Polar Graphs Summary

CIRCLE/CARDIOID SUMMARY

- $r = a$ _____ is the graph of a <u>CIRCLE</u> centered _at origin_ with a radius of length __a__.

- $\theta = n$ _____ is the graph of a <u>LINE</u> passing through the _origin____.

- $r = a\cos\theta \quad r = a\sin\theta$ is the graph of a <u>CIRCLE</u> with one endpoint of its _diameter_ located at the origin.

- $r = a \pm a\cos\theta \quad r = a \pm a\sin\theta$ is the graph of a <u>CARDIOID</u> and follows the same rules as those of a circle.

LIMACON SUMMARY

- $r = a \pm b\cos\theta \quad r = a \pm b\sin\theta$ _____ is the graph of:
    - A <u>LIMACON</u> with an inner loop if __$b > a$____ Stretch > shift
    - A <u>LIMACON</u> without an inner loop if __$b < a$__ stretch < shift
    - What shape is it if $\dfrac{|a|}{|b|} = 1$? _Cardioid____

- The limacon lies along the <u>x-axis</u> if the equation is of the form $r = a \pm b\cos\theta$ and lies along the <u>y-axis</u> if the equation is of the form $r = a \pm b\sin\theta$.

- The limacon has intercepts on the axis it lies on of $a + b$ and $b - a$ and intercepts along the other axis of _$\pm a$____.

- Changing the sign of b, _reflects the limacon_

ROSE SUMMARY

- $r = a\cos n\theta \quad r = a\sin n\theta$ is the graph of a <u>ROSE</u> with _n____ leaves if n is odd, and _$2n$____ leaves if n is even. (Note: n is a whole number greater than 1.)

- The leaves of the rose have a length of __a____

- The spacing between the leaves, in degrees, is $\dfrac{360°}{\text{\# of leaves}}$

- The "first leaf" for $r = a\cos(n\theta)$ occurs at _$0°$____

- The "first leaf" for $r = a\sin(n\theta)$ occurs at _$\dfrac{90}{n}$____

- Multiplying by -1 _reflects the rose____.

<div align="center">CIRCLE/CARTIOID GRAPH SUMMARY</div>

- r = c is the graph of a circle centered at the origin with a radius of length "c".

- θ = **#** is the graph of a line passing through the origin.

- r = acosθ or asinθ is the graph of a circle with one endpoint of its diameter located at the origin.

- $r = a \pm a\cos\theta \ \ or \ \ a \pm a\sin\theta$ is the graph of a cardioid and follows the same rules as those of a circle.

<div align="center">ROSE GRAPH SUMMARY</div>

- $r = a\cos(n\theta) \ \ or \ \ r = a\sin(n\theta)$ is the graph of a rose with n leaves if n is odd, and 2n leaves if n is even. (Note: n is a whole number greater than 1.)

- The leaves of the rose have a length of $|a|$

- The spacing between the leaves, in degrees, is $\dfrac{360°}{\#leaves}$

- The "first leaf" for $r = a\cos(n\theta)$ occurs at $0°$

- The "first leaf" for $r = a\sin(n\theta)$ occurs at $\dfrac{90°}{n}$

- Multiplying by -1, reflects the rose over an axis.

<div align="center">LIMACON GRAPH SUMMARY</div>

- $r = a \pm b\cos\theta \ \ or \ \ r = a \pm b\sin\theta$ is the graph of:

- A limacon with an inner loop if $\dfrac{|a|}{|b|} < 1$ ($|a|$ is smaller than $|b|$)

- A limacon without an inner loop if $\dfrac{|a|}{|b|} > 1$ ($|a|$ is larger than $|b|$)

- What shape is it if $\dfrac{|a|}{|b|} = 1$? A _____

- The limacon lies along the x axis if the equation is of the form $r = a \pm b \cos \theta$ and lies along the y axis if the equation is of the form $r = a \pm b \sin \theta$

- The limacon has intercepts on the axis it lies on of $|a| + |b|$ and $|b| - |a|$ and intercepts along the other axis of $\pm a$.

- Changing the sign of b, reflects the limacon over an axis.