Integrated Algebra Unit 1 Review Name: _____Key_____

Topic #1: Solving Equations:

Reminders:

Solve:

1. $\frac{2}{3}(9x-6)=-(x+1)$

$6x - 4 = -x - 1$

$7x = 3$

$\boxed{x = \frac{3}{7}}$

2. $\frac{2x-5}{5}+7=2$

$\frac{2x-5}{5} = -5$

$2x - 5 = -25$

$2x = -20$

$\boxed{x = -10}$

3. $\frac{2x}{3}=\frac{x-3}{2}$

$4x = 3(x-3)$

$4x = 3x - 9$

$\boxed{x = -9}$

4. $2x+7-(5x-5)=\frac{4}{7}(14x-7)$

$2x + 7 - 5x + 5 = 8x - 4$

$-3x + 12 = 8x - 4$

$-11x = -16$

$x = \frac{16}{11}$

5. $12\left[\frac{x}{4}-\frac{2}{3}=\frac{x}{3}+1\right]$

$3x - 8 = 4x + 12$

$\boxed{-20 = x}$

$\boxed{x = -20}$

6. Is -3 a solution of 2x + 4 = 2?

$2(-3) + 4 \overset{?}{=} 2$

$-6 + 4 \overset{?}{=} 2$

$-2 \overset{?}{=} 2$

False

∴ -3 is <u>not</u> a solution

TOPIC #2: Solving Literal Equations:

7. Solve $I = Prt$ for P

$$\frac{I}{rt} = P$$

8. Solve $A = \frac{LWH}{3}$ for W

$$3A = LWH$$

$$\frac{3A}{LH} = W$$

9 $2x - 3y = 15$ for y

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

10. Solve $A = \frac{1}{2}x(b+c)$ for c

$$2A = x(b+c)$$

$$\frac{2A}{x} = b+c$$

$$\frac{2A}{x} - b = c$$

11 Solve $A = \frac{1}{xy}$ for y

$$Axy = 1$$

$$y = \frac{1}{Ax}$$

*12. Solve $A = P + Prt$ for P

$$\frac{A}{(1+rt)} = \frac{P(1+rt)}{(1+rt)}$$

$$P = \frac{A}{(1+rt)}$$

Topic #3: Inequalities
Important Rule:

Interval notation & graphs:

Compound Inequalities:

1. Solve. Graph. Write in interval notation.

a) $3x - 1 > 11$

$3x > 12$

$x > 4$

4

$(4, \infty)$

b) $4 - x \geq 5$

$4 \geq 5 + x$

$-1 \geq x$

$x \leq -1$

$(-\infty, -1]$

c) $-3x < 6$

$\frac{}{-3} \quad \frac{}{-3}$

$x > -2$

-2

$(-2, \infty)$

d) $\frac{3x + 6}{4} - 7 < 2$

$\frac{3x + 6}{4} < 9$

$3x + 6 < 36$

$3x < 30$

$x < 10$

$(-\infty, 10)$

e). $-\frac{2}{3}x - 10 \geq -4$

$-\frac{2}{3}x \geq 6$

$-2x \geq 18$

$\boxed{x \leq -9}$

$(-\infty, -9]$

-9

f. $2x - 5 > \frac{1}{2}(4x - 8)$

$2x - 5 > 2x - 4$

$-5 > -4$

false

∴ $\underline{no \ soln.}$

$\emptyset$

not a solution!

g. Is -3 a solution of the inequality: $-9 < 2x - 3 < 7$?

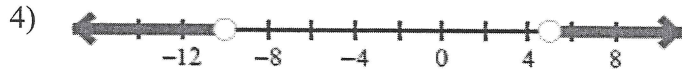$-9 < 2(-3) - 3 < 7$

$-9 < -9 < 7$ false ∴ no

Now, I give you the graph, you come up with the inequality. Write in interval notation.

2)
$$(-6, -3)$$

3)
$$(-\infty, 9) \cup [10, \infty)$$

4)
$$(-\infty, -10) \cup (5, \infty)$$

5)
$$(-\infty, 8)$$

Solve and graph each compound inequality. Write the solution in interval notation.

OARS

6. $2x - 3 \le 7$ OR $\dfrac{2}{3}x + 5 > 21$

$2x \le 10$ $\dfrac{2}{3}x > 16$
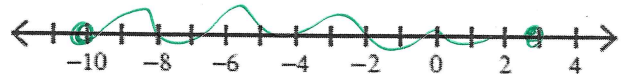
$\boxed{x \le 5}$ $2x > 48$

$\boxed{x > 24}$

5   24

7) $-20 \le -6m - 2 \le 58$

$-18 \le -6m \le 60$

$3 \ge m \ge -10$

$-10 \le m \le 3$

8. $\dfrac{2x-3}{3} < -5$ OR $-2(x-5) \le \dfrac{2}{3}(6x+3)$

$2x - 3 < -15$ or $-2x + 10 \le 4x + 2$

$2x < -12$ $-6x \le -8$

$x < -6$ $x \ge \dfrac{4}{3}$

$(-\infty, -6) \cup \left[\dfrac{4}{3}, \infty\right)$

-6 $\dfrac{4}{3}$

9). $-8 < \dfrac{2}{3}x - 2 < 6$
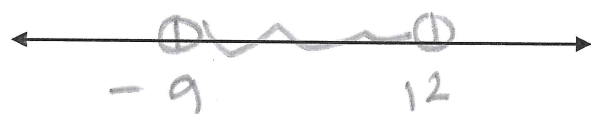
$-6 < \dfrac{2}{3}x < 8$
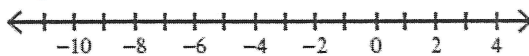
$-18 < 2x < 24$

$-9 < x < 12$

$(-9, 12)$

-9 12

TOPIC 4: Absolute Value Equations

The absolute value of a number is always __positive__. The technical definition is the __distance__ from __zero__.

Therefore, $|-2| = $ __2__, and when $|x| = 4$ that means that $x = $ __4__ or __-4__!

Because numbers inside the absolute value can be __positive__ or negative, we must account for two separate cases.

↙ Isolate 1st

Example 1: $|x + 3| = 8$

$$x + 3 = 8 \quad \text{or} \quad x + 3 = -8$$
$$x = 5 \quad \text{or} \quad x = -11$$

Example 2: $-3|2x - 4| = 12$

$$|2x - 4| = -4$$
$$| | = neg$$
$$can't?$$
$$no \ solution$$

↙ Isolate it!

Example 3: $\frac{2}{3}|x + 1| - 14 = 6$

$$\frac{2}{3}|x + 1| = 20$$
$$2|x + 1| = 60$$
$$|x + 1| = 30$$

$$x + 1 = 30 \quad \text{or} \quad x + 1 = -30$$
$$\boxed{x = 29} \quad \boxed{x = -31}$$

Example 4: $\frac{|2x - 6|}{4} - 2 = 5$
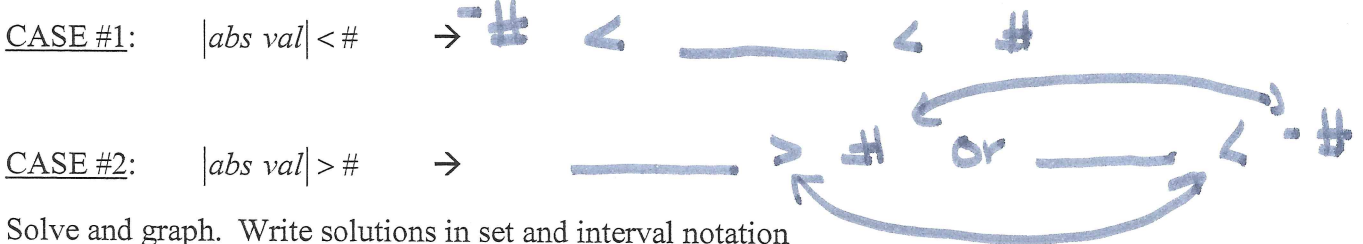
$$\frac{|2x - 6|}{4} = 7$$
$$|2x - 6| = 28$$

$$2x - 6 = 28 \quad 2x - 6 = -28$$
$$2x = 34$$
$$\boxed{x = 17} \quad \boxed{x = -11}$$

Topic 5: Absolute Value Inequalities

When solving absolute value _____, we create compound inequalities like the ones we saw in the warmup. There are two distinct cases that cause the two cases: _____ & _____.

CASE #1: $|abs\ val| < \#$ → $-\# < \underline{} < \#$

CASE #2: $|abs\ val| > \#$ → $\underline{} > \#$ or $\underline{} < -\#$

(handwritten note: flip & negate)

Solve and graph. Write solutions in set and interval notation

(handwritten note: isolate)

a) $2|x+8| > 6$

$|x+8| > 3$

$x+8 > 3$ OR $x+8 < -3$
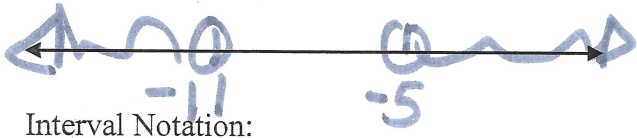
$x > -5$ or $x < -11$

$(-\infty, -11) \cup (-5, \infty)$

Interval Notation:

b) $|x-1| - 3 < 4$

(handwritten note: flip & negate and)

$|x-1| < 7$

$-7 < x-1 < 7$

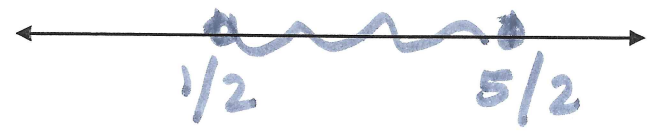$-6 < x < 8$

$(-6, 8)$

Interval Notation:

c. $-2|2x-3| + 10 \geq 6$

$|2x-3| \leq 2$

$-2 \leq 2x-3 \leq 2$

$1 \leq 2x \leq 5$

$\frac{1}{2} \leq x \leq \frac{5}{2}$
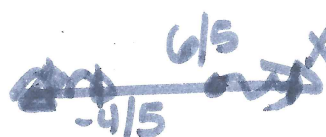

1/2   5/2

d. $3|5x-1| + 9 \geq 24$

(handwritten note: isolate)

$3|5x-1| \geq 15$

$|5x-1| \geq 5$

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

(handwritten note: flip/negate)

$5x \geq 6$

$x = 6/5$ or $5x \leq -4$

$x \leq -4/5$

-4/5

Additional Practice:

I. Order of Operations: PEMDAS (without calculator)

1. $\dfrac{6 \div (-8 - 4)}{2(3^2 - 1) - 7}$

2. $\dfrac{x^2 + y^2 - 3z}{4z - y}$ $x = -2, y = 3, z = 4$

3. $-2[3 - (7 - 10)^2]$

$\dfrac{6 \div -12}{2(8) - 7}$

$= \dfrac{\frac{1}{2}}{} \div 9$

$= \dfrac{1}{2} \cdot \dfrac{1}{9} = \dfrac{1}{18}$

$= \dfrac{(-2)^2 + 3^2 - 3(4)}{4(4) - 3}$

$= \dfrac{4 + 9 - 12}{13}$

$= \boxed{\dfrac{1}{13}}$

-2

II. Solve Equations: Backwards PEMDAS

4. $\dfrac{3}{2}(x + 6) = \left(x - \dfrac{1}{3}\right) \cdot 6$

$9(x + 6) = 6x - 2$

$9x + 54 = 6x - 2$

$3x = -56$

$\boxed{x = \dfrac{-56}{3}}$

5. $11 - 3(x + 5) = 3x + 1$

$11 - 3x - 15 = 3x + 1$

$-3x - 4 = 3x + 1$

$-6x = 5$

$\boxed{x = -5/6}$

6. $\dfrac{3 - 2x}{5} + 1 = -4x - 7$

$5\left(\dfrac{3 - 2x}{5}\right) = \left(-4x - 8\right) \cdot 5$

$3 - 2x = -20x - 40$

$18x = -43$

$x = -43/18$

7. $\left[\dfrac{4}{5}x + 8 = \dfrac{1}{3}x - 2\right]$ 15

$12x + 120 = 5x - 30$

$7x = -150$

$x = \dfrac{-150}{7}$

Karla and Juan both solved the following problem:

You have added enough antifreeze to your car's cooling system to lower the freezing point to -35°C and raise the boiling point to 125°C. The coolant will remain a liquid as long as the temperature C (in degrees Celsius) satisfies the inequality -35 < C < 125. Write the inequality in degrees Fahrenheit using the equation $C = \frac{5}{9}(F - 32)$

Karla's Work

-35 < C < 125 ✓

$-35 < \frac{5}{9}(F - 32) < 125$ ✓

-63 < F - 32 < 225 ✓

95 < F < 257

Juan's Work

-35 < C < 125 ✓

$-35 < \frac{5}{9}(F - 32) < 125$ ✓

-63 < F - 32 < 225 ✓

-31 < F < 257

24. Solve the inequality to show who solved the problem correctly. _____Juan_____

A plumber charges a $60 service charge for making a house call. The cost for labor is $45 per hour. Which is a linear model for the cost of the plumber's visit where n represents the number of hours of labor?

A. C = 60n + 45
B. C = 45n + 60
C. C = 60n - 45
D. C = 45n - 60

$C = 45x + 60$

B