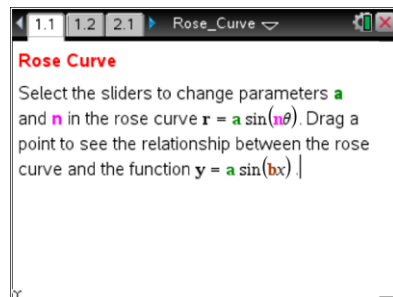




Open the TI-Nspire document *Rose_Curve.tns*

In this activity, you will explore the effect of changing the parameters a and n in the curve $r = a\sin(n\theta)$. You will also explore the relationship between the rose curve $r = a\sin(n\theta)$ and the function $y = a\sin(bx)$.



Move to page 1.2.

1. A polar curve with an equation in the form $r = a\sin(n\theta)$ is called a rose curve. Why do you think this is so?
2. Use the sliders to change the value of n in the equation $r = a\sin(n\theta)$.
 - a. What effect does the value of n have on the graph of the curve?
 - b. Explain what happens to the curve when you increase and decrease the value of n .
3. How many petals does the curve have when $n = 3$? When $n = 4$? Predict the number of petals when $n = 9$ and when $n = 10$.
4. Write a rule to predict the number of petals of a rose curve.
5. Use the sliders to change the value of a in the equation $r = a\sin(n\theta)$. Explain the effect that the value of a has on the graph. Be sure to include a description of what happens to the curve when you increase and decrease the value of a .
6. Explain how your knowledge of sinusoidal functions can help you understand the effect the value of a has on the graph of a rose curve.



Rose Curve

Student Activity



Move to page 2.1.

7. Select point P (located at the origin) and slowly drag it along the function $y = 3\sin(2x)$, $0 \leq x \leq 2\pi$. As you drag point P , you will see the polar curve $r = 3\sin(2\theta)$, $0 \leq \theta \leq 2\pi$ also being sketched.
- Explain the effect of the coefficient 2 on the graph of each of the two curves.
 - What part of the rectangular graph of the function corresponds to the first quadrant petal in polar coordinates? Generalize this idea for all four petals of the curve.
 - What effect does the coefficient 3 have upon the graphs of each of the two curves?

Move to page 2.2 to answer Question 8.

8. What is the equation of a rose curve that would be formed if we dragged point P along the function $y = 5\sin(4x)$?

Move to page 3.1.

9. Drag point P along the function $y = 3\sin(3x)$, $0 \leq x \leq 2\pi$. As you drag P , the polar curve $r = 3\sin(3\theta)$, $0 \leq \theta \leq 2\pi$ will be sketched. Explain why the polar curve $r = 3\sin(3\theta)$ has only three petals, while the function $y = 3\sin(3x)$ has six arches.

Move to pages 3.2 and 3.3 to answer Questions 10 and 11.

10. What is the equation of a rose curve that has 12 petals, each of length 10?
11. What is the equation of a rose curve that has 5 petals, each of length 6?
12. Explain the similarities and differences you would expect if we replaced the sine graphs on pages 2.1 and 3.1 with cosine graphs.