Honors Math 3 Unit 1 Test Review

Name: Key

I. Skills throughout the unit
   A. Graphing linear, quadratic, square root
   B. Writing equations of linear, quadratic, square root
   C. Average Rate of Change

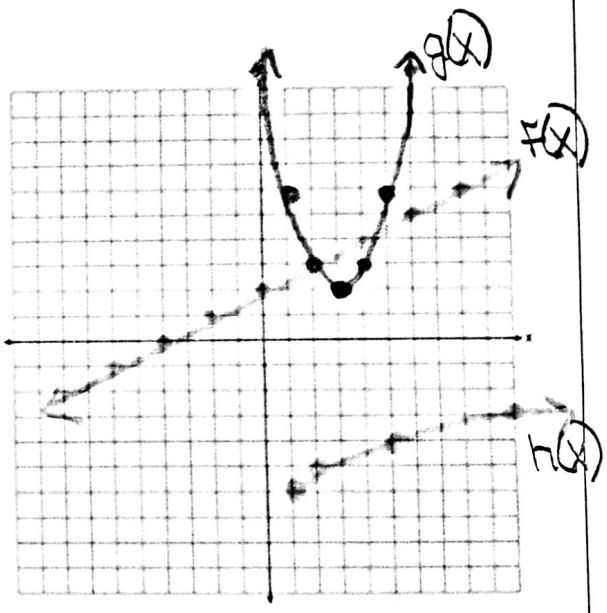
II. Absolute Value
   A. Solving
   B. Writing as a piecewise function
   C. Graphing
   D. Domain and Range

III. Piecewise
   A. Graphing
   B. Writing an equation from a graph
   C. Interpreting a graph
   D. Find f(x) from a piecewise function

Practice:

Given the following functions: $f(x) = \frac{1}{2}(x+4)$, $g(x) = (x-3)^2 + 2$, $h(x) = \sqrt{(x-1)} - 6$

1. Graph and label the functions on the graph at right.

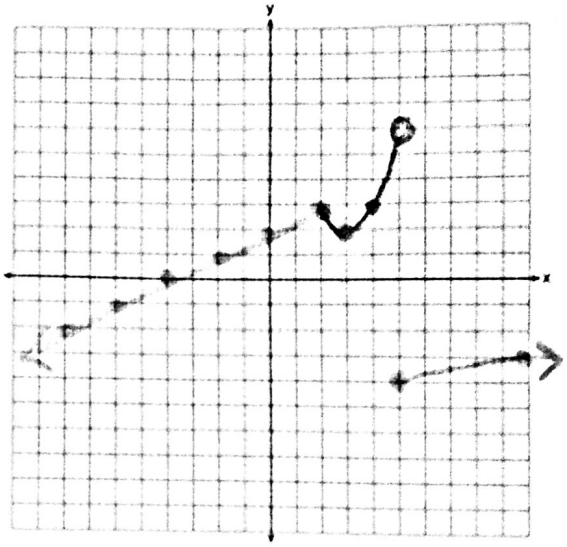


2. State the domain and range of each function:

Function	Domain	Range
$f(x) = \frac{1}{2}(x+4)$	$(-\infty, \infty)$	$(-\infty, \infty)$
$g(x) = (x-3)^2 + 2$	$(-\infty, \infty)$	$[2, \infty)$
$h(x) = \sqrt{(x-1)} - 6$	$[1, \infty)$	$[-6, \infty)$

3. Graph the following function:

$$k(x) = \begin{cases} \frac{1}{2}(x+4), & x \le 2 \\ (x-3)^2 + 2, & 2<x<5 \\ \sqrt{(x-1)} - 6, & 5 \le x<10 \end{cases}$$



4. Use the equation or the graph to find the following:

a. k(-2) = 1 b. k(0) = 2

c. k(1) = 2.5 $\left(\frac{5}{2}\right)$ d. k(2) = 3

e. k(3)= 2 f. k(4) = 3

g. k(5) = -4 h. k(10) = -3

5. $f(x) = \begin{cases} x^2+3 & \text{if } x<-2 \\ |x-1| & \text{if } -2 \le x < 3 \\ 5 & \text{if } x \ge 3 \end{cases}$

a) $f(-2) = |-2-1|$
$= |-3|$
$= 3$

b) $f(3) = 5$

c) $3f(-1) + 2f(-3) - f(4)$
$= 3|-1-1| + 2((-3)^2+3) - 5$
$= 3(2) + 2(12) - 5$
$= 6 + 24 - 5 = 25$

6. You are buying tee shirts for the math club. The pricing of the shirts is given by the following function: $c(x) = \begin{cases} 15x & \text{if } 1 \le x \le 10 \\ 12x & \text{if } 11 \le x \le 20 \\ 10x & \text{if } 21 \le x < \infty \end{cases}$ (where x is an integer)

a. If 43 members of the math club order tee shirts, what is x? 43

What is the total cost of the tee shirts? \$430 How much will each member pay? \$10
10(43)

b. If only 5 members of the club order tee shirts, how much will each member pay? \$15

c. Which order costs less: 10 shirts or 11 shirts? 11 shirts
15(10)=\$150 12(11)=\$132

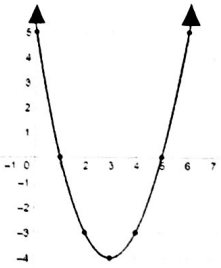
If 10 members want to buy shirts, how many shirts should be ordered so that each member gets a shirt and the cost is minimized? 11 shirts

7. Write an equation for the following functions; state their domains and ranges:

Equation: $f(x) = (x-3)^2 - 4$

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

Range: $[-4, \infty)$

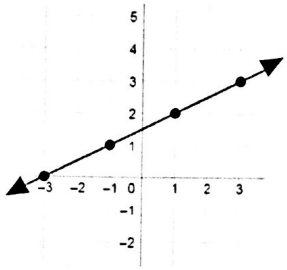


Equation: $g(x) = \frac{1}{2}(x-1)+2$

* Could use different point

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

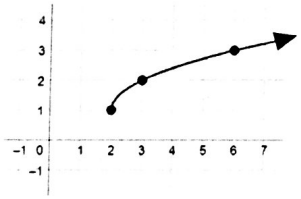
Range: $(-\infty, \infty)$



Equation: $h(x) = \sqrt{x-2} + 1$

Domain: $[2, \infty)$

Range: $[1, \infty)$

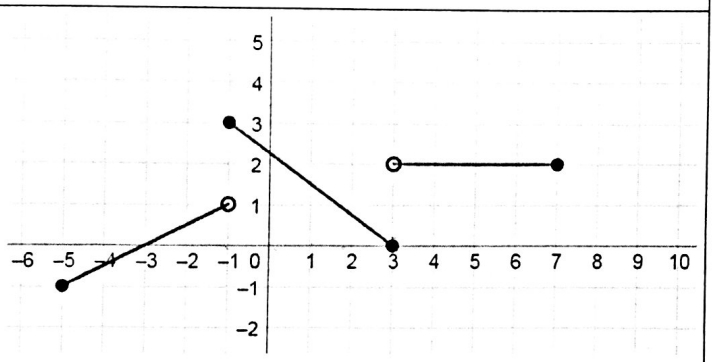


8. Write the equation of $y = |x - 3|$ in piecewise notation.

$$y = \begin{cases} -(x-3), & x < 3 \\ (x-3), & x \geq 3 \end{cases}$$

9. Fill in the blanks to complete the equation of the following piecewise function:

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



Interval	Average Rate of Change
$-5 \leq x \leq -3$	$1/2$

10. Given the graph above, find the average rate of change of f(x) on each interval.

Interval	Average Rate of Change
$-5 \le x \le -3$	$\frac{1}{2}$
$-1 \le x \le 3$	$-\frac{3}{4}$
$4 \le x \le 5$	0

11. Find the value(s) of x where f(x) = 0.

x = -3, 3

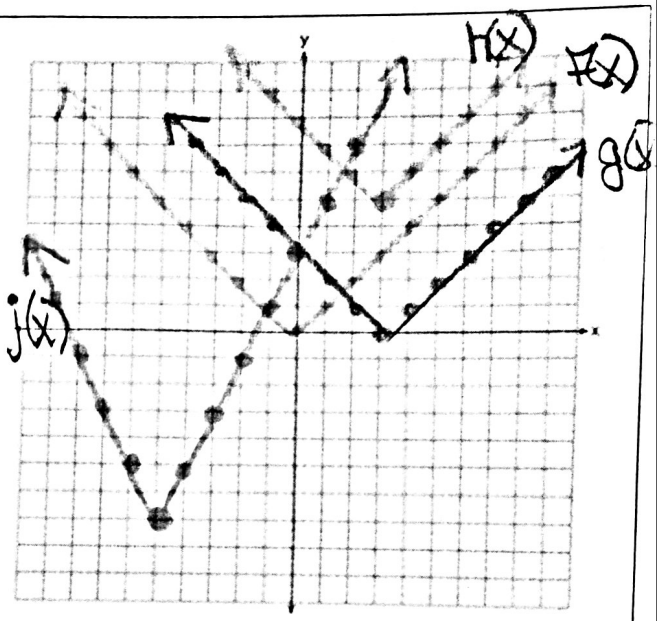
12. Solve the following absolute value inequalities:

Inequality	Solution	Follow up question:
A. $\lvert 7 - 9k \rvert = 43$	$7-9k=43$; $-9k=36$; $k=-4$ $-(7-9k)=43$; $-7+9k=43$; $9k=50$; $k=\frac{50}{9}$ $\{-4, \frac{50}{9}\}$	What can you say about the following? $\lvert 3x+5 \rvert = -2$ Solution is $\varnothing$ because distance can't be negative.
B. $\lvert x - 3 \rvert > 5$	$x-3>5$; $x>8$ $-(x-3)>5$; $-x+3>5$; $-x>2$; $x<-2$ $\{x<-2 \text{ or } x>8\}$	Is x = 12 in the solution set? Yes, because 12 is greater than 8.
C. $\lvert n - 1 \rvert - 7 > -3$	$(n-1)-7>-3$; $n-8>-3$; $n>5$ $-(n-1)-7>-3$; $-n+1-7>-3$; $-n-6>-3$; $-n>3$; $n<-3$ $\{n<-3 \text{ or } n>5\}$	Is x = 8 in the solution set? Yes, because 8 is greater than 5
D. $2\lvert a - 2 \rvert - 8 \le -4$	$2(a-2)-8\le-4$; $2a-4-8\le-4$; $2a-12\le-4$; $2a\le8$; $a\le4$ and $-2(a-2)-8\le-4$; $-2a+4-8\le-4$; $-2a-4\le-4$; $-2a\le0$; $a\ge0$ $\{0\le a\le4\}$	Is x = -6 in the solution set? No, -6 is not between 0 and 4, inclusive

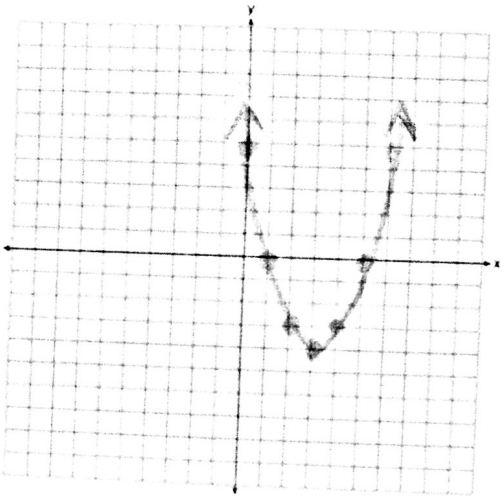
13. Graph and label the functions on the graph below.

State the domain and range of each function:

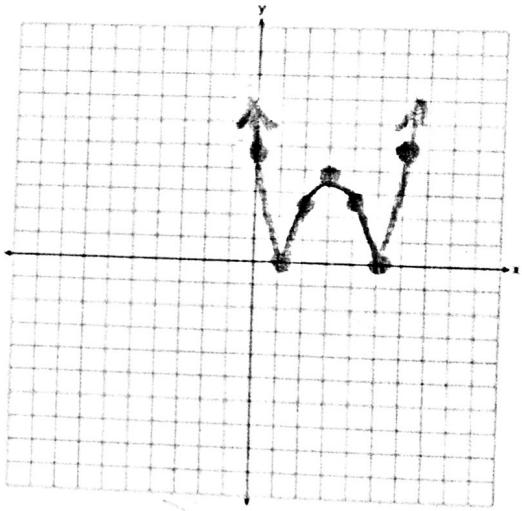
Function	Domain	Range
$f(x) = \lvert x \rvert$	$(-\infty, \infty)$	$[0, \infty)$
$g(x) = \lvert x - 3 \rvert$	$(-\infty, \infty)$	$[0, \infty)$
$h(x) = \lvert x - 3 \rvert + 5$	$(-\infty, \infty)$	$[5, \infty)$
$j(x) = 2\lvert x + 5 \rvert - 7$	$(-\infty, \infty)$	$[-7, \infty)$



14. Graph $y = (x - 3)^2 - 4$



15. Graph $y = \lvert (x - 3)^2 - 4 \rvert$



16. Graph $y \leq -3\lvert x + 1 \rvert + 5$