UNIT 2: ABSOLUTE VALUE AND PIECEWISE FUNCTIONS — NAME: Key

PRACTICE SWIG — PERIOD: ________ DATE: ________

ADVANCED ALGEBRA

1. Find the solution(s) of $|2x-1| = 5$. Check your solution(s). → in original equation

$|2x-1| = 5 \Rightarrow 2x-1 = 5$ OR $2x-1 = -5$

$+1 \quad +1 \qquad\qquad +1 \quad +1$

$\frac{2x}{2} = \frac{6}{2} \qquad\qquad \frac{2x}{2} = \frac{-4}{2}$

$x = 3$ OR $x = -2$

CHECK: $x=3$

$|2x-1| = 5$

$|2(3)-1| = 5$

$|6-1| = 5$

$|5| = 5$

$5 = 5$

true ✓

CHECK: $x=-2$

$|2x-1| = 5$

$|2(-2)-1| = 5$

$|-4-1| = 5$

$|-5| = 5$

$5 = 5$

true ✓

2. Solve the following absolute value equation: $|3x+5| = -10$.

$|3x+5| = -10 \Rightarrow$ NO SOLUTION!

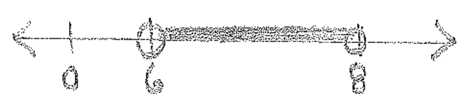
why? Because the distance from 0 on the number line cannot be negative, namely cannot be -10.

3. Graph the inequality: $8 < 2x - 4 < 12$ ← This is an AND compound inequality.

$+4 \qquad +4 \quad +4$

$\frac{12}{2} < \frac{2x}{2} < \frac{16}{2}$

$6 < x < 8$ ← open circle

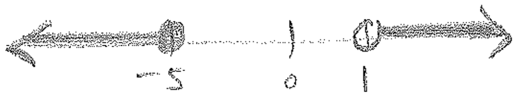


Graph

4. Solve the inequality, and then graph the solution. $2x - 9 > -7$ or $7x + 5 \leq -30$

$+9 \quad +9 \qquad\qquad -5 \quad -5$

$\frac{2x}{2} > \frac{2}{2} \qquad\qquad \frac{7x}{7} \leq \frac{-35}{7}$



$x > 1$ OR $x \leq -5$

↓ open circle ↓ closed circle

5. Solve the inequality, and then graph the solution. $-17x - 12 < 13x - 12 \leq -8 + 9x$

$-17x - 12 < 13x - 12$ AND $13x - 12 \leq -8 + 9x$

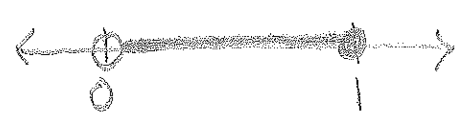
$+17x \qquad +17x \qquad\qquad -9x \qquad -9x$

$-12 < 20x - 12 \qquad\qquad 4x - 12 \leq -8$

$+12 \qquad +12 \qquad\qquad +12 \quad +12$

$\frac{0}{20} < \frac{20x}{20} \qquad\qquad \frac{4x}{4} \leq \frac{4}{4}$

$0 < x$ AND $x \leq 1$



→ AND compound Inequality

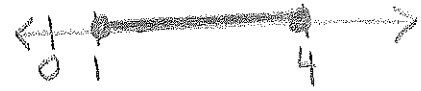
6. Solve the absolute value inequality, and then graph the solution. $|4x - 10| \le 6$

$$|4x-10| \le 6 \implies -6 \le 4x - 10 \le 6$$

$$+10 \quad +10 \quad +10$$

$$\frac{4}{4} \le \frac{4x}{4} \le \frac{16}{4}$$

$$1 \le x \le 4$$



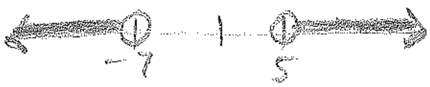
→ OR compound inequality.

7. Solve the absolute value inequality, and then graph the solution. $|8 + 9x| > 53$

$$|8+9x| > 53 \implies 8+9x > 53 \text{ OR } 8+9x < -53$$

$$-8 \quad -8 \qquad -8 \quad -8$$

$$\frac{9x}{9} > \frac{45}{9} \qquad \frac{9x}{9} < \frac{-61}{9}$$

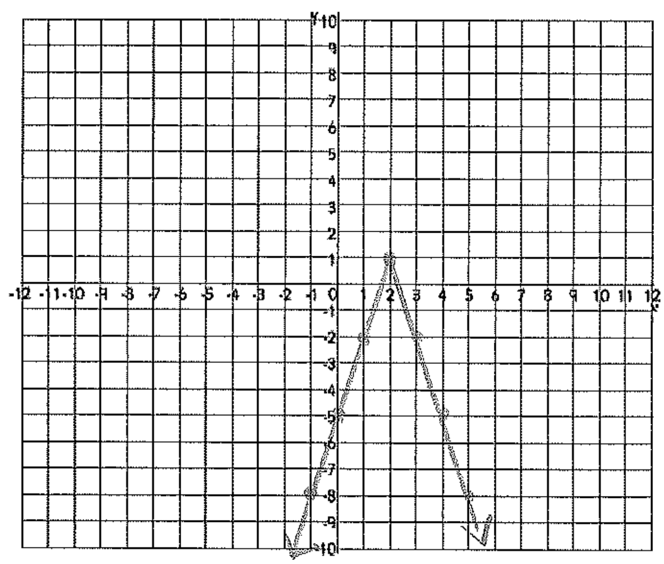


$x > 5$ OR $x < -7$

8. Graph the absolute value function.
   $y = -3|x - 2| + 1.$

Vertex = (2, 1)

Slope = $\frac{-3\downarrow}{1\rightarrow}$

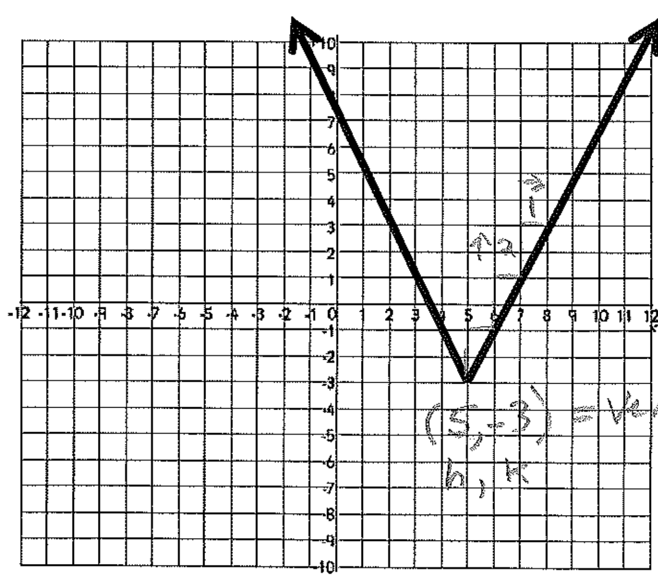


9. Write the equation of the graph below.

General Rule:

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

$$= 2|x-5| - 3$$



$\frac{2}{1} = 2 = a$

slope

(5, -3) = Vertex

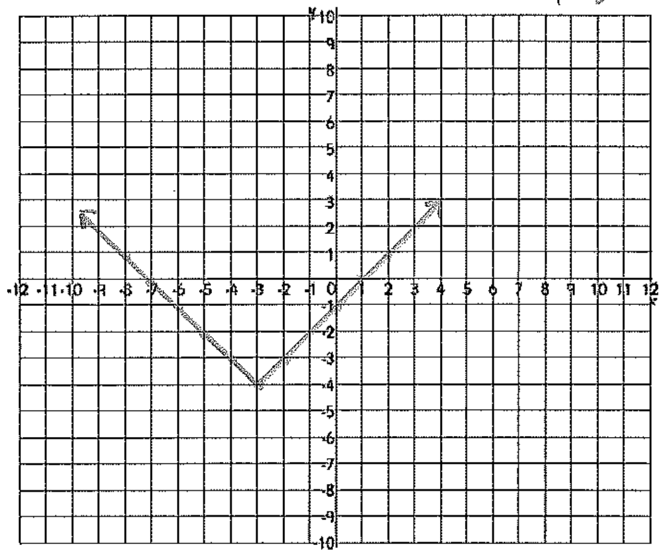
h, k

10. Graph the absolute value function.

$y = ||x + 3| - 4$

Vertex $= (-3, -4)$

Slope $= a = \frac{1 \uparrow}{1 \rightarrow}$

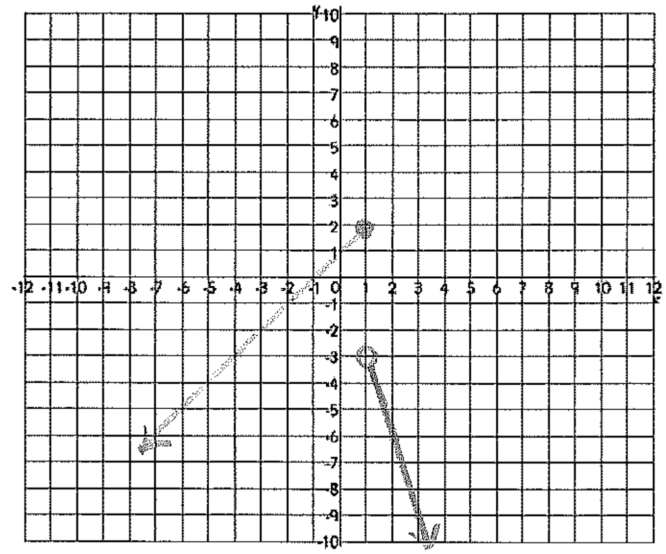


11. Graph the following piecewise function.

$$f(x) = \begin{cases} -3x, & x > 1 \\ x + 1, & x \leq 1 \end{cases}$$

slope: $\frac{-3 \downarrow}{1 \rightarrow}$ y-int: 0

slope: $\frac{1 \uparrow}{1 \rightarrow}$ y-int: 1

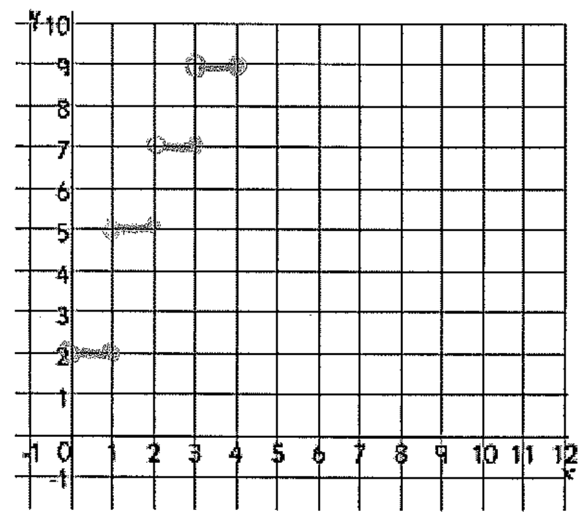


12. Graph the following step function.

$$f(x) = \begin{cases} 2, & 0 < x \leq 1 \\ 5, & 1 < x \leq 2 \\ 7, & 2 < x \leq 3 \\ 9, & 3 < x \leq 4 \end{cases}$$

x-axis condition

y-axis



13. Graph the following piecewise function.

$$f(x) = \begin{cases} 2x - 3, & x > 3 \\ -x + 5, & x \leq 3 \end{cases}$$

Slope: $\frac{2 \uparrow}{1 \rightarrow}$ y-int: -3

Slope: $\frac{-1 \downarrow}{1 \rightarrow}$ y-int: 5