

Chapter 8 Review

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

1) $y = \frac{1}{x+1} - 3$ left 1
down 3

Transformations: \nearrow
 Vertical Asymptote: VA @ $x = -1$
 Horizontal Asymptote: HA @ $y = -3$
 Domain: $\mathbb{R}; x \neq -1$
 Range: $\mathbb{R}; y \neq -3$

2) $y = \frac{5}{x+2} + 3$ Stretch by 5
left 2
up 3

Transformations: \nearrow UP 3
 Vertical Asymptote: $x = -2$
 Horizontal Asymptote: $y = 3$
 Domain: $\mathbb{R}; x \neq -2$
 Range: $\mathbb{R}; y \neq 3$

Identify the holes and vertical asymptotes of each.

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

Holes: none

VA @ $x = 3$ & -1

Fill in the information below.

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

H.A.: none $m > n$

V.A.: none

Holes: -2

Domain: $\mathbb{R} x \neq -2$

x-intercepts: $x = 2$

y-intercepts: $y = -2$

4) $f(x) = \frac{-3x + 12}{x^3 - 6x^2 + 8x}$ $\frac{-3(x-4)}{x(x-4)(x-2)}$

$x(x^2 - 6x + 8)$

Holes @ $x = 4$

VA @ $x = 0$ & 2

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

H.A.: $y = 0$

V.A.: $x = 0, \pm \sqrt{2}$

Holes: none

Domain: $\mathbb{R} x \neq 0$

x-intercepts: $x = \text{none}$

y-intercepts: $y = \text{none}$

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↑

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

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 $x(x^2 - 6x + 8)$

Holes @ $x = 4$
 VA @ $x = 0$ & 2

Fill in the information below.

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

H.A.: none $m > n$
 V.A.: none
 Holes: -2
 Domain: $\mathbb{R} x \neq -2$
 x-intercepts: $x = 2$
 y-intercepts: $y = -2$

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

H.A.: $y = 0$
 V.A.: $x = 0, 2$
 Holes: none
 Domain: $\mathbb{R} x \neq 0$
 x-intercepts: $x = \text{none}$
 y-intercepts: $y = \text{none}$

Simplify each and state the excluded values.

$$7) \frac{18p}{21p^2 + 27p} = \frac{18p}{3p(7p+9)}$$

$$\boxed{\frac{6}{(7p+9)}} \quad p \neq 0, -9/7$$

$$8) \frac{k-1}{2k^2 - 2k} = \frac{(k-1)}{2k(k-1)}$$

$$\boxed{\frac{1}{2k}} \quad k \neq 1, 0$$

$$9) \frac{n+5}{12n^3 + 28n^2} \cdot \frac{12n^3 + 28n^2}{10n^3 - 70n^2}$$

$$\frac{(n+5)}{4n^2(3n+7)} \cdot \frac{4n^2(3n+7)}{10n^2(n-7)}$$

$$\boxed{\frac{(n+5)}{10n^2(n-7)}} \quad n \neq 7, 0$$

$$10) \frac{r^2 + 2r - 15}{r^2 - r - 56} \cdot \frac{r+7}{4r^2 - 12r}$$

$$\frac{(r+5)(r-3)}{(r-8)(r+7)} \cdot \frac{(r+7)}{4r(r-3)}$$

$$\boxed{\frac{(r+5)}{4r(r-8)}} \quad r \neq 8, 0$$

$$11) \frac{5a^3 + 50a^2}{9a^2} \div \frac{a^2 - 100}{2a^3 - 20a^2}$$

$$12) \frac{6n + 18}{n^2 - 9} \div \frac{6n - 6}{4n^3 - 12n^2}$$

$$\frac{5a^2(a+10)}{9a^2} \cdot \frac{2a^2(a-10)}{(a+10)(a-10)}$$

$$\frac{6(n+3)}{(n+3)(n-3)} \cdot \frac{4n^2(n-3)}{4n^2(n-1)}$$

$$\frac{10a^4}{9a^2} = \boxed{\frac{10a^2}{9}}$$

$a \neq 0, 10, -10$

$$\frac{4n^2}{n-1} = \boxed{\frac{4n^2}{n-1}}$$

$n \neq 1, 3, -3$

13) A field has a length of $\frac{x^2 + 3x + 2}{x - 4}$ feet and a width of $\frac{x^2 + x - 20}{x^2 + 5x + 6}$ feet. What is the area of the field in simplified form? $A = l \times w.$

$$\frac{(x+2)(x+1)}{(x-4)} \cdot \frac{(x+5)(x-4)}{(x+3)(x+2)} = \boxed{\frac{(x+1)(x+5)}{(x+3)}}$$

14) Suppose that x and y vary inversely. $x = 30$ when $y = 2$. Find y when $x = 5$.

15) Write your own set of 4 ordered pairs in which y varies directly with x .

16) z varies jointly with x and y . When $x = 2$ and $y = 2$, $z = 7$. Find z when $x = 4$ and $y = 8$.

17) Write an equation for the translation of $y = \frac{4}{x}$ that has a horizontal asymptote at $y = 3$ and a vertical asymptote at $x = 4$.

Simplify each expression.

18) $\frac{n-1}{n^2-9} - \frac{5}{n+3}$

$$\frac{n-1}{(n+3)(n-3)} - \frac{5}{(n+3)}$$

$$\frac{n-1}{(n+3)(n-3)} - \frac{5(n-3)}{(n+3)(n-3)} = \frac{-4n+14}{(n+3)(n-3)}$$

19) $\frac{4}{x-3} + \frac{4x+1}{x^2+x-12}$

$$\frac{(x+4)4}{(x+4)(x-3)} + \frac{4x+1}{(x+4)(x-3)}$$

$$\frac{4x+16}{(x+4)(x-3)} + \frac{4x+1}{(x+4)(x-3)} = \frac{8x+17}{(x+4)(x-3)}$$

$$\boxed{\frac{8x+17}{(x+4)(x-3)}}$$

Solve each equation. Remember to check for extraneous solutions.

20) $\frac{x-3}{6x^2} = \frac{1}{6x} + \frac{3}{x}$

$$x-3 = 1x + 18x$$

$$x-3 = 19x$$

$$\frac{-3}{18} = \frac{18x}{18}$$

$$\boxed{x = -\frac{1}{6}}$$

21) $\frac{1}{a^2+5a} = \frac{1}{a+5} + \frac{4}{a^2+5a}$

$$\frac{1}{a(a+5)} = \frac{1}{a+5} + \frac{4}{a(a+5)}$$

$$1 = 1a + 4$$

$$-3 = 1a$$

$$\boxed{a = -3}$$