

8-1 to 8-4 Review

1) Suppose  $x$  and  $y$  vary inversely and  $x = 13$  when  $y = 17$ . Find  $x$  when  $y = 45$ .

$y = \frac{k}{x}$   
 $17 = \frac{k}{13} \quad k = 221 \quad y = \frac{221}{x} \quad 45 = \frac{221}{x} \quad 45x = 221$   
 $x = \frac{221}{45}$

2) Is the relationship between the ordered pairs listed direct variation, inverse variation or neither? Explain how you know.

- $\{(2, -4.8), (6, -14.4), (12, -28.8), (19, -45.6)\}$

$-4.8 = \frac{k}{2} \quad k = -9.6 \quad -14.4 = \frac{k}{6} \quad k = -86.4$

$x \rightarrow$  gets bigger  
 $y \rightarrow$  gets smaller  $\leftarrow$  check inverse  
 $y = kx \quad -4.8 = 2k$   
 $k = -2.4$

The relationship is direct variation. It follows the equation  $y = -2.4x$ . I checked the  $k$ -value for every ordered pair.

3)  $z = 30$  when  $x = 3$  and  $y = 2$ , and  $z$  varies directly with  $x$  and inversely with  $y$ . Find  $k$  and write an equation that models this relationship.

$z = \frac{kx}{y} \quad 30 = \frac{k(3)}{2} \quad k = 20 \quad z = \frac{20x}{y}$

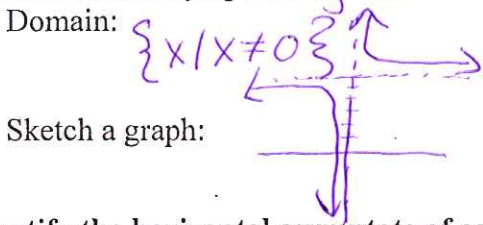
Transformations: Write the transformations of the parent function  $y = \frac{1}{x}$  to the new function.

4)  $y = \frac{4}{x} + 6$

Transformations: stretch bfo 4, shift up 6

Vertical Asymptote:  $x = 0$

Horizontal Asymptote:  $y = 6$



Sketch a graph:

Identify the horizontal asymptote of each.

5)  $f(x) = \frac{x^2 - 2x - 8}{-3x + 6}$  none

6)  $f(x) = \frac{x^2 + 7x + 12}{4x^2 + 4x - 48}$   $y = 1/4$

7)  $f(x) = -\frac{x^1}{x^2 + x}$   $y = 0$  (topless)

8)  $f(x) = \frac{x^3 + x^2 - 6x}{x^3 - 2x^2 - 3x}$   $y = 1$

Identify the holes and vertical asymptotes of each.

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

Hole: none  
 VA:  $x = 3$  &  $x = -1$

10)  $f(x) = \frac{x^2 - x - 6}{2x^2 - 2x}$   $\frac{x(x-3)(x+2)}{2x(x-1)}$

Hole:  $x = 0$   
 YA:  $x = 1$

Fill in the information below.

11)  $y = \frac{x^2 - 4}{x + 2}$   $\frac{(x+2)(x-2)}{(x+2)}$

Domain:  $\{x | x \neq -2\}$

x-intercepts:  $x = 2$

y-intercepts:  $-\frac{4}{2} = -2$

12)  $y = \frac{16x^3 + x}{x^5 - 4x^3}$   $\frac{x(16x^2 + 1)}{x^3(x^2 - 4)} = \frac{x(16x^2 + 1)}{x^3(x+2)(x-2)}$

Domain:  $\{x | x \neq 0, 2, -2\}$

x-intercepts:  $16x^2 + 1 = 0$   
 $x^2 = -1/16$   $x = \pm \frac{i}{4}$

y-intercepts: none

Simplify each and state the excluded values.

13)  $\frac{18p}{21p^2 + 27p}$   $\frac{18p}{3p(7p+9)}$   
 $\frac{6}{7p+9}$   $p \neq 0, -9/7$

14)  $\frac{r^2 + 2r - 15}{r^2 - r - 56} \cdot \frac{r + 7}{4r^2 - 12r}$   
 $\frac{(r+5)(r-3)}{(r+7)(r-8)} \cdot \frac{(r+7)}{4r(r-3)}$   
 $\frac{r+5}{4r(r-8)}$   $r \neq -7, 8, 0, 3$

15)  $\frac{b^2 + 4b + 4}{7b + 49} \cdot \frac{7b - 14}{b^2 - 4}$   
 $\frac{(b+2)(b+2)}{7(b+7)} \cdot \frac{7(b-2)}{(b+2)(b-2)}$   
 $\frac{b+2}{b+7}$   $b \neq -7, 2, -2$

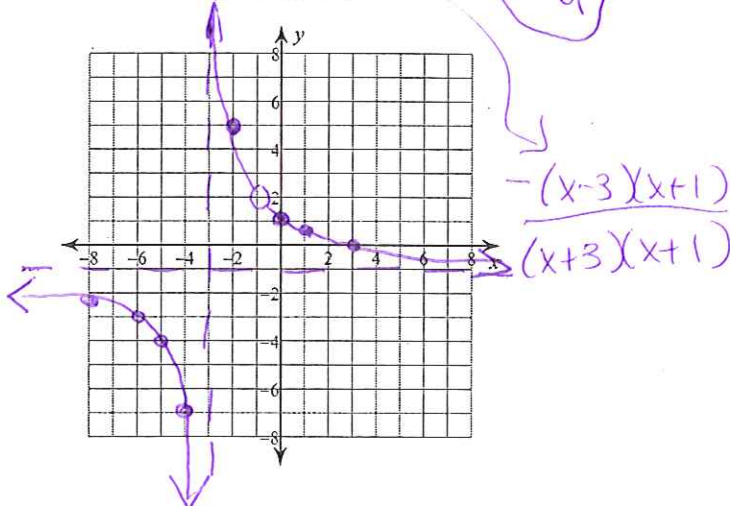
16)  $\frac{x^2 - 5x + 6}{6x^3 - 60x^2} \cdot \frac{x - 10}{4x - 12}$   
 $\frac{(x-3)(x-2)}{6x^2(x-10)} \cdot \frac{(x-10)}{4(x-3)}$   
 $\frac{x-2}{24x^2}$   $x \neq 0, 10, 3$

17)  $\frac{5a^3 + 50a^2}{9a^2} \div \frac{a^2 - 100}{2a^3 - 20a^2}$   
 $\frac{5a^2(a+10)}{9a^2} \div \frac{(a-10)(a+10)}{2a^2(a-10)}$   
 $\frac{5a^2(a+10)}{9a^2} \cdot \frac{2a^2(a-10)}{(a-10)(a+10)}$   
 $\frac{10a^2}{9}$   $a \neq 0, 10, -10$

18)  $\frac{4x^2}{4x^3 + 24x^2} \div \frac{x^2 - 3x - 4}{x^2 + 10x + 9}$   $\frac{4x^2}{4x^2(x+6)} \div \frac{(x-4)(x+1)}{(x+9)(x+1)}$   
 $\frac{4x^2}{4x^2(x+6)} \cdot \frac{(x+9)(x+1)}{(x-4)(x+1)}$   
 $\frac{x+9}{(x+6)(x-4)}$   $x \neq 0, -6, 9, -1, 4$

Graph each function.

19)  $f(x) = \frac{-x^2 + 2x + 3}{x^2 + 4x + 3}$



20)  $f(x) = \frac{4x + 8}{x^3 - x^2 - 6x}$

