Name: **Key**   Period:_____

Honors Advanced Algebra
Key Concept 1 - Special Functions and Linear Systems

1) Solve for y.

① $x + y + z = 1$
② $2x - y + 2z = -1$
③ $-x - 3y + z = 1$

①$(x+y+z=1)$ ×(-2)
② $2x-y+2z=-1$

① $-2x-2y-2z=-2$
② $2x-y+2z=-1$
_____
$-3y = -3$
$\frac{-3y}{-3} = \frac{-3}{-3}$

$\boxed{y=1}$

Done ☺

① $|x| + |y| + |z| = 1$
③ $-x - 3y + |z| = 1$
_____
④ $-2y + 2z = 2$

2) Solve for x.

① $x + 3y - 2z = 8$
② $3x + 2y - 3z = 15$
③ $4x + 2y + 3z = -1$

② $3x + 2y - 3z = 15$
③ $4x + 2y + 3z = -1$
_____
④ $7x + 4y = 14$

① $3(x+3y-2z=8)$ → $3x+9y-6z=24$
③ $2(4x+2y+3z=-1)$ → $8x+4y+6z=-2$
_____
⑤ $11x + 13y = 22$

④ $-13(7x+4y=14)$ → $-91x-52y=-182$
⑤ $4(11x+13y=22)$ → $44x+52y=88$
_____
$-47x = -94$

$\boxed{x=2}$

Done ☺

→ Kathy invested $2000 in her savings, $3000 in her time deposit, and $1000 in bond.

3) Kathy has $6000 invested among a saving account paying 3%, a time deposit paying 4%, and a bond paying 8%. She has $1000 less invested in the bond than in her saving account, and she earned a total of $260 in annual interest. Determine the system that represents the amount invested in each account. Use the Nspire to solve.

• Let x be the $ invested in savings acct
• Let y be the $ invested in time deposit
• Let z be the $ invested in bond
        ↓
    money

① $x + y + z = 6000$
② $0.03x + 0.04y + 0.08z = 260$
③ $z = x - 1000$
"she has $1000 less invested in bond than sv."

(2000, 3000, 1000)

4) The measure of the largest angle of a triangle is 10 degree more than the sum of the measures of the other two angles and 10 degree less than 3 times the measure of the smallest angle. Determine the system that represents all three angles. Use the Nspire to solve.

Let x be the smallest ∠ of a △
Let y be the middle ∠ of a △
Let z be the largest ∠ of a △

① $x + y + z = 180$ (All ∠s add to 180°)
② $z = (x+y) + 10$
③ $z = 3x - 10$

(35, 50, 95)

The smallest ∠ is 35°, the middle 50°, and largest 95°.

5) Write an absolute value function that represents the change given from the parent function f(x) = |x| *Think opposite for shifts left/right

a) Shifts right 2   **b) Shifts left 1**   **c) Shifts up 4**   **d) Shifts down 3**

$f(x) = |x - 2|$ $f(x) = |x+1|$ $f(x) = |x| + 4$ $f(x) = |x| - 3$

e) "Flipped" (or reflected over the x—axis)   **f) Vertical "stretch" by a factor of 3**   **g) Vertical "compression" by a factor of 1/2**

$f(x) = -|x|$ $f(x) = 3|x|$ $f(x) = \frac{1}{2}|x|$

$f(x) = a|x-h| + k$

Graph the following functions by hand. State the domain and range too.

vertex (4,2)

6) $g(x) = -|x-4| + 2$

opens down

slope $-\frac{1}{1}$

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

Range: $(-\infty, 2]$

vertex (-3,-1)

7) $h(x) = 2|x+3| - 1$ → slope $\frac{2}{1}$

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

Range: $[-1, +\infty)$

open ○
closed [,]
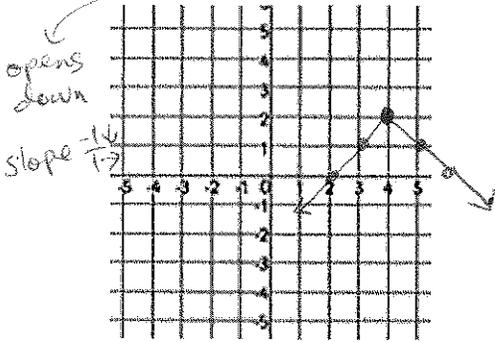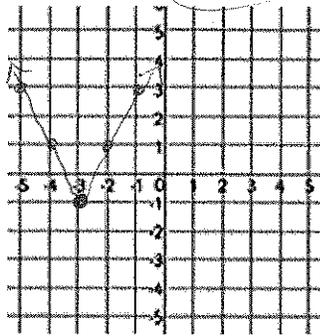
8) $f(x) = \begin{cases} 4 & -3 < x \leq -1 \\ 3 & -1 < x \leq 1 \\ -2 & 1 < x \leq 3 \end{cases}$
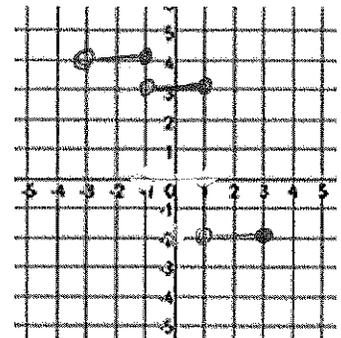
Domain : $(-3, 3]$

Range : $\{-2, 3, 4\}$

9) $k(x) = \begin{cases} 2x+1 & x < 2 \\ -3x+4 & x \geq 2 \end{cases}$ Slope $\frac{2}{1}$ y-int: 1
                                        Slope $\frac{-3}{1}$ y-int: 4
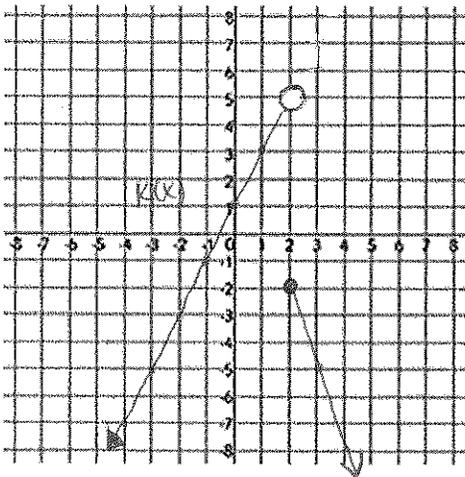
$D: (-\infty, \infty)$
$R: (-\infty, 5)$

10) $d(x) = \begin{cases} 4x & x \geq -1 \\ -6 & x < -1 \end{cases}$ Slope: $\frac{4}{1}$ y-int: 0
   horizontal line at y=6
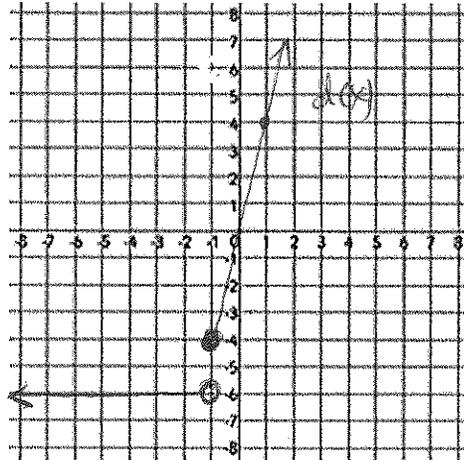
$D: (-\infty, \infty)$
$R: \{-6\} \cup [-4, +\infty)$

Determine the piecewise OR step function for the following graphs.

11). $f(x) = \begin{cases} -x-5 & x < 1 \\ 2x-4 & x \geq 1 \end{cases}$
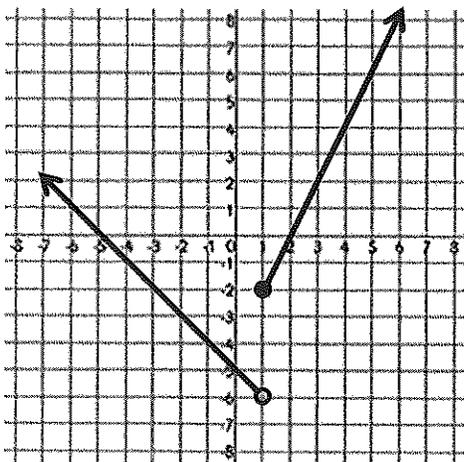
12). $f(x) = \begin{cases} -5 & -8 \leq x \leq -4 \\ -3 & -4 \leq x < 0 \\ 3 & 0 \leq x < 4 \\ 5 & 4 \leq x < 8 \end{cases}$

Done ☺