Algebra 2 Semester 1 Final Exam Practice

Complete the following problems. Show all work. Calculator not permitted. Flashcards permitted.

1. Given the points $(-6, -3)$ and $(2,10)$.

a. Find the distance between the points.   b. Find the slope through these two points.

c. Find the equation of the line that goes through these two points.

d. Find three *other* points one the line through these two points.

2. Given the system of equations $3x + 2y = 8$ and $-2x - 5y = -9$.

a. Solve the system of equations using *elimination.*

b. Solve the system of equations using *substitution.*

c. Write both equations in $y = mx + b$ form.   d. Graph the equations.

3. Evaluate if $g(x) = 5x - x^2$.

a. $g(-3)$ b. $g\left(\frac{2}{3}\right)$ c. $g(2a + 3)$

d.   For what value(s) of x does $g(x) = -6$? Show your work.

4. Simplify each expression.

   a. 2^{-3}

   b. $64^{\frac{1}{3}}$

   c. $(k^3 hm^{\frac{3}{4}})^8$

   d. $\left(\frac{1}{216}\right)^{-\frac{3}{4}}$

   e. $(9^{\frac{1}{2}})^{-4}$

5. Multiply these polynomials:

a. Use the area model to multiply $(x + 3)(x^2 - 4x + 7)$.

b. Multiply with the method of your choice: $(x + y)^3$.

6. Factor!

a. $2x^2 + 7x - 4$

b. $12x^4 + 36x^3 + 15x^2$

7. Multiplying and dividing rational expressions.

a. $\dfrac{3}{2} \bullet \dfrac{5}{7}$

b. $\dfrac{7}{5} \div \dfrac{8}{9}$

c. $\dfrac{x^2-x-30}{x^2+13x+40} \cdot \dfrac{x^2+11x+24}{x^2-9x+18}$

d. $\dfrac{x^2-1}{x^2-6x-7} \div \dfrac{x^3+x^2-2x}{x-7}$

8. Adding and subtracting rational expressions.
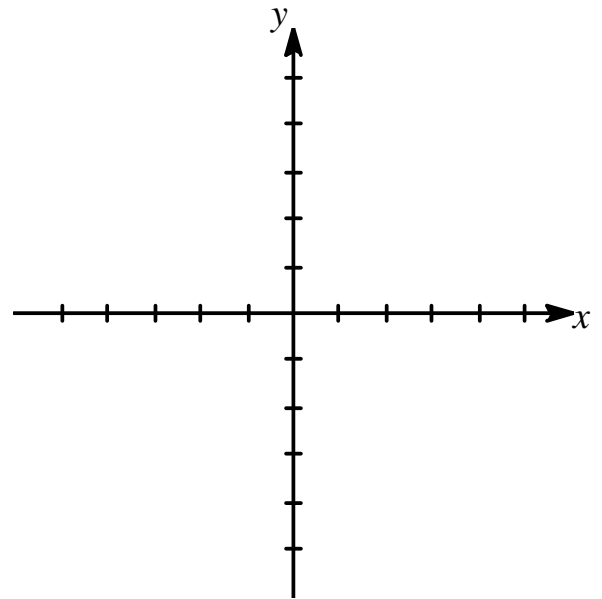
a. $\dfrac{8}{11} - \dfrac{13}{5}$

b. $\dfrac{x+4}{x^2-3x-28} - \dfrac{x-5}{x^2+2x-35}$

9. Investigate the funciton $f(x) = -\sqrt{x+4} + 1$.

9b. Investigate the funciton $f(x) = 2(x+3)^2 + 4$

9c. Investigate the funciton $f(x) = \frac{1}{x-3} + 1$

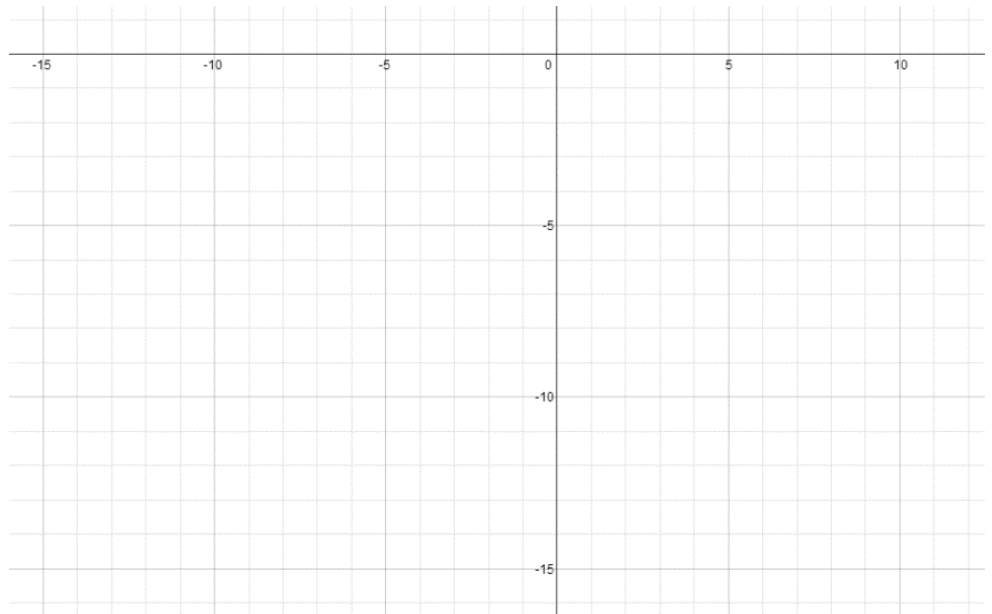9d. Investigate the funciton $f(x) = -1/4|x-5| + 3$

10. Given the quadratic equation $y = x^2 + 4x - 12$.

a. What is the y-intercept?

b. What are the x-intercepts of this equation?

c. Write the equation in graphing form $y = a(x-h)^2 + k$.   d. Graph it. Label.

11. Order of operations:

a. Simplify $(8 - 2)^2 \div 6 \cdot 3 + 5 - 8 \cdot 2^3$.

b. Evaluate $-6^2 \div 4 \cdot 2 - (4^2 + 3^2)$.

12. Solve $2(4 - 2x) - 3(x + 5) = -5x - 2$. Show all of your work clearly.

13. Darren was tossing a ball and he noticed that the path of the ball was a parabola, so he quickly took measurements. The highest point the ball reached was 5 feet and it landed 6 feet from where he was standing. Sketch a graph and write an equation that describes the path of the ball. Be sure that your variables are clearly defined or labeled on your graph.

6. Consider the inequality $7x - 23 \leq 72$

a.   Find at least five x-values that make the inequality true.

b.   How many solutions are there?

c.   Find and name the boundary point. What is its relationship with the inequality?

d.   Write an inequality that represents the solution for x. On a number line, highlight the solutions for x.

7. Graph the system of inequalities below on one set of axes.

i. $y < -\frac{2}{3}x - 3$
ii. $y \geq -\frac{5}{2}x + 6$

a.   Is the boundary line for each inequality included in the solution? Explain.

b.   Which points are solutions to this system?

c.   Verify your solution region algebraically. Be sure to check each inequality and show your work.

d.   How can you be sure this region is the only set of points that makes both inequalities true?

8. a. Find the equation of the radical (yes it is shown below, SHOW WORK). State the domain and range.

-0.521, 2.202

3.702, 0.837

0.8, 0
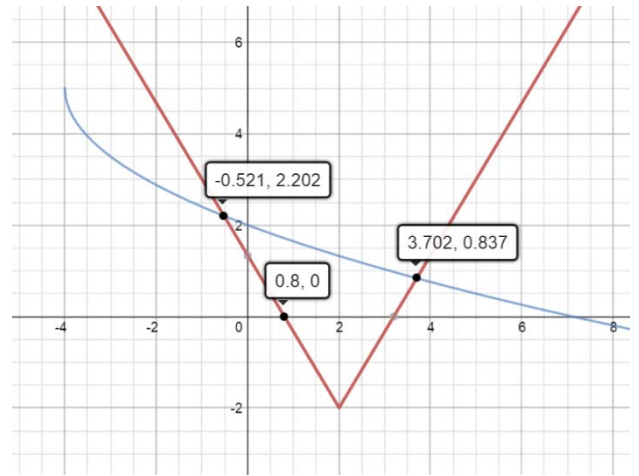
b. Find the equation of the other function. State the domain and range.

c. Solve $\frac{5}{3}|\ x - 2\ | - 2 = -\frac{3}{2}\sqrt{x + 4} + 5$.

d. Solve $y = \frac{5}{3}|\ x - 2\ | - 2$

$y = -\frac{3}{2}\sqrt{x + 4} + 5$

e. What is the difference between the answer to c and d? Explain why this is so.

f. Solve $\frac{5}{3}|\ x - 2\ | - 2 < -\frac{3}{2}\sqrt{x + 4} + 5$.

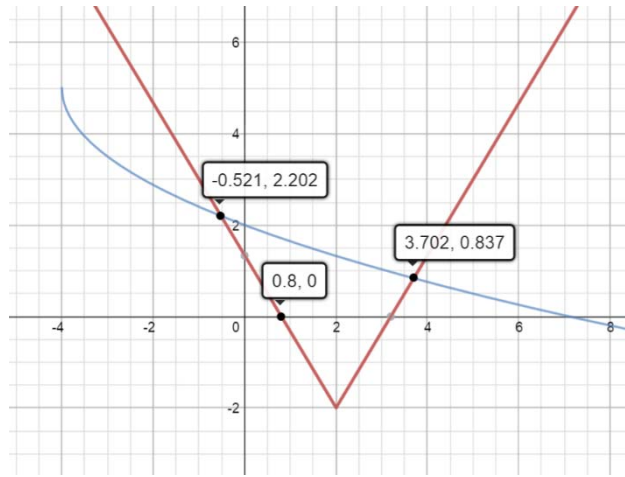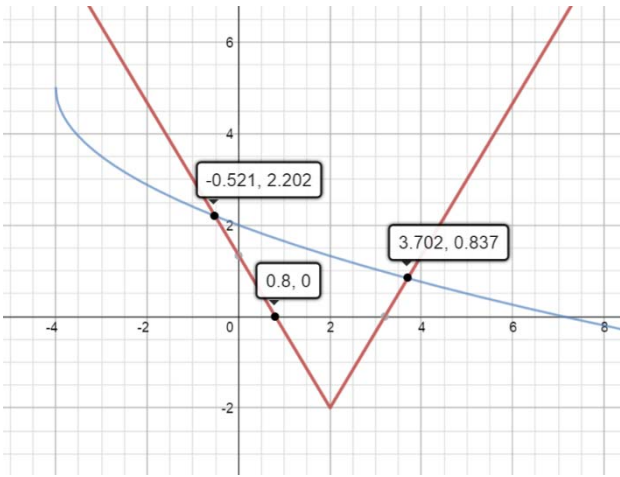g. Solve $\frac{5}{3}|\ x - 2\ | - 2 \geq -\frac{3}{2}\sqrt{x + 4} + 5$.

For problems h-k, solve by shading the appropriate region.

h. $y \leq \frac{5}{3}| x - 2 | - 2$

$y \geq -\frac{3}{2}\sqrt{x + 4} + 5$

i. $y \leq \frac{5}{3}| x - 2 | - 2$

$y \leq -\frac{3}{2}\sqrt{x + 4} + 5$

j. $y \geq \frac{5}{3}| x - 2 | - 2$

$y \geq -\frac{3}{2}\sqrt{x + 4} + 5$

k. $y \geq \frac{5}{3}| x - 2 | - 2$

$y \leq -\frac{3}{2}\sqrt{x + 4} + 5$
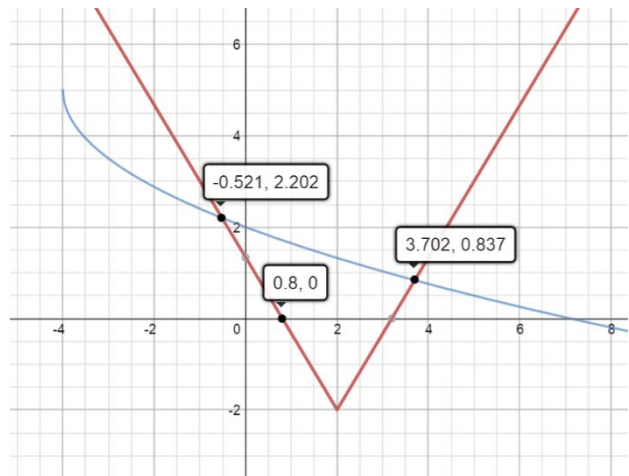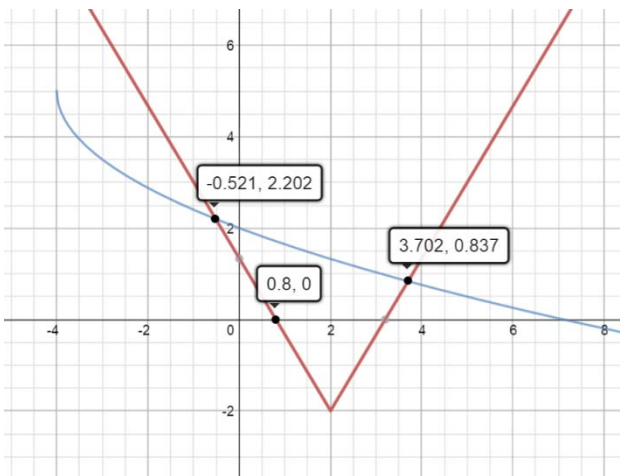
Vocabulary: Make sure that you can DEFINE and GIVE AN EXAMPLE of each of these.

asymptote	**dependent variable**	**domain**
equation	**function**	**graph**
independent variable	**infinity**	**input**
investigating a function	**situation**	**symmetry**

output   range   *x-intercept*

x -> y table   y-intercept

compress	dilation	domain
even function	function	general equation
graphing form	(h, k)	horizontal shift
odd function	parameter	parent graph
piecewise function	range	reflection
Standard Form (quadratic function)	step function	stretch factor
transformation	translation	variable
vertex	vertex form	vertical shift

closed set	coefficient	constant term
difference of squares	equivalent	equation
excluded value	exponent	expression
factor	function	Giant One
least common denominator	polynomial	rational expression
rational function	rewrite	simplify
substitution	term	

solution	boundary curve	boundary line
boundary point	extraneous solution	intercepts
intersection	linear programming	Looking Inside
maximize	one-variable equation	one-variable inequality
rewrite	solution region	system of equations
system of inequalities	two-variable equation	two-variable inequality
Undoing		