1. The variables x and y vary inversely, and $y = 2$ when $x = 5$. Write an equation that relates x and y. Then find y when $x = 4$.

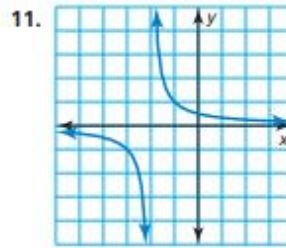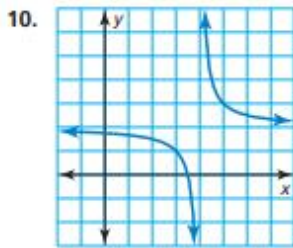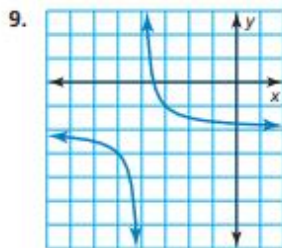2. Graph $f(x) = \dfrac{5x + 7}{x + 1}$. Find the domain and range.

Perform the indicated operation.

3. $\dfrac{3x^2y}{4x^3y^5} \div \dfrac{6y^2}{2xy^3}$

4. $\dfrac{3x}{x^2 + x - 12} - \dfrac{6}{x + 4}$

5. $\dfrac{x^2 - 3x - 4}{x^2 - 3x - 18} \cdot \dfrac{x - 6}{x + 1}$

6. $\dfrac{4}{x + 5} + \dfrac{2x}{x^2 - 25}$

Solve the equation.

7. $\dfrac{15}{2x - 1} = \dfrac{x + 11}{x - 1}$

8. $\dfrac{x}{x + 4} = \dfrac{16}{x^2 + 4x} + \dfrac{2}{x}$

The graph shows the function $y = \dfrac{1}{x - h} + k$. Determine whether the value of each constant h and k is *positive*, *negative*, or *zero*. Explain your reasoning.

9.

10.

11.

12. Let $g(x) = \dfrac{(x + 3)(x - 2)}{x + 3}$. Simplify $g(x)$. Determine whether the graph of $f(x) = x - 2$ and the graph of g are different. Explain your reasoning.

13. The asymptote of the graph of $g(x) = 3^x + 4$ is the same as the horizontal asymptote of the graph of $f(x) = \dfrac{ax + 1}{2x - 3}$. Find the value of a.

14. The initial cost to start a beekeeping business is $500. The cost to collect, clean, bottle, and label the honey is $1.25 per pound. How many pounds of honey must be produced for the average cost per pound to fall to $1.75? Justify your answer.

15. You can use a simple lever to lift a 300-pound rock. The force F (in foot-pounds) needed to lift the rock is inversely related to the distance d (in feet) from the pivot point of the lever. To lift the rock, you need 60 pounds of force applied to a lever with a distance of 10 feet from the pivot point. What force is needed when you increase the distance to 15 feet from the pivot point? Justify your answer.