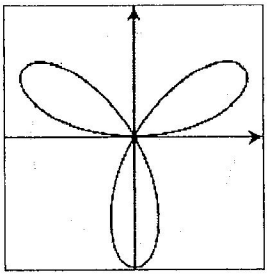


$a \geq 2b$
Convex Limaçon
(one side is flattened)

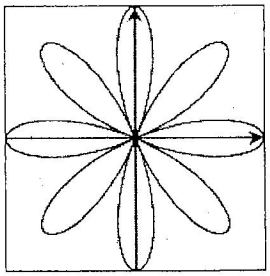
Rose curves are in the form $r = a\cdot\sin(n\theta)$ or $r = a\cdot\cos(n\theta)$. The maximum diameter of a petal is controlled by a. If n is even, the rose curve will have $2n$ petals. If n is odd, the rose curve will have n petals. Interesting patters can be formed if n is a decimal and the curve is viewed with θ starting at 0 and going out to very large numbers.



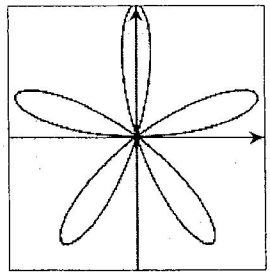
$r = a\cdot\sin(2\theta)$



$r = a\cdot\sin 3\theta$

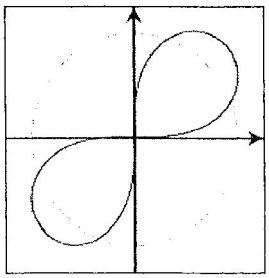


$r = a\cdot\cos(4\theta)$

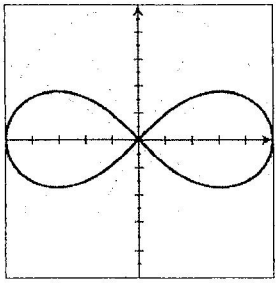


$r = a\cdot\sin(5\theta)$

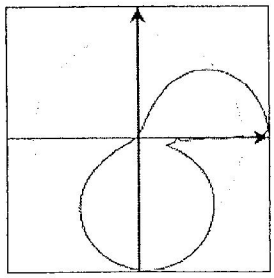
Lemniscates look like infinity signs and are in the form $r^2 = a^2\cdot\sin(2\theta)$ [symmetric to the origin] and $r^2 = a^2\cdot\cos(2\theta)$ [symmetric to the x-axis]
If the coefficient of θ is a number other than 1 or 2, a deformed lemniscates will result.



$r^2 = a^2\cdot\sin(2\theta)$



$r^2 = a^2\cdot\cos(2\theta)$



$r^2 = a^2\cdot\cos(1.3\theta)$

Match the polar equations with their graphs below.

E 1) $r = 3 - \cos\theta$

D 2) $r = 2 - 2\sin\theta$

F 3) $r = 5\cos(3\theta)$

B 4) $r = 2 - 2\cos\theta$

I 5) $r = 3 - 1.5\sin\theta$

C 6) $r = 3.5\cos(2\theta)$

G 7) $r = 5\sin(3\theta)$

J 8) $r^2 = -16\cos(2\theta)$

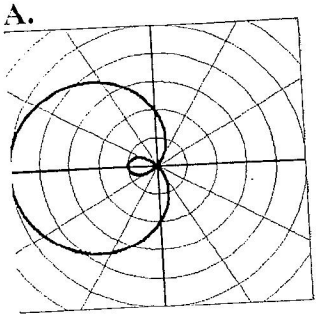
A 9) $r = 2 - 3\cos\theta$

H 10) $r = 3\cos(4\theta)$

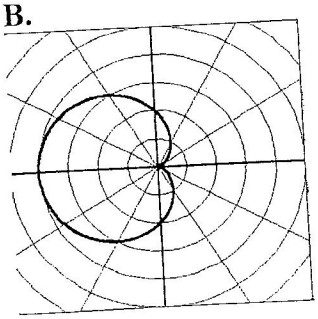
L 11) $r = -4\cos\theta$

K 12) $r = 3.5\sin(2\theta)$

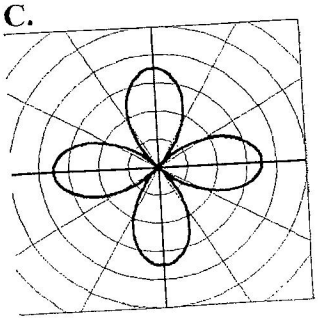
A.



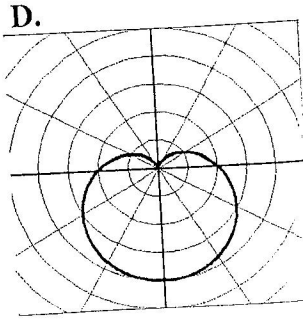
B.



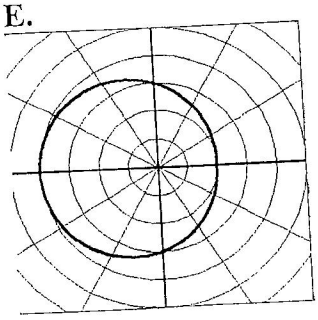
C.



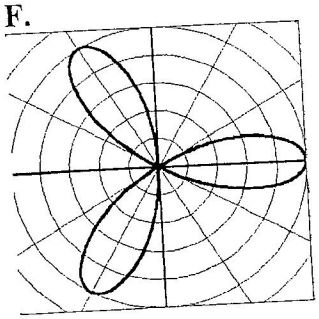
D.



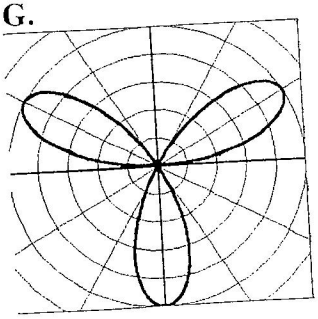
E.



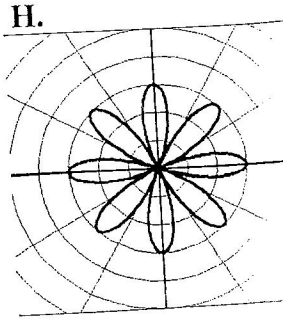
F.



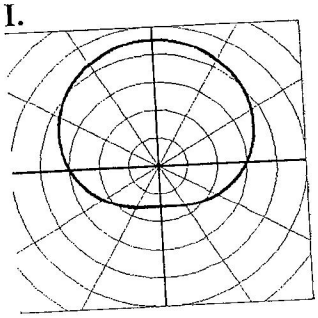
G.



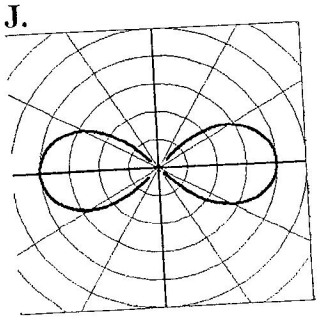
H.



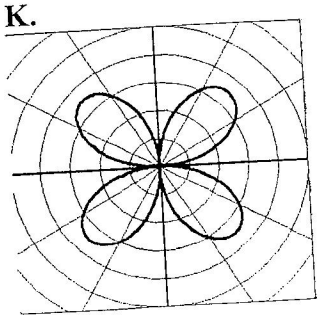
I.



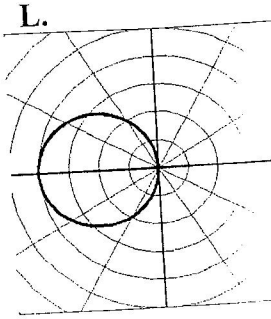
J.



K.



L.



screen 3:2 ratio

xmin	x-max	ymin	ymax
-3	3	-2	2
-6	6	-4	4
-9	9	-6	6