

## Test Review - Unit 10 - Rational Functions

Simplify each expression.

1)  $\frac{10}{10a + 30} \cdot \frac{a^2 + 9a + 8}{a^2 + 10a + 16}$

$$\frac{a + 1}{(a + 3)(a + 2)}$$

3)  $\frac{5x + 30}{x^2 + 7x + 10} \cdot \frac{x + 2}{x^2 + 15x + 54}$

$$\frac{5}{(x + 5)(x + 9)}$$

5)  $\frac{3m - 3}{m^2 + 8m - 9} \cdot \frac{m + 4}{m^2 + 10m + 24}$

$$\frac{3}{(m + 9)(m + 6)}$$

7)  $\frac{2}{7a^2 + 35a} \cdot \frac{a^2 + 13a + 40}{9a^3 + 72a^2}$

$$\frac{2}{63a^3}$$

9)  $\frac{p^2 - 5p - 50}{p^2 + 14p + 45} \cdot \frac{p^2 + 2p - 63}{p - 10}$

$$p - 7$$

11)  $\frac{5x^3 + 20x^2}{x + 4} \cdot \frac{35x - 40}{70x^3 - 80x^2}$

$$\frac{5}{2}$$

13)  $\frac{x^2 + 5x - 24}{7x - 21} \cdot \frac{x - 7}{5x + 40}$

$$\frac{x - 7}{35}$$

15)  $\frac{3n + 24}{n + 8} \cdot \frac{n^2 - 100}{7n - 70}$

$$\frac{3(n + 10)}{7}$$

2)  $\frac{30a - 30}{4} \cdot \frac{54}{30a - 30}$

$$\frac{27}{2}$$

4)  $\frac{v^2 + 10v + 24}{v^2 - 19v + 90} \cdot \frac{v^2 - 16v + 63}{v^2 - 3v - 28}$

$$\frac{v + 6}{v - 10}$$

6)  $\frac{m^2 + 10m + 24}{7m + 28} \cdot \frac{m^2 - 13m + 40}{m^2 + m - 30}$

$$\frac{m - 8}{7}$$

8)  $\frac{v^2 + v - 30}{2v^2 + 12v} \cdot \frac{2v}{9v + 36}$

$$\frac{v - 5}{9(v + 4)}$$

10)  $\frac{x^2 + 9x + 20}{x^2 + 2x - 8} \cdot \frac{x^2 - 9x + 14}{2x + 10}$

$$\frac{x - 7}{2}$$

12)  $\frac{9r + 6}{r^2 + 11r + 24} \cdot \frac{r^2 + r - 6}{9r + 6}$

$$\frac{r - 2}{r + 8}$$

14)  $\frac{v - 8}{v^2 + v - 72} \cdot \frac{v^2 + 3v - 4}{v^2 + 8v + 16}$

$$\frac{v - 1}{(v + 9)(v + 4)}$$

16)  $\frac{n^2 - 2n - 24}{n - 6} \div \frac{n^2 + n - 72}{n^2 - 5n - 24}$

$$\frac{(n + 3)(n + 4)}{n + 9}$$

$$17) \frac{9v^3 - 27v^2}{5v^3 + 10v^2} \div \frac{v^2 + 5v - 24}{v^2 + 10v + 16}$$

$$\frac{9}{5}$$

$$19) \frac{n + 7}{8n + 16} \div \frac{2n + 14}{n^2 + 7n + 10}$$

$$\frac{n + 5}{16}$$

$$21) \frac{9v - 90}{10v} \div \frac{v^2 - 9v - 10}{v^2 - 5v - 6}$$

$$\frac{9(v - 6)}{10v}$$

$$23) \frac{2x - 2}{x + 5} \div \frac{x^2 - 16x + 63}{x^2 - 2x - 35}$$

$$\frac{2(x - 1)}{x - 9}$$

$$25) \frac{p^2 - 11p + 28}{p^2 - 49} \div \frac{1}{p^2 - 3p - 70}$$

$$(p - 4)(p - 10)$$

$$27) \frac{8n + 40}{40n - 56} \div \frac{n + 5}{10n^2 - 14n}$$

$$2n$$

$$29) \frac{x^2 + 11x + 10}{x + 10} \div \frac{x^2 + 8x - 20}{x^2 + 19x + 90}$$

$$\frac{(x + 9)(x + 1)}{x - 2}$$

$$31) \frac{5v}{4v + 4} - \frac{v + 3}{4v + 4}$$

$$\frac{4v - 3}{4v + 4}$$

$$33) \frac{2k - 3}{9k^2 + 36k} + \frac{k + 4}{9k^2 + 36k}$$

$$\frac{3k + 1}{9k^2 + 36k}$$

$$18) \frac{3k - 3}{6k - 24} \div \frac{3k}{16k^2 - 64k}$$

$$\frac{8(k - 1)}{3}$$

$$20) \frac{b^2 + 14b + 48}{b^2 - b - 72} \div \frac{b + 6}{3b - 27}$$

$$3$$

$$22) \frac{n^2 + 11n + 18}{n + 9} \div \frac{3n + 12}{n^2 + 5n + 4}$$

$$\frac{(n + 1)(n + 2)}{3}$$

$$24) \frac{4n - 32}{n + 10} \div \frac{n^2 - 13n + 40}{n^2 + 5n - 50}$$

$$4$$

$$26) \frac{8p - 56}{p + 4} \div \frac{p^2 - 12p + 35}{p^2 - 16}$$

$$\frac{8(p - 4)}{p - 5}$$

$$28) \frac{30p^2 - 54p}{p + 2} \div \frac{25p - 45}{5p + 10}$$

$$6p$$

$$30) \frac{x^2 - 7x - 8}{15x + 9} \div \frac{x^2 - 64}{15x + 9}$$

$$\frac{x + 1}{x + 8}$$

$$32) \frac{x + 5}{2x^2 - 13x + 6} - \frac{x + 2}{2x^2 - 13x + 6}$$

$$\frac{3}{2x^2 - 13x + 6}$$

$$34) \frac{n - 1}{n^2 - n - 2} - \frac{n + 1}{n^2 - n - 2}$$

$$-\frac{2}{n^2 - n - 2}$$

$$35) \frac{2n}{6} - \frac{n+5}{3n-5}$$

$$\frac{3n^2 - 8n - 15}{3(3n-5)}$$

$$36) \frac{3x}{x+3} - \frac{5}{x+1}$$

$$\frac{3x^2 - 2x - 15}{(x+3)(x+1)}$$

$$37) \frac{2}{2x-8} + \frac{5x}{3}$$

$$\frac{3 + 5x^2 - 20x}{3(x-4)}$$

$$38) \frac{3}{5n-2} - \frac{6}{2n+1}$$

$$\frac{-24n + 15}{(5n-2)(2n+1)}$$

$$39) \frac{4x}{x-2} + \frac{5}{x-6}$$

$$\frac{4x^2 - 19x - 10}{(x-6)(x-2)}$$

$$40) \frac{4x}{x+3} + \frac{5x}{6}$$

$$\frac{39x + 5x^2}{6(x+3)}$$

$$41) \frac{6a}{5a+1} - \frac{4}{a+1}$$

$$\frac{6a^2 - 14a - 4}{(a+1)(5a+1)}$$

$$42) \frac{2b}{b+5} - \frac{3}{2}$$

$$\frac{b-15}{2(b+5)}$$

$$43) \frac{p-2}{4p+10} + \frac{2}{3}$$

$$\frac{11p+14}{6(2p+5)}$$

$$44) \frac{2}{a-5} - \frac{4}{6}$$

$$\frac{16-2a}{3(a-5)}$$

$$45) \frac{a+6}{a-4} + \frac{2a}{a-3}$$

$$\frac{3a^2 - 5a - 18}{(a-4)(a-3)}$$

$$46) \frac{2}{m+5} + \frac{6m}{3m+6}$$

$$\frac{12m+4+2m^2}{(m+5)(m+2)}$$

$$47) \frac{2}{3} - \frac{6}{n-3}$$

$$\frac{2n-24}{3(n-3)}$$

$$48) \frac{6a}{a-2} - \frac{5}{a-4}$$

$$\frac{6a^2 - 29a + 10}{(a-4)(a-2)}$$

$$49) \frac{2}{5v+4} + \frac{2}{5v-4}$$

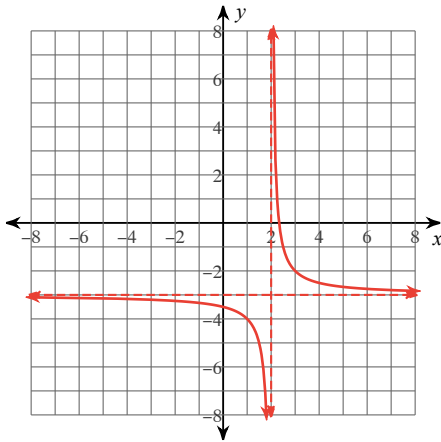
$$\frac{20v}{(5v-4)(5v+4)}$$

$$50) \frac{6b}{2b+6} - \frac{6}{2}$$

$$-\frac{9}{b+3}$$

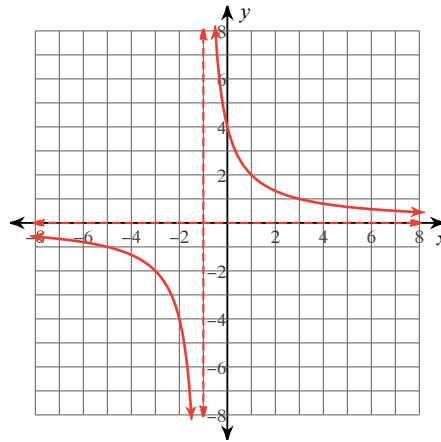
Identify the points of discontinuity and vertical asymptotes of each. Then sketch the graph.

$$51) f(x) = \frac{1}{x-2} - 3$$



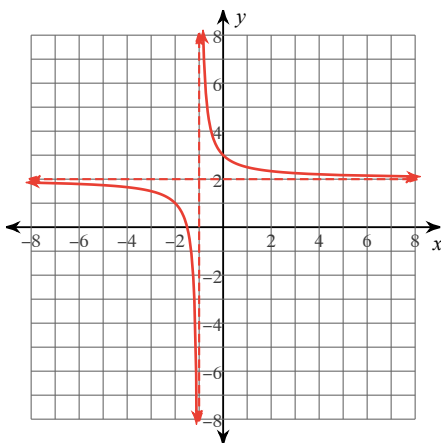
Discontinuities: 2  
Vertical Asym.:  $x = 2$

$$52) f(x) = \frac{4}{x+1}$$



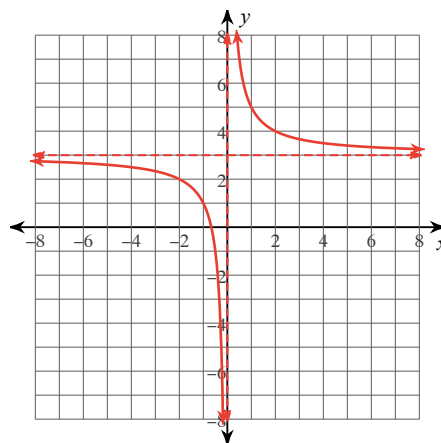
Discontinuities: -1  
Vertical Asym.:  $x = -1$

$$53) f(x) = \frac{1}{x+1} + 2$$



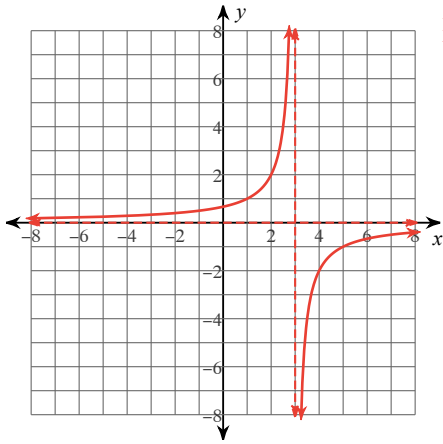
Discontinuities: -1  
Vertical Asym.:  $x = -1$

$$54) f(x) = \frac{2}{x} + 3$$



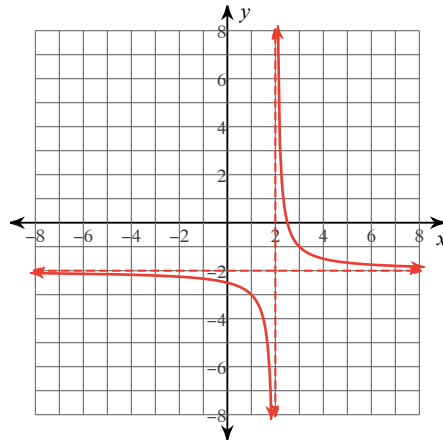
Discontinuities: 0  
Vertical Asym.:  $x = 0$

$$55) f(x) = -\frac{2}{x-3}$$



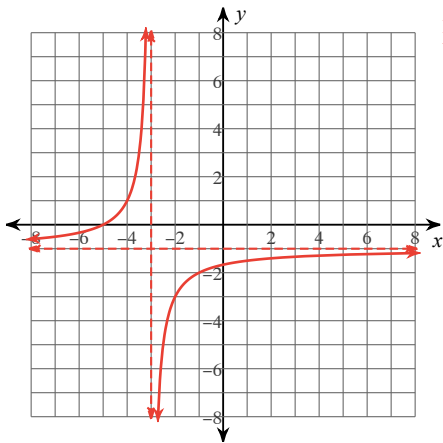
Discontinuities: 3  
Vertical Asym.:  $x = 3$

$$56) f(x) = \frac{1}{x-2} - 2$$



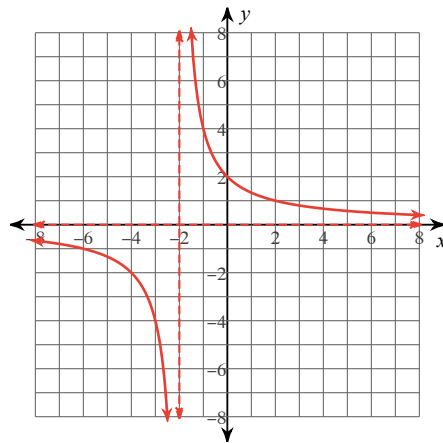
Discontinuities: 2  
Vertical Asym.:  $x = 2$

$$57) f(x) = -\frac{2}{x+3} - 1$$



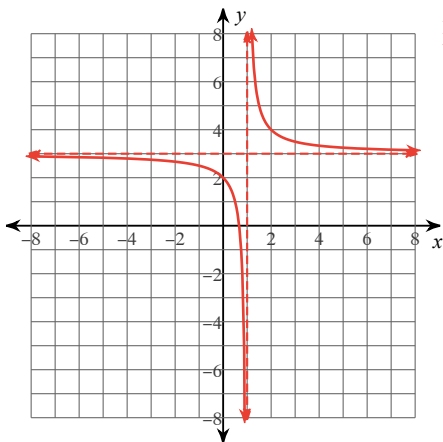
Discontinuities: -3  
Vertical Asym.:  $x = -3$

$$58) f(x) = \frac{4}{x+2}$$



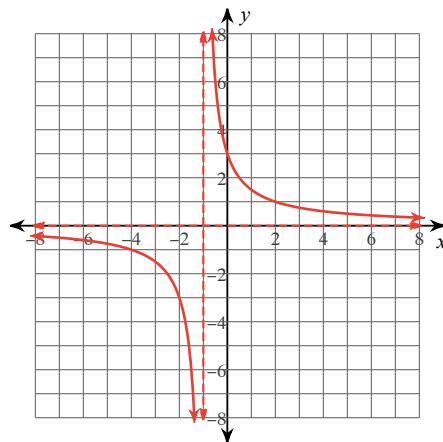
Discontinuities: -2  
Vertical Asym.:  $x = -2$

$$59) f(x) = \frac{1}{x-1} + 3$$



Discontinuities: 1  
Vertical Asym.:  $x = 1$

$$60) f(x) = \frac{3}{x+1}$$



Discontinuities: -1  
Vertical Asym.:  $x = -1$