

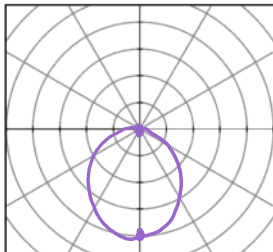
# 6.5 Day 2

Wednesday, May 8, 2019 1:22 PM

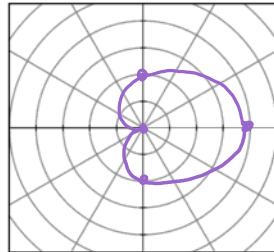
Name Krey

**Opener**

Graph  $r = -4 \sin \theta$



Graph  $r = 2 + 2 \cos \theta$



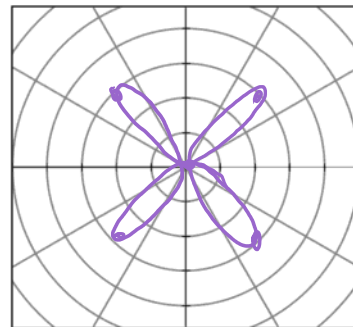
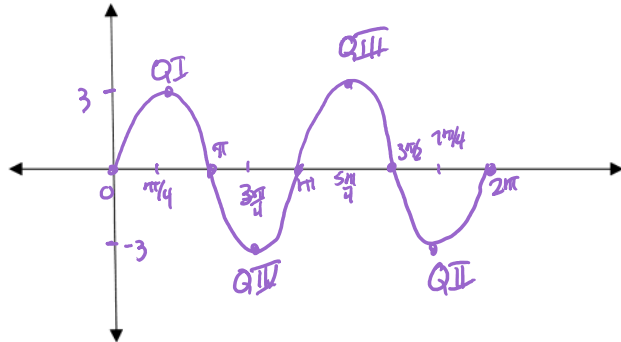
Is there a difference between the graphs of  $r = 2 + 2 \cos \theta$  and  $r = -2 + 2 \cos \theta$ ? Where do each of the graphs begin?

The graphs are the same, however  $r = 2 + 2 \cos \theta$  starts @  $(2, 0)$  and  $r = -2 + 2 \cos \theta$  starts @ the pole.

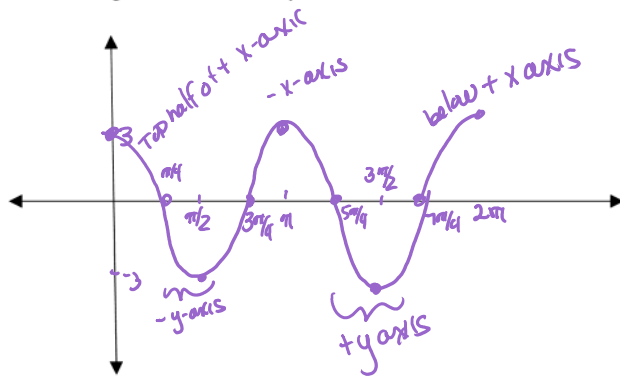
**Notes:**

Graph the function  $y = 3 \sin(2\theta)$  from  $[0, 2\pi]$  in a rectangular coordinate system.

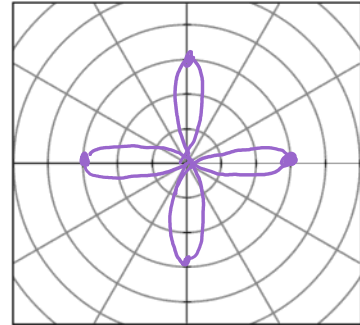
Now graph  $r = 3 \sin(2\theta)$ .



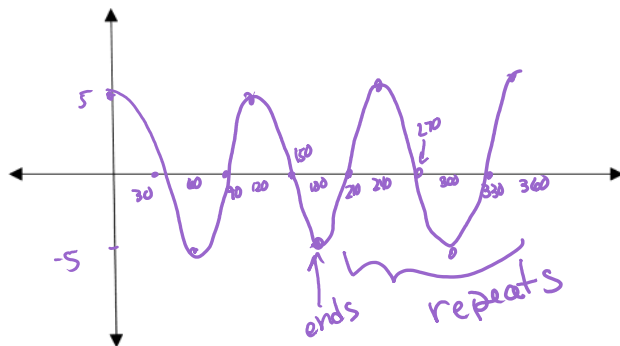
Graph the function  $y = 3 \cos(2\theta)$  from  $[0, 2\pi]$  in a rectangular coordinate system.



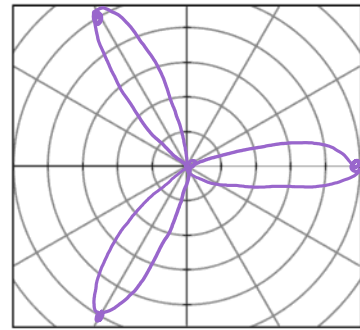
Now graph  $r = 3 \cos(2\theta)$ .



Graph the function  $y = 5 \cos(3\theta)$  from  $[0, 2\pi]$   ~~$[0, 2\pi]$~~   $[0, 360]$  in a rectangular coordinate system.



Now graph  $r = 5 \cos(3\theta)$



Use your graphing calculator to graph a few more, then answer the questions on the next page.

$$r = 4 \cos(4\theta) \quad r = 4 \sin(4\theta)$$

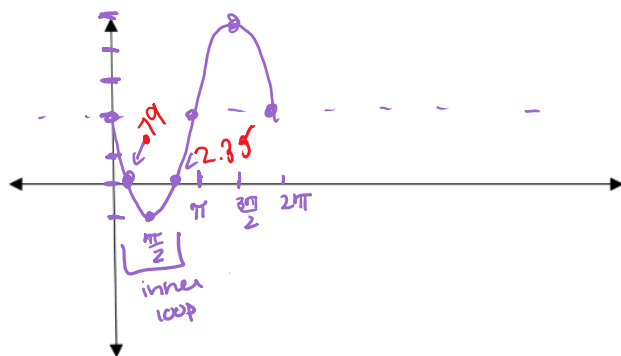
$$r = 2 \cos(5\theta) \quad r = 2 \sin(5\theta)$$

- What determines the length of the rose petals?
- When will the rose have an even number of leaves?
- When will the rose have an odd number of leaves?
- How can you tell how many petals the rose will have?
- How could you determine the spacing, in degrees, between the petals?
- How could you determine at what angle to graph the first petal?

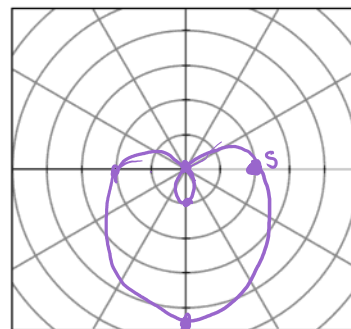
### ROSE GRAPH SUMMARY

- $r = a\cos(n\theta)$  or  $r = a\sin(n\theta)$  is the graph of a rose with  $n$  petals if  $n$  is odd, and  $2n$  petals if  $n$  is even. Note:  $n$  is a whole number greater than 1.
- The petals of the rose have a length of  $|a|$
- The spacing between the petals, in degrees, is  $\frac{360^\circ}{\# \text{ petals}}$
- The "first petal" for  $r = a\cos(n\theta)$  occurs at  $0^\circ$
- The "first petal" for  $r = a\sin(n\theta)$  occurs at  $\frac{90^\circ}{n}$
- Multiplying by  $-1$  reflects all petals through the pole.

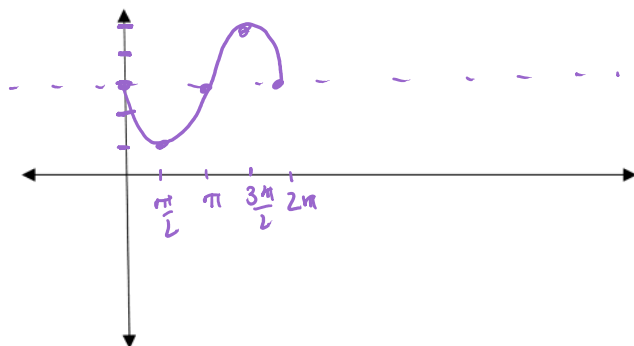
Graph the function  $y = 2 - 3\sin\theta$  from  $[0, 2\pi]$  in a rectangular coordinate system.



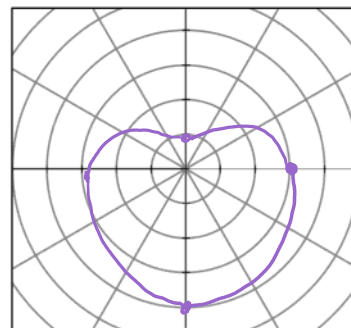
Now graph  $r = 2 - 3\sin\theta$



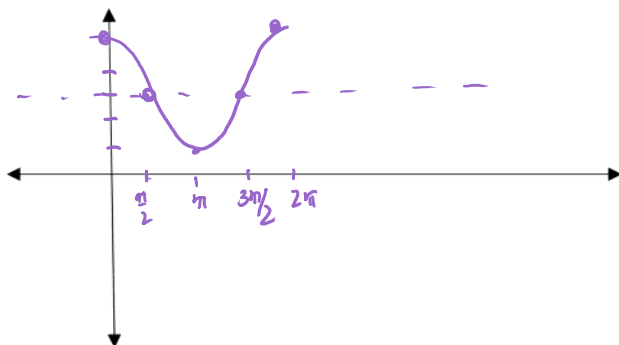
Graph the function  $y = 3 - 2\sin\theta$  from  $[0, 2\pi]$  in a rectangular coordinate system.



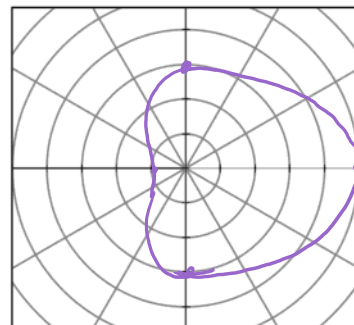
Now graph  $r = 3 - 2\sin\theta$



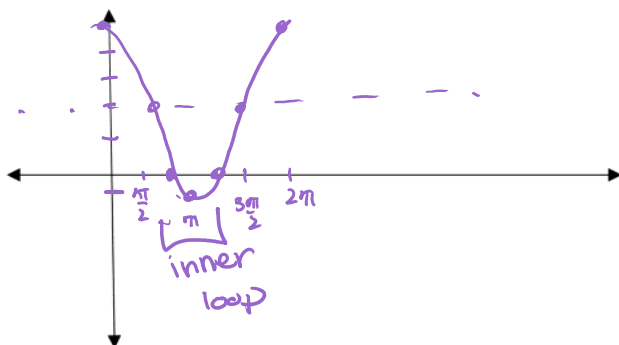
Graph the function  $y = 3 + 2 \cos \theta$  from  $[0, 2\pi]$  in a rectangular coordinate system.



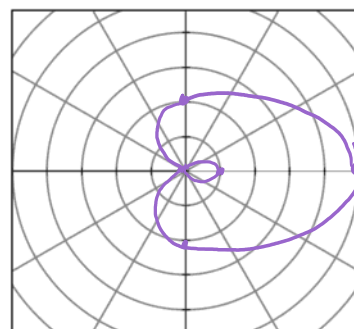
Now graph  $r = 3 + 2 \sin \theta$



Graph the function  $y = 2 + 3 \cos \theta$  from  $[0, 2\pi]$  in a rectangular coordinate system.



Now graph  $r = 2 + 3 \sin \theta$



Use your graphing calculator to graph a few more, then answer the questions on the next page.

$$\begin{array}{ll} r = 2 + 5 \sin \theta & r = 5 + 2 \sin \theta \\ r = 3 - \cos \theta & r = 1 - 3 \cos \theta \end{array}$$

### **What observations can you make???**

- How many different shapes did you get?
- When do you get the shape with an inner loop?
- When do you get the shape without an inner loop?
- What determines whether or not the shape lies along the x or y axis?
- How can you determine where the graph crosses the axes?
- How can you change the equation to reflect the graph across an axis?

### **LIMACON GRAPH SUMMARY**

- $r = a + b\cos\theta$  or  $r = a + b\sin\theta$  is the graph of a limaçon with an inner loop if  $|a| < |b|$  and without an inner loop if  $|a| > |b|$
- The limaçon lies along the x axis if the equation is of the form  $r = a + b\cos\theta$  and lies along the y axis if the equation is of the form  $r = a + b\sin\theta$
- The limaçon has intercepts on the axis it lies on of  $b+a$  and  $b-a$  and intercepts along the other axis of  $\pm a$ .
- Changing the sign of  $b$ , reflects the limaçon over an axis.