3-7

Practice

Graphs of Rational Functions

Determine the equations of the vertical and horizontal asymptotes, if any, of each function.

1. $f(x) = \dfrac{4}{x^2 + 1}$
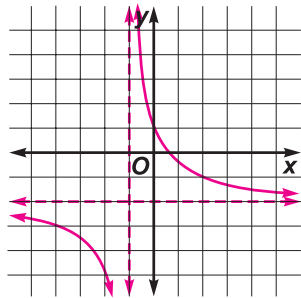
$y = 0$

2. $f(x) = \dfrac{2x + 1}{x + 1}$

$x = -1, y = 2$

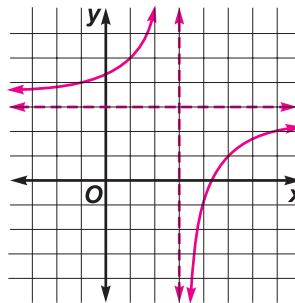**3.** $g(x) = \dfrac{x + 3}{(x + 1)(x - 2)}$

$x = -1, x = 2, y = 0$

Use the parent graph $f(x) = \dfrac{1}{x}$ to graph each equation. Describe the transformation(s) that have taken place. Identify the new locations of the asymptotes.

4. $y = \dfrac{3}{x + 1} - 2$

expanded vertically by a factor of 3; translated left 1 unit and down 2 units; $x = -1, y = -2$

5. $y = -\dfrac{4}{x - 3} + 3$

reflected over x-axis; expanded vertically by a factor of 4; translated right 3 units and up 3 units; $x = 3, y = 3$
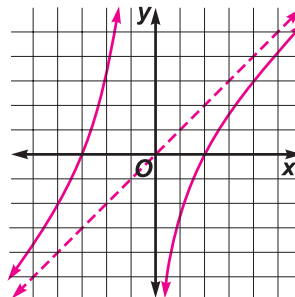
Determine the slant asymptotes of each equation.

6. $y = \dfrac{5x^2 - 10x + 1}{x - 2}$

$y = 5x$

7. $y = \dfrac{x^2 - x}{x + 1}$

$y = x - 2$

8. Graph the function $y = \dfrac{x^2 + x - 6}{x + 1}$.

9. *Physics* The illumination I from a light source is given by the formula $I = \dfrac{k}{d^2}$, where k is a constant and d is distance. As the distance from the light source doubles, how does the illumination change? **It decreases by one fourth.**