EXPLORE Rational Functions

Given:
$$f(x) = \frac{x^2-4}{x^2-x-6}$$

What is the domain of f(x)?
All reals except . . .

2. Graph f(x) in a friendly viewing rectangle (TI-81: [-4.7,4.8] by [-5,5]; TI-82/83: [-4.7,4.7] by [-5,5]; TI-85 [-6.3,6.3] by [-5,5].

TRACE the graph from left to right across the screen. Where is f(x) undefined?

Describe what happens to the graph of f(x) at each x-value for which f(x) is undefined:

3. A vertical asymptote occurs at a place on a graph where the function is undefined and the graph grows towards positive or negative infinity on each side of the undefined point. Does f(x) have a vertical asymptote?

4. A **hole** occurs where f(x) is undefined at a single point, but the graph would be continuous if that single point was not missing. Does f(x) have a hole in its graph? Where?

5. Write f(x) in factored form: f(x) =

(a) How could you use the equation of f(x) to predict where a vertical asymptote will occur in the graph?

(b) How could you use the equation of f(x) to predict where a hole will occur in the graph?

6. TRACE the graph of f(x) to the right beyond the current viewing rectangle. Continue to trace to the right for awhile. What seems to happen to the y-coordinates as x gets large?

7. TRACE the graph of f(x) to the left beyond the current viewing rectangle. Continue to trace to the left for awhile. What seems to happen to the y-coordinates as x gets small?

8. What is the end-behavior of the graph of f(x)?