

# Mid-Term Review 4/9/18

## Unit 1: Relationships between Quantities and Expressions

1.) Find the sum  $(5x^2 + 6x - 15) + (3x^2 - 8x + 9)$ .

$$8x^2 - 2x - 6$$

2.) Find the difference  $(x^3 - 7x^2 + 5x - 2) - (6x^2 - 9)$ .

$$x^3 - 7x^2 + 5x - 2 - 6x^2 + 9 = x^3 - 13x^2 + 5x + 7$$

3.) Multiply the polynomials  $(5x - 9)(2x + 5)$ .

4.) Simplify  $\sqrt{75x^7}$

5.) Simplify  $\sqrt{5} - 9\sqrt{45}$ .

6.) Simplify  $7\sqrt{3} - 12\sqrt{3}$

	$5x$	$-9$
$2x$	$10x^2$	$-18x$
$+5$	$25x$	$-45$

Labels: 1st, 2nd, 3rd

$$10x^2 + 7x - 45$$

7.) Simplify  $(\sqrt{10})(\sqrt{4})$

8.) Simplify  $\sqrt{6}(2 + \sqrt{50})$

④  $\sqrt{75x^7}$

3 25

5 5

$\sqrt{x^7} = \cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x}$

$= x^3 \sqrt{x}$

$5\sqrt{3}$

$\sqrt{75x^7} = 5x^3\sqrt{3x}$

⑤  $-26\sqrt{5}$

⑥  $-5\sqrt{3}$

⑦  $2\sqrt{10}$

⑧  $= 2\sqrt{6} + 10\sqrt{3}$   
 $2(\sqrt{6} + 5\sqrt{3})$

**Unit 2: Reasoning with Linear Equations and Inequalities**

$$5x + 4y = 10x + 8y$$

9.) What does an equation with infinite solutions look like? What does an equation with no solution look like?

10.) You are purchasing <sup>x</sup> paint and <sup>y</sup> paintbrushes for an art project. Tubes of paint cost \$12 each and paintbrushes cost \$18 each. You plan on spending \$75 and purchasing a total of 6 items. Which linear system best represents the situation?

$$\begin{aligned} x + y &= 6 \\ 12x + 18y &= 75 \end{aligned}$$

11.) What is the solution to this system of equations?  $\begin{cases} 2x + y = 20 \\ 6x - 5y = 12 \end{cases}$

*Substitution*

12.) What is the solution to the following system of equations?  $\begin{cases} 8x + y = -16 \\ -3x + y = -5 \end{cases}$

*Elimination*

$$\begin{array}{r} 8x + y = -16 \\ + (-3x - y = 5) \\ \hline \end{array}$$

$$\frac{11x}{11} = \frac{-11}{11}$$

$$x = -1$$

$$y =$$

$$\begin{aligned} \textcircled{11} \quad 2x + y &= 20 \quad \textcircled{1} \\ 6x - 5y &= 12 \quad \textcircled{2} \end{aligned}$$

$$\begin{array}{r} 2x + y = 20 \\ -2x \phantom{+ y} = -2x \\ \hline y = 20 - 2x \end{array}$$

$$6x - 5(20 - 2x) = 12$$

$$6x - 100 + 10x = 12$$

$$\begin{array}{r} 16x - 100 = 12 \\ +100 \phantom{=} +100 \\ \hline 16x = 112 \end{array}$$

$$\begin{array}{r} 16x = 112 \\ \hline 16 \phantom{x} = 16 \end{array}$$

$$x = 7$$

**Literal Equations.**

13. Solve for y:  $xy - d = m$

$$\frac{xy}{x} = \frac{m+d}{x}$$

15. Solve for w:  $V = \frac{1}{6}wh$

14. Solve for y:  $\frac{y}{2} + c = d$

$$\frac{y}{2} = 2(d - c)$$

or  $y = 2d - 2c$

16. Solve for p:  $\frac{1}{3}p = n$

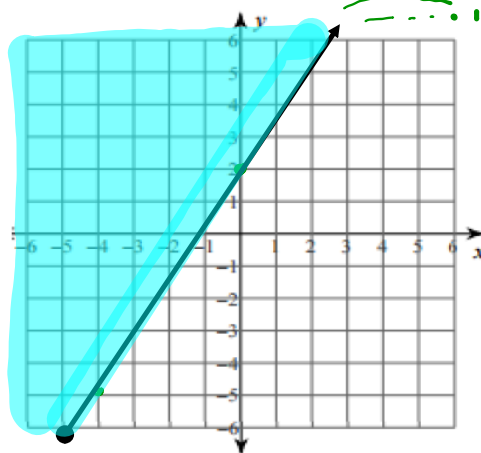
$$p = 3n$$

17.) Graph the following inequality:

$$m = \frac{7}{4} \quad b = 2$$

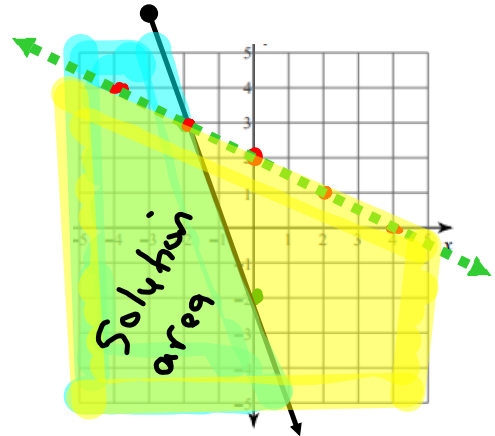
$$y \geq \frac{7}{4}x + 2 \quad y = mx + b$$

$\geq < \dots$



18.) Graph the system of linear inequalities:

Solid  $y \leq -\frac{5}{2}x - 2$   $m = -\frac{5}{2}$   $b = -2$   
 dashed  $y < -\frac{1}{2}x + 2$   $m = -\frac{1}{2}$   $b = 2$



Use graph to answer questions 16-18.

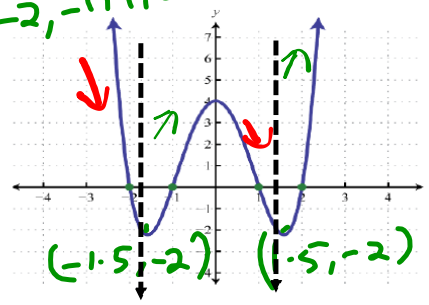
19. What point could be described as the REALTIVE MINIMUM in the graph?

20. What point(s) could be described as an x-intercept in the graph?  $x = -2, -1, 1, 2$

21. What are the intervals of increase, decrease, and constant?

$(-1.5 < x < 0)$   
 $(1.5 < x < 00)$

$(-\infty < x < -1.5)$   
 $(0 < x < 1.5)$



## Unit 3: Modeling and Analyzing Quadratic Functions

- 22.) What are the two binomial factors of the polynomial shown?

$$3x^2 - 8x + 4$$

x-box  
10x

- 23.) Solve the following by factoring and using the zero product property.
- $x^2 - 10x + 24 = 0$

Big-x

$$x^2 - 10x + 24 = 0$$

- 24.) Solve equation by taking
- square roots
- .
- $5x^2 + 8 = 253$

- 25.) Which is the factored form of
- $7x^2 + 28x - 84$
- ?

$$7(x^2 + 4x - 12)$$

~~$$\begin{array}{r} -12 \\ 6 \quad \quad \quad = 2 \\ \quad \quad \quad 4 \end{array}$$~~

$$7(x+6)(x-2)$$



$$\textcircled{22} \quad 3x^2 - 8x + 4$$

$$a = 3 \quad b = -8 \quad c = 4$$

$$a \cdot c = 12$$

<del>12</del>	X	$3x \quad -2$
<del>-6</del>		$3x^2$
<del>-2</del>		$-2x$
<del>-8</del>	$-2$	$-6x$
		$4$

$$\boxed{(3x-2)(x-2)}$$

$$\textcircled{23} \quad x^2 - 10x + 24 = 0$$

$$a = 1 \quad b = -10 \quad c = 24$$

$$a \cdot c = 24$$

<del>24</del>	x = 6
<del>-6</del>	x = 4
<del>-4</del>	
<del>-10</del>	

$$(x-6)(x-4) = 0$$

$$\textcircled{24} \quad 5x^2 + 8 = 253$$

$$\frac{5x^2}{5} = \frac{245}{5}$$

$$\sqrt{x^2} = \sqrt{49}$$

$$\boxed{x = \pm 7}$$

26.) The length of a rectangle is 8 cm more than four times the width. If the area of the rectangle is  $96 \text{ cm}^2$ , what is the width of the rectangle? (HINT:  $A=lw$ )

Width:  $w$

length:  $4w + 8$

$$w(4w+8) = 96$$

$$4w^2 + 8w = 96$$

$$4w^2 + 8w - 96 = 0$$

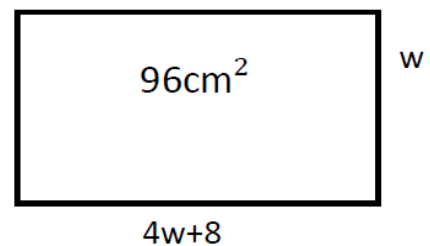
$$4(w^2 + 2w - 24) = 0$$

~~$$\begin{array}{r} -24 \\ 6 \quad -4 \\ 2 \end{array}$$~~

$$4(w+6)(w-4) = 0$$

$$w = -6 \text{ or } w = 4$$

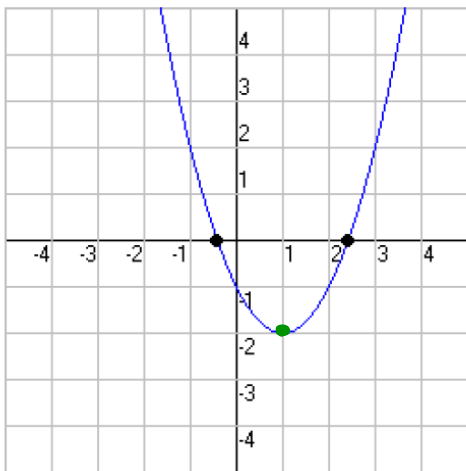
$$\text{Width} = 4 \text{ cm}$$



- 27.) Tell whether the graph of the quadratic function  $y = -2x^2 - 10x + 8$  opens upward or downward. Explain.

because  $a$  is negative

For questions 28 – 29 use the graph below.



- 28.) Identify the vertex of the parabola. Then give the minimum or maximum value of the function.

$V = (1, -2)$  Minimum:  $y = -2$

- 29.) Find the roots of the quadratic function.

$x = -0.5 ; x = 2.5$

- 30.) Order the functions from narrowest graph to widest graph.

$$f(x) = 2x^2, g(x) = \frac{1}{2}x^2, \text{ and } h(x) = x^2$$

$f(x)$ ,  $h(x)$ ,  $g(x)$

stretch      compress.      Parent

- 31.) Using  $f(x) = x^2$  as a parent graph, write a function that includes a translation of 4 units to the right?

$$f(x) = (x - 4)^2$$

- 32.) Using  $f(x) = x^2$  as a parent graph, write an equation that shows translation of 2 right and vertical stretch by 3 to graph.

$$f(x) = 3(x - 2)^2$$

- 33.) John threw a ball straight up with an initial speed of 20 meters per second. The function  $y = -4(x - 9)^2 + 25$  describes the ball's height, in meters,  $t$  seconds after John threw it. What are the coordinates of the vertex?

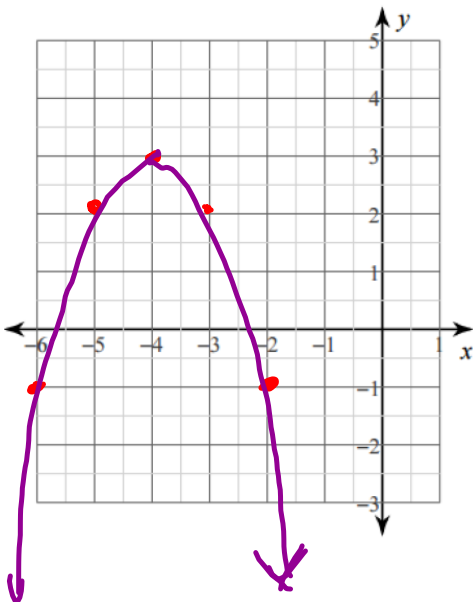
$$\text{Vertex: } (9, 25)$$

34.)  $a = -1$   $b = -8$   
 Graph  $f(x) = -x^2 - 8x - 13$

$$x = \frac{-b}{2a} = \frac{-(-8)}{2(-1)} = \frac{8}{-2} = -4$$

$$f(-4) = -(-4)^2 - 8(-4) - 13 = -16 + 32 - 13 = 3$$

$V = (-4, 3)$

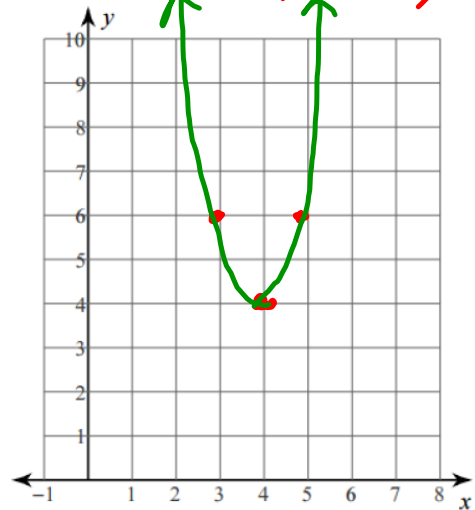


35.)  $a = 2$   $b = -16$   
 Graph  $f(x) = 2x^2 - 16x + 33$

$$x = \frac{-b}{2a} = \frac{-(-16)}{2(2)} = \frac{16}{4} = 4$$

$$f(4) = 2(4)^2 - 16(4) + 33 = 32 - 64 + 33 = 1$$

$V = (4, 1)$



$$2(1)^2 = 2$$

$$2(2)^2 = 8$$