

Name: _____

7.1 Worksheet: Factoring Review

Factor Completely:

1) $7x^2 - 35x$

2) $4x^2 - 25$

3) $x^2 + 7x + 12$

4) $x^2 - x - 12$

5) $x^2 - 144$

6) $x^2 + 64$

7) $2x^2 + 16x + 32$

8) $-x^2 - 7x + 8$

9) $4x^2 - 3x - 10$

10) $2a^2 - 5a - 3$

11) $y^3 + 12y^2 - 28y$

12) $6a^2 - 24$

13) $a^3 - 64$

14) $3x^3 - 81$

15) $-5x^5 - 40x^2$

16) $6x^2 + 5x - 6$

17) $5x^2 + 9x - 2$

18) $4x^2 + 13x + 10$

19) How can we determine when a rational function is undefined?

(Hint: a rational function is any function that can be written in the form $\frac{f(x)}{g(x)}$, where $g(x) \neq 0$)

20) Which of the following is a factor of the polynomial $2x^2 - 3x - 5$?

A. $x - 1$

B. $2x - 3$

C. $2x - 5$

D. $2x + 5$

E. $3x + 5$

Algebra 2
7.2 Homework

Name: _____

Find the Domain for the following in set notation:

1) $y = \frac{6}{x-1}$

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

3) $y = \frac{10}{x-4} - 1$

4) $\frac{(x+5)(x-3)}{3x(x+10)}$

5) Create a rational expression that is undefined when x is 3 or 0.

Simplify the following and state the domain:

6) $\frac{x^2-3x-10}{x^2-10x+25}$

7) Domain:

8) $\frac{x^2+5x-6}{2x^2+12x}$

9) Domain:

10) $\frac{x^2-6x+9}{x^2+5x-24}$

11) Domain:

12) $\frac{x^3-19x^2+90x}{x^3-100x}$

13) Domain:

14) What is the reduced form of the expression: $\frac{2x^2+9x-5}{6x^2-5x+1}$?

15) What is the x -intercept of the graph of $y = x^2 - 4x + 4$?

- A. -2
- B. -1
- C. 0
- D. 1
- E. 2

16) Write $\frac{5x^3 - 3x^2 - 2x}{x^3 - x^2}$ in its simplest form.

17) $\sqrt{-(-9)^2} = ?$ (Note: $i = \sqrt{-1}$)

- A. $9i$
- B. $9 + i$
- C. $9 - i$
- D. 9
- E. -9

18) Abandoned mines frequently fill with water. Before an abandoned mine can be reopened, the water must be pumped out. The size of pump required depends on the depth of the mine. If pumping out a mine that is D feet deep requires a pump that pumps a minimum of $\frac{D^2}{25} + 4D - 250$ gallons per minute, pumping out a mine that is 150 feet deep would require a pump that pumps a minimum of how many gallons per minute?

- A. 362
- B. 500
- C. 800
- D. 1,250
- E. 1,750

Algebra 2

Name: _____

7.3 Homework

Multiply or divide the following rational expressions, simplify, and state the domain restrictions:

1) $\frac{x^2+4x}{x^2-6x+8} \cdot \frac{x^2-x-2}{3x^3+12x^2}$

2) Domain:

3) $\frac{x^2-36}{x+5} \div (x+6)$

4) Domain:

5) $\frac{x^2+8x-20}{5x^3+50x^2} \div \frac{x^2+9x}{x^2+7x-18}$

6) Domain:

7) $\frac{(x+2)^2}{x-5} \cdot \frac{x^2-2x}{x^2-4}$

8) Domain:

9) $\frac{x^2-4x+4}{15x} \div \frac{x-2}{5x}$

10) Domain:

11) $\frac{x+3}{x^2-36} \cdot \frac{5x+30}{2x^2+7x+3}$

12) Domain:

13) Perform the indicated operation: $\frac{x^2-3x-10}{x^2+2x-3} \div \frac{x+5}{x+3}$

A. $\frac{(x-5)(x+2)}{(x-1)(x+5)}$

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

B. $\frac{(x-5)(x+3)(x+2)}{(x-1)(x-3)(x+5)}$

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

14) The area of a triangle is $3x^2 - 2x - 5$ square units and the base is equal to $x - 1$ units. Write an expression that can be used to represent the height of the triangle.

A. $h = \frac{1}{2}(3x^2 - 2x - 5)(x - 1)$

C. $h = \frac{2(x - 1)}{3x^2 - 2x - 5}$

B. $h = \frac{1}{2}(x - 1)$

D. $h = \frac{2(3x^2 - 2x - 5)}{x - 1}$

15) An industrial cleaner is manufactured using only the 3 secret ingredients A, B, and C, which are mixed in the ratio of 2:3:5, respectively, by weight. How many pounds of secret ingredient B are in a 42-pound (net weight) bucket of this cleaner?

A. 4.2

B. 12.6

C. 14.0

D. 18.0

E. 21.0

16) $\frac{4}{\sqrt{2}} + \frac{2}{\sqrt{3}} = ?$

Algebra 2

Name: _____

7.4 Homework**Add or subtract the following rational expressions, simplify, and state where the domain is undefined:**

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

2) $\frac{9}{x+3} + \frac{2}{x-3}$

3) $\frac{3x+4}{x^2-16} - \frac{2}{x-4}$

4) $\frac{4x}{x^2-9} + \frac{2}{x+3} - \frac{2}{x-3}$

5) Sales for a business were 3 million dollars more the second year than the first, and sales for the third year were double the sales for the second year. If sales for the third year were 38 million dollars, what were sales, in millions of dollars, for the first year?

- A. 16
- B. 17.5
- C. 20.5
- D. 22
- E. 35

6) What is the least common denominator for the following expression? $\frac{x-4}{5x} - \frac{12}{5(x-4)}$

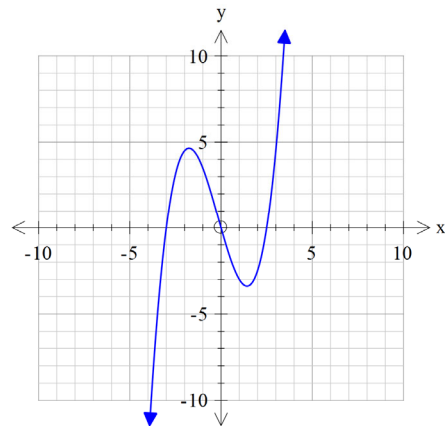
7) Perform the indicated operation: $\frac{x^2-5}{x^2+5x-14} + \frac{x+3}{x+7}$

8) Add: $\frac{4x+5}{x^2-25} + \frac{7}{x-5}$

9) Add: $\frac{1}{1-x} + \frac{x}{x-1}$

10) The function $f(x) = \frac{1}{2}x^3 + \frac{1}{4}x^2 - \frac{15}{4}x$ is graphed to the right, over which intervals of x is the graph above the x -axis?

- A. $(-\infty, +\infty)$ C. $(-3, 2.5)$
 B. $(-3, 0) \cup (2.5, +\infty)$ D. $[-\infty, -3) \cup (2.5, +\infty]$



11) For all nonzero real numbers p , t , x , and y such that $\frac{x}{y} = \frac{3p}{2t}$, which of the following expressions is equivalent to t ?

- A. $\frac{y}{2}$ B. $\frac{3px}{2y}$ C. $\frac{6py}{x}$ D. $\frac{3py}{x}$ E. $\frac{3py}{2x}$

Algebra 2

Name: _____

7.5 Homework**For #1 – 6, solve each equation.**

1)
$$\frac{4x+50}{x^2-25} = \frac{-3}{x+5} + \frac{x}{x-5}$$

2)
$$\frac{x-4}{x+2} = \frac{x+6}{x+10}$$

3)
$$\frac{6}{x+4} + \frac{1}{x-2} = \frac{3}{x-2}$$

4)
$$\frac{4}{x+5} - \frac{5}{x-3} = \frac{7}{x^2+2x-15}$$

5)
$$\frac{x}{3x+2} = \frac{4}{x+5}$$

6)
$$\frac{2x}{x+2} + \frac{5x}{x-4} = \frac{7x^2-3x+9}{x^2-2x-8}$$

7) Identify any x -values for which the expression below is undefined:

$$\frac{x^2 + 14x + 45}{25x^2 - 9} - \frac{2x + 3}{x + 7}$$

- A. The expression is undefined at $x = -9$ and 7
- B. The expression is undefined at $x = 9$ and -7
- C. The expression is undefined at $x = -9, 9$ and 7
- D. The expression is undefined at $x = -\frac{3}{5}, \frac{3}{5}$ and -7

8) If each of the following expressions is defined, which is equivalent to $x - 1$?

- A. $\frac{(x + 1)(x - 1)}{(x - 1)}$
- B. $\frac{(x - 1)(x + 2)}{x + 1} \cdot \frac{x + 1}{x + 2}$
- C. $\frac{(x + 1)(x + 2)}{x - 2} \div \frac{x + 2}{x - 2}$
- D. $\frac{x + 1}{x + 2} + \frac{x - 1}{x + 2}$

9) Which of the following is equivalent to $\frac{5}{k} + \frac{k+3}{k+5}$?

- A. $\frac{k+8}{2k+5}$
- B. $\frac{k+8}{k(k+5)}$
- C. $\frac{k(k+3)}{k(k+5)}$
- D. $\frac{k^3+3k}{2k+5}$
- E. $\frac{k^2+8k+25}{k(k+5)}$

Algebra 2
Ch 7 Practice Test

Name: _____

For #1 - 4, perform the indicated operation and simplify. State any restrictions on the domain.

1. $\frac{x^2 + x - 20}{x^2 + 2x - 15}$

2. $\frac{5}{x+13} - \frac{9}{x+13}$

3. $\frac{x-3}{2x-8} \cdot \frac{6x^2-96}{x^2-9}$

4. $\frac{x^2+8x+7}{x^2+4x+3} \div \frac{x+7}{x+3}$

5. Solve: $\frac{2}{x+2} = \frac{6}{2x+5}$

6. Solve: $\frac{x}{x-2} + \frac{1}{x-4} = \frac{2}{x^2-6x+8}$

7. Simplify to one rational expression: $\frac{3x}{x+2} + \frac{6}{x-2}$

8. Subtract and simplify your answer: $\frac{x}{2x-6} - \frac{5}{x^2-9}$

For #9-10, perform the indicated operation and simplify. State any restrictions on the domain.

$$9. \frac{x^2-x-2}{x^2+4x-5} \div \frac{3x-6}{x^2-25}$$

$$10. \frac{x^2+2x-3}{3x-12} \div \frac{2x^2+7x+6}{x^2-2x-8}$$

For #11-12, solve.

$$11. \frac{x}{x-3} + \frac{2x}{x+3} = \frac{18}{x^2-9}$$

$$12. \frac{x+12}{3} = \frac{2x+3}{x+2}$$

$$13. \text{ Perform the indicated operation: } \frac{x^2-3x-10}{x^2+2x-3} \div \frac{x+5}{x+3}$$

14.

Perform the indicated operation: $\frac{3x+4}{x^2-16} - \frac{2}{x-4}$

15. If each of the following expressions is defined, which is NOT equivalent to $x - 1$?

A. $\frac{(x-1)(x+1)}{(x+1)}$

C. $\frac{(x-1)(x+2)}{x-2} \div \frac{x+2}{x-2}$

B. $\frac{(x+1)(x+2)}{x-1} \cdot \frac{x+1}{x+2}$

D. $\frac{x^2}{x+2} + \frac{x-2}{x+2}$

16. Create a rational function that contains a quadratic function in the numerator and denominator and simplifies to $\frac{x+2}{x-8}$.

17. What would be the next logical step in simplifying the expression below?

Step 1	$\frac{6x - 3}{x^2 - x - 12} - \frac{x}{x + 3}$
Step 2	$\frac{6x - 3}{(x + 3)(x - 4)} - \frac{x}{x + 3}$
Step 3	$\frac{6x - 3}{(x + 3)(x - 4)} - \frac{x}{x + 3} \cdot \frac{x - 4}{x - 4}$
Step 4	$\frac{(6x - 3) - x(x - 4)}{(x + 3)(x - 4)}$

A. $\frac{6x + 3 + x^2 + 4}{(x + 3)(x - 4)}$

C. $\frac{6x - 3 - x^2 - 4}{(x + 3)(x - 4)}$

B. $\frac{6x - 3 + x^2 - 4}{(x + 3)(x - 4)}$

D. $\frac{6x - 3 - x^2 + 4x}{(x + 3)(x - 4)}$

18. Solve: $\frac{x+4}{x-5} = \frac{x-3}{x+6}$

19. Solve: $\frac{3x}{x-1} + \frac{2x}{x-6} = \frac{5x^2-15x+20}{x^2-7x+6}$

20. A triangular flower bed has an area of $x^2 - 4 \text{ ft}^2$. The base of the flower bed measures $x + 2 \text{ ft}$. If $x = 7$, what is the height of the flower bed?

Algebra 2
6.3 Homework

Name: _____

1. $(4x^2 - 14x - 5) \div (2x - 1)$

2. $(15x^3 + 16x^2 + x - 2) \div (3x + 2)$

3. $(4x^3 + 5x^2 + 2x + 16) \div (x + 2)$

4. $(x^3 + 7x^2 + 5x + 35) \div (x + 7)$

5. $(5x^3 - 8x^2 - x - 4) \div (x - 2)$

6. What is the remainder in the division
$$\frac{(6x^3 + 7x^2 - 3)}{2x + 1}?$$

7. Factor $2x^2 + 33x + 16$ completely given -16 is a root.

8. Factor $f(x) = 16x^3 - 144x^2 - 81x + 729$ given 9 is one zero.

9. A student was asked to find the quotient $(4x^3 + x^2 + 2x + 1) \div (x + 2)$.

The student's work is shown below. Find the error and correct the work.

$$\begin{array}{r} \underline{2} \\ 4 \\ \hline 8 \\ 4 \\ \hline 9 \\ 18 \\ \hline 20 \\ 40 \\ \hline 41 \end{array}$$

$$\begin{aligned} \text{so } (4x^3 + x^2 + 2x + 1) \div (x + 2) \\ = 4x^2 + 9x + 20 + \frac{41}{x + 2} \end{aligned}$$

10. One zero of $f(x) = x^3 - 2x^2 - 23x + 60$ is $x = 3$. What are the other zeros?

11. Given $f(-2) = 0$ and $f(x) = x^3 + 2x^2 - 9x - 18$, find the other solutions.

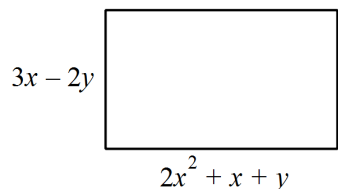
12. Given $f(x) = -\frac{8}{3}(x + 3)^2 - 8$, identify all the transformations from the parent function.

13. Write the equation for the function $g(x) = -2|x + 1| + 2$ after it's been translated 3 units up and 4 left.

14. Write the equation for a linear function that's been shifted right 6, down 3, and stretched with a degree of $\frac{3}{2}$. Put your answer in slope-intercept form.

15. Write the equation for a linear function that's been shifted left 2, up 1, reflected, and compressed with a degree of $\frac{1}{2}$. Put your answer in slope-intercept form.

16. Write an expression to represent the perimeter of the figure below:



Algebra 2
6.4 Homework

Name: _____

1. List the possible zeroes of $g(x) = 2x^3 - 11x^2 + 10x + 8$

2. List the possible roots for $f(x) = x^4 + 3x^3 - 7x^2 - 27x - 18$

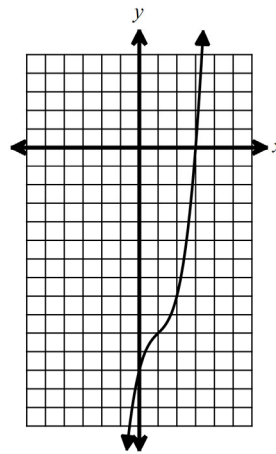
3. The equation $x^3 - 3x^2 + 4x - 12 = 0$ is graphed below. Use the graph to help solve the equation and find all the roots of the function.

A. $x = 3, -2, 2$

B. $x = -12, 1, 3$

C. $x = 3, -2i, 2i$

D. $x = 12, \frac{3 - i\sqrt{7}}{2}, \frac{3 + i\sqrt{7}}{2}$



4. Which of the following are possible roots for the function, $f(x) = 2x^3 + 13x^2 + 3x - 18$. Choose all that apply!

A. -3

B. $\frac{2}{3}$

C. $-\frac{1}{18}$

D. $-\frac{9}{2}$

E. 6

F. -1

G. $\frac{1}{3}$

5. List the possible zeros for $f(x) = x^3 + x^2 - 44x - 84$.

6. Use the possible zeros from #5 and synthetic division to find all real roots of $f(x) = x^3 + x^2 - 44x - 84$.

7. If $x^2 + 4x + 6 = (x - h)^2 + k$, then what's the value of k ?

8. Given the function, $g(x) = x^3 - 4x^2 - 11x + 30$ and that $(x - 2)$ is a factor of $g(x)$, factor completely.

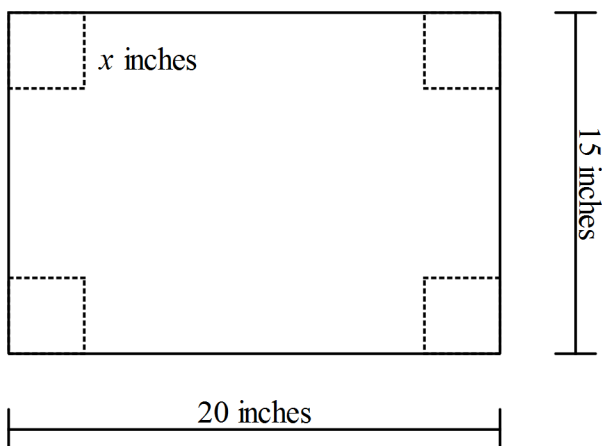
9. Solve, $f(x) = x^3 - 5x^2 - 2x + 24$, given that $x = 4$ is a solution.

10. Solve: $4x^3 + 13x^2 = -10x$

11. Solve: $x^4 - 121 = 0$

12. A manufacturer is going to package their product in an open rectangular box made from a single flat piece of cardboard. The box will be created by cutting a square out from each corner of the rectangle and folding the flaps up to create a box. The original rectangular piece of cardboard is 20 inches long and 15 inches wide.

Write a function $V(x)$ that represents the volume of the box.



Algebra 2
7.6 Homework

Name: _____

- 1) In an inverse variation, $x = -8$ when $y = -\frac{1}{4}$. What is the value of y when $x = 4$?
- 2) If x and y vary inversely and $x = 3$ when $y = \frac{2}{3}$, what is the value of y when $x = -1$?
- 3) **SAT/ACT** Suppose y varies inversely as the square of x . If x is multiplied by 4, which of the following is true for the value of y ?
 - a. It is multiplied by 4.
 - b. It is multiplied by 16.
 - c. It is multiplied by $\frac{1}{4}$.
 - d. It is multiplied by $\frac{1}{16}$.

For #4-7, use the following rational expression: $y = \frac{2}{x}$

- 4) Graph the function on the coordinate system provided and state the transformations.

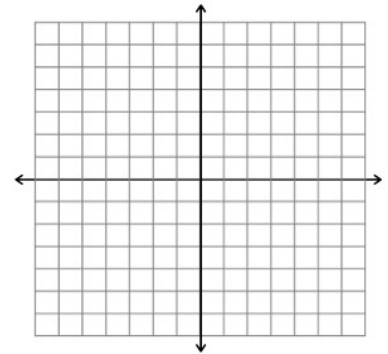
- 5) State the domain and range.

- 6) Find the VA and HA.

- 7) State the end behavior.

$$\text{as } x \rightarrow \infty, y \rightarrow$$

$$\text{as } x \rightarrow -\infty, y \rightarrow$$



For #8-11, use the following rational expression: $y = \frac{-3}{x}$

- 8) Graph the function on the coordinate system provided and state the transformations.

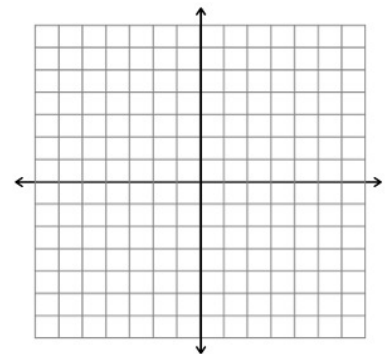
- 9) State the domain and range.

- 10) Find the VA and HA.

- 11) State the end behavior.

$$\text{as } x \rightarrow \infty, y \rightarrow$$

$$\text{as } x \rightarrow -\infty, y \rightarrow$$



For #12-15, Identify the transformations from the parent function $f(x) = \frac{1}{x}$

12) $f(x) = \frac{1}{x+6} - 3$

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

14) $f(x) = \frac{-1}{x-5} + 2$

15) $f(x) = 2 + \frac{-3}{x-6}$

16) Translate the graph of $f(x) = \frac{1}{x}$ to the right 3 units and up two units. Write the equation of the function after the translation.

Algebra 2
7.7 Homework

Name: _____

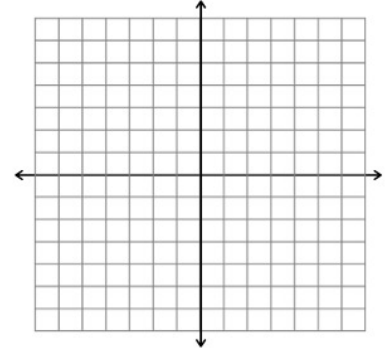
For #1-4, use the following rational expression: $y = \frac{-2}{x+3} - 4$

1) Graph the function on the coordinate system provided and state the transformations.

2) State the domain and range.

3) Find the VA and HA.

4) State the end behavior.
 $as\ x \rightarrow \infty, y \rightarrow$
 $as\ x \rightarrow -\infty, y \rightarrow$



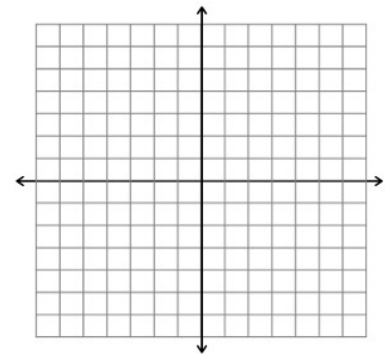
For #5-8, use the following rational expression: $y = \frac{3}{x-5} + 1$

5) Graph the function on the coordinate system provided and state the transformations

6) State the domain and range.

7) Find the VA and HA.

8) State the end behavior.
 $as\ x \rightarrow \infty, y \rightarrow$
 $as\ x \rightarrow -\infty, y \rightarrow$



9) Translate the graph of $f(x) = \frac{1}{x}$ to the right 7 units and down 3 units. Write the equation of the function after the translation.

10) Describe the transformations of $g(x) = \frac{1}{x+6} + 4$ from the parent function $f(x) = \frac{1}{x}$.

For #11 – 12, use the rational function $f(x) = \frac{6x-4}{x+2}$.

11) Write the rational expression in graphing form.

12) Identify the HA and VA.

For #13 – 14, use the rational function $y = \frac{3x+11}{x+5}$.

13) Write the rational expression in graphing form.

14) Identify the HA and VA.

15) The function $f(x) = -\frac{2}{x+3} - 1$ is translated up three units and left one unit. Write the function after the transformations.

9. Graph the function. Fill in the information below.

$$y = \frac{5}{x-1} - 2$$

Transformations:

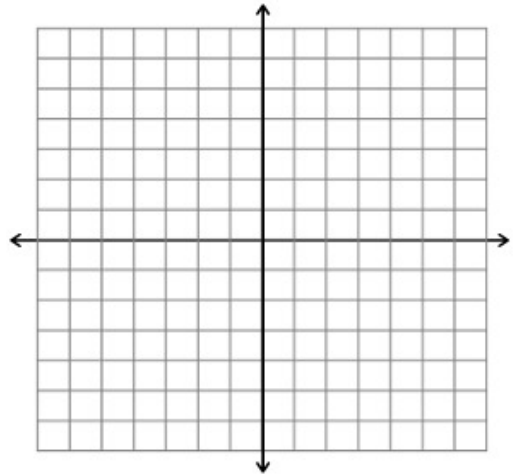
Domain:

Range:

VA:

HA:

End Behavior:



10. $y = \frac{-4}{x+2} + 3$

Transformations:

y

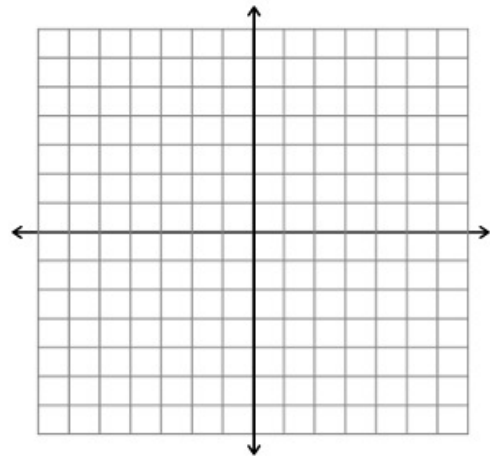
Domain:

Range:

VA:

HA:

End Behavior:



11. Find the domain of the function in set notation: $y = \frac{-2}{x+4} - 1$

12. Rewrite the function $f(x) = \frac{x+3}{x+2}$ in graphing form.