Unit 3 Test Review Guide E

Date:_____ Name_____

1. A 11th degree polynomial should have _____ if all terms are present
   a. 10 terms
   b. 11 terms
   c. 12 terms
   d. 13 terms
   e. 14 terms

2. A 11th degree polynomial should have _____ if all terms are present
   a. 10 VARIABLE terms
   b. 11 VARIABLE terms
   c. 12 VARIABLE terms
   d. 13 VARIABLE terms
   e. 14 VARIABLE terms

3. A 11th degree polynomial CAN have _____ if all terms are present
   a. UP to 10 direction changes
   b. UP to 11 direction changes
   c. UP to 12 direction changes
   d. UP to 13 direction changes
   e. UP to 14 direction changes

4. A 11th degree polynomial CAN have _____ if all terms are present
   a. UP to 10 x intercepts
   b. UP to 11 x intercepts
   c. UP to 12 x intercepts
   d. UP to 13 x intercepts
   e. UP to 14 x intercepts

5. If you have a negative lead coefficient, then what MUST be true?
   a. The function's graph must end in Q1
   b. The function's graph must end in Q2
   c. The function's graph must end in Q3
   d. The function's graph must end in Q4
   e. The function's graph must end in Q1 and Q2
   f. The function's graph must end in Q1 and Q3
   g. The function's graph must end in Q3 and Q4
   h. The function's graph must end in Q2 and Q4

6. If you have a positive lead coefficient and the highest exponent is ODD, then what MUST be true?
   a. The function's graph must end in Q1
   b. The function's graph must end in Q2
   c. The function's graph must end in Q3
   d. The function's graph must end in Q4
   e. The function's graph must end in Q1 and Q2
   f. The function's graph must end in Q1 and Q3
   g. The function's graph must end in Q3 and Q4
   h. The function's graph must end in Q2 and Q4

7. If you have NO constant term, then what must be true? (Mark all that apply)
   a. The polynomial's y intercept is also one of its x intercepts
   b. The polynomial must pass through the origin
   c. The polynomial will have all its x intercepts
   d. The polynomial will be missing one of its intercepts
   e. The polynomial will be missing one of its terms

8. Mark all the ALWAYS true statements
   a. A polynomial whose highest degree term is 3 will have at most 3 x intercepts
   b. A polynomial whose highest degree term is 4 will have at least one x intercept
   c. Missing terms that are related to variable terms have a coefficient of 0
   d. A polynomial whose highest degree term is 4 will have an absolute extreme
   e. A polynomial whose highest degree term is 4 will have an absolute minimum
   f. A polynomial whose highest degree term is 3 will have at least one x intercept
   g. A polynomial whose highest degree term is 4 will have at most three x intercepts

9. Rewrite the following polynomial in standard form, state its classification based on its degree and number of terms, state the lead coefficient and constant.

$$5x^3 - 6x^2 + 27 - 3(2x^2 + 3x^3 + 9)$$

highest degree to lowest degree

Standard Form: $-4x^3 - 12x^2 + 0$

Lead Coefficient: -4

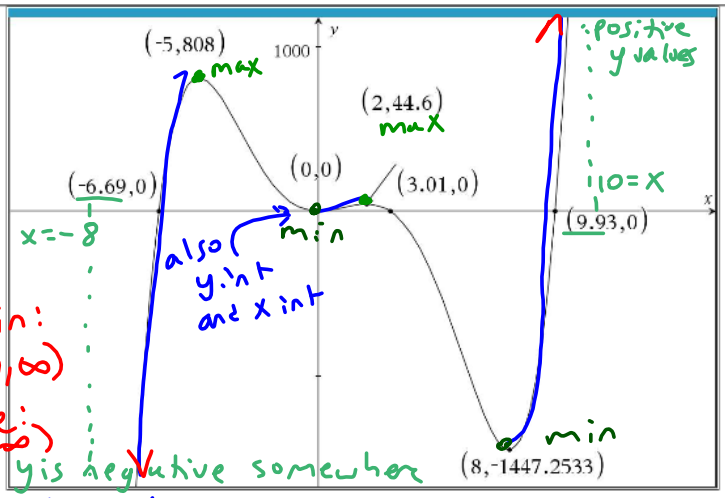
Constant: 0

Name/Classification: Cubic Binomial

missing its Linear (x^1) and Constant (x^0) terms

Linear Quadratic Cubic Quartic Quintic 6th degree

Standard Form _____ Classification _____



Domain: $x \in (-\infty, \infty)$

Range: $y \in (-\infty, \infty)$ y is negative somewhere

Always Left to Right

10 A. This is a Quintic polynomial's graph. x^5

10 B. State all the ROOTS of this polynomial

(-6.69, 0)
(0,0)
(3.01, 0)
(9.93, 0)
} only 4 of 5

11. Which is most likely be true?

Choice A: one of the roots repeats

Choice B: one of the roots is imaginary

hill or valley not through x axis

(0,0) has a bounce

Explain your choice

ex.

12. The polynomial is INCREASING over which intervals (This is ALWAYS done in terms of x)
Use set notation, interval notation, or inequality where necessary

$x \in (-\infty, -5) \cup (0, 3.01) \cup (8, \infty)$ or $\{x \in \mathbb{R} \mid -\infty < x < -5 \cup 0 < x < 3.01 \cup 8 < x < \infty\}$

13. State the LOCAL extremes of the polynomial (these should always be coordinates)

local max ★ Hills: (-5, 808) ∪ (2, 44.6)

local min ★ Valleys: (0,0) ∪ (8, -447.2533)

14. State the ABSOLUTE extremes if possible, if NOT possible state why not

Not possible because graph extends in both directions

Absolute Maximum _____ Absolute Minimum _____

15. Which of the following is true about f(-8)?
a. ~~It is a positive number~~
b. ~~It is a negative number~~
c. It is 0

16. Explain your justification for the choice you made for the previous question.
-8 is left of the x int. and the function goes down

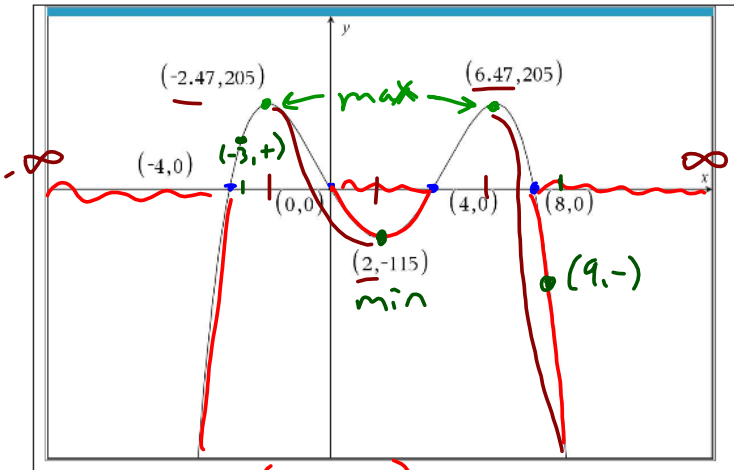
17. Which of the following is true about f(10)?
a. ~~It is a positive number~~
b. It is a negative number
c. It is 0

18. Explain your justification for the choice you made for the previous question.
10 is right of x int where function is going up.

19. Based solely on the graph of the quintic polynomial, discuss the nature of both the leading coefficient and the constant.

Based on the graph, I know that the lead coefficient MUST be positive b/c right side is up

Based on the graph I know that the constant MUST be 0 because (0,0) is the y int



20 A. This is a Quartic polynomial's graph.

20 B. State all the ROOTS of this polynomial

(-4,0)
(0,0)
(4,0)
(8,0)

21. The polynomial has NEGATIVE function values over which intervals
Use set notation, interval notation, or inequality where necessary

$x \in (-\infty,-4) \cup (0,4) \cup (8,\infty)$

$\{x \in \mathbb{R} \mid -\infty < x < -4 \cup 0 < x < 4 \cup 8 < x < \infty\}$

Domain: $x \in (-\infty,\infty)$

Range: $y \in (-\infty,205]$

22. The polynomial is DECREASING over which intervals (This is ALWAYS done in terms of x)
Use set notation, interval notation, or inequality where necessary

$x \in (-2.47, 2) \cup (6.47,\infty)$

$\{x \in \mathbb{R} \mid -2.47 < x < 2 \cup 6.47 < x < \infty\}$

* x values only

23. State the LOCAL extremes of the polynomial (these should always be coordinates)

local max $(-2.47,205) \cup (6.47,205)$

local min $(2,-115)$

24. State the ABSOLUTE extremes if possible, if NOT possible state why not

Absolute Maximum $(-2.47,205)$ & $(6.47,205)$ since both have same highest y value

Absolute Minimum None goes down

25. Which of the following is true about f(-3)?
a. It is a positive number
b. It is a negative number
c. It is 0

26. Explain your justification for the choice you made for the previous question
The function is above x axis between $x \in (-4,0)$

27. Which of the following is true about f(9)?
a. It is a positive number
b. It is a negative number
c. It is 0

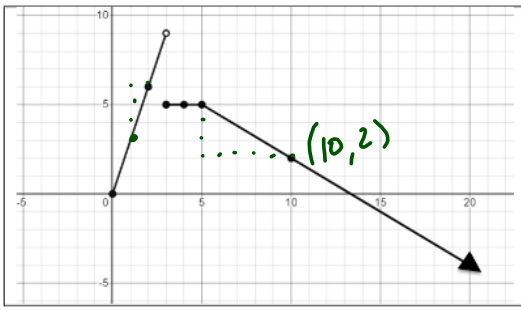
28. Explain your justification for the choice you made for the previous question
the function is below xaxis after $x = 8$

29. Based solely on the graph of the quartic polynomial, discuss the nature of both the leading coefficient and the constant.

Based on the graph, I know that the lead coefficient MUST be negative b/c right side is down

Based on the graph I know that the constant MUST be 0 b/c the y intercept is (0,0)

Piece Wise Practice



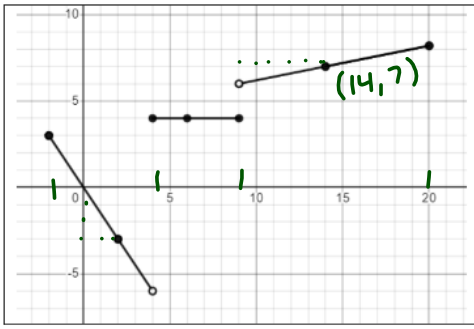
30. Write the piecewise function

$$f(x)=\begin{cases} 3x, & 0 \le x < 3 \\ 5, & 3 \le x < 5 \\ -\frac{3}{5}(x-10)+2, & 5 \le x < \infty \end{cases}$$

State the domain of the function $x \in [0,\infty)$ closed circle

State the range of the function $y \in (-\infty, 9)$ open circle

Complete the statement $x \to \infty \quad y \to -\infty$ arrow points down at right

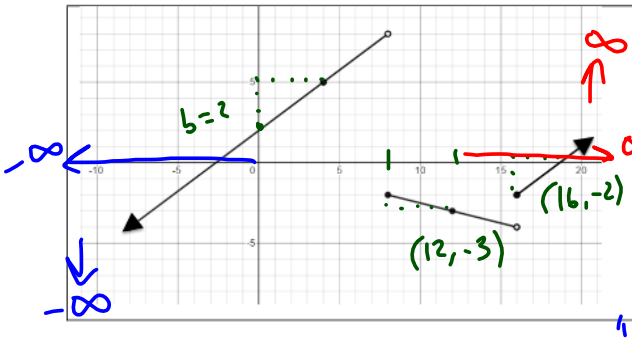


31. Write the piecewise function

$$f(x)=\begin{cases} -\frac{3}{2}x, & -2 \le x < 4 \\ 4, & 4 \le x \le 9 \\ \frac{1}{5}(x-14)+7, & 9 < x \le 20 \end{cases}$$

State the domain of the function $x \in [-2, 20]$

State the range of the function $y \in [-6,3] \cup \{4\} \cup (6,8]$



32. Write the piecewise function

$$f(x)=\begin{cases} \frac{3}{4}x+2, & x < 8 \\ -\frac{1}{4}(x-12)-3, & 8 \le x < 16 \\ \frac{2}{3}(x-16)-2, & x \ge 16 \end{cases}$$

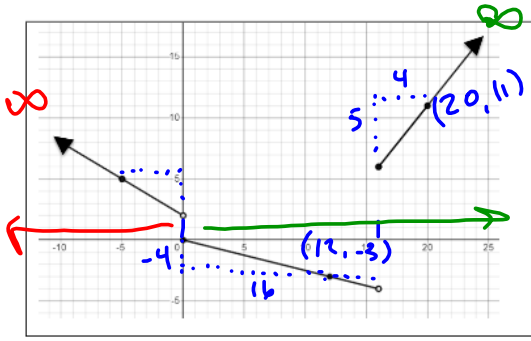
State the domain of the function $x \in (-\infty, \infty)$

State the range of the function $y \in (-\infty, \infty)$

Complete the statements $x \to -\infty \quad y \to -\infty$

$x \to \infty \quad y \to \infty$

"$x \to$" means "as x approaches"



33. Write the piecewise function

$$f(x)=\begin{cases} -\frac{3}{5}x+2, & x < 0 \\ -\frac{1}{4}(x-12)-3, & 0 \le x < 16 \\ \frac{5}{4}(x-20)+11, & x \ge 16 \end{cases}$$

State the domain of the function $x \in (-\infty, \infty)$

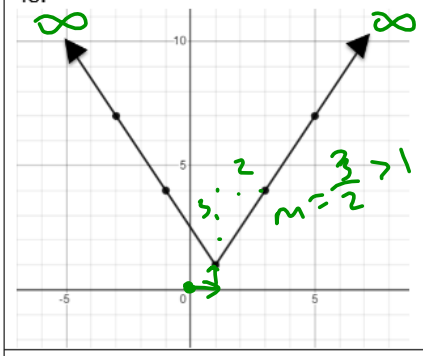
State the range of the function $y \in (-4,0) \cup (2,\infty)$

Complete the statements $x \to -\infty \quad y \to \infty$

$x \to \infty \quad y \to \infty$

Use the graph to answer the related questions

48.



Circle all the transformations present

Vertical compression
Vertical stretch $a=\frac{3}{2}$
Horizontal shift LEFT
Horizontal shift RIGHT 1
Vertical shift UP 1
Vertical shift DOWN
Vertical reflection

State the Vertex of the Graph
(1, 1)

State the values of a , h, k
$a = \frac{3}{2}$ $h = 1$ $k = 1$

State the domain of the function
$x \in (-\infty, \infty)$

State the range of the function
$y \in [1, \infty)$

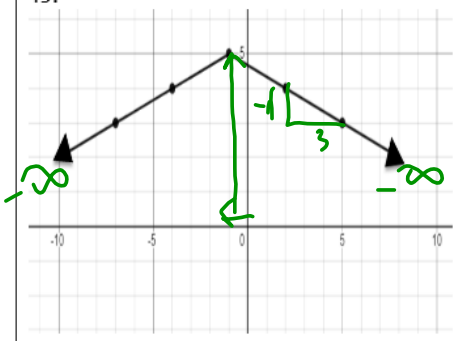
State the absolute value function $y = \frac{3}{2}|x-1|+1$

State the related piecewise function

$$f(x) = \begin{cases} \frac{3}{2}(x-1)+1, & x \le 1 \\ -\frac{3}{2}(x-1)+1, & x > 1 \end{cases}$$

Complete the statements
$x \to -\infty$ $y \to \infty$
$x \to \infty$ $y \to \infty$

49.



Circle all the transformations present

Vertical compression $\frac{1}{3}$
Vertical stretch
Horizontal shift LEFT 1
Horizontal shift RIGHT
Vertical shift UP 5
Vertical shift DOWN
Vertical reflection

State the Vertex of the Graph
(-1, 5)

State the values of a , h, k
$a = -\frac{1}{3}$ $h = -1$ $k = 5$

State the domain of the function
$x \in (-\infty, \infty)$

State the range of the function
$y \in (-\infty, 5]$

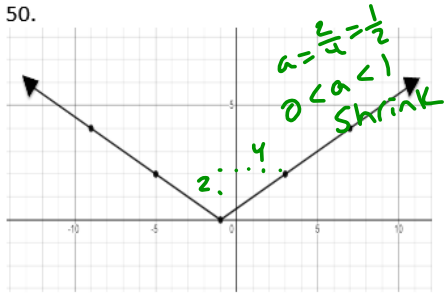
State the absolute value function $y = -\frac{1}{3}|x+1|+5$

State the related piecewise function

$$f(x) = \begin{cases} \frac{1}{3}(x+1)+5, & x \le -1 \\ -\frac{1}{3}(x+1)+5, & x > -1 \end{cases}$$

Complete the statements
$x \to -\infty$ $y \to -\infty$
$x \to \infty$ $y \to -\infty$

50.



Circle all the transformations present

Vertical compression $\frac{1}{2}$
Vertical stretch
Horizontal shift LEFT 1
Horizontal shift RIGHT
Vertical shift UP None
Vertical shift DOWN
Vertical reflection

State the Vertex of the Graph
(-1, 0)

State the values of a , h, k
$a = \frac{1}{2}$ $h = -1$ $k = 0$

State the domain of the function
$x \in (-\infty, \infty)$

State the range of the function
$y \in [0, \infty)$

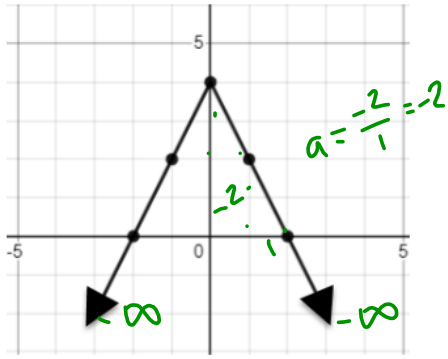
State the absolute value function $y = \frac{1}{2}|x+1|$

State the related piecewise function

$$f(x) = \begin{cases} -\frac{1}{2}(x+1), & x \le -1 \\ \frac{1}{2}(x+1), & x > -1 \end{cases}$$

Complete the statements
$x \to -\infty$ $y \to$ ____
$x \to \infty$ $y \to$ ____

51.



Circle all the transformations present

Vertical compression
Vertical stretch 2
Horizontal shift LEFT None
Horizontal shift RIGHT
Vertical shift UP 4
Vertical shift DOWN
Vertical reflection

State the Vertex of the Graph
(0, 4)

State the values of a , h, k
$a = -2$ $h = 0$ $k = 4$

State the domain of the function
$x \in (-\infty, \infty)$

State the range of the function
$y \in (-\infty, 4]$

State the absolute value function $y = -2|x|+4$

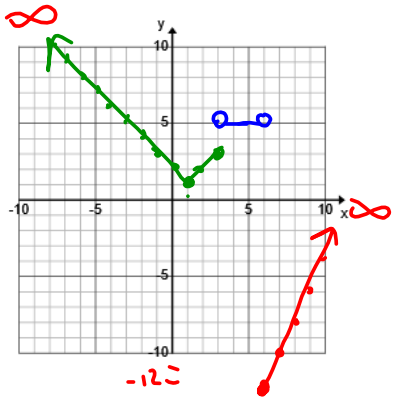
State the related piecewise function

$$f(x) = \begin{cases} 2x+4, & x \le 0 \\ -2x+4, & x > 0 \end{cases}$$

Complete the statements
$x \to -\infty$ $y \to -\infty$
$x \to \infty$ $y \to -\infty$

Name_____Piecewise functions and Absolute Value function Practice

52. Graph and proper label the given piecewise function



For the absolute value function present

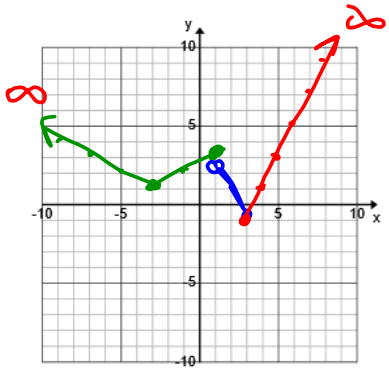
Vertical compression
Vertical stretch
Horizontal shift LEFT
Horizontal shift RIGHT
Vertical shift UP
Vertical shift DOWN
Vertical reflection
State the Vertex of the Graph (1, 1)
State the values of a , h, k
a = 1 h = 1
k = 1

For the PIECEWISE FUNCTION
State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in [-12, \infty)$
Related piecewise function

$$f(x) = \begin{cases} 1|x-1|+1, & -\infty < x \le 3 \\ 5, & 3 < x < 6 \\ -2x, & 6 \le x < \infty \end{cases}$$

Complete the statements $x \to -\infty$ $y \to \infty$
$x \to \infty$ $y \to \infty$

53. Graph and proper label the given piecewise function



For the absolute value function present

Vertical compression $\frac{1}{2}$
Vertical stretch
Horizontal shift LEFT 3
Horizontal shift RIGHT
Vertical shift UP 1
Vertical shift DOWN
Vertical reflection
State the Vertex of the Graph (-3, 1)
State the values of a , h, k
a = $-\frac{1}{2}$ h = -3
k = 1

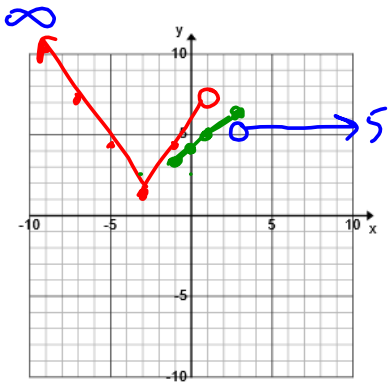
For the PIECEWISE FUNCTION
State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in [-1, \infty)$
Related piecewise function

$$f(x) = \begin{cases} \frac{-1}{2}|x+3|+1, & -\infty < x \le 1 \\ \frac{-5}{3}x+4, & 1 < x < 3 \\ 2x-7, & 3 \le x < \infty \end{cases}$$

$f(1)$
$\frac{-5}{3}(1)+4$
$= 2\frac{2}{3}$

Complete the statements $x \to -\infty$ $y \to \infty$
$x \to \infty$ $y \to \infty$

54. Graph and proper label the given piecewise function



For the absolute value function present

Vertical compression
Vertical stretch 1.5 = 3/2
Horizontal shift LEFT 3
Horizontal shift RIGHT
Vertical shift UP 1
Vertical shift DOWN
Vertical reflection
State the Vertex of the Graph (-3, 1)
State the values of a , h, k
a = 3/2 h = -3
k = 1

For the PIECEWISE FUNCTION
State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in [1, \infty)$
Related piecewise function

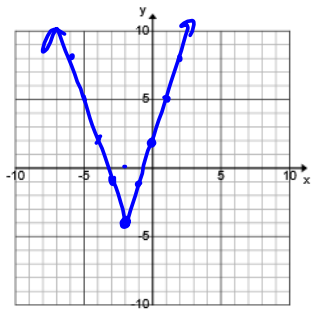
$$f(x) = \begin{cases} \frac{3}{2}|x+3|+1, & -\infty < x \le -1 \\ \frac{2}{3}x+4, & -1 \le x \le 3 \\ 5, & 3 < x < \infty \end{cases}$$

$\frac{2}{3}(-1)+4$

not a function overlapping domain

Complete the statements $x \to -\infty$ $y \to \infty$
$x \to \infty$ $y \to 5$

55. Graph $f(x) = 3|x+2| - 4$



Circle all the transformations present

Vertical compression ~~Vertical stretch~~
~~Horizontal shift LEFT~~ Horizontal shift RIGHT
Vertical shift UP ~~Vertical shift DOWN~~
~~Vertical reflection~~

State the Vertex of the Graph (-2 , -4)
State the values of a , h, k
$a =$ 3 $h =$ -2 $k =$ -4

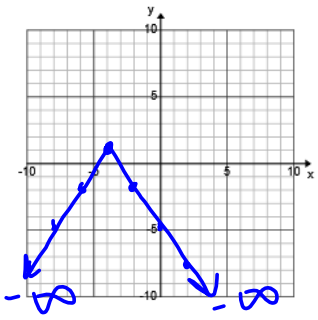
State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in [-4, \infty)$
State the y intercept (0, 2)
State the related piecewise function

$$f(x) = \begin{cases} -3(x+2)-4, & x \le -2 \\ 3(x+2)-4, & x \ge -2 \end{cases}$$

Complete the statements $x \to -\infty$ $y \to \infty$

$x \to \infty$ $y \to \infty$

56. Graph $f(x) = \frac{-3}{2}|x+4| + 1$



Circle all the transformations present

~~Vertical compression~~ ~~Vertical stretch~~
~~Horizontal shift LEFT~~ Horizontal shift RIGHT
~~Vertical shift UP~~ Vertical shift DOWN
~~Vertical reflection~~

State the Vertex of the Graph (-4 , 1)
State the values of a , h, k
$a =$ $-\frac{3}{2}$ $h =$ -4 $k =$ 1

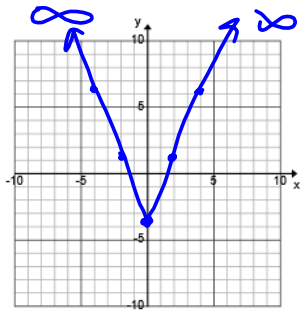
State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in (-\infty, 1]$
State the y intercept (0, -5)
State the related piecewise function

$$f(x) = \begin{cases} -\frac{3}{2}(x+4)+1, & x \le -4 \\ \frac{3}{2}(x+4)+1, & x \ge -4 \end{cases}$$

Complete the statements $x \to -\infty$ $y \to -\infty$

$x \to \infty$ $y \to -\infty$

57. Graph $f(x) = \frac{5}{2}|x| - 4$



Circle all the transformations present

Vertical compression ~~Vertical stretch~~
~~Horizontal shift LEFT~~ ~~Horizontal shift RIGHT~~
Vertical shift UP ~~Vertical shift DOWN~~
~~Vertical reflection~~

State the Vertex of the Graph (0 , -4)
State the values of a , h, k
$a =$ $\frac{5}{2}$ $h =$ 0 $k =$ -4

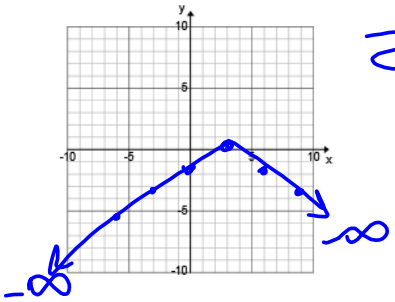
State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in [-4, \infty)$
State the y intercept (0, -4)
State the related piecewise function

$$f(x) = \begin{cases} -\frac{5}{2}x - 4, & x \le 0 \\ \frac{5}{2}x - 4, & x > 0 \end{cases}$$

Complete the statements $x \to -\infty$ $y \to \infty$

$x \to \infty$ $y \to \infty$

58. Graph $f(x) = \frac{-2}{3}|x-3|$



Circle all the transformations present

~~Vertical compression~~ Vertical stretch
Horizontal shift LEFT ~~Horizontal shift RIGHT~~
~~Vertical shift UP~~ Vertical shift DOWN
~~Vertical reflection~~

State the Vertex of the Graph (3 , 0)
State the values of a , h, k
$a =$ $-\frac{2}{3}$ $h =$ 3 $k = 0$

State the domain of the function
$x \in (-\infty, \infty)$
State the range of the function
$y \in (-\infty, 0]$
State the y intercept (0, -2)
State the related piecewise function

$$f(x) = \begin{cases} \frac{2}{3}x - 2, & x \le 3 \\ -\frac{2}{3}(x-3), & x \ge 3 \end{cases}$$

Complete the statements $x \to -\infty$ $y \to -\infty$

$x \to \infty$ $y \to -\infty$

You should be able to State the Polynomial in Standard Form, its Lead Coefficient, Constant, Degree, Total Terms, Name of missing terms, and Name of Polynomial by Degree and Number of Terms

Polynomial 1: $f(x) = -2$ } constant	Polynomial 10: $f_1(x) = -2 + x$	Polynomial 19: $g_1(x) = -2 + x + \frac{5}{2}x^3$ Cubic
Polynomial 2: $g(x) = 3$	Polynomial 11: $f_2(x) = 3 - 2x$ } Linear	Polynomial 20: $g_2(x) = 3 - 2x + \frac{2}{5}x^4$ Quartic
Polynomial 3: $h(x) = 0$	Polynomial 12: $f_3(x) = 10 - \frac{2}{3}x$	Polynomial 21: $g_3(x) = 10 - \frac{2}{3}x + \frac{5}{2}x^3$ cubic
Polynomial 4: $j(x) = -2x$ } linear	Polynomial 13: $f_4(x) = -2x + 6$	Polynomial 22: $g_4(x) = -2x + 6 - \frac{3}{2}x^2$ Quadratic
Polynomial 5: $k(x) = \frac{-2}{3}x$	Polynomial 14: $f_5(x) = \frac{-2}{3}x + \frac{3}{2}x^2$ Quadratic	Polynomial 23: $g_5(x) = \frac{-2}{3}x + \frac{3}{2}x^2 + 12$ Quadratic
Polynomial 6: $m(x) = \frac{3}{2}x^2$ Quadratic	Polynomial 15: $f_6(x) = \frac{-5}{2}x^3 + \frac{3}{2}x^2$ cubic	Polynomial 24: $g_6(x) = 6x^5 + \frac{-5}{2}x^3 + \frac{3}{2}x^2$ Quintic
Polynomial 7: $n(x) = \frac{-5}{2}x^3$ cubic	Polynomial 16: $f_7(x) = \frac{-5}{2}x^3 + \frac{2}{5}x^4$ Quartic	Polynomial 25: $g_7(x) = \frac{-5}{2}x^3 + \frac{2}{5}x^4 - 2x$ Quartic
Polynomial 8: $p(x) = \frac{2}{5}x^4$ Quartic	Polynomial 17: $f_8(x) = \frac{2}{5}x^4 - 6x^5$ } Quintic	Polynomial 26: $g_8(x) = \frac{2}{5}x^4 - 6x^5 - \frac{3}{2}x^2$ Quintic
Polynomial 9: $q(x) = 6x^5$ Quintic	Polynomial 18: $f_9(x) = 6x^5 + 2$	Polynomial 27: $g_9(x) = 6x^5 + 2x + \frac{2}{5}x^4$ Trinomials Quintic
Monomials	Binomials	

Constant 0 # w/o variable	Monomial	Coefficient
Linear x	Binomial	Lead Coefficient # in front of highest exponent
Quadratic x^2	Trinomial	Constant
Cubic x^3	4-Term polynomial	Term
Quartic x^4	5-Term polynomial	Degree exponent
Quintic x^5		
6th degree polynomial x^6		

Match the graphs with the equations and also write the name of the function family. Label the Vertex or Inflection Points, and Axis of Symmetry if applicable

$f(x) = -|x + 3| + 4$

$g(x) = 2x + 5$

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

$j(x) = -\frac{2}{7}(x + 3)^2 + 9$

$p(x) = 4x^3 + 2$

$w(x) = (2)^{(x+4)} - 3$

$q(x) = -\frac{1}{3}(x)^2 - 4$

$k(x) = 4|x - 2| - 9$