



Graphs of Rational Functions 2

Student Activity



Name _____

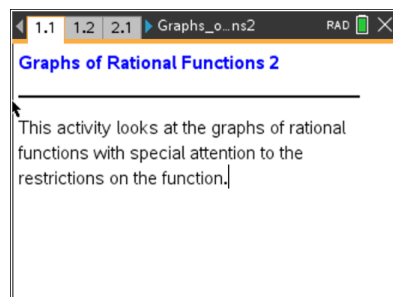
Class _____

Open the TI-Nspire document

Graphs_of_Rational_Functions2.tns.

Some functions have restrictions on their domain and range.

This activity looks at such restrictions for rational functions.



Move to page 1.2.

Grab and drag point P across the screen from left to right.

- 1
 - a. Move slowly toward the y -axis from the left. Record what is happening to the graph.
What is happening to the x -value? What is happening to the y -value?
 - b. Move slowly away from the y -axis toward the right. Record what is happening to the graph.
What is happening to the x -value? What is happening to the y -value?
- 2 Given the equation for the graph: $f(x) = \frac{1}{x}$.
 - a. Explain how the graph changes as the x -value comes closer and closer to zero from the negative side and from the positive side.
 - b. Why is there an asymptote at $x = 0$?
 - c. What is the restriction on the domain of the function? Why?



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- d. Explain how the graph changes as the x -value becomes infinitely large (approaches positive infinity). Why does this happen?

- e. Explain how the graph changes as the x -value becomes infinitely small (approaches negative infinity). Why does this happen?

- f. What is the restriction on the range of the function? Why?

Move to page 2.1.

Grab and drag point P across the screen left and right. Notice the equation of the function listed below the graph.

- 3. Why are the asymptotes dotted and not solid lines?

- 4. Explain the relationship between the equation of the asymptote and the equation of the rational function.

- 5. What transformation is being done to the graph of the rational function $f(x) = \frac{1}{x}$ as you move point P ?

- 6. Move point P so that the asymptote is $x = 3$. Explain how the graph changes as the x -value becomes infinitely large or small (approaches positive or negative infinity). Is this answer different from your answers to question 2a and b?



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7. Write an equation of a rational function with a vertical asymptote at $x = -2$. What is the restriction on the domain for the equation?
8. What would be the equation of the function $f(x) = \frac{1}{x+1}$, $x \neq -1$ after a horizontal shift of 3 units to the right? Include the new restriction.

Move to page 3.1.

Grab and drag points $P1$ and $P2$ across the screen from left to right. Notice the equation of the function listed below the graph.

9. What would be an equation of a rational function with the restrictions $x \neq \pm 1$?
10. a. Describe what happens when $P1 = P2$.
- b. If $P1 = P2 = 2$, how does the graph differ from the graph of $f(x) = \frac{1}{x-2}$, $x \neq 2$?
11. How does the graph of the function $f(x) = \frac{1}{x^2+1}$ differ from the rational functions we have looked at in this activity? You may want to use the Graph feature of the Scratchpad to explore this function or add a Graphs page to this activity.