GRAPHS OF THE POLAR EQUATIONS

 $r = a \pm b \cos \theta$ $r = a \pm b \sin \theta$

HOW THE SIZES OF a, b IMPACT THE GENERAL SHAPE OF THE GRAPH

 $r = a \pm b \cos \theta$ $r = a \pm b \sin \theta$







$cardiological r = a + b \cos \theta, where |a|=|b|$ $r = 2 + 2 \cos \theta$















HOW THE TRIGONOMETRIC FUNCTION IMPACTS THE ORIENTATION OF THE GRAPH

 $r = a \pm b \cos \theta$ $r = a \pm b \sin \theta$

$r = a + b \cos \theta$, where a > 0, b > 0 $r = 1 + 2 \cos \theta$



$r = a + b \sin \theta$, where a > 0, b > 0 $r = 1 + 2 \sin \theta$



HOW THE SIGNS OF a, b IMPACT THE DIRECTION OF THE GRAPH

 $r = a \pm b \cos \theta$ $r = a \pm b \sin \theta$

$r = a + b \cos \theta$, where a > 0, b > 0 $r = 1 + 2 \cos \theta$



$r = a + b \cos \theta$, where a > 0, b < 0 $r = 1 - 2 \cos \theta$



$r = a + b \cos \theta$, where a < 0, b > 0 $r = -1 + 2 \cos \theta$



$r = a + b \cos \theta$, where a < 0, b < 0 $r = -1 - 2 \cos \theta$



HOW WOULD YOU FIND THE x- AND y-INTERCEPTS OF A POLAR CURVE $r = f(\theta)$?

BE CAREFUL OF NEGATIVE VALUES OF r (THE INTERCEPTS WILL APPEAR ON THE "OPPOSITE" SIDE OF THE AXIS)

FOR $\theta = 0, \pi/2, \pi$ AND $3\pi/2$

FIND THE VALUES OF r

GRAPHS OF THE POLAR EQUATIONS $r = a \pm b \cos \theta$ $r = a \pm b \sin \theta$

- Determine the shape of the graph by comparing |a| to |b| and 2|b|
- 2. Determine the axis of symmetry from the trigonometric function
- 3. Determine the direction of the "fat" part from the sign of the trigonometric function
- 4. Find and plot the x- and y-intercepts by finding the values of r for $\theta = 0$, $\pi/2$, π AND $3\pi/2$
- 5. Connect and form the appropriate shape

Circles, cardioids and limacons with loops pass through the pole; dimpled and convex limacons do not

PUTTING IT TOGETHER

GUESS THE GRAPH BY DETERMINING THE SHAPE, THE ORIENTATION, THE DIRECTION & THE INTERCEPTS

$$r = -4 - 3 \sin \theta$$



PUTTING IT TOGETHER

GUESS THE GRAPH BY DETERMINING THE SHAPE, THE ORIENTATION, THE DIRECTION & THE INTERCEPTS

 $r = -4 + 4 \cos \theta$





GRAPHS OF THE POLAR EQUATIONS

 $r = a \cos n\theta$ $r = a \sin n\theta$

HOW THE VALUE OF n IMPACTS THE GENERAL SHAPE OF THE GRAPH

 $r = a \cos n\theta$ $r = a \sin n\theta$













PUTTING IT TOGETHER

GUESS THE EQUATION OF A ROSE CURVE WITH [a] 16 petals [b] 15 petals [c] 14 petals

PUTTING IT TOGETHER

[a] $r = a \sin 8\theta$ or $r = a \sin 8\theta$ [b] $r = a \sin 15\theta$ or $r = a \sin 15\theta$ [c] no such rose curve

HOW THE TRIGONOMETRIC FUNCTION IMPACTS THE ORIENTATION OF THE GRAPH

 $r = a \cos n\theta$ $r = a \sin n\theta$























