Integrated Math EQUATIONS QUIZ   Name: _____

Solve each equation below. Write the properties that justify each step.

1. $\left(\frac{1}{7}x + 3 = \frac{2}{7}\right)\frac{7}{1}$ multiplication ppty of equality

$x + 21 = 2$ distributive ppty

$\quad -21 \quad -21$ subtraction ppty of equality

$$\boxed{x = -19}$$

OR

$\frac{1}{7}x + 3 = \frac{2}{7}$

$\quad -3 \quad -3$ subt. ppty of equality

$7\left(\frac{1}{7}x\right) = \left(\frac{2}{7}\right)7$ mult. ppty of equality

$x = 2$

2. $-7(x+1) - 6 = -41x + 55$

$-7x - 7 - 6 = -41x + 55$ distributive ppty

$-7x - 13 = -41x + 55$

$+41x \qquad\qquad +41x$ add. ppty of equality

$\overline{34x - 13 = 55}$

$\qquad +13 \quad +13$ add. ppty of equality

$\overline{34x = 68}$

$\frac{34x}{34} = \frac{68}{34}$ div. ppty of equality

$x = 2$

Solve the following equations. CIRCLE your final answer. Show ALL your work.

3. $\frac{5x+1}{2} - 4 = 9$

$\qquad +4 \quad +4$

$\frac{2}{1}\left(\frac{5x+1}{2}\right) = (13)(2)$

$5x + 1 = 26$

$\quad -1 \qquad -1$

$\frac{5x}{5} = \frac{25}{5}$

$\boxed{X = 5}$

4. $\left(\frac{2x}{8} + 1 = \frac{17}{12} - \frac{x}{6}\right)\frac{24}{1}$

$3 \cdot 2x + 24 = 2 \cdot 17 - 4 \cdot x$

$6x + 24 = 34 - 4x$

$+4x \qquad\qquad +4x$

$\overline{10x + 24 = 34}$

$\qquad -24 \quad -24$

$\frac{10x}{10} = \frac{10}{10}$

$\boxed{x = 1}$

5. $\frac{1}{2}(12x + 3) - 3 = 3(7 - 3x)$

$6x + 1.5 - 3 = 21 - 9x$

$6x - 1.5 = 21 - 9x$

$+9x \qquad\qquad +9x$

$\overline{15x - 1.5 = 21}$

$\qquad +1.5 \quad +1.5$

$\frac{15x}{15} = \frac{22.5}{15}$

$\boxed{X = 1.5}$

6. $2(4 - x) = -2(1 + x) - 2 + x$

$8 - 2x = -2 - 2x - 2 + x$

$8 - 2x = -4 - x$

$+2x \qquad\quad +2x$

$\overline{8 = -4 + x}$

$+4 \quad +4$

$\boxed{12 = x}$

6. Write an expression to complete the sentence:

The equation $3x + 5 = $ ___$3x + $ (⟵any #) $not\ 5$___
has no solutions.

8 – 10 … TRUE or FALSE??? **(Show Work)**

__T__ 8. $5x – 7(x – 1) = -3x + 8$ has exactly 1 solution.
$5x - 7x + 7 = -3x + 8$
$-2x + 7 = -3x + 8$
different coefficients

7. Consider the equation $8 – 3(2x – 5) = ax + b$.
For what values of a and b would the equation have infinitely many solutions? Show your work.
$8 - 6x + 15 = ax + b$
$-6x + 23 = ax + b$

__T__ 9. $2 – 7x + 3 + 4x = -3x + 8$ has no solution.
$2 - 7x + 3 + 4x = -3x + 8$
$5 - 3x = -3x + 8$
same coefficient, diff. constant

__T__ 10. $-3(x – 3) – 1 = -3x + 8$ has infinite solutions.
$-3x + 9 - 1 = -3x + 8$
$-3x + 8 = -3x + 8$
same expression on both sides

Answers: a = ___-6___ b = ___23___

12. Write the following equations in standard form. CIRCLE your final answer.

   a. $y + 1 = -4x + 3$
   $+4x \quad +4x$
   $\overline{4x + y + 1 = 3}$
   $\quad -1 \quad -1$
   $\boxed{4x + y = 4}$

   b. $\left(y = \frac{2}{3}x - 5\right)3$
   $3y = 2x - 15$
   $-2x \quad -2x$
   $\boxed{-2x + 3y = -15}$ or $\boxed{2x - 3y = 15}$

13. Write the following equations in slope-intercept form.

   a. $3x + 5y = 25$
   $-3x \qquad -3x$
   $\dfrac{5y}{5} = \dfrac{-3x + 25}{5}$
   $\boxed{y = \frac{-3}{5}x + 5}$

   b. $x – 8y = 96$
   $-x \qquad -x$
   $\dfrac{-8y}{-8} = \dfrac{-x + 96}{-8}$
   $\boxed{y = \frac{1}{8}x - 12}$

14. The formula $A = 2h(\ell + w)$ gives the lateral area A of a rectangular solid with length ℓ, width w, and height h.

   a. Solve the equation for h.
   $\dfrac{A}{2(\ell + w)} = \dfrac{2h(\ell + w)}{2(\ell + w)}$
   $\dfrac{A}{2(\ell + w)} = h$

   b. Solve the equation for ℓ.
   $\dfrac{A}{2h} = \dfrac{2h(\ell + w)}{2h}$
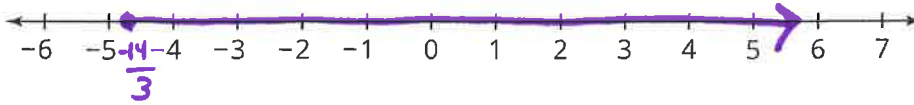 $\dfrac{A}{2h} = \ell + w$
   $-w \qquad -w$
   $\boxed{\dfrac{A}{2h} - w = \ell}$

Quick Inequality Quiz

(Key)

(1) Solve each inequality, and graph the solution on the number line.

a. $\left(-\frac{3}{7}x \le 2\right)\frac{-7}{3}$ $x \ge \frac{-14}{3}$ $\frac{-14}{3} = -4.\overline{6}$

b. $81 > 69 - 2x$
$-69 \quad -69$

$12 > -2x$
$-6 < x$
$x > -6$

(2) The graph represents the temperature range in a city over 20 hours. Luke hates extreme cold and decides he will only go outside when the temperature is 30°F or greater. Circle the place on the graph ~~that~~ represents when Luke will go outside.
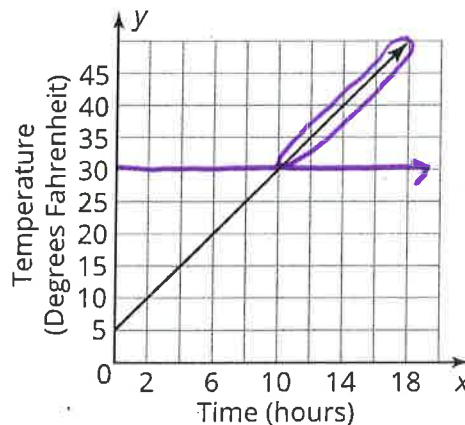
Name _____

3 A number is less than 24 or greater than 35. Write a compound inequality that represents the possible values of the number. Then, graph the compound inequality on the number line.
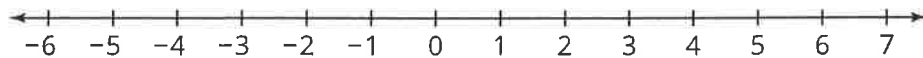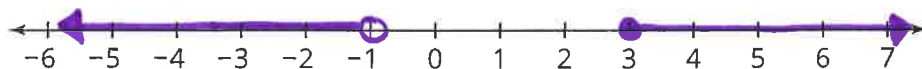

$x < 24$ or $x > 35$

4 Represent the solution to each compound inequality on the number line shown. Then, write the final solution that represents the graph.
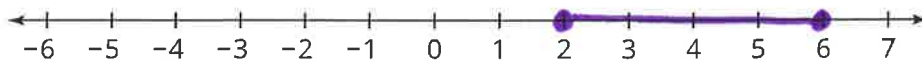
a. $x < -1$ or $x \geq 3$

b. $x < 1$ and $x > -2$

5 Solve each compound inequality and represent the solution on the number line shown. Then, write the final solution that represents the graph.
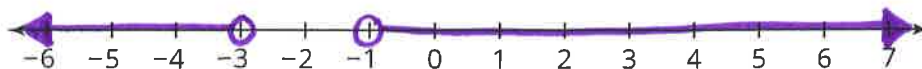
a. $-3 \leq 2x - 7 \leq 5$

$-3 \leq 2x - 7 \leq 5$
$+7 \qquad +7 \quad +7$

$\dfrac{4}{2} \leq \dfrac{2x}{2} \leq \dfrac{12}{2}$

$2 \leq x \leq 6$

b. $-6x + 2 > 20$ or $-11 < 10x - 1$

$-6x + 2 > 20$
$\quad -2 \quad -2$
$\overline{\quad -6x > 18 \quad}$
$\dfrac{-6x}{-6} \quad \dfrac{18}{-6}$
$x < -3$

$-11 < 10x - 1$
$+1 \qquad +1$
$\overline{\quad -10 < 10x \quad}$
$\dfrac{-10}{10} \quad \dfrac{10x}{10}$
$-1 < x$
$x > -1$

Systems of Equations QUIZ

Name: _____

1. Graph the system of equations. Determine the solution. *(2 points)*

$$\begin{cases} 2x = y - 5 \\ x + 2y = -10 \end{cases}$$
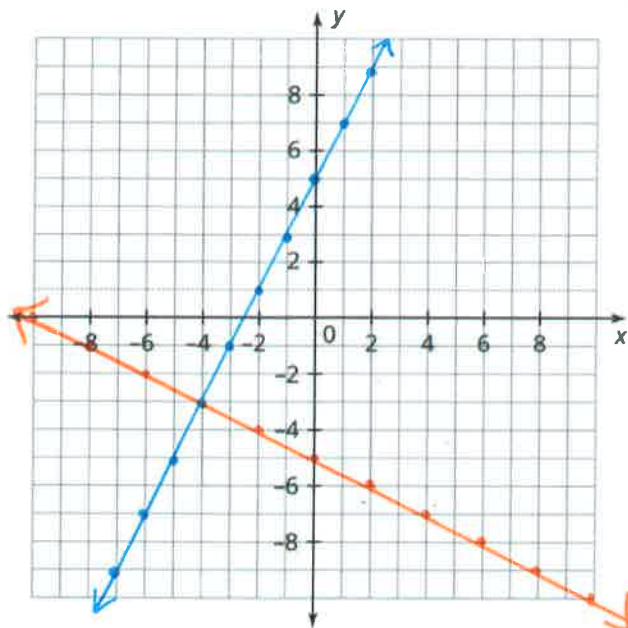
Work (handwritten):

$$2x = y - 5$$
$$+5 \qquad +5$$
$$\overline{}$$
$$2x + 5 = y$$

$$x + 2y = -10$$
$$-x \qquad\quad -x$$
$$\overline{}$$
$$\frac{2y}{2} = \frac{-x - 10}{2}$$
$$y = \frac{-1}{2}x - 5$$

Solution: $(-4, -3)$

2. Kali says the most efficient method to solve the system below is using substitution. Autumn disagrees, as she believes the most efficient method to solve the system below is using elimination. Who do you agree with, and why? Be sure to attend to precision with your vocabulary and level of detail. *(2 points)*

$$\begin{cases} 6x - 3y = 12 \\ 5x + 2y = 19 \end{cases}$$

Kali — all numbers (coefficients + constants) in first equation are multiples of 3, so can multiply by $\frac{1}{3}$ or divide by 3 to isolate y. Solve for y then substitute expression into second equation.

Autumn — y coefficients already opposites signs, Can multiply first equation by 2 and second by 3, then add the 2 equations together to eliminate y variable, then solve for x.

Both are acceptable, must be defended!

3. Joseph is researching cable companies. Two different cable companies offer different plans for their basic packages. Totally TV charges $115 plus $30 per month. Clearly Cable costs $60 per month. How many months would Joseph need to have cable in order for Totally TV to be the better buy? *(2 points)*

Totally TV $\quad 115 + 30x = y$
$$115 + 30(4) = 235$$

Clearly Cable $\quad 60x = y$
$$60(4) = 240$$

$$115 + 30x = 60x$$
$$-30x \quad -30x$$
$$\overline{}$$
$$\frac{115}{30} = \frac{30x}{30}$$
$$3.83 = x$$

Joseph needs to have cable for 4 months for Totally TV to be the better buy

solution is between 3 & 4 months... need to round up in this case

other even easier option: multiply second equation by $\frac{3}{2}$, will have fractions but can eliminate y immediately

4. Solve each of the following systems using any method you prefer. Show any work you do. Write the solution and the method you used in the space provided (elimination, substitution, graph by hand, graph with technology, other technological methods). You must solve at least one system using the **elimination method**. You must solve at least one system using the **substitution method**. *(7 points)*

a. $\begin{cases} 7x - y = 15 \\ -6x + 3y = 15 \end{cases}$ solution: **(4, 13)** method: **substitution**

$7x - y = 15$
$+y +y$
$7x = y + 15$
$-15 -15$
$7x - 15 = y$

$-6x + 3(7x - 15) = 15$
$-6x + 21x - 45 = 15$
$15x - 45 = 15$
$15x = 60$
$x = 4$

$7(4) - y = 15$
$28 - y = 15$
$-y = -13$
$y = +13$

*needs to be solved this way - only equation/system with isolated variable

$-6(4) + 3(13) = 15$
$-24 + 39 = 15$
$15 = 15$ ✓

b. $\begin{cases} 3x = 5y + 1 \\ -2x - 3y = 12 \end{cases}$ solution: **(-3, -2)** method: **elimination**

$3x = 5y + 1$
$-5y -5y$
$3x - 5y = 1$

$2(3x - 5y = 1) \rightarrow 6x - 10y = 2$
$3(-2x - 3y = 12) \rightarrow -6x - 9y = 36$
$\underline{ + }$
$-19y = 38$
$\frac{-19y}{-19} = \frac{38}{-19}$
$y = -2$

other option: graph on calc

$3x - 1 = 5y$
$\frac{3}{5}x - \frac{1}{5} = y$

$-2x - 3y = 12$
$-3y = 2x + 12$
$y = \frac{-2}{3}x - 4$

graph
& find solution using calc
5: intersect

$3x = 5(-2) + 1$
$3x = -10 + 1$
$3x = -9$
$x = -3$

$-2(-3) - 3(-2) = 12$
$6 + 6 = 12$
$12 = 12$ ✓

c. $\begin{cases} \frac{1}{10}x + \frac{3}{8}y = 1 \\ \frac{1}{4}y + 1 = -\frac{2}{5}x \end{cases}$ solution: **(-5, 4)** method: **elimination**

$40\left(\frac{1}{10}x + \frac{3}{8}y = 1\right) \rightarrow (4x + 15y = 40)$

$20\left(\frac{1}{4}y + 1 = \frac{-2}{5}x\right) \rightarrow 5y + 20 = -8x$
$+8x - 20 +8x - 20$
$\underline{}$
$8x + 5y = -20$

graph on calc:
$\frac{8}{3}\left(\frac{3}{8}y = \frac{-1}{10}x + 1\right)$
$y = \frac{-8}{30}x + \frac{8}{3}$

$4\left(\frac{1}{4}y = \frac{-2}{5}x - 1\right)$
$y = \frac{-8}{5}x - 4$

graph then use calc 5: intersect

$-8x - 30y = -80$
$8x + 5y = -20$
$\underline{}$
$-25y = -100$
$y = 4$

$\frac{1}{4}(4) + 1 = \frac{-2}{5}x$
$1 + 1 = \frac{-2}{5}x$
$2 = \frac{-2}{5}x$
$-5 = x$

$\frac{1}{10}(-5) + \frac{3}{8}(4) = 1$
$\frac{-5}{10} + \frac{12}{8} = 1$
$1 = 1$ ✓

*lots of other ways to solve #5!

5. How many solutions does each system of equations have? Use any method to find your answer. *(3 points)*

a. $\begin{cases} 3y - 6x = 12 \\ 5y + 10 = 15x \end{cases}$ **1**

$\frac{1}{3}(-6x + 3y = 12) \rightarrow -2x + y = 4$
$-\frac{1}{5}(-15x + 5y = -10) \rightarrow +3x - y = 2$
_____
$x = 6$

different slopes, could have stopped here

$3y - 6(6) = 12$
$3y - 36 = 12$
$3y = 48$
$y = 16$

b. $\begin{cases} 6y = 4x + 9 \\ 12y - 8x = 18 \end{cases}$ **∞**

$6y = 4x + 9$
$y = \frac{4}{6}x + \frac{9}{6}$
$y = \frac{2}{3}x + \frac{3}{2}$

$5(16) + 10 = 15(6)$
$80 + 10 = 90$
$90 = 90$ ✓

$12y = 8x + 18$
$y = \frac{8}{12}x + \frac{18}{12}$
$y = \frac{2}{3}x + \frac{3}{2}$

c. $\begin{cases} y + 5x = 13 \\ 4y + 17 = -20x \end{cases}$

$y = -5x + 13$
$4y = -20x - 17 \rightarrow y = -5x - \frac{17}{4}$

none

no solutions – same slope, different y-int, parallel lines

6. Write a system of equations for THREE of the following scenarios, your choice. Use variables appropriate to the story (NOT x/y). You should **NOT** solve the systems. *(4 points)*

a. Joey has a piggy bank containing 26 nickels and dimes. The total value of these coins is $2.00. How many of each type of coin does Joey have?

$n + d = 26$
$.05n + .1d = 2$

b. Logan has a farm containing 18 animals, which are all pigs and chickens. There are 66 legs in all on his farm. How many of each type of animal does Logan's farm have?

$p + c = 18$
$4p + 2c = 66$

c. Lindsey wants to buy a cake for her friend's birthday. If she buys from Ode to Joy, the cake will cost $2.50 per serving plus a $10 fondant fee. If she buys the cake from Cupcake Ali, the cake will cost $2.25 per serving plus a $15 fondant fee. For how many servings would the cake cost the same from either bakery?

$2.5s + 10 = c$
$2.25s + 15 = c$

d. Brook and Aya are selling candles for a school fundraiser. Brook sells 5 small candles and 12 medium candles and brings in $268. Aya sells 8 small candles and 7 medium candles and brings in $197. How much does each size candle sell for?

$5s + 12m = 268$
$8s + 7m = 197$

7. Complete the table. *(4 points)*

Consistent or Inconsistent?	Consistent	inconsistent	Consistent	consistent
# Solutions	1	0	1	∞