Name: Key Hour: ____ ALGEBRA 2 SEMESTER 1 FINAL REVIEW

Unit 1: Function Family

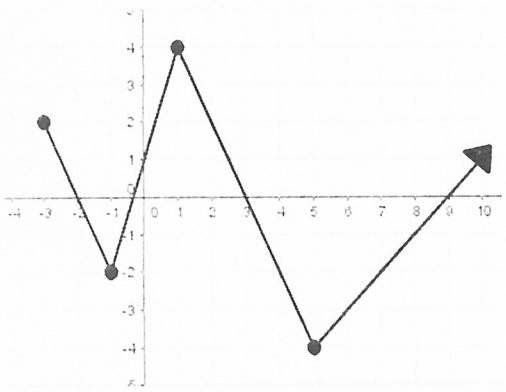
1) NC Draw a rough sketch of each of the parent functions

a) Linear Equation:	b) Absolute Value Equation:	c) Quadratic Equation:	d) Square Root Equation:
e) Cubic Equation:	f) Cube Root Equation:	g) Exponential Growth Equation:	h) Logarithmic Equation:

2) NC $g(x)= b(x-m)^2+ r$ What happens to the function when....

$\|b\|> 1$ Vertical stretch "skinnier"	$m> 0$ moves right	$r> 0$ moves up
$0< b< 1$ vertical compression "fatter"	$m< 0$ moves left	$r< 0$ moves down
$b< 0$ Reflection "flip"		

3) NC Find the requested information for the graph below. Make sure you use the correct parentheses and/or brackets.



Increasing: $(-1, 1)$ $(5, \infty)$

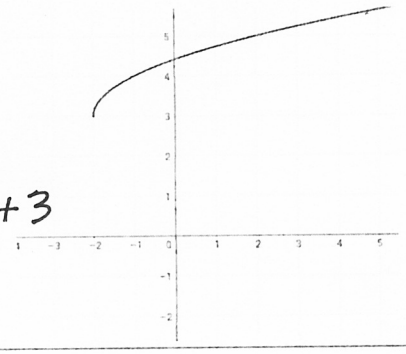
Decreasing: $(-3, -1)$ $(1, 5)$

Domain: $[-3, \infty)$

Range: $[-4, \infty)$

4) NC For each graph below, list the transformations. Then, write the equation of the graph.

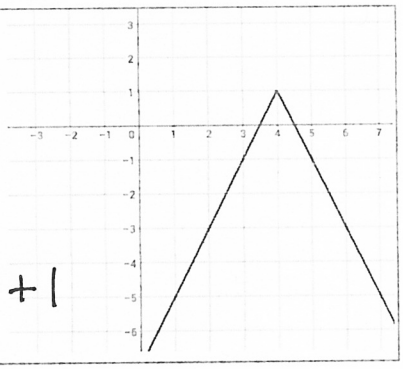
a) Transformations:
- left 2
- up 3



New Equation:

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

b) Transformations:
- flip
- up 1
- right 4
- ~~stretch~~

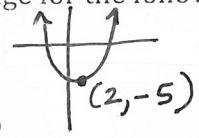


New Equation:

$f(x) = -2|x-4| + 1$

5) Find the domain & range for the following 2 functions: (Hint: It might help to draw a rough sketch!)

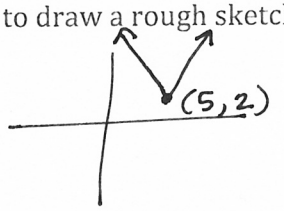
a) $f(x) = 3(x-2)^2 - 5$



$D: (-\infty, \infty)$

$R: [-5, \infty)$

b) $g(x) = \sqrt{x-5} + 2$



$D: [\infty, \infty)$

$R: [2, \infty)$

Unit 2: Systems

1) NC Solve the system by graphing.

$5x + 3y = 9$

$3y = -5x + 9$

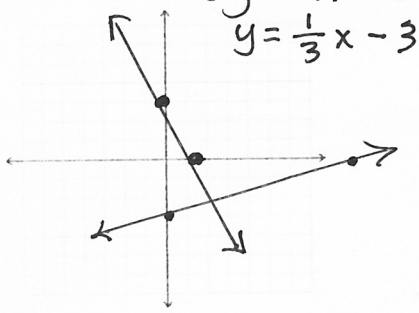
$y = \frac{-5}{3}x + 3$

$x - 3y = 9$

$-3y = -x + 9$

$y = \frac{1}{3}x - 3$

$(3, -2)$



2) NC Solve the system using any method.

$5x + y = 9$

$y = -5x + 9$

$10x + 2y = 20$

$\frac{2y}{2} = \frac{-10x + 20}{2}$

$y = -5x + 10$

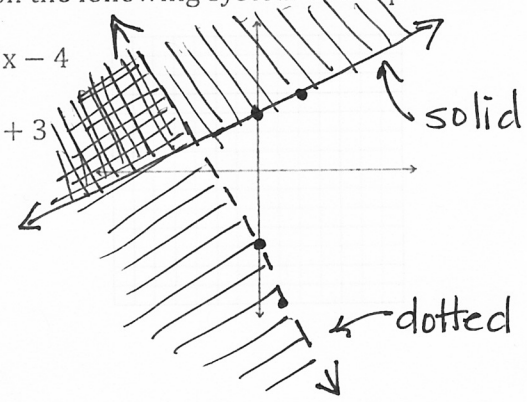
{Same Slope
{Different y-intercepts

The lines are parallel.
No intersection.

3) Graph the following system of inequalities.

$y < -3x - 4$

$y \geq \frac{1}{2}x + 3$



4) Are the points below a solution to

$5x + 3y \geq 9$?

a. (-2, 10) b. (2, -3) c. (4, 3) d. (1, 1)

a. $5(-2) + 3(10) \geq 9$

$-10 + 30 \geq 9$

$20 \geq 9$

Yes

b. $5(2) + 3(-3) \geq 9$

$10 + (-9) \geq 9$

$1 \geq 9$

No

c. $5(4) + 3(3) \geq 9$

$20 + 9 \geq 9$

$29 \geq 9$

Yes

d. $5(1) + 3(1) \geq 9$

$5 + 3 \geq 9$

$8 \geq 9$

No

5) Maria is hosting a party. She places an order at Pizza Hut for 5 pizzas and 4 breadsticks for a total of $51. Halfway through the party, she realizes that she will need one more pizza and 2 more order of breadsticks. This time she was given a total of $15. How much does a pizza cost? How much does a breadstick cost?

P = pizza
b = bread

$$\begin{cases} 5P + 4b = 51 \\ (1P + 2b = 15) \times(-2) \end{cases}$$

$5p + 4b = 51$
$-2p - 4b = -30$

$3p = 21$
$p = 7$

* Substitute back into an equation to find b.

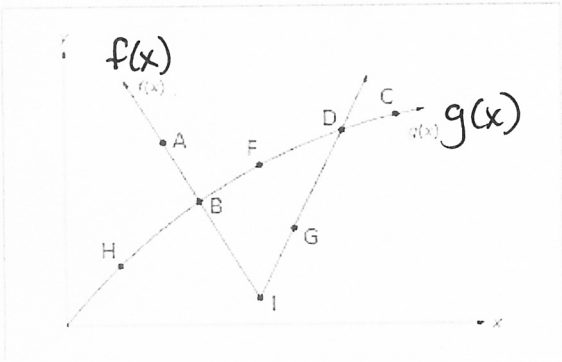
$7 + 2b = 15$
$2b = 8$
$b = 4$

Pizza is $7, and bread is $4.

6) NC Janelle is selling cookies (x) and brownies (y) at a bake sale. A cookie costs $1.50 and a brownie costs $2.00. She needs to make at least $50 to make a profit but she only has 20 cookies to sell. Write a system of linear inequalities to model this problem. (You don't have to solve)

$$\begin{cases} 1.50x + 2.00y \geq 50 \\ x \leq 20 \end{cases}$$

7) The graphs of y = f(x) and y = g(x) are shown. **A.REI.D.11**



Solutions for...	List **all** the points (2 pts each)
y = f(x)	A, B, I, G, D
y = g(x)	H, B, F, D, C
f(x) = g(x)	B, D

8) Find where the system intersects: $f(x) = x^2 + 5x - 10$; $g(x) = x + 2$

$$\begin{cases} y = x^2 + 5x - 10 \\ y = x + 2 \end{cases}$$

Substitute:

$x^2 + 5x - 10 = x + 2$
$-x \quad -x$
$x^2 + 4x - 10 = 2$
$-2 \quad -2$
$x^2 + 4x - 12 = 0$

factor

$x^2 + 4x - 12 = 0$
$(x + 6)(x - 2) = 0$

$x + 6 = 0$ → $x = -6$
$x - 2 = 0$ → $x = 2$

or

Quadratic Formula

$$\frac{-4 \pm \sqrt{16 - 4(1)(-12)}}{2(1)}$$

$$\frac{-4 \pm \sqrt{64}}{2}$$

$\frac{-4 + 8}{2} = 2$ $\quad \frac{-4 - 8}{2} = -6$

Unit 3: Rational/Radical

1) NC Simplify: $36^{\frac{1}{2}} = \sqrt{36} = 6$

2) NC Simplify: $8^{\frac{2}{3}}$ $\sqrt[3]{8^2} = 4$

3) NC Convert to radical form: $x^{\frac{4}{5}}$

$\sqrt[5]{x^4}$

4) NC Convert to exponential form: $\left(\sqrt[4]{x}\right)^3$

$x^{\frac{3}{4}}$

5) NC Simplify:

a) $\sqrt{72}$

72 → 9 · 8 → 3 · 3 · 2 · 4 → 2 · 2

$= 3 \cdot 2\sqrt{2}$

$= \boxed{6\sqrt{2}}$

b) $\sqrt{200}$

200 → 2 · 100 → 2 · 50 → 2 · 25 → 5 · 5

$= 2 \cdot 5\sqrt{2}$

$= \boxed{10\sqrt{2}}$

6) Simplify: $x^{\frac{2}{3}} \cdot x^{\frac{3}{4}}$

$= x^{2/3 + 3/4}$

$= x^{\frac{8}{12} + \frac{9}{12}}$

$= \boxed{x^{\frac{17}{12}}}$

7) NC Simplify: $\frac{w^2xy^{-3}z}{w^5x^3y^3z^{-4}}$

$= w^{2-5} x^{1-3} y^{-3-3} z^{1-(-4)}$

$= w^{-3} x^{-2} y^{-6} z^5$

$= \boxed{\frac{z^5}{w^3x^2y^6}}$

8) NC Simplify: $\frac{x^{-3}y^2z}{x^2y^{-7}z}$

$= x^{-3-2} y^{2-(-7)} z^{1-1}$

$= x^{-5} y^9 z^0$

$= \boxed{\frac{y^9}{x^5}}$

9) NC Solve: $\frac{4}{x} = \frac{-3}{x+8}$

Cross multiply:

$-3x = 4(x+8)$ Distribute.

$-3x = 4x + 32$

$-4x \quad -4x$

$\frac{-7x}{-7} = \frac{32}{-7}$

$\boxed{x = -4\frac{4}{7}}$

10) Solve $\frac{x^2+11x+30}{x^2+3x-18}$

Simplify: Factor the numerator and denominator.

$\frac{(x+5)(x+6)}{(x+6)(x-3)} = \boxed{\frac{x+5}{x-3}}$

11) $\left(\sqrt{3x-5}\right)^2 = (7)^2$

$3x - 5 = 49$

$+5 \quad +5$

$\frac{3x}{3} = \frac{54}{3}$

$\boxed{x = 18}$

12) $\left(\sqrt{90-x}\right)^2 = (x)^2$

$90 - x = x^2 + x$

$+x$

$90 = x^2 + x - 90$

-90

$0 = x^2 + x - 90$

$0 = (x+10)(x-9)$

$x = -10$ $\quad \boxed{x = 9}$

13) $\left(\sqrt{x-5}\right)^2 = \left(\sqrt{10-2x}\right)^2$

$x - 5 = 10 - 2x$

$+2x \qquad +2x$

$3x - 5 = 10$

$+5 \quad +5$

$\frac{3x}{3} = \frac{15}{3}$

$\boxed{x = 5}$

Unit 4: Quadratics

1) Which of the following equations shows the minimum or maximum of h(x)? Is it a max or min?

$h(x)= 2(x+3)(x+1)$ | $h(x)= 2(x+2)^2-2$ | $h(x)= 2x^2+8x+6$

Vertex Form

2) Factor to find the x-intercepts

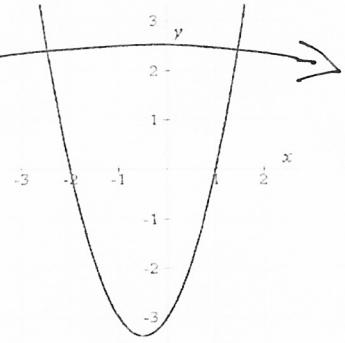
a) $x^2 - 13x + 30 = 0$

$= \frac{13 \pm \sqrt{169-4(1)(30)}}{2(1)} = \frac{13 \pm \sqrt{49}}{2} = \frac{13+7}{2} = 10$, $\frac{13-7}{2} = 3$

b) $x^2 + 5x - 14 = 0$

$\frac{-5 \pm \sqrt{25-4(1)(-14)}}{2(1)} = \frac{-5 \pm \sqrt{81}}{2}$, $\frac{-5+9}{2} = 2$, $\frac{-5-9}{2} = -7$

3) NC The graph below can be represented by which of the following equations:



a) $y = (x-2)(x+1)$
b) b) $y = (x-1)(x+2)$
c) c) $y = (x+1)(x+2)$
d) d) $y = (x-1)(x-2)$

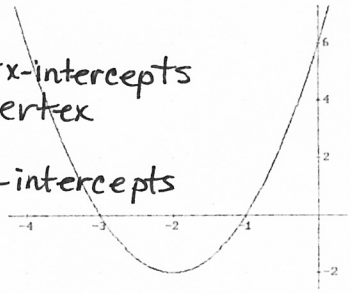
$y = (x-1)(x+2)$

Let $y = 0$ to find the x-intercepts.

$0 = (x-1)(x+2)$

$x-1=0$, $+1\ +1$, $x=1$ | $x+2=0$, $-2\ -2$, $x=-2$

4) NC Select all of the functions that can represent the following graph:



a) $2x^2+4x+3$
b) $2(x+3)(x+1)$ Correct x-intercepts
c) $2(x+2)^2-2$ Correct vertex
d) $2(x-3)(x-1)$
e) $2x^2+8x+6$ Correct x-intercepts
f) $2(x-2)^2-2$

5) NC Solve the following equations using any method.

a) $(p-6)^2 = 9$

Square root both sides:

$p-6=3$, $+6\ +6$, $p=9$ or $p-6=-3$, $+6\ +6$, $p=3$

-or-

Foil and use the quad. formula.

$p^2-12p+36=9$, $-9\ -9$, $p^2-12p+27=0$, $a=1$, $b=-12$, $c=27$

b) $x^2 - 11x + 19 = -5$, $+5\ +5$

$x^2-11x+24=0$

$(x-8)(x-3)=0$

$x=+8$, $x=+3$

*Or use the quadratic formula. $\frac{11 \pm \sqrt{121-4(1)(24)}}{2}$

c) $x^2 + 4x + 6 = 0$ This does not factor.

Use the quadratic formula.

$= \frac{-4 \pm \sqrt{16-4(1)(6)}}{2(1)}$

$= \frac{-4 \pm \sqrt{-8}}{2}$ No Real Solutions

Using complex numbers: $\frac{-4 \pm 2i\sqrt{2}}{2} = -2 \pm i\sqrt{2}$

6) How many times does each of the following functions intersect the x-axis?

a) $y = 3x^2 + \frac{2}{3}x - \frac{1}{3}$ — 2

b) $f(x) = \frac{4}{3}x^2 - 4x + 3$ — 1

c) $f(x) = 2x^2 - \frac{1}{2}x + \frac{3}{2}$ — 0