



Graphing Calculator Investigation

A Follow-Up of Lesson 9-3

TI-82

Graphing Rational Functions

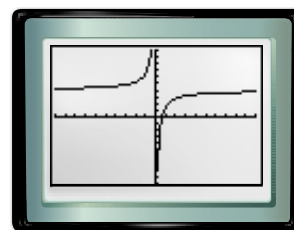
A TI-82 graphing calculator can be used to explore the graphs of rational functions. These graphs have some features that never appear in the graphs of polynomial functions.

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: $\boxed{Y=}$ $\boxed{(}$ $\boxed{8}$ $\boxed{X,T,\theta}$ $\boxed{-}$ $\boxed{5}$ $\boxed{)}$ $\boxed{\div}$ $\boxed{(}$ $\boxed{2}$
 $\boxed{X,T,\theta}$ $\boxed{)}$ \boxed{ZOOM} $\boxed{6}$

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 $y = 4$.



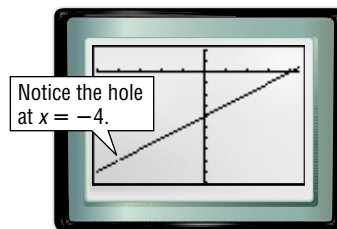
$[-10, 10]$ scl: 1 by $[-10, 10]$ scl: 1

Example 2 Graph $y = \frac{x^2 - 16}{x + 4}$ in the window $[-5, 4.4]$ by $[-10, 2]$ with scale factors of 1.

- Because the function is not continuous, put the calculator in dot mode.

KEYSTROKES: \boxed{MODE} $\boxed{\nabla}$ $\boxed{\nabla}$ $\boxed{\nabla}$ $\boxed{\nabla}$ $\boxed{\blacktriangleright}$ \boxed{ENTER}

This graph looks like a line with a break in continuity at $x = -4$. This happens because the denominator is 0 when $x = -4$. Therefore, the function is undefined when $x = -4$.



$[-5, 4.4]$ scl: 1 by $[-10, 2]$ scl: 1

If you TRACE along the graph, when you come to $x = -4$, you will see that there is no corresponding y value.

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.

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