

## Rational and Radical Functions

1. Alice can clean the kitchen in 20 minutes. Her brother takes twice as long as Alice to do the same amount of work. If they work together, how long would it take them to clean the kitchen?

13.3 minutes

2. Fred and Wilma worked 2 hours to paint the fence. On her own, Wilma takes 5 hours. How long would it take Fred to paint the fence if he painted the fence by himself?

3.3 hours

3. A rational function has a vertical asymptote at  $x=4$  and a horizontal asymptote at  $y=-2$ . Write a possible equation for this function. Express your final answer as one fraction.

$$\frac{-2x + 9}{x - 4}$$

4. A rational function has a vertical asymptote at  $x=2$  and a hole at  $x=-3$ . The function also has a horizontal asymptote at  $y=-3$ . Write a possible equation for this function. Express your final answer as one fraction.

$$\frac{-3x^2 + 10x + 3}{x^2 + x - 6}$$

5. (challenge) A rational function has a vertical asymptote at  $x=4$  and a slanted asymptote at  $y = 2x + 1$ . Write a possible equation for this function. Express your final answer as one fraction.

$$\frac{2x^2 - 3x - 4}{x - 4}$$

6. Find the domain, asymptotes, and hole(s) for the functions below.

a.  $f(x) = \frac{-3x^2-10}{x^2+x-12}$

Domain:  $(-\infty, -4) \cup (-4, 3) \cup (3, \infty)$

VA:  $x=-4$  and  $x=3$

HA:  $y = -3$

No holes

c.  $h(x) = \frac{x-3}{x^2+4x-21}$

Domain:  $(-\infty, -7) \cup (-7, 3) \cup (3, \infty)$

VA:  $x=-7$

Hole: @ 3

HA:  $y=0$

b.  $g(x) = \frac{x^2-10x+25}{x+1}$

Domain:  $(-\infty, -1) \cup (-1, \infty)$

VA:  $x=-1$ , no holes

HA: None

SA:  $y=x-11$

d.  $k(x) = \frac{x^2+5x+6}{x^2-x-6}$

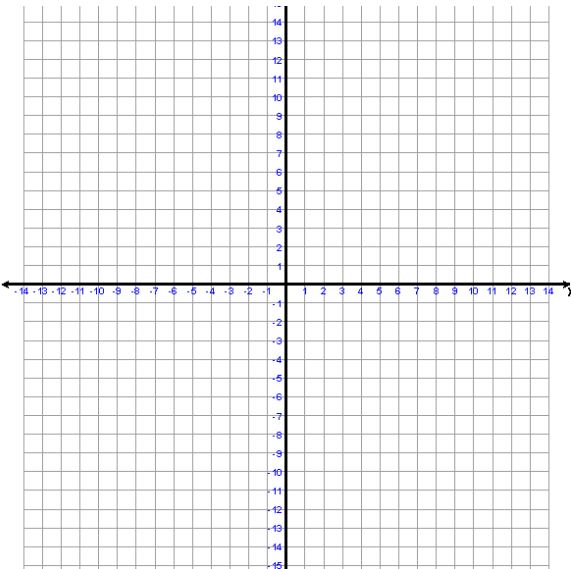
Domain:  $(-\infty, -2) \cup (-2, 3) \cup (3, \infty)$

VA:  $x=3$

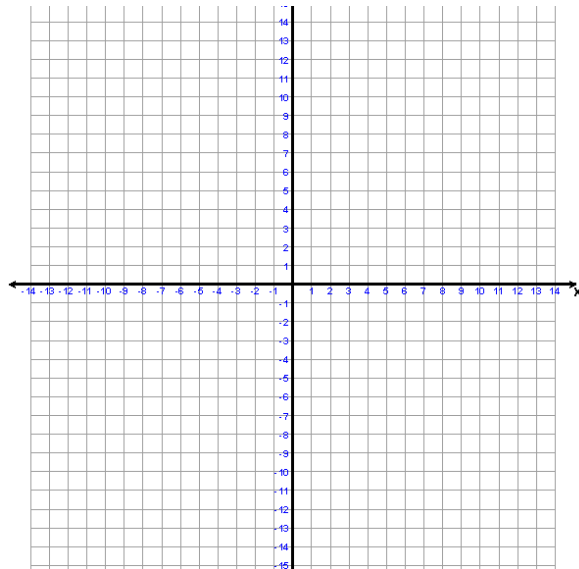
Hole @ -2

HA:  $y=1$

7. Graph:  $b(x) = \frac{3x+7}{x+2}$



8. Graph:  $c(x) = \frac{x^2+10x+21}{x^2+11x+28}$



9.

Simplify

a.  $\frac{\frac{2}{x} \cdot \frac{5x}{x+2}}{\frac{x-3}{x}}$

$\frac{-5x^2+2x+4}{x^2-x-6}$

b.  $\frac{x}{x+4} + 1$

$\frac{2x+4}{x+4}$

c.  $\frac{x^2-3x-28}{x^2+4x+3} \cdot \frac{x+2}{7-x}$

$\frac{-x^2-6x-8}{x^2+4x+3}$

10. Solve

a.  $\frac{1}{2x^2} + \frac{3}{2x} = \frac{1}{x^2}$   $x = \frac{1}{3}$

b.  $\frac{1}{2n-3} + 2 = \frac{7}{2n-3}$   $n=3$

c.  $\frac{1}{x^2-5x} = \frac{x+7}{x} - 1$   $x = 36/7$

11. Solve

a.  $\sqrt{2x-1} - 1 = 6$   $x=25$

b.  $\sqrt{2x-3} - \sqrt{2x+8} = 0$  **No solutions**

c.  $\sqrt[3]{2x+1} = 7$   $x=171$

d.  $\sqrt{x+7} + 1 = \sqrt{x+16}$   $x=9$