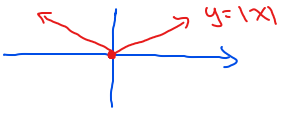
Solution = answer



16 | Unit 1 **12AdvF** Date: Jan. 12 Name: _____

Absolute Value Functions

$y = |x|$ D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R} | y \geq 0\}$

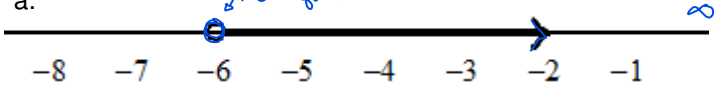
1. What is the difference between set notation of a solution and interval notation of the solution?

① uses {.....} ex: $\{x \in \mathbb{R} | -5 \leq x \leq -1\}$ ⟷ ② uses (, [brackets ex: $x \in (-5, -1]$ (not equal $x \neq -5$, equal $x = -1$)

2. Write the following in both set notation as well as interval notation.

Eg.

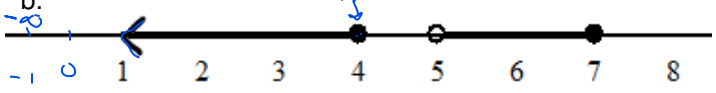
a.



Set Notation: $\{x \in \mathbb{R} | -6 < x\}$

Interval Notation: $x \in (-6, \infty)$

b.



Set: $\{x \in \mathbb{R} | x \leq 4 \text{ and } 5 < x \leq 7\}$

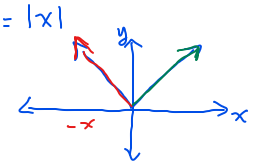
Interval: $x \in (-\infty, 4]$ and $(5, 7]$

3. What is an absolute value of a number?

ex: $|5| = 5$ $|-5| = 5$ → makes the number positive. $\rightarrow (-5) = 5$

4. What is the parent function of the absolute value?

$f(x) = |x|$



D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R} | y \geq 0\}$

5. How can this function be represented using piecewise notation?

$$f(x) = \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$$

6. What is the difference between 1 and 2 dimensional representations of an absolute value? Show examples.

7. Things to know when solving inequalities: → Not equal < or >

If multiply or divide negative number the sign will change

↳ < → >

↳ > → <

Solve the following:

Eg.

8. $-4 + 4|8x - 4| > -76$

-4 -4

$-4|8x - 4| > -80$

$|8x - 4| < \frac{-80}{-4}$

$|8x - 4| < 20$

* divide negative number ↳ need to change the sign.

$8x - 4 < 20$ or $-(8x - 4) < 20$

$8x < 24$ $-8x + 4 < 20$

$x < 3$ $-8x < 16$

$x > \frac{16}{-8}$

$x > -2$

Ans:

9. $-4|-3 + 7v| + 9 \leq -59$

$-4|-3 + 7v| \leq -68$

$|-3 + 7v| \geq 17$

$-3 + 7v \geq 17$ or $-(-3 + 7v) \geq 17$

$7v \geq 20$ $3 - 7v \geq 17$

$v \geq \frac{20}{7}$ $-7v \geq 14$

$v \leq \frac{14}{7}$

10. $3 + 2|9 + n| \leq -1$

$2|9 + n| \leq -4$

$|9 + n| \leq -2$

$9 + n \leq -2$ or $-(9 + n) \leq -2$

$n \leq -11$ $-9 - n \leq -2$

$-n \leq 7$

$n \geq -7$

number line!

11. $-1 + 4|6r| > -97$

$4|6r| > -96$

$|6r| \geq -24$

$6r \geq -24$ or $-6r \geq -24$

$r \geq -4$ $r \leq 4$

→ Solve absolute value equation
→ Solve absolute value inequation
→ write the answer as set notation and interval notation
→ represent the solution using a number line.

12. Solve the following absolute values and graph the solution set on a number line

Homework

a. $|x-2|=9$

b. $|5x-15|-3\leq 42$

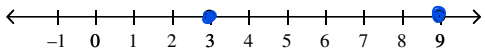
c. $-3|2x+5|>69$

d. $5|18-3x|>55$

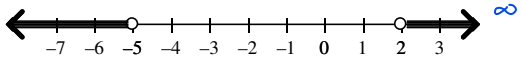
13. Express the following with a few algebraic representations:

$$|x-\text{centre}| \begin{cases} = \\ < \\ > \end{cases} \text{radius}$$

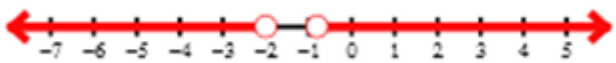
a. $x=3$ and $x=9$



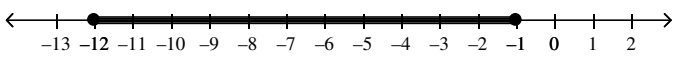
b. $x\in(-\infty,-5)$ and $(2,\infty)$



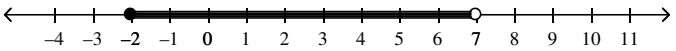
c. $x\in(-\infty,-2)$ and $(-1,\infty)$



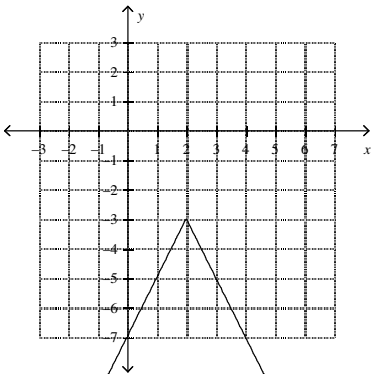
d. $x\in[-12,-1]$



e. $x\in[-2,7)$



f.



g.