Graphing Calculator Investigation

A Follow-Up of Lesson 9-3

Sharp EL-9600c

Graphing Rational Functions

A Sharp EL-9600c graphing calculator can be used to explore the graphs of rational functions. These graphs have some features that never appear in the graphs of polynomial functions.

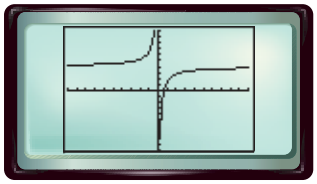
Example 1

Graph $y = \frac{8x - 5}{2x}$ in the standard viewing window. Find the equations of any asymptotes.

- Enter the equation in the Y= list.

KEYSTROKES: [Y=] [(] 8 [X/θ/T/n] [−] 5 [)] [÷] [(] 2 [X/θ/T/n] [)] [ZOOM] 5

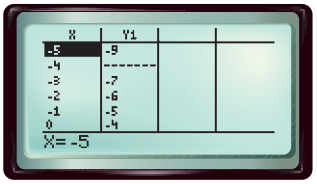
By looking at the equation, we can determine that if $x = 0$, the function is undefined. The equation of the vertical asymptote is $x = 0$. Notice what happens to the y values as x grows larger and as x gets smaller. The y values approach 4. So, the equation for the horizontal asymptote is $y = 4$.



[−10, 10] scl: 1 by [−10, 10] scl: 1

Example 2

Graph $y = \frac{x^2 - 16}{x + 4}$ in the window [−5, 5] by [−10, 2] with scale factors of 1.



- The graph looks like a solid line, however it is not continuous. Use the TABLE feature to find the values of y for x values beginning at −5.

KEYSTROKES: [2nd F] [TBLSET] [ENTER] [▼] −5 [ENTER] 1 [ENTER] [TABLE]

Notice there is not a y value at $x = -4$. This happens because the denominator is 0 when $x = -4$. Therefore, the function is undefined when $x = -4$.

Exercises 1–6. See pp. 519A–519D for graphs.

Use a graphing calculator to graph each function. Be sure to show a complete graph. Draw the graph on a sheet of paper. Write the *x*-coordinates of any points of discontinuity and/or the equations of any asymptotes. 2. $x = -2$, $y = 1$ 4. $x = 2$, $y = \frac{2}{3}$ 5. $x = 1$, $y = 4$

1. $f(x) = \frac{1}{x}$ $x = 0$, $y = 0$
2. $f(x) = \frac{x}{x + 2}$
3. $f(x) = \frac{2}{x - 4}$ $x = 4$, $y = 0$
4. $f(x) = \frac{2x}{3x - 6}$
5. $f(x) = \frac{4x + 2}{x - 1}$
6. $f(x) = \frac{x^2 - 9}{x + 3}$ point discontinuity at $x = -3$

7. Which graph(s) has point discontinuity? 6
8. Describe functions that have point discontinuity. See margin.

www.algebra2.com/other_calculator_keystrokes