

Graphing Technology Lab

Graphing Rational Functions

Casio FX-9750G

A Casio FX-9750G graphing calculator can be used to explore graphs of rational functions. These graphs have some features that never appear in the graphs of polynomial functions.

ACTIVITY 1 Graph with Asymptotes

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

Clear the calculator memory and set the viewing window to standard.

Select MEM from the main menu; \blacktriangledown [Reset] F1 MENU 5 SHIFT

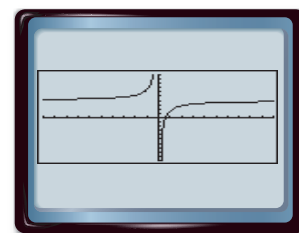
[V-Window] F3 EXE

Step 1 Enter the equation in the Graph Func menu and then graph.

KEYSTROKES: (8 X,θ,T - 5) ÷
(2 X,θ,T) EXE F6

Step 2 Examine the graph.

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

ACTIVITY 2 Graph with Point Discontinuity

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

Step 1 Because the function is not continuous, put the calculator in plot mode.

KEYSTROKES: SHIFT [SET UP] F2 EXIT

Step 2 Enter the equation and change the viewing window.

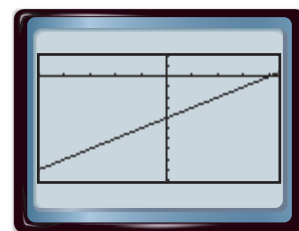
KEYSTROKES: \blacktriangle F2 F1 (X,θ,T x^2 - 16) ÷ (X,θ,T
+ 4) EXE SHIFT F3 (←) 5 EXE 4.4 EXE \blacktriangledown
(←) 10 EXE 2 EXE EXE F6

Examine the graph.

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 $x = -4$.

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

Press SHIFT [Trace], then use \blacktriangleleft or \blacktriangleright to get near -4 .



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

Exercises

Use a graphing calculator to graph each function. Write the x -coordinates of any points of discontinuity and/or the equations of any asymptotes.

1. $f(x) = \frac{1}{x}$

2. $f(x) = \frac{x}{x+2}$

3. $f(x) = \frac{2}{x-4}$

4. $f(x) = \frac{2x}{3x-6}$

5. $f(x) = \frac{4x+2}{x-1}$

6. $f(x) = \frac{x^2-9}{x+3}$