

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples								
WARM-UP	<p>Given: $x + 2 = 5$, what must x equal? How did you know this?</p> <p style="font-size: 1.1em;">$x = 3$; $3 + 2 = 5$</p>								
INVERSE OPERATIONS	<p>The equation above is known as a one-step equation and can be solved using inverse operations. Inverse operations undo each other.</p> <p>Examples of inverse operations:</p> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px 15px; border-radius: 5px;">Addition</div> <div style="font-size: 1.5em;">↔</div> <div style="border: 1px solid black; padding: 5px 15px; border-radius: 5px;">Subtraction</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px 15px; border-radius: 5px;">Multiplication</div> <div style="font-size: 1.5em;">↔</div> <div style="border: 1px solid black; padding: 5px 15px; border-radius: 5px;">Division</div> </div>								
SOLVING ONE-STEP EQUATIONS	<p style="text-align: center;">Steps to Solve One-Step Equations:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">①</td> <td>Locate the variable.</td> </tr> <tr> <td style="text-align: center;">②</td> <td>Determine the operation tied to the variable.</td> </tr> <tr> <td style="text-align: center;">③</td> <td>Use inverse operations on both sides of the equal sign to solve.</td> </tr> <tr> <td style="text-align: center;">④</td> <td>Check your solution!</td> </tr> </table>	①	Locate the variable.	②	Determine the operation tied to the variable.	③	Use inverse operations on both sides of the equal sign to solve.	④	Check your solution!
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②	Determine the operation tied to the variable.								
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ADDITION & SUBTRACTION EQUATIONS	<p>Directions: Solve each equation. Show your work and check your solution.</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p>1. $x + 14 = 30$ $\begin{array}{r} x + 14 = 30 \\ -14 \quad -14 \\ \hline x = 16 \end{array}$ ck: $16 + 14 = 30$ $30 = 30 \checkmark$</p> </div> <div style="width: 50%;"> <p>2. $2 + y = -4$ $\begin{array}{r} 2 + y = -4 \\ -2 \quad -2 \\ \hline y = -6 \end{array}$ ck: $2 + (-6) = -4$ $-4 = -4 \checkmark$</p> </div> <div style="width: 50%;"> <p>3. $5 + p = -18$ $\begin{array}{r} 5 + p = -18 \\ -5 \quad -5 \\ \hline p = -23 \end{array}$ ck: $5 + (-23) = -18$ $-18 = -18 \checkmark$</p> </div> <div style="width: 50%;"> <p>4. $c + 7 = -3$ $\begin{array}{r} c + 7 = -3 \\ -7 \quad -7 \\ \hline c = -10 \end{array}$ ck: $-10 + 7 = -3$ $-3 = -3 \checkmark$</p> </div> <div style="width: 50%;"> <p>5. $-6 = k + 6$ $\begin{array}{r} -6 = k + 6 \\ -6 \quad -6 \\ \hline -12 = k \end{array}$ ck: $-6 = -12 + 6$ $-6 = -6 \checkmark$</p> </div> <div style="width: 50%;"> <p>6. $14 = 8 + w$ $\begin{array}{r} 14 = 8 + w \\ -8 \quad -8 \\ \hline 6 = w \end{array}$ ck: $14 = 8 + 6$ $14 = 14 \checkmark$</p> </div> </div>								

7. $y - 5 = 4$ $\begin{array}{r} +5 \quad +5 \\ \hline y = 9 \end{array}$	ck: $9 - 5 = 4$ $4 = 4 \checkmark$	8. $m - 8 = -10$ $\begin{array}{r} +8 \quad +8 \\ \hline m = -2 \end{array}$	ck: $-2 - 8 = -10$ $-10 = -10 \checkmark$
9. $a - 25 = -7$ $\begin{array}{r} +25 \quad +25 \\ \hline a = 18 \end{array}$	ck: $18 - 25 = -7$ $-7 = -7 \checkmark$	10. $x - 13 = -22$ $\begin{array}{r} +13 \quad +13 \\ \hline x = -9 \end{array}$	ck: $-9 - 13 = -22$ $-22 = -22 \checkmark$
11. $44 = q - 10$ $\begin{array}{r} +10 \quad +10 \\ \hline 54 = q \end{array}$	ck: $44 = 54 - 10$ $44 = 44 \checkmark$	12. $-15 = a - 3$ $\begin{array}{r} +3 \quad +3 \\ \hline -12 = a \end{array}$	ck: $-15 = -12 - 3$ $-15 = -15 \checkmark$
13. $-4 + w = 19$ $\begin{array}{r} +4 \quad +4 \\ \hline w = 23 \end{array}$	ck: $-4 + 23 = 19$ $19 = 19 \checkmark$	14. $-18 = -3 + p$ $\begin{array}{r} +3 \quad +3 \\ \hline -15 = p \end{array}$	ck: $-18 = -3 + (-15)$ $-18 = -18 \checkmark$

Translating Equations

Directions: Translate and solve each equation.

15. "The sum of a number and 6 is 32."

$$\begin{array}{r} x + 6 = 32 \\ -6 \quad -6 \\ \hline x = 26 \end{array}$$

$$\begin{array}{l} 26 + 6 = 32 \\ 32 = 32 \checkmark \end{array}$$

16. "12 increased by a number is 24."

$$\begin{array}{r} 12 + x = 24 \\ -12 \quad -12 \\ \hline x = 12 \end{array}$$

$$\begin{array}{l} 12 + 12 = 24 \\ 24 = 24 \checkmark \end{array}$$

17. "The difference between a number and 8 is 11."

$$\begin{array}{r} x - 8 = 11 \\ +8 \quad +8 \\ \hline x = 19 \end{array}$$

$$\begin{array}{l} 19 - 8 = 11 \\ 11 = 11 \checkmark \end{array}$$

18. "Nine less than a number is five."

$$\begin{array}{r} x - 9 = 5 \\ +9 \quad +9 \\ \hline x = 14 \end{array}$$

$$\begin{array}{l} 14 - 9 = 5 \\ 5 = 5 \checkmark \end{array}$$

19. "Seven is equal to a number plus six."

$$\begin{array}{r} 7 = x + 6 \\ -6 \quad -6 \\ \hline 1 = x \end{array}$$

$$\begin{array}{l} 7 = 1 + 6 \\ 7 = 7 \checkmark \end{array}$$

20. "The sum of a number and -4 is -18."

$$\begin{array}{r} x + (-4) = -18 \\ x - 4 = -18 \\ +4 \quad +4 \\ \hline x = -14 \end{array}$$

$$\begin{array}{l} -14 + (-4) = -18 \\ -18 = -18 \checkmark \end{array}$$

Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 1: One-Step Equations
(Addition & Subtraction)**Directions:** Solve each equation. Show your work and check your solution.

1. $x + 9 = 14$ $\begin{array}{r} x + 9 = 14 \\ -9 \quad -9 \\ \hline x = 5 \end{array}$ $5 + 9 = 14$ $14 = 14 \checkmark$	2. $-3 = m - 14$ $\begin{array}{r} -3 = m - 14 \\ +14 \quad +14 \\ \hline 11 = m \end{array}$ $-3 = 11 - 14$ $-3 = -3 \checkmark$	3. $-6 + p = -22$ $\begin{array}{r} -6 + p = -22 \\ +6 \quad +6 \\ \hline p = -16 \end{array}$ $-6 + (-16) = -22$ $-22 = -22 \checkmark$
4. $c - 17 = -1$ $\begin{array}{r} c - 17 = -1 \\ +17 \quad +17 \\ \hline c = 16 \end{array}$ $16 - 17 = -1$ $-1 = -1 \checkmark$	5. $k - 8 = -8$ $\begin{array}{r} k - 8 = -8 \\ +8 \quad +8 \\ \hline k = 0 \end{array}$ $0 - 8 = -8$ $-8 = -8 \checkmark$	6. $4 = 23 + w$ $\begin{array}{r} 4 = 23 + w \\ -23 \quad -23 \\ \hline -19 = w \end{array}$ $4 = 23 + (-19)$ $4 = 4 \checkmark$
7. $y - 25 = -41$ $\begin{array}{r} y - 25 = -41 \\ +25 \quad +25 \\ \hline y = -16 \end{array}$ $-16 - 25 = -41$ $-41 = -41 \checkmark$	8. $-16 = n + 27$ $\begin{array}{r} -16 = n + 27 \\ -27 \quad -27 \\ \hline -43 = n \end{array}$ $-16 = -43 + 27$ $-16 = -16 \checkmark$	9. $-18 + a = -5$ $\begin{array}{r} -18 + a = -5 \\ +18 \quad +18 \\ \hline a = 13 \end{array}$ $-18 + 13 = -5$ $-5 = -5 \checkmark$

Directions: Translate and solve each equation. Show your work and check your solution.

10. "The sum of a number and 17 is 24" $x + 17 = 24$ $\begin{array}{r} x + 17 = 24 \\ -17 \quad -17 \\ \hline x = 7 \end{array}$ $7 + 17 = 24$ $24 = 24 \checkmark$	11. "A number decreased by 16 is -3." $x - 16 = -3$ $\begin{array}{r} x - 16 = -3 \\ +16 \quad +16 \\ \hline x = 13 \end{array}$ $13 - 16 = -3$ $-3 = -3 \checkmark$
12. "Eighteen subtracted from a number is 35." $x - 18 = 35$ $\begin{array}{r} x - 18 = 35 \\ +18 \quad +18 \\ \hline x = 53 \end{array}$ $53 - 18 = 35$ $35 = 35 \checkmark$	13. "-9 more than a number results in -20." $-9 + x = -20$ $\begin{array}{r} -9 + x = -20 \\ +9 \quad +9 \\ \hline x = -11 \end{array}$ $-9 + (-11) = -20$ $-20 = -20 \checkmark$
14. "-4 less than a number is 17." $x - (-4) = 17$ $x + 4 = 17$ $\begin{array}{r} x + 4 = 17 \\ -4 \quad -4 \\ \hline x = 13 \end{array}$ $13 - (-4) = 17$ $17 = 17 \checkmark$	15. "The total of a number and -15 equals -6." $x + (-15) = -6$ $x - 15 = -6$ $\begin{array}{r} x - 15 = -6 \\ +15 \quad +15 \\ \hline x = 9 \end{array}$ $9 + (-15) = -6$ $-6 = -6 \checkmark$

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Main Ideas/Questions

Notes/Examples

ONE-STEP EQUATIONS:
Multiplication
& Division

Recall that multiplication and division are **inverse operations**. To solve one-step equations involving multiplication and division, follow the same steps you used to solve equations involving addition and subtraction.

EXAMPLES

Directions: Solve each equation. Show your work and check your solution.

$$1. \frac{3x}{3} = \frac{36}{3}$$

$$\boxed{x = 12}$$

$$3(12) = 36$$

$$36 = 36 \checkmark$$

$$2. \frac{-108}{9} = \frac{9m}{9}$$

$$\boxed{-12 = m}$$

$$-108 = 9 \cdot (-12)$$

$$-108 = -108 \checkmark$$

$$3. \frac{-10n}{-10} = \frac{-50}{-10}$$

$$\boxed{n = 5}$$

$$-10(5) = -50$$

$$-50 = -50 \checkmark$$

$$4. \frac{-17x}{-17} = \frac{34}{-17}$$

$$\boxed{x = -2}$$

$$-17(-2) = 34$$

$$34 = 34 \checkmark$$

$$5. \frac{x}{17} = 3 \cdot 17$$

$$\boxed{x = 51}$$

$$\frac{51}{17} = 3$$

$$3 = 3 \checkmark$$

$$6. \frac{v}{-2} = 16 \cdot -2$$

$$\boxed{v = -32}$$

$$\frac{-32}{-2} = 16$$

$$16 = 16 \checkmark$$

$$7. -2 = \frac{y}{-8} \cdot -8$$

$$\boxed{16 = y}$$

$$-2 = \frac{16}{-8}$$

$$-2 = -2 \checkmark$$

$$8. \frac{k}{-11} = 10 \cdot -11$$

$$\boxed{k = -110}$$

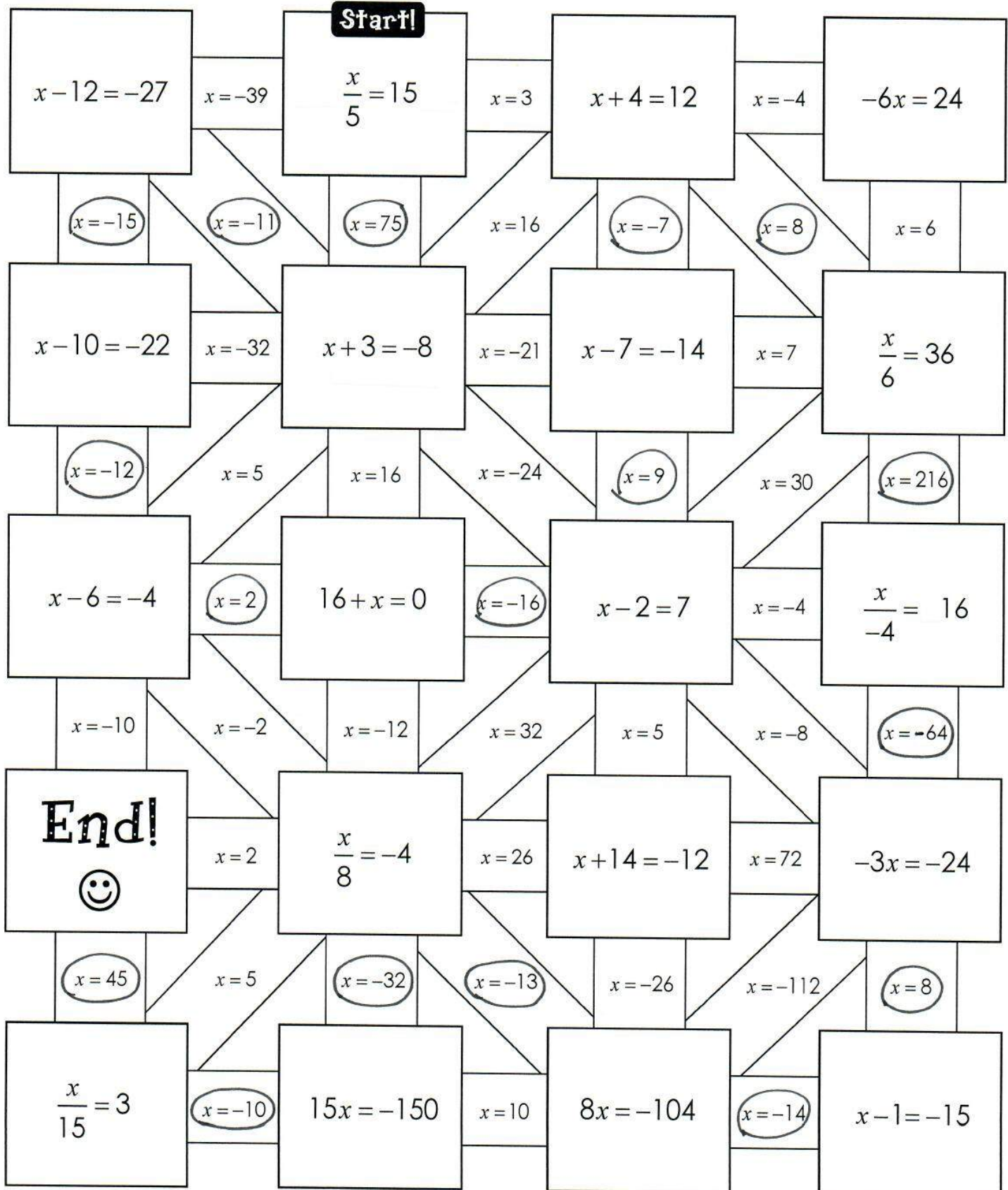
$$\frac{-110}{-11} = 10$$

$$10 = 10 \checkmark$$

	$9. -4 = \frac{p}{6} \cdot 6$ $-4 = \frac{-24}{6}$ $-4 = -4 \checkmark$ $\boxed{-24 = p}$	$10. \frac{6x}{6} = \frac{-30}{6}$ $x = -5$ $6(-5) = -30$ $-30 = -30 \checkmark$
	$11. \frac{-16}{-1} = \frac{-p}{-1}$ $-16 = -1(16)$ $-16 = -16 \checkmark$ $\boxed{16 = p}$	$12. 36 = \frac{p}{4} \cdot 4$ $36 = \frac{144}{4}$ $36 = 36 \checkmark$ $\boxed{144 = p}$
TRANSLATING EQUATIONS	Directions: Translate and solve each equation. Show your work and check your solution.	
	$13. \text{"The product of a number and 5 is 30."}$ $\frac{5x}{5} = \frac{30}{5}$ $x = 6$ $5(6) = 30$ $30 = 30 \checkmark$	$14. \text{"A number divided by five is -13."}$ $-5 \cdot \frac{x}{-5} = 13 \cdot -5$ $\frac{-65}{-5} = 13$ $13 = 13 \checkmark$ $\boxed{x = -65}$
	$15. \text{"The quotient of a number and -4 is 15."}$ $-4 \cdot \frac{x}{-4} = 15 \cdot -4$ $-60 = 15$ $15 = 15 \checkmark$ $\boxed{x = -60}$	$16. \text{"Triple a number is thirty."}$ $\frac{3x}{3} = \frac{30}{3}$ $x = 10$ $3(10) = 30$ $30 = 30 \checkmark$
ONE-STEP EQUATIONS: Mixed Review!	Directions: Solve each equation. Show your work and check your solution.	
	$17. 12 + p = -23$ $\frac{-12}{-12} \quad \frac{-23}{-12}$ $\boxed{p = -35}$ $12 + (-35) = -23$ $-23 = -23$	$18. -5 = -7 + c$ $\frac{+7}{+7} \quad \frac{+7}{+7}$ $\boxed{2 = c}$ $-5 = -7 + 2$ $-5 = -5 \checkmark$
	$19. m - 4 = -19$ $\frac{+4}{+4} \quad \frac{+4}{+4}$ $\boxed{m = -15}$ $-15 - 4 = -19$ $-19 = -19 \checkmark$	$20. -11 = \frac{y}{-2} \cdot -2$ $\frac{-22}{-2} = y$ $\boxed{22 = y}$ $-11 = \frac{22}{-2}$ $-11 = -11 \checkmark$
	$21. \frac{8n}{8} = \frac{-32}{8}$ $8(-4) = -32$ $-32 = -32 \checkmark$ $\boxed{n = -4}$	$22. -14 = \frac{x}{6} \cdot 6$ $-14 = \frac{-84}{6}$ $-14 = -14 \checkmark$ $\boxed{-84 = x}$

One-Step Equations Maze!

Directions: Solve each equation. Use your solutions to navigate through the maze.
SHOW ALL WORK on a separate sheet of paper!



Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 2: One-Step Equations
(Multiplication & Division)**Directions:** Solve each equation. Show your work and check your solution.

1. $\frac{4x}{4} = \frac{28}{4}$

$x = 7$

$4(7) = 28$
 $28 = 28 \checkmark$

2. $\frac{-2a}{-2} = 8 \cdot -2$

$a = -16$

$\frac{-16}{-2} = 8$

$8 = 8 \checkmark$

3. $\frac{-54}{3} = \frac{3w}{3}$

$-18 = w$

$-54 = 3(-18)$

$-54 = -54 \checkmark$

4. $15 = \frac{p}{4} \cdot 4$

$60 = p$

$15 = \frac{60}{4}$

$15 = 15 \checkmark$

5. $\frac{-n}{-1} = \frac{4}{-1}$

$n = -4$

$-1(-4) = 4$

$4 = 4 \checkmark$

6. $\frac{-7k}{-7} = \frac{-84}{-7}$

$k = 12$

$-7(12) = -84$

$-84 = -84 \checkmark$

7. $\frac{v}{-6} = 3 \cdot -6$

$v = -18$

$\frac{-18}{-6} = 3$

$3 = 3 \checkmark$

8. $\frac{-17r}{-17} = \frac{51}{-17}$

$r = -3$

$-17(-3) = 51$

$51 = 51 \checkmark$

9. $-9 = \frac{h}{-5} \cdot -5$

$45 = h$

$-9 = \frac{45}{-5}$

$-9 = -9 \checkmark$

10. $\frac{0}{9} = \frac{9p}{9}$

$0 = p$

$0 = 9(0)$

$0 = 0 \checkmark$

11. $\frac{m}{-3} = 16 \cdot -3$

$m = -48$

$\frac{-48}{-3} = 16$

$16 = 16 \checkmark$

12. $\frac{5v}{5} = \frac{65}{5}$

$v = 13$

$5(13) = 65$

$65 = 65 \checkmark$

Directions: Translate and solve each equation. Show your work and check your solution.

13. "The quotient of a number and 3 is 8."

$3 \cdot \frac{x}{3} = 8 \cdot 3$

$x = 24$

$\frac{24}{3} = 8$

$8 = 8 \checkmark$

14. "Nine times a number is -63."

$\frac{9x}{9} = \frac{-63}{9}$

$x = -7$

$9(-7) = -63$

$-63 = -63 \checkmark$

15. "Twice a number is 26."

$\frac{2x}{2} = \frac{26}{2}$

$x = 13$

$2(13) = 26$

$26 = 26 \checkmark$

16. "The product of a number and -8 is 72."

$\frac{-8x}{-8} = \frac{72}{-8}$

$x = -9$

$-8(-9) = 72$

$72 = 72 \checkmark$

Name:

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Main Ideas/Questions

Notes/Examples

Rational Equations

The steps to solve an equation with decimals or fractions are exactly the same!

- ① Locate the variable.
- ② Determine the operation tied to the variable.
- ③ Use **inverse operations** on both sides of the equal sign to solve.
- ④ Check your solution!

Set 1: Equations with Decimals

Directions: Solve each equation. Check all solutions.

$$1. -6.2 + c = -1.25$$

$$\begin{array}{r} +6.2 \quad +6.2 \\ \hline \end{array}$$

$$\boxed{c = 4.95}$$

$$\begin{array}{l} -6.2 + 4.95 = -1.25 \\ -1.25 = -1.25 \checkmark \end{array}$$

$$2. 8.7 = 5.92 + r$$

$$\begin{array}{r} -5.92 \quad -5.92 \\ \hline \end{array}$$

$$\boxed{2.78 = r}$$

$$\begin{array}{l} 8.7 = 5.92 + 2.78 \\ 8.7 = 8.7 \checkmark \end{array}$$

$$3. m + 12.88 = -16.3$$

$$\begin{array}{r} -12.88 \quad -12.88 \\ \hline \end{array}$$

$$\boxed{m = -29.18}$$

$$\begin{array}{l} -29.18 + 12.88 = -16.3 \\ -16.3 = -16.3 \checkmark \end{array}$$

$$4. -8.3 = x - 4$$

$$\begin{array}{r} +4 \quad +4 \\ \hline \end{array}$$

$$\boxed{-4.3 = x}$$

$$\begin{array}{l} -8.3 = -4.3 - 4 \\ -8.3 = -8.3 \checkmark \end{array}$$

$$5. k - 4.9 = -3.45$$

$$\begin{array}{r} +4.9 \quad +4.9 \\ \hline \end{array}$$

$$\boxed{k = 1.45}$$

$$\begin{array}{l} 1.45 - 4.9 = -3.45 \\ -3.45 = -3.45 \checkmark \end{array}$$

$$6. q - 15.6 = 32.9$$

$$\begin{array}{r} +15.6 \quad +15.6 \\ \hline \end{array}$$

$$\boxed{q = 48.5}$$

$$\begin{array}{l} 48.5 - 15.6 = 32.9 \\ 32.9 = 32.9 \checkmark \end{array}$$

$$7. -4.7y = 16.45$$

$$\begin{array}{r} \div -4.7 \quad \div -4.7 \\ \hline \end{array}$$

$$\boxed{y = -3.5}$$

$$\begin{array}{l} -4.7(-3.5) = 16.45 \\ 16.45 = 16.45 \checkmark \end{array}$$

$$8. -3.75 = -2.5r$$

$$\begin{array}{r} \div -2.5 \quad \div -2.5 \\ \hline \end{array}$$

$$\boxed{1.5 = r}$$

$$\begin{array}{l} -3.75 = -2.5(1.5) \\ -3.75 = -3.75 \checkmark \end{array}$$

$$9. -4.6d = 21.62$$

$$\begin{array}{r} \div -4.6 \quad \div -4.6 \\ \hline \end{array}$$

$$\boxed{d = -4.7}$$

$$\begin{array}{l} -4.6(-4.7) = 21.62 \\ 21.62 = 21.62 \checkmark \end{array}$$

$$10. 0.48 = \frac{b}{5} \cdot 5$$

$$\boxed{2.4 = b}$$

$$\begin{array}{l} 0.48 = \frac{2.4}{5} \\ 0.48 = 0.48 \checkmark \end{array}$$

$$11. \frac{x}{8.3} = 0.3 \cdot 8.3$$

$$\boxed{x = 2.49}$$

$$\begin{array}{l} \frac{2.49}{8.3} = 0.3 \\ 0.3 = 0.3 \checkmark \end{array}$$

$$12. -1.2 = \frac{y}{4.4} \cdot 4.4$$

$$\boxed{-5.28 = y}$$

$$\begin{array}{l} -1.2 = \frac{-5.28}{4.4} \\ -1.2 = -1.2 \checkmark \end{array}$$

Set 2: Equations with Fractions

Directions: Solve each equation. Check all solutions.

$$13. x - 1\frac{1}{2} = -6\frac{4}{5}$$

$$x - \frac{3}{2} = -6\frac{4}{5}$$

$$+ \frac{3}{2} \quad + \frac{3}{2}$$

$$x = -5\frac{3}{10} \quad (-5\frac{3}{10})$$

$$-5\frac{3}{10} - 1\frac{1}{2} = -6\frac{4}{5}$$

$$-6\frac{4}{5} = -6\frac{4}{5} \checkmark$$

$$14. 3 = 2\frac{2}{3} + a$$

$$3 = \frac{8}{3} + a$$

$$-\frac{8}{3} \quad -\frac{8}{3}$$

$$\frac{1}{3} = a$$

$$3 = \frac{8}{3} + \frac{1}{3}$$

$$3 = \frac{9}{3}$$

$$3 = 3 \checkmark$$

$$15. n - 1\frac{3}{4} = -5$$

$$n - \frac{7}{4} = -5$$

$$+ \frac{7}{4} \quad + \frac{7}{4}$$

$$n = -3\frac{1}{4} \quad (-3\frac{1}{4})$$

$$-1\frac{3}{4} - \frac{7}{4} = -5$$

$$-2\frac{20}{4} = -5$$

$$-5 = -5 \checkmark$$

$$16. x - \frac{2}{5} = 1\frac{3}{7}$$

$$x - \frac{2}{5} = \frac{10}{7}$$

$$+ \frac{2}{5} \quad + \frac{2}{5}$$

$$x = \frac{64}{35} \quad (1\frac{29}{35})$$

$$\frac{64}{35} - \frac{2}{5} = \frac{10}{7}$$

$$\frac{50}{35} = \frac{10}{7}$$

$$\frac{10}{7} = \frac{10}{7} \checkmark$$

Recall: To divide by a fraction, multiply by its reciprocal !

$$17. \frac{3}{4}a = \frac{3}{8} \cdot \frac{4}{3}$$

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

$$\frac{3}{4} \cdot \frac{1}{2} = \frac{3}{8}$$

$$\frac{3}{8} = \frac{3}{8} \checkmark$$

$$18. \frac{1}{2}x = -\frac{17}{18} \cdot \frac{2}{1}$$

$$x = -\frac{17}{9}$$

$$(-1\frac{8}{9})$$

$$\frac{1}{2}(-\frac{17}{9}) = -\frac{17}{18}$$

$$-\frac{17}{18} = -\frac{17}{18} \checkmark$$

$$19. -\frac{27}{28} = 2\frac{1}{4}k$$

$$\frac{4}{9} \cdot -\frac{27}{28} = \frac{9}{4}k \cdot \frac{4}{9}$$

$$-\frac{3}{7} = k$$

$$-\frac{27}{28} = \frac{9}{4}(-\frac{3}{7})$$

$$-\frac{27}{28} = -\frac{27}{28} \checkmark$$

$$20. \frac{7}{3} \cdot -\frac{15}{21} = \frac{3n}{7} \cdot \frac{7}{3}$$

$$-\frac{5}{3} = n$$

$$-\frac{15}{21} = \frac{3}{1}(-\frac{5}{3})$$

$$-\frac{5}{7} = -\frac{5}{7} \checkmark$$

$$21. -5\frac{1}{3} = -2p$$

$$-\frac{1}{2} \cdot -\frac{16}{3} = -2p \cdot -\frac{1}{2}$$

$$(2\frac{2}{3}) \frac{8}{3} = p$$

$$-\frac{16}{3} = -2(\frac{8}{3})$$

$$-\frac{16}{3} = -\frac{16}{3} \checkmark$$

$$22. 1 = \frac{n}{2} \cdot 2$$

$$2 = n$$

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

$$1 = 1 \checkmark$$

$$23. -8x = 2\frac{1}{9}$$

$$-\frac{1}{8} \cdot -8x = \frac{19}{9} \cdot -\frac{1}{8}$$

$$x = -\frac{19}{72}$$

$$-8(-\frac{19}{72}) = \frac{19}{9}$$

$$\frac{19}{9} = \frac{19}{9} \checkmark$$

$$24. -2m = \frac{15}{2} \cdot -\frac{1}{2}$$

$$m = -\frac{15}{4}$$

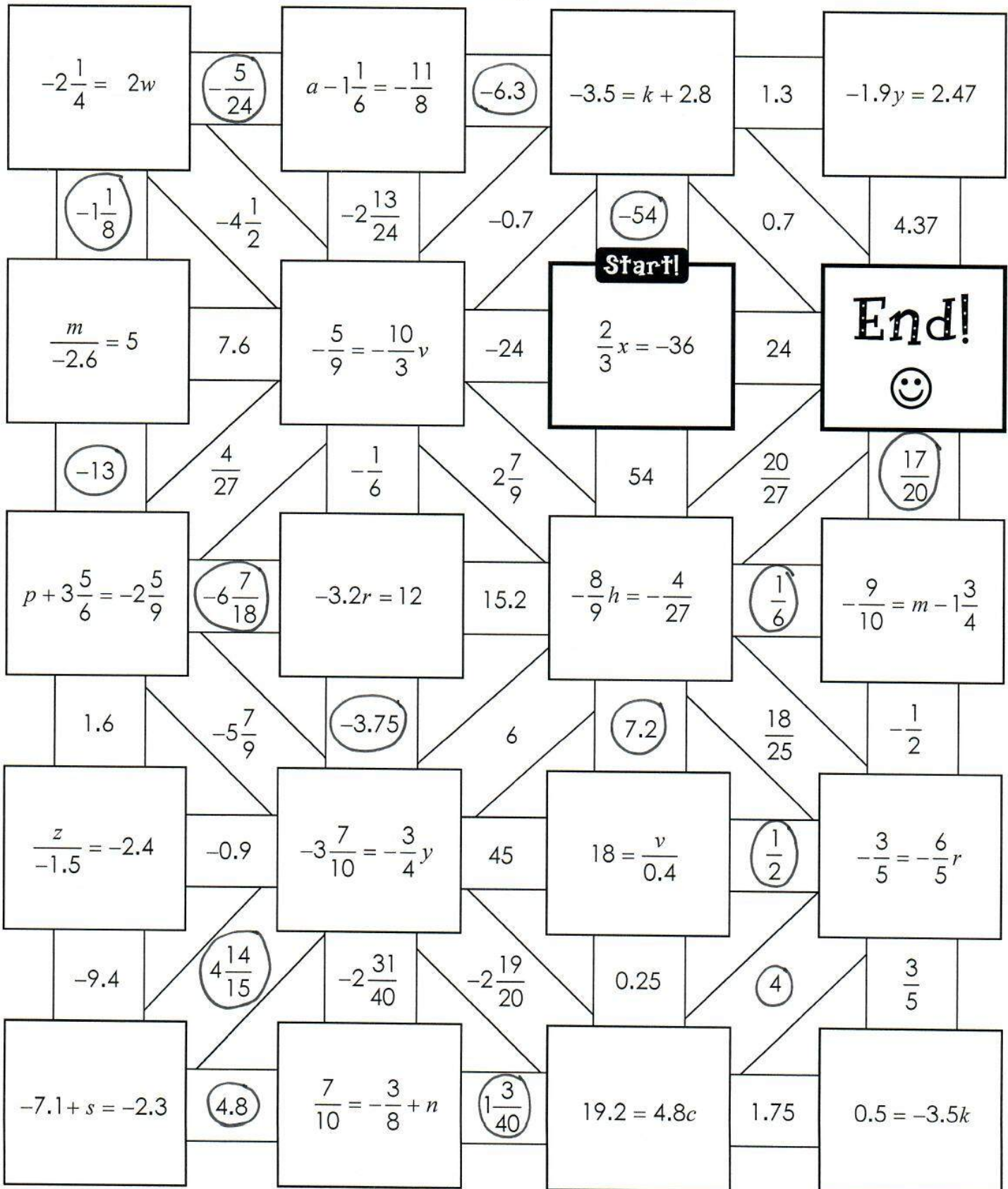
$$(-3\frac{3}{4})$$

$$-2(-\frac{15}{4}) = \frac{15}{2}$$

$$\frac{15}{2} = \frac{15}{2} \checkmark$$

Rational Equations Maze!

Directions: Solve each equation. Use your solutions to navigate through the maze.
SHOW ALL WORK on a separate sheet of paper!



Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 3: One-Step Rational Equations

Directions: Solve each equation. Show your work and check your solution.

1. $x - 14.8 = -16.5$
 $+14.8 \quad +14.8$

$$\boxed{x = -1.7}$$

$$\begin{aligned} -1.7 - 14.8 &= -16.5 \\ -16.5 &= -16.5 \checkmark \end{aligned}$$

2. $-6.12 = \frac{3.4m}{3.4}$

$$\boxed{-1.8 = m}$$

$$\begin{aligned} -6.12 &= 3.4(-1.8) \\ -6.12 &= -6.12 \checkmark \end{aligned}$$

-1 3. $\frac{y}{-7.2} = -5.65 \cdot -7.2$

$$\boxed{y = 40.68}$$

$$\begin{aligned} \frac{40.68}{-7.2} &= -5.65 \\ -5.65 &= -5.65 \checkmark \end{aligned}$$

4. $a + 12.75 = -6.1$
 $-12.75 \quad -12.75$

$$\boxed{a = -18.85}$$

$$\begin{aligned} -18.85 + 12.75 &= -6.1 \\ -6.1 &= -6.1 \checkmark \end{aligned}$$

5. $k + \frac{13}{6} = \frac{7}{4}$

$$-\frac{13}{6} \quad -\frac{13}{6}$$

$$\boxed{k = -\frac{5}{12}}$$

$$\begin{aligned} -\frac{5}{12} + \frac{13}{6} &= \frac{7}{4} \\ \frac{7}{4} &= \frac{7}{4} \checkmark \end{aligned}$$

-2 3. $-\frac{3}{2}m = \frac{15}{16} \cdot -\frac{2}{3}$

$$m = -\frac{30}{48}$$

$$\boxed{m = -\frac{5}{8}}$$

$$\begin{aligned} -\frac{3}{2}(-\frac{5}{8}) &= \frac{15}{16} \\ \frac{15}{16} &= \frac{15}{16} \checkmark \end{aligned}$$

7. $-1\frac{23}{40} = \frac{9}{10}p$

$$\frac{10}{9} \cdot -\frac{63}{40} = \frac{9}{10}p \cdot \frac{10}{9}$$

$$\boxed{-\frac{7}{4} = p}$$

$$\begin{aligned} -1\frac{23}{40} &= \frac{9}{10}(-\frac{7}{4}) \\ -1\frac{23}{40} &= -\frac{63}{40} \\ -1\frac{23}{40} &= -1\frac{23}{40} \checkmark \end{aligned}$$

8. $-\frac{2}{3} + y = -2\frac{1}{6}$

$$+\frac{2}{3} \quad +\frac{2}{3}$$

$$\boxed{y = -\frac{3}{2}}$$

$$\begin{aligned} -\frac{2}{3} + (-\frac{3}{2}) &= -2\frac{1}{6} \\ -2\frac{1}{6} &= -2\frac{1}{6} \checkmark \end{aligned}$$

9. $a + 1\frac{1}{6} = -11\frac{7}{9}$

$$a + \frac{7}{6} = -\frac{106}{9}$$

$$-\frac{7}{6} \quad -\frac{7}{6}$$

$$\boxed{a = -\frac{233}{18}} \quad (-12\frac{17}{18})$$

$$\begin{aligned} -12\frac{17}{18} + 1\frac{1}{6} &= -11\frac{7}{9} \\ -11\frac{7}{9} &= -11\frac{7}{9} \checkmark \end{aligned}$$

10. $-8\frac{5}{9} = 4\frac{2}{3}w$

$$\frac{3}{14} \cdot -\frac{17}{9} = \frac{14}{3}w \cdot \frac{3}{14}$$

$$\boxed{-\frac{11}{6} = w}$$

$$\begin{aligned} -8\frac{5}{9} &= \frac{14}{3}(-\frac{11}{6}) \\ -8\frac{5}{9} &= -\frac{77}{9} \\ -8\frac{5}{9} &= -8\frac{5}{9} \checkmark \end{aligned}$$

11. $-2n = -1\frac{1}{4}$

$$\frac{1}{2} \cdot -2n = -\frac{5}{4} \cdot \frac{1}{2}$$

$$\boxed{n = \frac{5}{8}}$$

$$-2(\frac{5}{8}) = -1\frac{1}{4}$$

$$-\frac{10}{8} = -1\frac{1}{4}$$

$$-1\frac{1}{4} = -1\frac{1}{4} \checkmark$$

12. $-3\frac{5}{8} = v - \frac{5}{6}$

$$-\frac{29}{8} = v - \frac{5}{6}$$

$$+\frac{5}{6} \quad +\frac{5}{6}$$

$$\boxed{-\frac{47}{24} = v} \quad (-2\frac{19}{24})$$

$$-3\frac{5}{8} = -\frac{47}{24} - \frac{5}{6}$$

$$-3\frac{5}{8} = -\frac{29}{8}$$

$$-3\frac{5}{8} = -3\frac{5}{8} \checkmark$$

ONE-STEP EQUATION WORD PROBLEMS

1 DEFINE A VARIABLE What are you trying to find? Use a "let statement" to define a variable. Ex: "let c = cost of one item"	2 SET UP EQUATION & SOLVE Use keywords to set up an equation. Then solve!	3 ANSWER IT! Give exactly what the problem is asking for.
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Directions: For each problem, define a variable and set up an equation, then solve.

<p>1. Ashley's tomato plant grew 9 inches over the summer. Her plant is now 23 inches tall. How tall was it at the beginning of the summer?</p> <p>let X = beg. height</p> $\begin{array}{r} X + 9 = 23 \\ -9 \quad -9 \\ \hline X = 14 \end{array}$	<p>2. Three sodas cost \$4.95. What is the cost of one soda?</p> <p>let X = soda cost</p> $\begin{array}{r} 3X = 4.95 \\ \frac{3X}{3} = \frac{4.95}{3} \\ X = 1.65 \end{array}$		
<p>Equation</p> $X + 9 = 23$	<p>Solution</p> <p>14 inches</p>	<p>Equation</p> $3X = 4.95$	<p>Solution</p> <p>\$1.65</p>
<p>3. Maggie spent half of the money in her savings account on a new computer. If the computer was \$345, how much money was in her savings account?</p> <p>let X = Savings</p> $2 \cdot \frac{1}{2}X = 345 \cdot 2$ $X = 690$	<p>4. A shark descended 32.6 feet to catch a fish. The shark is now at -82.25 feet. What was his starting point?</p> <p>let X = starting point</p> $\begin{array}{r} X - 32.6 = -82.25 \\ +32.6 \quad +32.6 \\ \hline X = -49.65 \end{array}$		
<p>Equation</p> $\frac{1}{2}X = 345$	<p>Solution</p> <p>\$690</p>	<p>Equation</p> $X - 32.6 = -82.25$	<p>Solution</p> <p>-49.65 ft</p>
<p>5. There are 14 students in an art class. Mr. Travis has 350 colored pencils to distribute equally among the students. How many colored pencils will each student receive?</p> <p>let X = # pencils</p> $\begin{array}{r} 14X = 350 \\ \frac{14X}{14} = \frac{350}{14} \\ X = 25 \end{array}$	<p>6. Kailyn made six dozen more cupcakes than Melissa. If Kailyn made 88 cupcakes, how many did Melissa make?</p> <p>let X = # Melissa's cupcakes</p> $\begin{array}{r} 72 + X = 88 \\ -72 \quad -72 \\ \hline X = 16 \end{array}$		
<p>Equation</p> $14X = 350$	<p>Solution</p> <p>25 colored pencils</p>	<p>Equation</p> $72 + X = 88$	<p>Solution</p> <p>16 cupcakes</p>
<p>7. Paul bought $3\frac{1}{3}$ pounds of bananas and apples. If he bought $1\frac{4}{5}$ pounds of apples, how many pounds of bananas did he buy?</p> <p>let X = # lb. bananas</p> $\begin{array}{r} \frac{9}{5} + X = \frac{10}{3} \\ -\frac{9}{5} \quad -\frac{9}{5} \\ \hline X = 2\frac{3}{15} \end{array}$	<p>8. Snow is falling at a rate of 2.5 inches per hour. At this rate, how long will it take 8 inches of snow to fall?</p> <p>let X = hours</p> $\begin{array}{r} 2.5X = 8 \\ \frac{2.5X}{2.5} = \frac{8}{2.5} \\ X = 3.2 \end{array}$		
<p>Equation</p> $1\frac{4}{5} + X = 3\frac{1}{3}$	<p>Solution</p> <p>$1\frac{8}{15}$ pounds</p>	<p>Equation</p> $2.5X = 8$	<p>Solution</p> <p>3.2 hours</p>

<p>9. Daniel bought movie tickets for 6 friends. If he paid a total of \$67.50 for the tickets, what was the cost of one movie ticket?</p> <p>let x = one ticket</p> $\frac{6x}{6} = \frac{67.50}{6}$ $x = 11.25$	<p>10. Marcos runs one mile in 7.5 minutes. If he spends a total of 30 minutes running at the same pace, how many miles will he complete?</p> <p>let x = miles</p> $\frac{7.5x}{7.5} = \frac{30}{7.5}$ $x = 4$
<p>Equation</p> $6x = 67.50$	<p>Equation</p> $7.5x = 30$
<p>Solution</p> $\$11.25$	<p>Solution</p> 4 miles
<p>11. A rectangular rug has an area of 38.5 square feet. If the rug is 5 feet wide, what is the length of the rug?</p> <p>let x = length</p> $\frac{5x}{5} = \frac{38.5}{5}$ $x = 7.7$	<p>12. Laura is buying dog food for a kennel. One bag of dog food costs \$32. If she spends a total of \$256, how many bags did she buy?</p> <p>let x = bags</p> $\frac{32x}{32} = \frac{256}{32}$ $x = 8$
<p>Equation</p> $5x = 38.5$	<p>Equation</p> $32x = 256$
<p>Solution</p> 7.7 feet	<p>Solution</p> 8 bags
<p>13. Kristen and Miles split the cost of a meal. Each paid \$23.78. What was the total cost of the meal?</p> <p>let x = total cost</p> $2 \cdot \frac{x}{2} = 23.78 \cdot 2$ $x = 47.56$	<p>14. Ricardo bought \$46.23 worth of groceries and paid with a \$100 bill. How much change did he receive?</p> <p>let x = change</p> $46.23 + x = 100$ $\begin{array}{r} 46.23 + x = 100 \\ -46.23 \quad -46.23 \\ \hline x = 53.77 \end{array}$
<p>Equation</p> $\frac{x}{2} = 23.78$	<p>Equation</p> $46.23 + x = 100$
<p>Solution</p> $\$47.56$	<p>Solution</p> $\$53.77$
<p>15. Two-thirds of the students in a class passed their math test. If 16 students passed the test, how many students are in the class?</p> <p>let x = students</p> $\frac{3}{2} \cdot \frac{2}{3}x = 16 \cdot \frac{2}{3}$ $x = 24$	<p>16. Lane is fourteen years older than Michelle. If Lane is 33, how old is Michelle?</p> <p>let x = Michelle</p> $x + 14 = 33$ $\begin{array}{r} x + 14 = 33 \\ -14 \quad -14 \\ \hline x = 19 \end{array}$
<p>Equation</p> $\frac{2}{3}x = 16$	<p>Equation</p> $x + 14 = 33$
<p>Solution</p> 24 students	<p>Solution</p> 19 years old
<p>17. When Trina arrived to take her driving test there was a 193 minute wait. If she has waited 88 minutes so far, how much longer does she have to wait to take her test?</p> <p>let x = wait time</p> $x + 88 = 193$ $\begin{array}{r} x + 88 = 193 \\ -88 \quad -88 \\ \hline x = 105 \end{array}$	<p>18. Nikki is participating in a charity walk this weekend. She walks at a pace of 4.2 miles per hour. How long will it take her to walk 35.7 miles?</p> <p>let x = time</p> $\frac{4.2x}{4.2} = \frac{35.7}{4.2}$ $x = 8.5$
<p>Equation</p> $x + 88 = 193$	<p>Equation</p> $4.2x = 35.7$
<p>Solution</p> 105 minutes	<p>Solution</p> 8.5 hours

Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 4: One-Step Equation
Word Problems

Directions: For each problem, define a variable and set up an equation, then solve.			
1. A bucket of raffle tickets was distributed evenly to 48 people. If each person got 4 tickets, how many tickets were in the bucket? let $x = \# \text{ tickets}$ $48 \cdot \frac{x}{48} = 4 \cdot 48$ $x = 192$		2. Samantha withdrew \$160 from her bank account. If the balance of the account is now \$379.52, what was her balance before the withdrawal? let $x = \text{starting balance}$ $x - 160 = 379.52$ $\begin{array}{r} x - 160 = 379.52 \\ +160 \quad +160 \\ \hline x = 539.52 \end{array}$	
Equation $\frac{x}{48} = 4$	Solution 192 tickets	Equation $x - 160 = 379.52$	Solution \$539.52
3. Gas is \$2.09 per gallon at the gas station. If Nate filled up his car and spent \$33.44, how many gallons did he put in his car? let $x = \text{gallons}$ $\frac{2.09x}{2.09} = \frac{33.44}{2.09}$ $x = 16$		4. In his last football game, Sean rushed for 89 yards. If his season total is now 871 yards, how many total yards did he have prior to his last game? $x = \text{yards prior}$ $x + 89 = 871$ $\begin{array}{r} x + 89 = 871 \\ -89 \quad -89 \\ \hline x = 782 \end{array}$	
Equation $2.09x = 33.44$	Solution 16 gallons	Equation $x + 89 = 871$	Solution 782 yds
5. While driving on the highway, Mason put his car on cruise control at 68 miles per hour. At this speed, how long would it take him to drive 85 miles? $x = \text{hours}$ $\frac{68x}{68} = \frac{85}{68}$ $x = 1.25$		6. If the temperature is dropping at a rate of 2 degrees per hour, how many hours will it take to drop 15 degrees? let $x = \text{hours}$ $\frac{2x}{2} = \frac{15}{2}$ $x = 7.5$	
Equation $68x = 85$	Solution 1.25 hrs	Equation $2x = 15$	Solution 7.5 hours
7. Eight adult tickets to the amusement park cost \$196. Find the cost for each ticket. let $x = \text{ticket cost}$ $\frac{8x}{8} = \frac{196}{8}$ $x = 24.5$		8. Tessa returned a book to the library 16 days late. If she was charged \$0.35 per day, what was the total fine? let $x = \text{total fine}$ $16 \cdot \frac{x}{16} = 0.35 \cdot 16$ $x = 5.6$	
Equation $8x = 196$	Solution \$24.50	Equation $\frac{x}{16} = 0.35$	Solution \$5.60
9. Braden finished his math test 14 minutes before Ariana did. If it took Ariana 57 minutes, and they both started the test at the same time, how long did it take Braden? let $x = \text{Braden's time}$ $x + 14 = 57$ $\begin{array}{r} x + 14 = 57 \\ -14 \quad -14 \\ \hline x = 43 \end{array}$		10. Sarah and Eva took a road trip. Sarah drove two-fifths of the miles. If she drove 128 miles, how many total miles did they drive? let $x = \text{total miles}$ $\frac{5}{2} \cdot \frac{2}{5}x = 128 \cdot \frac{5}{2}$ $x = 320$	
Equation $x + 14 = 57$	Solution 43 min	Equation $\frac{5}{2}x = 128$	Solution 320 mi

Name: _____

Math 7

Date: _____ Per: _____

Unit 3: Equations & Inequalities

Quiz 3-1: One-Step Equations**Directions:** Solve each equation. Show your work and check all solutions.

1. $\frac{7m}{7} = \frac{28}{7}$

$$\boxed{m=4}$$

$$7(4) = 28$$
$$28 = 28 \checkmark$$

2. $-30 = p - 17$
$$\begin{array}{r} +17 \\ +17 \end{array}$$

$$\boxed{-13 = p}$$

$$-30 = -13 - 17$$
$$-30 = -30 \checkmark$$

3. $-6 = \frac{z}{3} \cdot 3$

$$\boxed{-18 = z}$$

$$-6 = \frac{-18}{3}$$
$$-6 = -6 \checkmark$$

4. $c + 12 = 15$
$$\begin{array}{r} -12 \\ -12 \end{array}$$

$$\boxed{c=3}$$

$$3 + 12 = 15$$
$$15 = 15$$

5. $-9 = -8 + k$
$$\begin{array}{r} +8 \\ +8 \end{array}$$

$$\boxed{-1 = k}$$

$$-9 = -8 - 1$$
$$-9 = -9 \checkmark$$

6. $\frac{9y}{9} = \frac{-126}{9}$

$$\boxed{y=-14}$$

$$9(-14) = -126$$
$$-126 = -126 \checkmark$$

7. $-17 = w + 23$
$$\begin{array}{r} -23 \\ -23 \end{array}$$

$$\boxed{-40 = w}$$

$$-17 = -40 + 23$$
$$-17 = -17 \checkmark$$

8. $\frac{r}{-4} = -13 \cdot -4$

$$\boxed{r=52}$$

$$\frac{52}{-4} = -13$$
$$-13 = -13 \checkmark$$

9. $v - 2.8 = 7.16$
$$\begin{array}{r} +2.8 \\ +2.8 \end{array}$$

$$\boxed{v=9.96}$$

$$9.96 - 2.8 = 7.16$$
$$7.16 = 7.16 \checkmark$$

10. $\frac{27.2}{-3.2} = \frac{-3.2a}{-3.2}$

$$\boxed{-8.5 = a}$$

$$27.2 = -3.2(-8.5)$$
$$27.2 = 27.2 \checkmark$$

11. $1.4 = 6.72 + x$
$$\begin{array}{r} -6.72 \\ -6.72 \end{array}$$

$$\boxed{-5.32 = x}$$

$$1.4 = 6.72 + (-5.32)$$
$$1.4 = 1.4 \checkmark$$

12. $\frac{n}{-0.4} = -29 \cdot -0.4$

$$\boxed{n=11.6}$$

$$\frac{11.6}{-0.4} = -29$$
$$-29 = -29 \checkmark$$

1. $m=4$

2. $p=-13$

3. $z=-18$

4. $c=3$

5. $k=-1$

6. $y=-14$

7. $w=-40$

8. $r=52$

9. $v=9.96$

10. $a=-8.5$

11. $x=-5.32$

12. $n=11.6$

$$13. \frac{19}{10} = x - \frac{23}{6}$$

$$+ \frac{23}{6} \quad + \frac{23}{6}$$

$$\boxed{\frac{86}{15} = x}$$

$$\frac{19}{10} = \frac{86}{15} - \frac{23}{6}$$

$$\frac{19}{10} = \frac{19}{10} \checkmark$$

$$14. \frac{8}{9} \cdot \frac{9}{8} a = -2 \cdot \frac{8}{9}$$

$$\boxed{a = -\frac{16}{9}}$$

$$\frac{9}{8} \cdot \frac{-16}{9} = -2$$

$$-2 = -2 \checkmark$$

$$13. x = \frac{86}{15} \left(5\frac{11}{15} \right)$$

$$14. a = -\frac{16}{9} \left(-1\frac{1}{9} \right)$$

$$15. m = \frac{26}{9} \left(2\frac{8}{9} \right)$$

$$16. k = -\frac{71}{20} \left(-3\frac{11}{20} \right)$$

$$15. -4\frac{1}{3} = -1\frac{1}{2}m$$

$$-\frac{2}{3} \cdot \frac{-13}{3} = -\frac{3}{2}m \cdot -\frac{2}{3}$$

$$\boxed{\frac{26}{9} = m}$$

$$-\frac{13}{3} = -\frac{3}{2} \cdot \frac{26}{9}$$

$$-\frac{13}{3} = -\frac{13}{3} \checkmark$$

$$16. 2\frac{1}{4} + k = -1\frac{3}{10}$$

$$\frac{9}{4} + k = -\frac{13}{10}$$

$$-\frac{9}{4} \quad -\frac{9}{4}$$

$$\boxed{k = -\frac{71}{20}}$$

$$\frac{9}{4} + \left(-\frac{71}{20} \right) = -\frac{13}{10}$$

$$-\frac{13}{10} = -\frac{13}{10} \checkmark$$

Directions: For each problem (a) translate into an equation using a variable, then (b) solve.

17. The smoothie shop offers a free smoothie each time a customer earns 75 points on their rewards card. If Ken needs 17 more points, how many points does he currently have on his card?

let $x =$
current pts

$$x + 17 = 75$$

$$-17 \quad -17$$

$$\boxed{x = 58}$$

$$17. (a) \underline{x + 17 = 75}$$

$$(b) \underline{58 \text{ pts}}$$

18. An online file storage site offers a payment plan where users can pay for a year membership in twelve equal payments. If Manny paid \$7.95 per month, how much did he pay in full for the year?

let $x =$
total for
year

$$12 \cdot \frac{x}{12} = 7.95 \cdot 12$$

$$\boxed{x = 95.4}$$

$$18. (a) \underline{\frac{x}{12} = 7.95}$$

$$(b) \underline{\$95.40}$$

19. Vera bought a new car in 2016. One year later, the car had depreciated in value by \$2,300 and was worth \$28,140. Find the value of her car when she purchased it in 2016.

let $x =$
purchase
value

$$x - 2300 = 28140$$

$$+2300 \quad +2300$$

$$\boxed{x = 30440}$$

$$19. (a) \underline{x - 2300 = 28140}$$

$$(b) \underline{\$30,440}$$

20. If a candlestick burns at a rate of 0.4 inches per hour, how many hours will it take a 12-inch candle to burn?

let $x =$ hours

$$0.4x = 12$$

$$\frac{0.4}{0.4} \quad \frac{12}{0.4}$$

$$\boxed{x = 30}$$

$$20. (a) \underline{0.4x = 12}$$

$$(b) \underline{30 \text{ hours}}$$

Name:

Date:

Topic:

Class:

Main Ideas/Questions

Notes/Examples

Two-Step Equations

$$px + q = r$$

Steps to Solve:

- ① Locate the variable.
- ② Undo the addition/subtraction to remove "q".
- ③ Undo the multiplication/division to remove "p".
- ④ Check your solution!

Examples

Directions: Solve each equation. Check all solutions.

$$\begin{array}{r} 1. \quad 5 + 8p = 77 \\ -5 \quad -5 \\ \hline 8p = 72 \\ \frac{8p}{8} = \frac{72}{8} \\ p = 9 \end{array}$$

$$\begin{array}{l} 5 + 8(9) = 77 \\ 5 + 72 = 77 \\ 77 = 77 \checkmark \end{array}$$

$$\begin{array}{r} 2. \quad -n + 2 = 7 \\ -2 \quad -2 \\ \hline -n = 5 \\ \frac{-n}{-1} = \frac{5}{-1} \\ n = -5 \end{array}$$

$$\begin{array}{l} -(-5) + 2 = 7 \\ 5 + 2 = 7 \\ 7 = 7 \checkmark \end{array}$$

$$\begin{array}{r} 3. \quad 6 - 6x = 108 \\ -6 \quad -6 \\ \hline -6x = 102 \\ \frac{-6x}{-6} = \frac{102}{-6} \\ x = -17 \end{array}$$

$$\begin{array}{l} 6 - 6(-17) = 108 \\ 6 + 102 = 108 \\ 108 = 108 \checkmark \end{array}$$

$$\begin{array}{r} 4. \quad \frac{m}{3} + 2 = 0 \\ -2 \quad -2 \\ \hline \frac{m}{3} = -2 \\ 3 \cdot \frac{m}{3} = -2 \cdot 3 \\ m = -6 \end{array}$$

$$\begin{array}{l} \frac{-6}{3} + 2 = 0 \\ -2 + 2 = 0 \\ 0 = 0 \checkmark \end{array}$$

$$\begin{array}{r} 5. \quad 3 - p = -12 \\ -3 \quad -3 \\ \hline -p = -15 \\ \frac{-p}{-1} = \frac{-15}{-1} \\ p = 15 \end{array}$$

$$\begin{array}{l} 3 - 15 = -12 \\ -12 = -12 \checkmark \end{array}$$

$$\begin{array}{r} 6. \quad 30 = -10x + 10 \\ -10 \quad -10 \\ \hline 20 = -10x \\ \frac{20}{-10} = \frac{-10x}{-10} \\ -2 = x \end{array}$$

$$\begin{array}{l} 30 = -10(-2) + 10 \\ 30 = 20 + 10 \\ 30 = 30 \checkmark \end{array}$$

$$\begin{array}{r} 7. \quad \frac{5}{3}k + 8 = 3 \\ -8 \quad -8 \\ \hline \frac{5}{3}k = -5 \\ \frac{3}{5} \cdot \frac{5}{3}k = -5 \cdot \frac{3}{5} \\ k = -3 \end{array}$$

$$\begin{array}{l} \frac{5}{3}(-3) + 8 = 3 \\ -5 + 8 = 3 \\ 3 = 3 \checkmark \end{array}$$

$$\begin{array}{r} 8. \quad -9 + \frac{b}{3} = -3 \\ +9 \quad +9 \\ \hline \frac{b}{3} = 6 \\ 3 \cdot \frac{b}{3} = 6 \cdot 3 \\ b = 18 \end{array}$$

$$\begin{array}{l} -9 + \frac{18}{3} = -3 \\ -9 + 6 = -3 \\ -3 = -3 \checkmark \end{array}$$

Two-Step Equations	Steps to Solve:			
	1	Locate the variable.		
	2	Undo the multiplication/division to remove "p".		
	3	Undo the addition/subtraction to remove "q".		
	4	Check your solution!		
Examples	$9. \frac{x+8}{3} = 3 \cdot 3$ $\begin{array}{r} x+8 = 9 \\ -8 \quad -8 \\ \hline x = 1 \end{array}$	$\frac{1+8}{3} = 3$ $\frac{9}{3} = 3$ $3 = 3 \checkmark$	$10. \frac{r+4}{4} = 4 \cdot 4$ $\begin{array}{r} r+4 = 16 \\ -4 \quad -4 \\ \hline r = 12 \end{array}$	$\frac{12+4}{4} = 4$ $\frac{16}{4} = 4$ $4 = 4 \checkmark$
	$11. \frac{5+m}{6} = 2 \cdot 6$ $\begin{array}{r} 12 = 5+m \\ -5 \quad -5 \\ \hline 7 = m \end{array}$	$2 = \frac{5+7}{6}$ $2 = \frac{12}{6}$ $2 = 2 \checkmark$	$12. \frac{-4+q}{7} = -3 \cdot 7$ $\begin{array}{r} -21 = -4+q \\ +4 \quad +4 \\ \hline -17 = q \end{array}$	$-3 = \frac{-4-17}{7}$ $-3 = \frac{-21}{7}$ $-3 = -3 \checkmark$
Translating Equations	Directions: Translate each equation, then solve. Check all solutions.			
	$13. \text{"Four less than ten times a number is one hundred twenty six."}$ $\begin{array}{r} 10x - 4 = 126 \\ +4 \quad +4 \\ \hline 10x = 130 \\ \frac{10x}{10} = \frac{130}{10} \\ x = 13 \end{array}$ $10 \cdot 13 - 4 = 126$ $130 - 4 = 126$ $126 = 126 \checkmark$	$14. \text{"Three more than the quotient of a number and three is nine."}$ $\begin{array}{r} \frac{x}{3} + 3 = 9 \\ -3 \quad -3 \\ \hline \frac{x}{3} = 6 \\ 3 \cdot \frac{x}{3} = 6 \cdot 3 \\ x = 18 \end{array}$ $\frac{18}{3} + 3 = 9$ $6 + 3 = 9$ $9 = 9 \checkmark$		
	$15. \text{"Ten more than half a number is fifteen."}$ $\begin{array}{r} \frac{1}{2}x + 10 = 15 \\ -10 \quad -10 \\ \hline \frac{1}{2}x = 5 \\ 2 \cdot \frac{1}{2}x = 5 \cdot 2 \\ x = 10 \end{array}$ $\frac{1}{2}(10) + 10 = 15$ $5 + 10 = 15$ $15 = 15 \checkmark$	$16. \text{"The sum of negative three and a number, divided by seven, is negative two."}$ $\begin{array}{r} \frac{-3+n}{7} = -2 \cdot 7 \\ -3+n = -14 \\ +3 \quad +3 \\ \hline n = -11 \end{array}$ $\frac{-3-11}{7} = -2$ $\frac{-14}{7} = -2$ $-2 = -2 \checkmark$		

Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 5: Two-Step Equations

**** This is a 2-page document! ******Directions:** Solve each equation. Check all solutions.

1. $5x + 9 = 24$

$$\begin{array}{r} -9 \quad -9 \\ \hline 5x = 15 \\ \frac{5}{5} \quad \frac{5}{5} \\ \hline x = 3 \end{array}$$

$$\begin{array}{l} 5(3) + 9 = 24 \\ 15 + 9 = 24 \\ 24 = 24 \checkmark \end{array}$$

2. $\frac{k}{8} - 1 = -3$

$$\begin{array}{r} +1 \quad +1 \\ \hline 8 \cdot \frac{k}{8} = -2 \cdot 8 \\ \hline k = -16 \end{array}$$

$$\begin{array}{l} \frac{-16}{8} - 1 = -3 \\ -2 - 1 = -3 \\ -3 = -3 \checkmark \end{array}$$

3. $-61 = 3m - 4$

$$\begin{array}{r} +4 \quad +4 \\ \hline -57 = 3m \\ \frac{-57}{3} \quad \frac{3m}{3} \\ \hline -19 = m \end{array}$$

$$\begin{array}{l} -61 = 3(-19) - 4 \\ -61 = -57 - 4 \\ -61 = -61 \checkmark \end{array}$$

4. $-2a + 6 = 32$

$$\begin{array}{r} -6 \quad -6 \\ \hline -2a = 26 \\ \frac{-2a}{-2} \quad \frac{26}{-2} \\ \hline a = -13 \end{array}$$

$$\begin{array}{l} -2(-13) + 6 = 32 \\ 26 + 6 = 32 \\ 32 = 32 \checkmark \end{array}$$

5. $5 = 9 + \frac{w}{-3}$

$$\begin{array}{r} -9 \quad -9 \\ \hline -3 \cdot -4 = \frac{w}{-3} \cdot -3 \\ \hline 12 = w \end{array}$$

$$\begin{array}{l} 5 = 9 + \frac{12}{-3} \\ 5 = 9 - 4 \\ 5 = 5 \checkmark \end{array}$$

6. $-2 + 7c = 40$

$$\begin{array}{r} +2 \quad +2 \\ \hline 7c = 42 \\ \frac{7c}{7} \quad \frac{42}{7} \\ \hline c = 6 \end{array}$$

$$\begin{array}{l} -2 + 7(6) = 40 \\ -2 + 42 = 40 \\ 40 = 40 \checkmark \end{array}$$

7. $18 = 5 - y$

$$\begin{array}{r} -5 \quad -5 \\ \hline 13 = -y \\ \frac{13}{-1} \quad \frac{-y}{-1} \\ \hline -13 = y \end{array}$$

$$\begin{array}{l} 18 = 5 - (-13) \\ 18 = 18 \checkmark \end{array}$$

8. $-6p - 7 = -31$

$$\begin{array}{r} +7 \quad +7 \\ \hline -6p = -24 \\ \frac{-6p}{-6} \quad \frac{-24}{-6} \\ \hline p = 4 \end{array}$$

$$\begin{array}{l} -6(4) - 7 = -31 \\ -24 - 7 = -31 \\ -31 = -31 \checkmark \end{array}$$

9. $57 = 12 - 5v$

$$\begin{array}{r} -12 \quad -12 \\ \hline 45 = -5v \\ \frac{45}{-5} \quad \frac{-5v}{-5} \\ \hline -9 = v \end{array}$$

$$\begin{array}{l} 57 = 12 - 5(-9) \\ 57 = 12 + 45 \\ 57 = 57 \checkmark \end{array}$$

10. $-6 - \frac{t}{4} = -1$

$$\begin{array}{r} +6 \quad +6 \\ \hline -4 \cdot \frac{-t}{4} = 5 \cdot -4 \\ \hline t = -20 \end{array}$$

$$\begin{array}{l} -6 - \frac{-20}{4} = -1 \\ -6 + 5 = -1 \\ -1 = -1 \checkmark \end{array}$$

<p>11. $\frac{1}{3}c + 5 = -4$</p> $\begin{array}{r} -5 \quad -5 \\ \hline 3 \cdot \frac{1}{3}c = -9 \cdot 3 \\ \hline c = -27 \end{array}$ <p>$\frac{1}{3}(-27) + 5 = -4$</p> $\begin{array}{r} -9 + 5 = -4 \\ -4 = -4 \checkmark \end{array}$	<p>12. $-23 = \frac{5}{4}q - 13$</p> $\begin{array}{r} +13 \quad +13 \\ \hline \frac{4}{5} \cdot -10 = \frac{5}{4}q \cdot \frac{4}{5} \\ \hline -8 = q \end{array}$ <p>$-23 = \frac{5}{4}(-8) - 13$</p> $\begin{array}{r} -23 = -10 - 13 \\ -23 = -23 \checkmark \end{array}$
<p>13. $-\frac{1}{2}s + 6 = 23$</p> $\begin{array}{r} -6 \quad -6 \\ \hline -2 \cdot -\frac{1}{2}s = 17 \cdot -2 \\ \hline s = -34 \end{array}$ <p>$-\frac{1}{2}(-34) + 6 = 23$</p> $\begin{array}{r} 17 + 6 = 23 \\ 23 = 23 \checkmark \end{array}$	<p>14. $8 - \frac{7}{2}m = -13$</p> $\begin{array}{r} -8 \quad -8 \\ \hline -\frac{2}{7} \cdot -\frac{7}{2}m = -21 \cdot -\frac{2}{7} \\ \hline m = 6 \end{array}$ <p>$8 - \frac{7}{2}(6) = -13$</p> $\begin{array}{r} 8 - 21 = -13 \\ -13 = -13 \checkmark \end{array}$
<p>15. $-11 = \frac{x-3}{2} \cdot 2$</p> $\begin{array}{r} -22 = x - 3 \\ +3 \quad +3 \\ \hline -19 = x \end{array}$ <p>$-11 = \frac{-19-3}{2}$</p> $\begin{array}{r} -11 = \frac{-22}{2} \\ -11 = -11 \checkmark \end{array}$	<p>16. $\frac{a+5}{-4} = -3 \cdot -4$</p> $\begin{array}{r} a+5 = 12 \\ -5 \quad -5 \\ \hline a = 7 \end{array}$ <p>$\frac{7+5}{-4} = -3$</p> $\begin{array}{r} \frac{12}{-4} = -3 \\ -3 = -3 \checkmark \end{array}$
<p>Directions: Translate each equation, then solve. Check all solutions.</p>	
<p>17. "The sum of twice a number and 19 is -23."</p> $\begin{array}{r} 2x + 19 = -23 \\ -19 \quad -19 \\ \hline 2x = -42 \\ \frac{2x}{2} = \frac{-42}{2} \\ \hline x = -21 \end{array}$ <p>$2(-21) + 19 = -23$</p> $\begin{array}{r} -42 + 19 = -23 \\ -23 = -23 \checkmark \end{array}$	<p>18. "The quotient of a number and -5, decreased by 9, is 2."</p> $\begin{array}{r} \frac{x}{-5} - 9 = 2 \\ +9 \quad +9 \\ \hline -5 \cdot \frac{x}{-5} = 11 \cdot -5 \\ \hline x = -55 \end{array}$ <p>$\frac{-55}{-5} - 9 = 2$</p> $\begin{array}{r} 11 - 9 = 2 \\ 2 = 2 \checkmark \end{array}$
<p>19. "Fourteen subtracted from the product of a number and -3 is 25."</p> $\begin{array}{r} -3x - 14 = 25 \\ +14 \quad +14 \\ \hline -3x = 39 \\ \frac{-3x}{-3} = \frac{39}{-3} \\ \hline x = -13 \end{array}$ <p>$-3(-13) - 14 = 25$</p> $\begin{array}{r} 39 - 14 = 25 \\ 25 = 25 \checkmark \end{array}$	<p>20. "The sum of a number and 12, divided by 4, is -7."</p> $\begin{array}{r} 4 \cdot \frac{x+12}{4} = -7 \cdot 4 \\ \hline x+12 = -28 \\ -12 \quad -12 \\ \hline x = -40 \end{array}$ <p>$\frac{-40+12}{4} = -7$</p> $\begin{array}{r} \frac{-28}{4} = -7 \\ -7 = -7 \checkmark \end{array}$

TWO-STEP EQUATIONS RELAY PUZZLE

Directions: Solve each equation beginning with the "Start" box. Use the arrows to navigate through the page. Use the answer from the previous problem to fill in the box for the next problem. Show all work!

Start! $9x + 13 = -5$	$-7 = \frac{a}{\boxed{-2}} - 3$	$\boxed{8}w - 13 = 27$	$17 - \boxed{5}p = 32$
$-5r + \boxed{16} = 51$	$\boxed{4} - 2y = -28$	$-19 = \boxed{-9}m + 17$	$\frac{k}{9} - 2 = \boxed{-3}$
$\frac{c}{\boxed{-7}} + 25 = 27$	$\frac{1}{2}n - 19 = \boxed{-14}$	$-11 = \boxed{10} - 7a$	$\frac{x - 10}{\boxed{3}} = -4$
$\frac{h - 13}{\boxed{9}} = -2$	$-3 = \frac{f + \boxed{12}}{-7}$	$-\frac{3}{4}z + 1 = \boxed{-8}$	$\boxed{-2} - v = 6$

TWO-STEP EQUATION WORD PROBLEMS

1

DEFINE A VARIABLE

What are you trying to find?
Use a "let statement" to define a variable.
Ex: "let c = cost of one item"

2

SET UP EQUATION & SOLVE

Use keywords to set up an equation. Then solve!

3

ANSWER IT!

Give exactly what the problem is asking for.

Directions: For each problem, define a variable and set up an equation, then solve.

1. There are 8 math classes in 7th grade. Seven are equally sized and the 8th class has 32 students. If there are a total of 221 students in the 7th grade, how many are in each of the equally sized math classes?

let x = students

$$\begin{array}{r} 7x + 32 = 221 \\ -32 \quad -32 \\ \hline 7x = 189 \\ \frac{7}{7} \quad \frac{7}{7} \\ \hline x = 27 \end{array}$$

2. Nick has a \$45 coffee gift card. He purchased the same latte 6 times and has \$18 left on the card. What was the price of each latte?

let x = cost per latte

$$\begin{array}{r} 6x + 18 = 45 \\ -18 \quad -18 \\ \hline 6x = 27 \\ \frac{6}{6} \quad \frac{6}{6} \\ \hline x = 4.5 \end{array}$$

Equation

Solution

$$7x + 32 = 221$$

27 students

Equation

Solution

$$6x + 18 = 45$$

\$4.50

3. Mr. Marcus is splitting a huge new pack of colored pencils equally among his 25 students. After splitting the pencils he has 4 left. If there were 429 colored pencils to begin with, how many did each student receive?

let x = pencils

$$\begin{array}{r} 25x + 4 = 429 \\ -4 \quad -4 \\ \hline 25x = 425 \\ \frac{25}{25} \quad \frac{25}{25} \\ \hline x = 17 \end{array}$$

4. Beth is four years older than two thirds the age of Milo. If Beth is 14 years old, how old is Milo?

let x = Milo's age

$$\begin{array}{r} \frac{2}{3}x + 4 = 14 \\ -4 \quad -4 \\ \hline \frac{2}{3} \cdot \frac{2}{3}x = 10 \cdot \frac{2}{3} \\ \hline x = 15 \end{array}$$

Equation

Solution

$$25x + 4 = 429$$

17 pencils

Equation

Solution

$$\frac{2}{3}x + 4 = 14$$

15 years old

5. Ella is selling cookies for \$4 per dozen. She pays \$10 for ingredients. If she ends up with a profit of \$66 how many dozen cookies did she sell?

let x = # dozen

$$\begin{array}{r} 4x - 10 = 66 \\ +10 \quad +10 \\ \hline 4x = 76 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline x = 19 \end{array}$$

6. Mr. Jenkins won \$500 in a raffle. He split some of the money among his three children and had \$20 left. How much did he give each of his children?

let x = amount \$

$$\begin{array}{r} 3x + 20 = 500 \\ -20 \quad -20 \\ \hline 3x = 480 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline x = 160 \end{array}$$

Equation

Solution

$$4x - 10 = 66$$

19 dozen

Equation

Solution

$$3x + 20 = 500$$

\$160

<p>7. Natalie added 20 pieces of candy to a bowl. Two days later, half of the candy in the bowl is gone. If there are 14 pieces left in the bowl, how many pieces were in the bowl before she added the 20 pieces?</p> <p>let x = candy at start</p> $2 \cdot \frac{x+20}{2} = 14 \cdot 2$ $\begin{array}{r} x+20 = 28 \\ -20 \quad -20 \\ \hline x = 8 \end{array}$		<p>8. Trish made a few pans of brownies to sell. Rachel also contributed 5 pans. Each pan of brownies was cut into 12 squares. If there were a total of 84 brownie squares, how many pans of brownies did Trish make?</p> <p>let x = pans of brownies</p> $\begin{array}{r} 60 + 12x = 84 \\ -60 \quad -60 \\ \hline 12x = 24 \\ \underline{12} \quad \underline{12} \\ x = 2 \end{array}$	
Equation	Solution	Equation	Solution
$\frac{x+20}{2} = 14$	8 pieces	$60 + 12x = 84$	2 pans
<p>9. Ryan is building a tree house. He has 18 feet of wood to use. He uses three-fourths of a foot of wood to make each step for the ladder. If he has 1.5 feet of wood left, how many ladder steps did he make?</p> <p>let x = # steps</p> $\begin{array}{r} 18 - \frac{3}{4}x = 1.5 \\ -18 \quad -18 \\ \hline -\frac{3}{4}x = -16.5 \\ \frac{3}{4} \cdot \frac{3}{4}x = -3 \cdot \frac{4}{3} \\ x = 4 \end{array}$		<p>10. You used 8 cups of sugar while baking three dozen cookies and one cake. If you used 1.25 cups of sugar for the cake and the same amount of sugar for each dozen of cookies, how much sugar was used for each dozen of cookies?</p> <p>let x = cups of sugar</p> $\begin{array}{r} 1.25 + 3x = 8 \\ -1.25 \quad -1.25 \\ \hline 3x = 6.75 \\ \underline{3} \quad \underline{3} \\ x = 2.25 \end{array}$	
Equation	Solution	Equation	Solution
$18 - \frac{3}{4}x = 1.5$	4 steps	$1.25 + 3x = 8$	2.25 cups
<p>11. Madison has a beach chair and umbrella stand. Each umbrella rents for \$19 per day. At the end of one day, she made \$130 off beach chair rentals and the rest from umbrella rentals. If she made a total of \$567, how many umbrellas did she rent that day?</p> <p>let x = umbrella rentals</p> $\begin{array}{r} 19x + 130 = 567 \\ -130 \quad -130 \\ \hline 19x = 437 \\ \underline{19} \quad \underline{19} \\ x = 23 \end{array}$		<p>12. Victoria spent one-fourth of her birthday money on clothes. She received another \$25 a week later. If she has a total of \$70 now, how much did she have before she went shopping?</p> <p>let x = \$ at start</p> $\begin{array}{r} \frac{3}{4}x + 25 = 70 \\ -25 \quad -25 \\ \hline \frac{3}{4}x = 45 \cdot \frac{4}{3} \\ x = 60 \end{array}$	
Equation	Solution	Equation	Solution
$19x + 130 = 567$	23 rentals	$\frac{3}{4}x + 25 = 70$	\$ 60

Name: _____

Unit 3: Equations & Inequalities

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Homework 6: Two-Step Equation
Word Problems**** This is a 2-page document! ******Directions:** For each problem, define a variable and set up an equation, then solve.

1. Mrs. Roland distributed a bag of skittles to her students. She gave each student five skittles, then ate the 8 that remained in the bag. If there were originally 143 skittles in the bag, how many students does she have?

let x = students

$$\begin{array}{r} 5x + 8 = 143 \\ -8 \quad -8 \\ \hline 5x = 135 \\ \underline{5} \quad \underline{5} \\ x = 27 \end{array}$$

2. Sarah bought a binder for \$7.25 and six folders that totaled \$9.05. How much did each folder cost?

let x = # folders

$$\begin{array}{r} 7.25 + 6x = 9.05 \\ -7.25 \quad -7.25 \\ \hline 6x = 1.8 \\ \underline{6} \quad \underline{6} \\ x = 0.3 \end{array}$$

Equation

$5x + 8 = 143$

Solution

27 students

Equation

$7.25 + 6x = 9.05$

Solution

\$0.30

3. Evan used half of his paycheck for his car payment, then \$125 for groceries. If he has \$215 left, how much was his paycheck?

let x =
paycheck

$$\begin{array}{r} \frac{1}{2}x - 125 = 215 \\ +125 \quad +125 \\ \hline 2 \cdot \frac{1}{2}x = 340 \cdot 2 \\ x = 680 \end{array}$$

4. It costs \$4.25 per game at the bowling alley, plus \$1.90 to rent shoes. If Wayne has \$20, how many games can he bowl?

let x = games

$$\begin{array}{r} 4.25x + 1.90 = 20 \\ -1.90 \quad -1.90 \\ \hline 4.25x = 18.10 \\ \underline{4.25} \quad \underline{4.25} \\ x \approx 4.2588... \end{array}$$

Equation

$\frac{1}{2}x - 125 = 215$

Solution

\$680

Equation

$4.25x + 1.90 = 20$

Solution

4 games

5. Kate's math homework had a set of equations and one word problem. She took 3 minutes to solve each equation, then 7 minutes to solve the word problem. If it took her 52 minutes total, how many equations did she solve?

let x = equations

$$\begin{array}{r} 3x + 7 = 52 \\ -7 \quad -7 \\ \hline 3x = 45 \\ \underline{3} \quad \underline{3} \\ x = 15 \end{array}$$

6. Bryson's Dad is 38 years old. If this is four years less than three times Bryson's age, how old is Bryson?

let x = Bryson's
age

$$\begin{array}{r} 3x - 4 = 38 \\ +4 \quad +4 \\ \hline 3x = 42 \\ \underline{3} \quad \underline{3} \\ x = 14 \end{array}$$

Equation

$3x + 7 = 52$

Solution

15 equations

Equation

$3x - 4 = 38$

Solution

14 years old

7. Evan bought a bag of Skittles, ate 13 of them, then distributed the them evenly into 4 bowls. If there are 64 Skittles in each bowl, how many were originally in the bag?

let X = Skittles

$$4 \cdot \frac{X-13}{4} = 64 \cdot 4$$

$$\begin{array}{r} X-13 = 256 \\ +13 \quad +13 \\ \hline X = 269 \end{array}$$

8. One-fourth of the seventh-grade students made honor roll in the first quarter. The number of honor roll students increased by 18 in the second quarter. If 105 students made honor roll in the second quarter, how many total seventh graders are there?

let X = 7th graders

$$\frac{1}{4}X + 18 = 105$$

$$\begin{array}{r} -18 \quad -18 \\ \hline 4 \cdot \frac{1}{4}X = 87 \cdot 4 \\ X = 348 \end{array}$$

Equation
 $\frac{X-13}{4} = 64$

Solution
269 skittles

Equation
 $\frac{1}{4}X + 18 = 105$

Solution
348 students

9. In their last game, the Cowboys scored 10 less than 3 times the number of points that the Giants scored. If the Cowboys scored 41 points, how many points did the Giants score?

let X = Giants

$$3X - 10 = 41$$

$$\begin{array}{r} +10 \quad +10 \\ \hline 3X = 51 \\ \frac{3X}{3} = \frac{51}{3} \\ X = 17 \end{array}$$

10. Victoria set a goal for the number of boxes of Girl Scout cookies she wants to sell. So far, she has sold 33 boxes. If this is nine more than two-fifths of her goal, what is her goal?

let X = # boxes

$$\frac{2}{5}X + 9 = 33$$

$$\begin{array}{r} -9 \quad -9 \\ \hline \frac{5}{2} \cdot \frac{2}{5}X = 24 \cdot \frac{5}{2} \\ X = 60 \end{array}$$

Equation

$3X - 10 = 41$

Solution

17 points

Equation

$\frac{2}{5}X + 9 = 33$

Solution

60 boxes

11. A one-year membership to the gym costs \$362. When signing up, members pay \$54 for the first month, then the remaining part is made in equal payments for the remaining months of the membership. How much can a member expect to pay each month after their initial month?

let X = monthly

$$54 + 11X = 362$$

$$\begin{array}{r} -54 \quad -54 \\ \hline 11X = 308 \\ \frac{11X}{11} = \frac{308}{11} \\ X = 28 \end{array}$$

12. Mara bought a bag that contained 16 cups of sugar. She uses two-thirds cup of sugar each time she makes a batch of cookies. If the bag now has 10 cups of sugar left, how many batches of cookies has she made?

X = batches

$$16 - \frac{2}{3}X = 10$$

$$\begin{array}{r} -16 \quad -16 \\ \hline -\frac{3}{2} \cdot -\frac{2}{3}X = -6 \cdot -\frac{3}{2} \\ X = 9 \end{array}$$

Equation

$54 + 11X = 362$

Solution

\$28

Equation

$16 - \frac{2}{3}X = 10$

Solution

9 batches

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
<h2 style="margin: 0;">Multi-Step Equations</h2> <p style="margin: 0;">(Variables on One Side)</p>	Steps to Solve:
	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">① Distribute (if needed).</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">② Combine Like Terms (if needed).</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">③ Solve the remaining equation.</div> <div style="border: 1px solid black; padding: 5px;">④ Check your solution!</div>
	Directions: Solve each equation. Check all solutions.
	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>1. $-20 = -4x - 6x$</p> $\begin{array}{r} -20 = -10x \\ \hline -10 \quad -10 \end{array}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">$2 = x$</div> </div> <div style="width: 48%;"> <p>2. $-15a - 110 + 7a = 90$</p> $\begin{array}{r} -8a - 110 = 90 \\ \hline +110 \quad +110 \\ \hline -8a = 200 \\ \hline -8 \quad -8 \\ \hline a = -25 \end{array}$ </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>3. $-8p - 2 + 7p = -9$</p> $\begin{array}{r} -p - 2 = -9 \\ \hline +2 \quad +2 \\ \hline -p = -7 \\ \hline -1 \quad -1 \\ \hline p = 7 \end{array}$ </div> <div style="width: 48%;"> <p>4. $12 = -4(-6y - 3)$</p> $\begin{array}{r} 12 = 24y + 12 \\ \hline -12 \quad -12 \\ \hline 0 = 24y \\ \hline 24 \quad 24 \\ \hline 0 = y \end{array}$ </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>5. $\frac{1}{4}(6c - 2) = 7$</p> $\begin{array}{r} \frac{3}{2}c - \frac{1}{2} = 7 \\ \hline +\frac{1}{2} \quad +\frac{1}{2} \\ \hline \frac{3}{2}c = \frac{15}{2} \\ \hline \frac{2}{3} \cdot \frac{3}{2}c = \frac{15}{2} \cdot \frac{2}{3} \\ \hline c = 5 \end{array}$ </div> <div style="width: 48%;"> <p>6. $2(b + 1) - 7 = 5$</p> $\begin{array}{r} 2b + 2 - 7 = 5 \\ 2b - 5 = 5 \\ \hline +5 \quad +5 \\ \hline 2b = 10 \\ \hline \frac{2b}{2} = \frac{10}{2} \\ \hline b = 5 \end{array}$ </div> </div>
	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>7. $-(r - 8) = -18$</p> $\begin{array}{r} -r + 8 = -18 \\ \hline -8 \quad -8 \\ \hline -r = -26 \\ \hline -1 \quad -1 \\ \hline r = 26 \end{array}$ </div> <div style="width: 48%;"> <p>8. $2(4v - 3) - 8 - 2v = 4$</p> $\begin{array}{r} 8v - 6 - 8 - 2v = 4 \\ 6v - 14 = 4 \\ \hline +14 \quad +14 \\ \hline 6v = 18 \\ \hline \frac{6v}{6} = \frac{18}{6} \end{array}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">$v = 3$</div> </div> </div>

$$9. -a + 2(3a - 3) = 49$$

$$-a + 6a - 6 = 49$$

$$5a - 6 = 49$$

$$+6 \quad +6$$

$$\underline{5a = 55}$$

$$\frac{5a}{5} = \frac{55}{5}$$

$$\boxed{a = 11}$$

$$10. 8(2c + 3) - 9(c - 2) = -7$$

$$16c + 24 - 9c + 18 = -7$$

$$7c + 42 = -7$$

$$-42 \quad -42$$

$$\underline{7c = -49}$$

$$\frac{7c}{7} = \frac{-49}{7}$$

$$\boxed{c = -7}$$

$$11. \frac{3}{2}(10 - 4d) = -27$$

$$15 - 6d = -27$$

$$-15 \quad -15$$

$$\underline{-6d = -42}$$

$$\frac{-6d}{-6} = \frac{-42}{-6}$$

$$\boxed{d = 7}$$

$$12. -18 = 6(1 + 3m) + 6m$$

$$-18 = 6 + 18m + 6m$$

$$-18 = 6 + 24m$$

$$-6 \quad -6$$

$$\underline{-24 = 24m}$$

$$\frac{-24}{24} = \frac{24m}{24}$$

$$\boxed{-1 = m}$$

$$13. 5(y + 2) - (y - 1) = 3$$

$$5y + 10 - y + 1 = 3$$

$$4y + 11 = 3$$

$$-11 \quad -11$$

$$\underline{4y = -8}$$

$$\frac{4y}{4} = \frac{-8}{4}$$

$$\boxed{y = -2}$$

$$14. -40 = 7(-2r + 2) - 4r$$

$$-40 = -14r + 14 - 4r$$

$$-40 = -18r + 14$$

$$-14 \quad -14$$

$$\underline{-54 = -18r}$$

$$\frac{-54}{-18} = \frac{-18r}{-18}$$

$$\boxed{3 = r}$$

$$15. 37 = -3 + 5(p + 6)$$

$$37 = -3 + 5p + 30$$

$$37 = 27 + 5p$$

$$-27 \quad -27$$

$$\underline{10 = 5p}$$

$$\frac{10}{5} = \frac{5p}{5}$$

$$\boxed{2 = p}$$

$$16. 8(4x - 4) + 5x = 79$$

$$32x - 32 + 5x = 79$$

$$37x - 32 = 79$$

$$+32 \quad +32$$

$$\underline{37x = 111}$$

$$\frac{37x}{37} = \frac{111}{37}$$

$$\boxed{x = 3}$$

Name: _____

Unit 3: Equations & Inequalities

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Homework 7: Multi-Step Equations
(Variables on One Side)**** This is a 2-page document! ******Directions:** Solve each equation. Check all solutions.

1. $-1 + 6x + 30 = 53$

$$\begin{array}{r} 6x + 29 = 53 \\ -29 \quad -29 \\ \hline 6x = 24 \\ \frac{6}{6} \quad \frac{6}{6} \\ \hline x = 4 \end{array}$$

2. $28 = -k + 16 - 2k - 9$

$$\begin{array}{r} 28 = -k + 16 - 2k - 9 \\ -7 \quad -1 \\ \hline 21 = -3k \\ \frac{-3}{-3} \quad \frac{-3}{-3} \\ \hline -7 = k \end{array}$$

3. $-4(2n + 7) = 20$

$$\begin{array}{r} -8n - 28 = 20 \\ +28 \quad +28 \\ \hline -8n = 48 \\ \frac{-8}{-8} \quad \frac{-8}{-8} \\ \hline n = -6 \end{array}$$

4. $-70 = -5(w + 2)$

$$\begin{array}{r} -70 = -5w - 10 \\ +10 \quad +10 \\ \hline -60 = -5w \\ \frac{-60}{-5} \quad \frac{-5w}{-5} \\ \hline 12 = w \end{array}$$

5. $-\frac{1}{2}(6p + 16) = 7$

$$\begin{array}{r} -3p - 8 = 7 \\ +8 \quad +8 \\ \hline -3p = 15 \\ \frac{-3}{-3} \quad \frac{15}{-3} \\ \hline p = -5 \end{array}$$

6. $-1 = -3(3r - 8) - 7$

$$\begin{array}{r} -1 = -9r + 24 - 7 \\ -1 = -9r + 17 \\ -17 \quad -17 \\ \hline -18 = -9r \\ \frac{-18}{-9} \quad \frac{-9r}{-9} \\ \hline 2 = r \end{array}$$

7. $6(v-5) - 2v = 2$

$$6v - 30 - 2v = 2$$

$$4v - 30 = 2$$

$$+30 \quad +30$$

$$\frac{4v}{4} = \frac{32}{4}$$

$$v = 8$$

$$\boxed{v=8}$$

8. $6a - 2(4a - 5) = 40$

$$6a - 8a + 10 = 40$$

$$-2a + 10 = 40$$

$$-10 \quad -10$$

$$\frac{-2a}{-2} = \frac{30}{-2}$$

$$a = -15$$

$$\boxed{a=-15}$$

9. $\frac{4}{3}(15 - 6y) - 7 = -11$

$$20 - 8y - 7 = -11$$

$$-8y + 13 = -11$$

$$-13 \quad -13$$

$$\frac{-8y}{-8} = \frac{-24}{-8}$$

$$y = 3$$

$$\boxed{y=3}$$

10. $-t - 4(2t - 5) = 20$

$$-t - 8t + 20 = 20$$

$$-9t + 20 = 20$$

$$-20 \quad -20$$

$$\frac{-9t}{-9} = \frac{0}{-9}$$

$$t = 0$$

$$\boxed{t=0}$$

11. $5(2c + 1) - 6(c + 2) = -43$

$$10c + 5 - 6c - 12 = -43$$

$$4c - 7 = -43$$

$$+7 \quad +7$$

$$\frac{4c}{4} = \frac{-36}{4}$$

$$c = -9$$

$$\boxed{c=-9}$$

12. $-2(x - 9) - (x + 13) = -16$

$$-2x + 18 - x - 13 = -16$$

$$-3x + 5 = -16$$

$$-5 \quad -5$$

$$\frac{-3x}{-3} = \frac{-21}{-3}$$

$$x = 7$$

$$\boxed{x=7}$$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Multi-Step Equations (Variables on Both Sides)	Steps to Solve:
	1 Simplify each side of the equation if needed by using the distributive property and/or combining like terms.
	2 Use inverse operations to move the variables to one side of the equation.
	3 Solve the remaining equation.
	4 Check your solution!
Examples	Directions: Solve each equation. Check all solutions.
	<div> 1. $5 - r = 2 - 4r$ $\quad +4r \quad +4r$ <hr/> $5 + 3r = 2$ $-5 \quad -5$ <hr/> $3r = -3$ $\frac{3}{3} \quad \frac{-3}{3}$ $r = -1$ </div>
	<div> 2. $-1 + 6v = -v + 6$ $\quad +v \quad +v$ <hr/> $-1 + 7v = 6$ $+1 \quad +1$ <hr/> $7v = 7$ $\frac{7}{7} \quad \frac{7}{7}$ $v = 1$ </div>
	<div> 3. $-4 + 5n = 6n + 1$ $\quad -5n \quad -5n$ <hr/> $-4 = n + 1$ $-1 \quad -1$ <hr/> $-5 = n$ </div>
	<div> 4. $-7 + 6x = 4x - 1$ $\quad -4x \quad -4x$ <hr/> $-7 + 2x = -1$ $+7 \quad +7$ <hr/> $2x = 6$ $\frac{2}{2} \quad \frac{6}{2}$ $x = 3$ </div>
	<div> 5. $-7 + 2k = k + 8$ $\quad -k \quad -k$ <hr/> $-7 + k = 8$ $+7 \quad +7$ <hr/> $k = 15$ </div>
	<div> 6. $-11 - 3y = 1 - y$ $\quad +3y \quad +3y$ <hr/> $-11 = 1 + 2y$ $-1 \quad -1$ <hr/> $-12 = 2y$ $\frac{-12}{2} \quad \frac{2y}{2}$ $-6 = y$ </div>

$$7. 5n + 11 = -6(4 - 2n)$$

$$\begin{array}{r} 5n + 11 = -24 + 12n \\ -5n \quad \quad -5n \\ \hline 11 = -24 + 7n \\ +24 \quad +24 \\ \hline 35 = 7n \\ \frac{35}{7} \quad \frac{7n}{7} \\ \hline \boxed{5 = n} \end{array}$$

$$8. 5(a - 2) = 2 + 3a$$

$$\begin{array}{r} 5a - 10 = 2 + 3a \\ -3a \quad \quad -3a \\ \hline 2a - 10 = 2 \\ +10 \quad +10 \\ \hline 2a = 12 \\ \frac{2a}{2} \quad \frac{12}{2} \\ \hline \boxed{a = 6} \end{array}$$

$$9. 5(6p + 5) = -25 + 5p$$

$$\begin{array}{r} 30p + 25 = -25 + 5p \\ -5p \quad \quad -5p \\ \hline 25p + 25 = -25 \\ -25 \quad -25 \\ \hline 25p = -50 \\ \frac{25p}{25} \quad \frac{-50}{25} \\ \hline \boxed{p = -2} \end{array}$$

$$10. -4(-4 + 4x) = -35 + x$$

$$\begin{array}{r} 16 - 16x = -35 + x \\ +16x \quad \quad +16x \\ \hline 16 = -35 + 17x \\ +35 \quad +35 \\ \hline 51 = 17x \\ \frac{51}{17} \quad \frac{17x}{17} \\ \hline \boxed{3 = x} \end{array}$$

$$11. -8(-5r + 7) = 7(7r + 1)$$

$$\begin{array}{r} 40r - 56 = 49r + 7 \\ -40r \quad -40r \\ \hline -56 = 9r + 7 \\ -7 \quad -7 \\ \hline -63 = 9r \\ \frac{-63}{9} \quad \frac{9r}{9} \\ \hline \boxed{-7 = r} \end{array}$$

$$12. -9(1 - 5c) = -(-9c + 9)$$

$$\begin{array}{r} -9 + 45c = 9c - 9 \\ -9c \quad -9c \\ \hline -9 + 36c = -9 \\ +9 \quad \quad +9 \\ \hline 36c = 0 \\ \frac{36c}{36} \quad \frac{0}{36} \\ \hline \boxed{c = 0} \end{array}$$

$$13. -3(d - 4) = -2d - 2(8 + 4d)$$

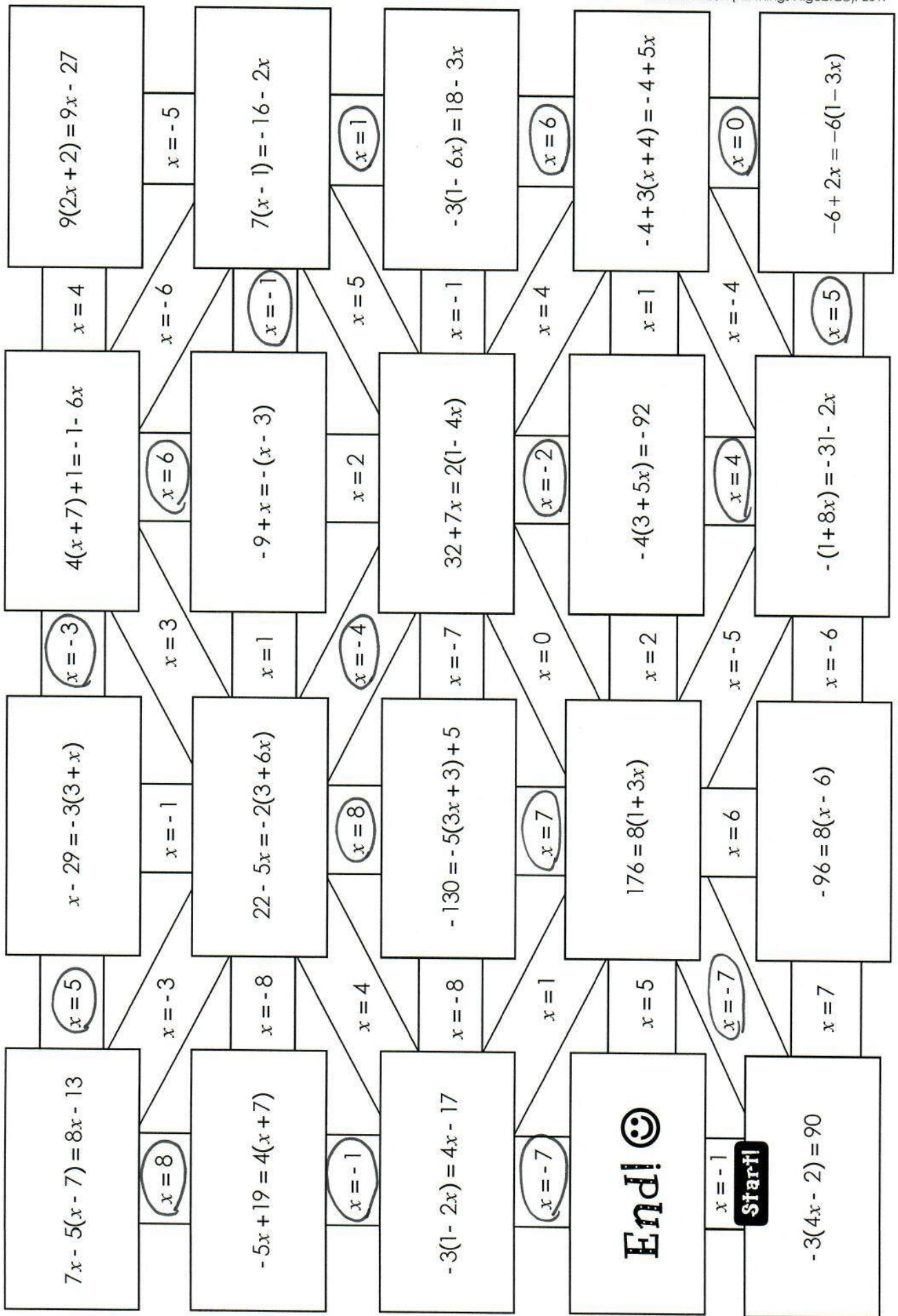
$$\begin{array}{r} -3d + 12 = -2d - 16 - 8d \\ -3d + 12 = -10d - 16 \\ +10d \quad +10d \\ \hline 7d + 12 = -16 \\ -12 \quad -12 \\ \hline 7d = -28 \\ \frac{7d}{7} \quad \frac{-28}{7} \\ \hline \boxed{d = -4} \end{array}$$

$$14. \frac{3}{4}(-8v - 4) = 2(v + 6) - 3v$$

$$\begin{array}{r} -6v - 3 = 2v + 12 - 3v \\ -6v - 3 = -v + 12 \\ +6v \quad +6v \\ \hline -3 = 5v + 12 \\ -12 \quad -12 \\ \hline -15 = 5v \\ \frac{-15}{5} \quad \frac{5v}{5} \quad \boxed{v = -3} \end{array}$$

Multi-Step Equations Maze!

Directions: Solve each equation. Use your solutions to navigate through the maze. **Staple all work to this paper!**



Name: _____

Unit 3: Equations & Inequalities

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Homework 8: Multi-Step Equations
(Variables on Both Sides)**** This is a 2-page document! ******Directions:** Solve each equation. Check all solutions.

1. $7m + 29 = 2m + 9$

$$\begin{array}{r} -2m \quad -2m \\ \hline \end{array}$$

$$\begin{array}{r} 5m + 29 = 9 \\ -29 \quad -29 \\ \hline \end{array}$$

$$\begin{array}{r} 5m = -20 \\ \frac{5}{5} \quad \frac{5}{5} \end{array}$$

$$\boxed{m = -4}$$

2. $10a - 7 = 7a - 55$

$$\begin{array}{r} -7a \quad -7a \\ \hline \end{array}$$

$$\begin{array}{r} 3a - 7 = -55 \\ +7 \quad +7 \\ \hline \end{array}$$

$$\begin{array}{r} 3a = -48 \\ \frac{3}{3} \quad \frac{3}{3} \end{array}$$

$$\boxed{a = -16}$$

3. $-10k + 11 = 3 - 2k$

$$\begin{array}{r} +10k \quad +10k \\ \hline \end{array}$$

$$\begin{array}{r} 11 = 3 + 8k \\ -3 \quad -3 \\ \hline \end{array}$$

$$\begin{array}{r} 8 = 8k \\ \frac{8}{8} \quad \frac{8}{8} \end{array}$$

$$\boxed{1 = k}$$

4. $6x - 16 = x + 29$

$$\begin{array}{r} -x \quad -x \\ \hline \end{array}$$

$$\begin{array}{r} 5x - 16 = 29 \\ +16 \quad +16 \\ \hline \end{array}$$

$$\begin{array}{r} 5x = 45 \\ \frac{5}{5} \quad \frac{5}{5} \end{array}$$

$$\boxed{x = 9}$$

5. $3q - 19 = 10q + 23$

$$\begin{array}{r} -3q \quad -3q \\ \hline \end{array}$$

$$\begin{array}{r} -19 = 7q + 23 \\ -23 \quad -23 \\ \hline \end{array}$$

$$\begin{array}{r} -42 = 7q \\ \frac{-42}{7} \quad \frac{7q}{7} \end{array}$$

$$\boxed{-6 = q}$$

6. $38 - 6v = v + 24$

$$\begin{array}{r} -6v \quad -6v \\ \hline \end{array}$$

$$\begin{array}{r} 38 = 7v + 24 \\ -24 \quad -24 \\ \hline \end{array}$$

$$\begin{array}{r} 14 = 7v \\ \frac{14}{7} \quad \frac{7v}{7} \end{array}$$

$$\boxed{2 = v}$$

$$7. 9(p+3) = 5p-1$$

$$\begin{array}{r} 9p+27=5p-1 \\ -5p \quad -5p \\ \hline 4p+27=-1 \\ -27 \quad -27 \\ \hline 4p=-28 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline \boxed{p=-7} \end{array}$$

$$8. 11n-19 = 4(2n+5)$$

$$\begin{array}{r} 11n-19=8n+20 \\ -8n \quad -8n \\ \hline 3n-19=20 \\ +19 \quad +19 \\ \hline 3n=39 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline \boxed{n=13} \end{array}$$

$$9. 4(4c-3) = 2(5c+18)$$

$$\begin{array}{r} 16c-12=10c+36 \\ -10c \quad -10c \\ \hline 6c-12=36 \\ +12 \quad +12 \\ \hline 6c=48 \\ \frac{6}{6} \quad \frac{6}{6} \\ \hline \boxed{c=8} \end{array}$$

$$10. -2(3r-14) = 4(13-r)$$

$$\begin{array}{r} -6r+28=52-4r \\ +6r \quad +6r \\ \hline 28=52+2r \\ -52 \quad -52 \\ \hline -24=2r \\ \frac{-24}{2} = \frac{2r}{2} \\ \hline \boxed{-12=r} \end{array}$$

$$11. -\frac{5}{2}(8y-2) = 5(10-y)$$

$$\begin{array}{r} -20y+5=50-5y \\ +20y \quad +20y \\ \hline 5=50+15y \\ -50 \quad -50 \\ \hline -45=15y \\ \frac{-45}{15} = \frac{15y}{15} \\ \hline \boxed{-3=y} \end{array}$$

$$12. -3(2w+5) + 7w = 5(w-11)$$

$$\begin{array}{r} -6w-15+7w=5w-55 \\ w-15=5w-55 \\ -w \quad -w \\ \hline -15=4w-55 \\ +55 \quad +55 \\ \hline 40=4w \\ \frac{40}{4} = \frac{4w}{4} \\ \hline \boxed{10=w} \end{array}$$

Name: _____

Math 7

Date: _____ Per: _____

Unit 3: Equations & Inequalities

Quiz 3-2: Two-Step & Multi-Step Equations**Directions:** Solve each equation. Show your work and check all solutions.

1. $8x - 18 = 38$

$$\begin{array}{r} +18 \quad +18 \\ \hline 8x = 56 \\ \hline 8 \quad 8 \\ x = 7 \end{array}$$

2. $16 = -5m + 11$

$$\begin{array}{r} -11 \quad -11 \\ \hline 5 = -5m \\ \hline -5 \quad -5 \\ -1 = m \end{array}$$

3. $19 - 2k = -13$

$$\begin{array}{r} -19 \quad -19 \\ \hline -2k = -32 \\ \hline -2 \quad -2 \\ k = 16 \end{array}$$

4. $-17 + \frac{a}{3} = -14$

$$\begin{array}{r} +17 \quad +17 \\ \hline 3 \cdot \frac{a}{3} = 3 \cdot 3 \\ a = 9 \end{array}$$

5. $-7 - p = -5$

$$\begin{array}{r} +1 \quad +1 \\ \hline -p = 2 \\ \hline -1 \quad -1 \\ p = -2 \end{array}$$

6. $6 = \frac{y+1}{-2} \cdot -2$

$$\begin{array}{r} -12 = y + 1 \\ \hline -1 \quad -1 \\ -13 = y \end{array}$$

7. $\frac{1}{2}c - 25 = -23$

$$\begin{array}{r} +25 \quad +25 \\ \hline 2 \cdot \frac{1}{2}c = 2 \cdot 2 \\ c = 4 \end{array}$$

8. $29 = -\frac{3}{2}r + 17$

$$\begin{array}{r} -17 \quad -17 \\ \hline -\frac{2}{3} \cdot 12 = -\frac{3}{2}r \cdot -\frac{2}{3} \\ -8 = r \end{array}$$

1. $x = 7$

2. $m = -1$

3. $k = 16$

4. $a = 9$

5. $p = -2$

6. $y = -13$

7. $c = 4$

8. $r = -8$

$$9. 4(2v - 9) = -12$$

$$\begin{array}{r} 8v - 36 = -12 \\ +36 \quad +36 \\ \hline 8v = 24 \\ \frac{8v}{8} = \frac{24}{8} \\ v = 3 \end{array}$$

$$10. 31 = n - 3(n - 7)$$

$$\begin{array}{r} 31 = n - 3n + 21 \\ 31 = -2n + 21 \\ -21 \quad -21 \\ \hline 10 = -2n \\ \frac{-2}{-2} \quad \frac{-2}{-2} \\ n = -5 \end{array}$$

$$9. v = 3$$

$$10. n = -5$$

$$11. w = 18$$

$$12. k = -4$$

$$13. n = -7$$

$$14. a = 1$$

$$11. 7w + 4 = 5w + 40$$

$$\begin{array}{r} -5w \quad -5w \\ \hline 2w + 4 = 40 \\ -4 \quad -4 \\ \hline 2w = 36 \\ \frac{2w}{2} = \frac{36}{2} \\ w = 18 \end{array}$$

$$12. 9k - 16 = 6k - 28$$

$$\begin{array}{r} -6k \quad -6k \\ \hline 3k - 16 = -28 \\ +16 \quad +16 \\ \hline 3k = -12 \\ \frac{3k}{3} = \frac{-12}{3} \\ k = -4 \end{array}$$

$$13. 12(n + 3) = 8(n + 1)$$

$$\begin{array}{r} 12n + 36 = 8n + 8 \\ -8n \quad -8n \\ \hline 4n + 36 = 8 \\ -36 \quad -36 \\ \hline 4n = -28 \\ \frac{4n}{4} = \frac{-28}{4} \quad n = -7 \end{array}$$

$$14. -\frac{1}{3}(12a + 18) = 5(a - 3)$$

$$\begin{array}{r} -4a - 6 = 5a - 15 \\ +4a \quad +4a \\ \hline -6 = 9a - 15 \\ +15 \quad +15 \\ \hline 9 = 9a \\ \frac{9}{9} = \frac{9a}{9} \quad a = 1 \end{array}$$

Directions: For each problem (a) translate into an equation using a variable, then (b) solve.

15. In their last game, the school football team scored an equal number of points in each of the first three quarters, then 14 points in the fourth quarter. If they scored 44 points in all, how many points did they score in the first quarter?

$$\begin{array}{r} 3x + 14 = 44 \\ -14 \quad -14 \\ \hline 3x = 30 \\ \frac{3x}{3} = \frac{30}{3} \quad x = 10 \end{array}$$

$$15. (a) 3x + 14 = 44$$

$$(b) 10 \text{ points}$$


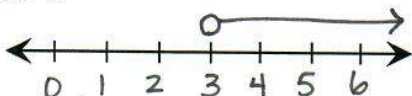
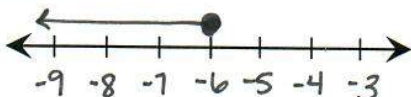
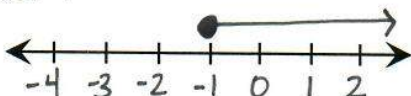
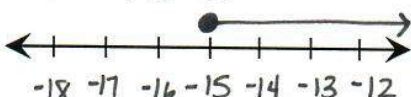
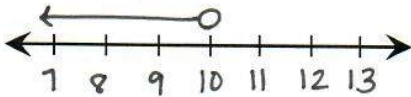
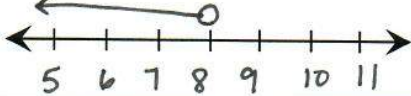
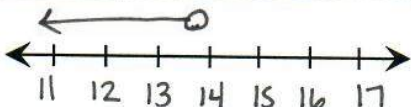
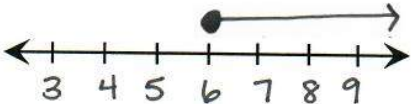
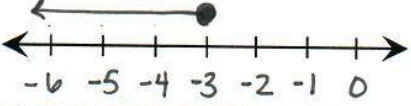
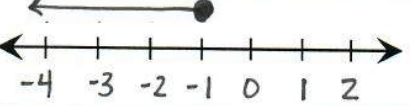
$$16. (a) \frac{1}{3}x + 16 = 37$$

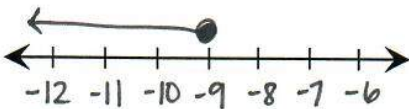
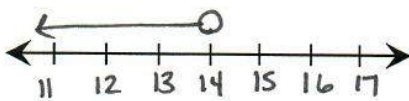
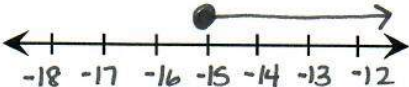
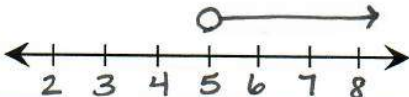
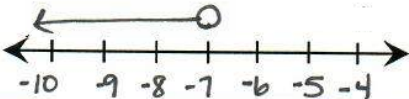
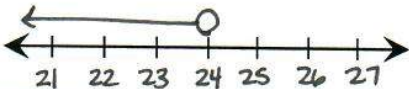
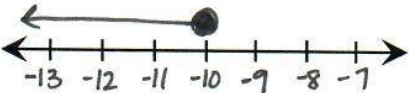
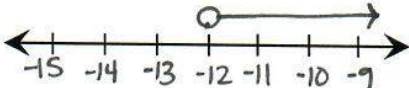
$$(b) 63 \text{ gummy bears}$$

16. Lily bought a bag of gummy bears and ate one-third of them. The next day, she ate 16 more gummy bears. If she ate a total of 37 gummy bears, how many were originally in the bag?

$$\begin{array}{r} \frac{1}{3}x + 16 = 37 \\ -16 \quad -16 \\ \hline \frac{1}{3}x = 21 \\ 3 \cdot \frac{1}{3}x = 21 \cdot 3 \\ x = 63 \end{array}$$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples				
INEQUALITY SYMBOLS	LESS THAN	LESS THAN OR EQUAL TO	GREATER THAN	GREATER THAN OR EQUAL TO	
	$<$	\leq	$>$	\geq	
GRAPHING INEQUALITIES	When graphing inequalities, the arrow should point towards the possible solutions. For example : $x \geq -2$ means "x is a number that is greater than or equal to -2."				
	<div></div> <p>When graphing inequalities:</p> <ul style="list-style-type: none">➤ Use an <u>open circle</u> for $<$ or $>$ symbols.➤ Use a <u>closed circle</u> for \leq or \geq symbols.				
EXAMPLES	Directions: Graph each inequality on the number line.				
	1. $b > 3$ 		2. $m \leq -6$ 		
	3. $x \geq -1$ 		4. $-15 \leq r$ $r \geq -15$ 		
	5. $10 > c$ $c < 10$ 		6. $n < 8$ 		
	TRANSLATING INEQUALITIES	Directions: Translate each inequality, then graph.			
		7. "A number is less than 14." $x < 14$			
8. "A number is at least 6." $x \geq 6$					
9. "A number is no more than -3." $x \leq -3$					
10. "A number is at most -1." $x \leq -1$					

SOLUTIONS TO INEQUALITIES	Directions: State whether the number is a solution to the given inequality.		
	11. $x > -9$; -16 $-16 > -9$ <div>No!</div>	12. $m \geq 12$; 12 $12 \geq 12$ <div>yes!</div>	13. $y < -2.5$; -2 $-2 < -2.5$ <div>No!</div>
	14. $b < 4.2$; 4.2 $4.2 < 4.2$ <div>No!</div>	15. $v \leq \frac{7}{8}$; $\frac{5}{6}$ $\frac{5}{6} \leq \frac{7}{8}$ <div>yes!</div>	16. $n \geq 2\frac{2}{3}$; $\frac{13}{4}$ $3\frac{1}{4} \geq 2\frac{2}{3}$ <div>yes!</div>
SOLVING INEQUALITIES	<ul style="list-style-type: none">To solve inequalities, you follow the same steps as solving equations.STOP! If you <u>multiply</u> or <u>divide</u> by a <u>negative</u> number, you must <u>flip</u> the inequality symbol!		
ONE-STEP INEQUALITIES	Directions: Solve each inequality and graph the solution on the number line.		
	17. $p - 2 \leq -11$ $+2 \quad +2$ <div>$p \leq -9$</div> 	18. $\frac{k}{7} < 2 \cdot 7$ <div>$k < 14$</div> 	
	19. $-35 \leq a - 20$ $+20 \quad +20$ $-15 \leq a$ <div>$a \geq -15$</div> 	20. $\frac{-5e}{-5} < \frac{-25}{-5}$ <div>$e > 5$</div> 	
	21. $\frac{140}{-20} < \frac{-20j}{-20}$ $-7 > j$ <div>$j < -7$</div> 	22. $\frac{12c}{12} < 2 \cdot 12$ $c < 24$ 	
	23. $\frac{5}{5} \cdot \frac{4}{4} r \leq -8 \cdot \frac{5}{4}$ $r \leq -10$ 	24. $\frac{-3s}{-3} < 4 \cdot -3$ $s > -12$ 	

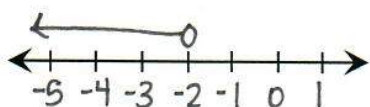
Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 9: Intro to Inequalities;
Solving One-Step Inequalities**** This is a 2-page document! ******Directions:** Graph each inequality on the number line.

1. $x < -2$



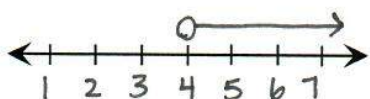
2. $a \geq 9$



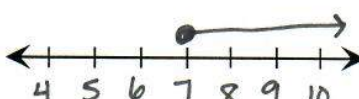
3. $v \leq -13$



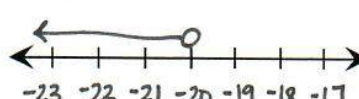
4. $c > 4$



5. $7 \leq k$ $k \geq 7$

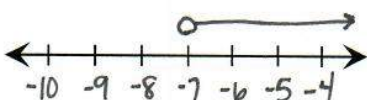


6. $-20 > r$ $r < -20$

**Directions:** Translate each inequality, then graph.

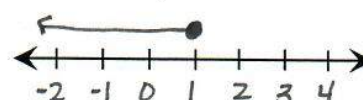
7. "A number is greater than -7."

$x > -7$



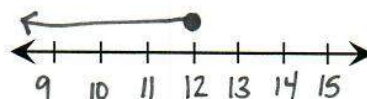
8. "A number is less than or equal to 1."

$x \leq 1$



9. "A number is at most 12."

$x \leq 12$



10. "A number is 3 at minimum."

$x \geq 3$



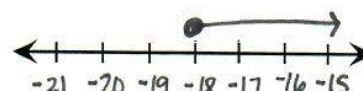
11. "A number is no more than 0."

$x \leq 0$



12. "A number is at least -18."

$x \geq -18$

**Directions:** State whether the number is a solution to the given inequality.

13. $x \geq -17$; -14

$-14 \geq -17$

Yes!

14. $m < 5$; 5

$5 < 5$

No!

15. $n > \frac{9}{16}$; $\frac{7}{12}$

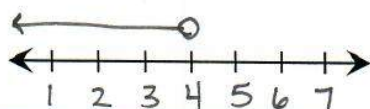
$\frac{7}{12} > \frac{9}{16}$

Yes!

Directions: Solve each inequality and graph the solution on the number line.

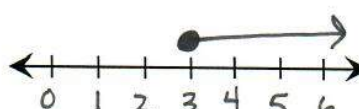
16. $a - 5 < -1$

$$\begin{array}{r} +5 \quad +5 \\ \hline a < 4 \end{array}$$

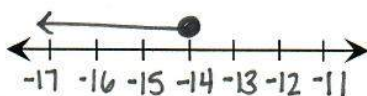


17. $\frac{9x}{9} \geq \frac{27}{9}$

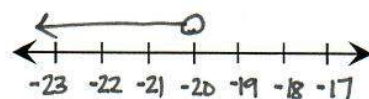
$x \geq 3$



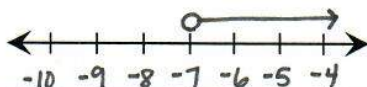
$$18. \begin{array}{r} 3 + w \leq -11 \\ -3 \quad -3 \\ \hline w \leq -14 \end{array}$$



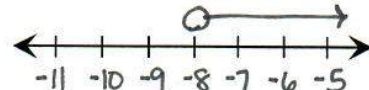
$$19. \begin{array}{r} \frac{p}{5} < -4 \cdot 5 \\ \hline p < -20 \end{array}$$



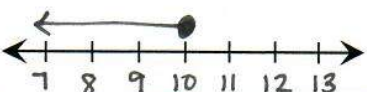
$$20. \begin{array}{r} -4m < 28 \\ -4 \quad -4 \\ \hline m > -7 \end{array}$$



$$21. \begin{array}{r} -15 + r > -23 \\ +15 \quad +15 \\ \hline r > -8 \end{array}$$



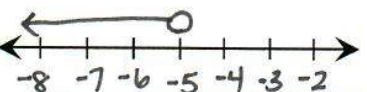
$$22. \begin{array}{r} \frac{r}{-2} \geq -5 \cdot -2 \\ \hline r \leq 10 \end{array}$$



$$23. \begin{array}{r} y + 9 \geq -2 \\ -9 \quad -9 \\ \hline y \geq -11 \end{array}$$



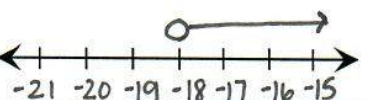
$$24. \begin{array}{r} 7 > k + 12 \\ -12 \quad -12 \\ \hline -5 > k \\ k < -5 \end{array}$$



$$25. \begin{array}{r} -5 \leq -16 + m \\ +16 \quad +16 \\ \hline 11 \leq m \\ m \geq 11 \end{array}$$



$$26. \begin{array}{r} -3 < \frac{v}{6} \cdot 6 \\ \hline -18 < v \\ v > -18 \end{array}$$



$$27. \begin{array}{r} \frac{-54}{-6} \leq \frac{-6c}{-6} \\ \hline 9 \geq c \\ c \leq 9 \end{array}$$

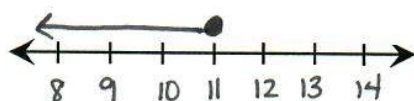


Name:	Date:
Topic:	Class:
Main Ideas/Questions	Notes/Examples

<h2>Two-Step Inequalities</h2>	<ul style="list-style-type: none"> To solve two-step inequalities, you follow the same steps as solving two-step equations. Don't forget! If you multiply or divide by a negative number, you must flip the inequality symbol!
<h2>Examples</h2>	<p>Directions: Solve each inequality and graph the solution on the number line.</p> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p>1. $3n + 3 \geq 30$</p> $\begin{array}{r} -3 \quad -3 \\ \hline 3n \geq 27 \\ \hline \frac{3}{3} \quad \frac{27}{3} \\ \hline n \geq 9 \end{array}$ </div> <div style="width: 50%;"> <p>2. $17 \leq -2m - 3$</p> $\begin{array}{r} +3 \quad +3 \\ \hline 20 \leq -2m \\ \hline \frac{-20}{-2} \leq \frac{-2m}{-2} \\ \hline -10 \geq m \\ \hline m \leq -10 \end{array}$ </div> <div style="width: 50%;"> <p>3. $-19 < -5 - 2y$</p> $\begin{array}{r} +5 \quad +5 \\ \hline -14 < -2y \\ \hline \frac{-14}{-2} < \frac{-2y}{-2} \\ \hline 7 > y \\ \hline y < 7 \end{array}$ </div> <div style="width: 50%;"> <p>4. $-8x + 7 < 15$</p> $\begin{array}{r} -7 \quad -7 \\ \hline -8x < 8 \\ \hline \frac{-8x}{-8} < \frac{8}{-8} \\ \hline x > -1 \end{array}$ </div> <div style="width: 50%;"> <p>5. $\frac{c}{-5} + 6 < 2$</p> $\begin{array}{r} -6 \quad -6 \\ \hline -5 \cdot \frac{c}{-5} < -4 \cdot -5 \\ \hline c > 20 \end{array}$ </div> <div style="width: 50%;"> <p>6. $\frac{a+1}{4} \leq 4 \cdot 4$</p> $\begin{array}{r} -1 \quad -1 \\ \hline a+1 \leq 16 \\ \hline a \leq 15 \end{array}$ </div> </div>

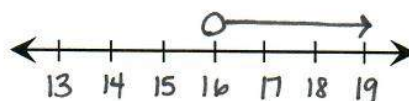
$$\begin{array}{r} 7. -y - 2 \geq -13 \\ +2 \quad +2 \\ \hline -y \geq -11 \\ \frac{-y}{-1} \geq \frac{-11}{-1} \end{array}$$

$$\boxed{y \leq 11}$$



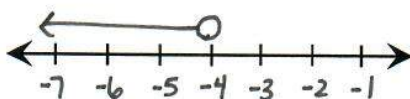
$$\begin{array}{r} 8. 6 < \frac{x}{2} - 2 \\ +2 \quad +2 \\ \hline 2 \cdot 8 < \frac{x}{2} \cdot 2 \end{array}$$

$$\boxed{x > 16}$$



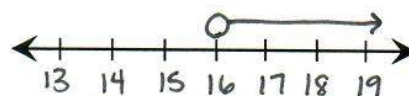
$$\begin{array}{r} 9. -3 > 2k + 5 \\ -5 \quad -5 \\ \hline -8 > 2k \\ \frac{-8}{2} > \frac{2k}{2} \end{array}$$

$$\boxed{k < -4}$$



$$\begin{array}{r} 10. -11 > -\frac{3}{4}c + 1 \\ -1 \quad -1 \\ \hline -\frac{4}{3} \cdot -12 > -\frac{3}{4}c \cdot -\frac{4}{3} \end{array}$$

$$\boxed{c > 16}$$



Solutions to Inequalities

Directions: Solve each inequality. Then, check each number that is a solution.

$$\begin{array}{r} 11. 4m - 2 \leq 30 \\ +2 \quad +2 \\ \hline 4m \leq 32 \\ \frac{4m}{4} \leq \frac{32}{4} \end{array}$$

$$\boxed{m \leq 8}$$

- ☒ 6
- ☒ 7
- ☒ 8
- ☐ 9
- ☐ 10

$$\begin{array}{r} 12. 4 - 4n \leq 16 \\ -4 \quad -4 \\ \hline -4n \leq 12 \\ \frac{-4n}{-4} \leq \frac{12}{-4} \end{array}$$

$$\boxed{n \geq -3}$$

- ☐ -6
- ☐ -5
- ☐ -4
- ☒ -3
- ☒ -2

$$\begin{array}{r} 13. 8 < -2 - 2a \\ +2 \quad +2 \\ \hline 10 < -2a \\ \frac{10}{-2} < \frac{-2a}{-2} \end{array}$$

$$\boxed{a < -5}$$

- ☒ -8
- ☒ -7
- ☒ -6
- ☐ -5
- ☐ -4

$$\begin{array}{r} 14. \frac{r}{2} + 4 \geq -1 \\ -4 \quad -4 \\ \hline 2 \cdot \frac{r}{2} \geq -5 \cdot 2 \\ \hline r \geq -10 \end{array}$$

$$\boxed{r \geq -10}$$

- ☐ -11
- ☒ -10
- ☒ -9
- ☒ -8
- ☒ -7

What did the Wall say to the Adjacent Wall?

Directions: Solve each inequality. Show all work on a separate sheet of paper. After completing each set, find matching answers. One will have a letter and the other a number. Write the letter in the matching numbered box at the bottom of the page.

SET 1					
R.	$3x + 7 \geq -41$	$x \geq -16$	9.	$6x - 5 > 19$	$x > 4$
T.	$\frac{x}{2} - 9 > -7$	$x > 4$	17.	$-4x + 11 \geq 39$	$x \leq -7$
E.	$-5x + 19 < -26$	$x > 9$	6.	$\frac{1}{2}x + 13 \geq 12$	$x \geq -2$
O.	$-17 - x \leq -15$	$x \geq -2$	11.	$-3x + 5 > -34$	$x < 13$
H.	$\frac{x+8}{7} < 3$	$x < 13$	2.	$2 - x < -7$	$x > 9$
E.	$10 - 2x \geq 24$	$x \leq -7$	15.	$\frac{x-4}{-2} \leq 10$	$x \geq -16$
SET 2					
T.	$-4 + 7a < 31$	$a < 5$	18.	$\frac{a+10}{7} \leq -2$	$a \leq -24$
Y.	$-9a + 7 \leq -2$	$a \geq 1$	10.	$-4a + 9 > -11$	$a < 5$
O.	$\frac{3}{4}a - 16 > -22$	$a > -8$	3.	$2a - 10 > -16$	$a > -3$
R.	$\frac{a}{-6} - 7 \geq -3$	$a \leq -24$	5.	$-10 + 6a \geq -4$	$a \geq 1$
E.	$-9 - 5a < 6$	$a > -3$	16.	$8 - \frac{3}{2}a \geq -7$	$a \leq 10$
N.	$\frac{a-4}{-3} \geq -2$	$a \leq 10$	14.	$\frac{a}{-2} - 19 < -15$	$a > -8$
SET 3					
A.	$8k - 17 \leq -1$	$k \leq 2$	4.	$5k + 4 > 34$	$k > 6$
U.	$\frac{k+8}{-3} < 2$	$k > -14$	12.	$25 - 2k > 27$	$k < -1$
C.	$-4 - \frac{2}{3}k \leq -10$	$k \geq 9$	7.	$16 + 3k > -26$	$k > -14$
E.	$-9 + 4k < -13$	$k < -1$	1.	$\frac{k-14}{-3} \geq 6$	$k \leq -4$
M.	$\frac{1}{2}k - 9 \leq -11$	$k \leq -4$	8.	$\frac{k}{-2} + 14 \geq 13$	$k \leq 2$
T.	$\frac{k}{-6} + 14 < 13$	$k > 6$	13.	$-11 + \frac{4}{3}k \geq 1$	$k \geq 9$

ANSWER:

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	
M	E	E	T	Y	O	U	A	T	T	H	E	C	O	R	N	E	R	!

Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

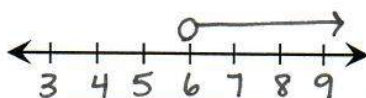
Homework 10: Two-Step Inequalities

**** This is a 2-page document! ******Directions:** Solve each inequality and graph the solution on the number line.

1. $2x + 9 > 21$

$$\begin{array}{r} -9 \quad -9 \\ \hline 2x > 12 \\ \hline \frac{2x}{2} > \frac{12}{2} \end{array}$$

$x > 6$



2. $-3r - 7 \geq -4$

$$\begin{array}{r} +7 \quad +7 \\ \hline -3r \geq 3 \\ \hline \frac{-3r}{-3} \geq \frac{3}{-3} \end{array}$$

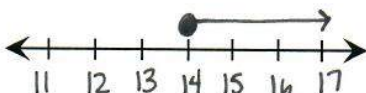
$r \leq -1$



3. $\frac{n}{7} - 13 \geq -11$

$$\begin{array}{r} +13 \quad +13 \\ \hline 7 \cdot \frac{n}{7} \geq 2 \cdot 7 \end{array}$$

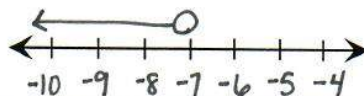
$n \geq 14$



4. $18 - a > 25$

$$\begin{array}{r} -18 \quad -18 \\ \hline -a > 7 \\ \hline \frac{-a}{-1} > \frac{7}{-1} \end{array}$$

$a < -7$



5. $11 - 4p \leq -9$

$$\begin{array}{r} -11 \quad -11 \\ \hline -4p \leq -20 \\ \hline \frac{-4p}{-4} \leq \frac{-20}{-4} \end{array}$$

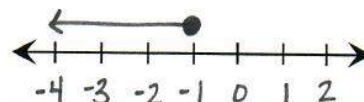
$p \geq 5$



6. $-1 + 8x \leq -9$

$$\begin{array}{r} +1 \quad +1 \\ \hline 8x \leq -8 \\ \hline \frac{8x}{8} \leq \frac{-8}{8} \end{array}$$

$x \leq -1$



7. $\frac{m}{-6} + 16 \geq 19$

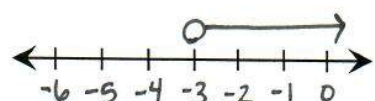
$$\begin{array}{r} -16 \quad -16 \\ \hline -\frac{m}{6} \geq 3 \cdot -6 \end{array}$$

$m \leq -18$



8. $\frac{k-7}{2} > -5 \cdot 2$

$$\begin{array}{r} +7 \quad +7 \\ \hline k > -3 \end{array}$$

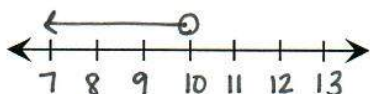


$$9. \frac{2}{5}v + 13 < 17$$

$$\underline{-13 \quad -13}$$

$$\frac{5}{2} \cdot \frac{2}{5} v < 4 \cdot \frac{5}{2}$$

$$\boxed{v < 10}$$

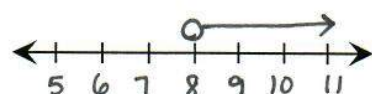


$$10. -\frac{1}{2}c + 26 < 22$$

$$\underline{-26 \quad -26}$$

$$-2 \cdot -\frac{1}{2}c < -4 \cdot -2$$

$$\boxed{c > 8}$$



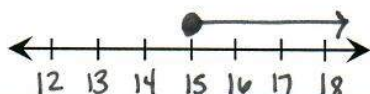
$$11. 38 \leq 3w - 7$$

$$\underline{+7 \quad +7}$$

$$\frac{45}{3} \leq \frac{3w}{3}$$

$$15 \leq w$$

$$\boxed{w \geq 15}$$



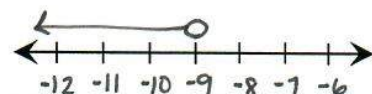
$$12. 1 < \frac{a+7}{-2} \cdot -2$$

$$\underline{-2 > a+7}$$

$$\underline{-7 \quad -7}$$

$$-9 > a$$

$$\boxed{a < -9}$$



Directions: Solve each inequality. Then, check each number that is a solution.

$$13. 2a - 3 \geq -11$$

$$\underline{+3 \quad +3}$$

$$\frac{2a}{2} \geq \frac{-8}{2}$$

$$\boxed{a \geq -4}$$

- ☐ -7
- ☐ -6
- ☐ -5
- ☒ -4
- ☒ -3

$$14. 5x + 13 < 48$$

$$\underline{-13 \quad -13}$$

$$\frac{5x}{5} < \frac{35}{5}$$

$$\boxed{x < 7}$$

- ☒ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10

$$15. 10 - 3n < 61$$

$$\underline{-10 \quad -10}$$

$$\frac{-3n}{-3} < \frac{51}{-3}$$

$$\boxed{n > -17}$$

- ☐ -18
- ☐ -17
- ☒ -16
- ☒ -15
- ☒ -14

$$16. -13 \geq \frac{1}{4}r - 16$$

$$\underline{+16 \quad +16}$$

$$4 \cdot 3 \geq \frac{1}{4}r \cdot 4$$

$$12 \geq r$$

$$\boxed{r \leq 12}$$

- ☒ 9
- ☒ 10
- ☒ 11
- ☒ 12
- ☐ 13

TRANSLATING & SOLVING Inequalities

Translate	Solve
<p>1 "Nine less than nine times a number is at least thirty-six."</p> <p>Inequality: $9x - 9 \geq 36$</p>	$\begin{array}{r} 9x - 9 \geq 36 \\ +9 \quad +9 \\ \hline 9x \geq 45 \\ \frac{9x}{9} \quad \frac{45}{9} \end{array} \quad \boxed{x \geq 5}$
<p>2 "The sum of 4 and a number, divided by 2 is less than -6."</p> <p>Inequality: $\frac{4+x}{2} < -6$</p>	$\begin{array}{r} 2 \cdot \frac{4+x}{2} < -6 \cdot 2 \\ \hline 4+x < -12 \\ -4 \quad -4 \end{array} \quad \boxed{x < -16}$
<p>3 "-5 plus triple a number is no more than sixteen."</p> <p>Inequality: $-5 + 3x \leq 16$</p>	$\begin{array}{r} -5 + 3x \leq 16 \\ +5 \quad +5 \\ \hline 3x \leq 21 \\ \frac{3x}{3} \quad \frac{21}{3} \end{array} \quad \boxed{x \leq 7}$
<p>4 "The difference of 8 and six times a number is a minimum of sixty-eight."</p> <p>Inequality: $8 - 6x \geq 68$</p>	$\begin{array}{r} 8 - 6x \geq 68 \\ -8 \quad -8 \\ \hline -6x \geq 60 \\ -6 \quad -6 \end{array} \quad \boxed{x \leq -10}$
<p>5 "Eight plus one fourth of a number is less than or equal to six."</p> <p>Inequality: $8 + \frac{1}{4}x \leq 6$</p>	$\begin{array}{r} 8 + \frac{1}{4}x \leq 6 \\ -8 \quad -8 \\ \hline 4 \cdot \frac{1}{4}x \leq -2 \cdot 4 \end{array} \quad \boxed{x \leq -8}$
<p>6 "The sum of -3 and four times a number is no more than -11."</p> <p>Inequality: $-3 + 4x \leq -11$</p>	$\begin{array}{r} -3 + 4x \leq -11 \\ +3 \quad +3 \\ \hline 4x \leq -8 \\ \frac{4x}{4} \quad \frac{-8}{4} \end{array} \quad \boxed{x \leq -2}$
<p>7 "Half of the sum of a number and five is a maximum of ten."</p> <p>Inequality: $\frac{1}{2}(x+5) \leq 10$; $\frac{x+5}{2} \leq 10$</p>	$\begin{array}{r} 2 \cdot \frac{x+5}{2} \leq 10 \cdot 2 \\ \hline x+5 \leq 20 \\ -5 \quad -5 \end{array} \quad \boxed{x \leq 15}$

TWO-STEP INEQUALITY WORD PROBLEMS

Directions: Define a variable, set up an inequality, then solve.

- 8** Peter spent half the money on his gift card on coffee. He loaded another \$10 onto the gift card. How much was on the gift card to begin with if he now has at least \$40 on the card?

$$\begin{array}{l} \text{let } x = \$ \text{ on card} \\ \frac{1}{2}x + 10 \geq 40 \\ \underline{-10 \quad -10} \\ 2 \cdot \frac{1}{2}x \geq 30 \cdot 2 \\ x \geq 60 \end{array}$$

- 9** Megan wants to spend no more than \$300 planning a party. She spent \$75 on food and wants to buy decorations that are \$10 each. How many decorations can she buy?

$$\begin{array}{l} \text{let } x = \# \text{ decorations} \\ 10x + 75 \leq 300 \\ \underline{-75 \quad -75} \\ 10x \leq 225 \\ \underline{10 \quad 10} \\ x \leq 22.5 \end{array}$$

Inequality

$$\frac{1}{2}x + 10 \geq 40$$

Solution

$$x \geq \$60$$

Inequality

$$10x + 75 \leq 300$$

Solution

$$x \leq 22 \text{ decorations}$$

- 10** A moving truck can carry no more than 1,480 pounds of cargo. Brian loaded 640 pounds into the truck already. He is loading boxes that weigh 70 pounds. How many boxes can he put into the truck?

$$\begin{array}{l} \text{let } x = \# \text{ boxes} \\ 640 + 70x \leq 1480 \\ \underline{-640 \quad -640} \\ 70x \leq 840 \\ \underline{70 \quad 70} \\ x \leq 12 \end{array}$$

- 11** The 7th grade class is putting on a fundraising dance. They pay \$400 to rent a hall for the dance. They plan to sell tickets for \$15 each. How many tickets will they need to sell if they want to raise at least \$1,495?

$$\begin{array}{l} \text{let } x = \# \text{ tickets} \\ 15x - 400 \geq 1495 \\ \underline{+400 \quad +400} \\ 15x \geq 1895 \\ \underline{15 \quad 15} \\ x \geq 126.\bar{3} \end{array}$$

Inequality

$$640 + 70x \leq 1480$$

Solution

$$x \leq 12 \text{ boxes}$$

Inequality

$$15x - 400 \geq 1495$$

Solution

$$x \geq 127 \text{ tickets}$$

- 12** Nancy has \$240 in the bank. She wants to buy as many \$15 video games as possible. How many video games could she buy if she wanted to keep at least \$120 in the bank?

$$\begin{array}{l} \text{let } x = \# \text{ games} \\ 240 - 15x \geq 120 \\ \underline{-240 \quad -240} \\ -15x \geq -120 \\ \underline{-15 \quad -15} \\ x \leq 8 \end{array}$$

- 13** A taxi charges a \$2.35 fee plus \$0.55 per mile. Melissa has no more than \$15 to spend on her taxi ride. How many miles can she go?

$$\begin{array}{l} \text{let } x = \text{miles} \\ .55x + 2.35 \leq 15 \\ \underline{-2.35 \quad -2.35} \\ .55x \leq 12.65 \\ \underline{.55 \quad .55} \\ x \leq 23 \end{array}$$

Inequality

$$240 - 15x \geq 120$$

Solution

$$x \leq 8 \text{ games}$$

Inequality

$$.55x + 2.35 \leq 15$$

Solution

$$x \leq 23 \text{ miles}$$

Name: _____

Unit 3: Equations & Inequalities

Date: _____ Per: _____

Homework 11: Inequality Word Problems

**** This is a 2-page document! ******Directions:** For each problem, define a variable and set up an inequality, then solve.

1. "The difference between a number and 7 is greater than -23."

$$\begin{array}{r} X - 7 > -23 \\ +7 \quad +7 \\ \hline X > -16 \end{array}$$

2. "Eight more than the quotient of a number and -5 is less than or equal to 6."

$$\begin{array}{r} \frac{X}{-5} + 8 \leq 6 \\ -8 \quad -8 \\ \hline -5 \cdot \frac{X}{-5} \leq -2 \cdot -5 \quad X \geq 10 \end{array}$$

Inequality

$X - 7 > -23$

Solution

$X > -16$

Inequality

$\frac{X}{-5} + 8 \leq 6$

Solution

$X \geq 10$

3. "Two-thirds of a number plus 17 is at least 29."

$$\begin{array}{r} \frac{2}{3}X + 17 \geq 29 \\ -17 \quad -17 \\ \hline \frac{2}{3} \cdot \frac{3}{2}X \geq 12 \cdot \frac{3}{2} \\ X \geq 18 \end{array}$$

4. "25 subtracted from the product of a number and 7 is less than -39."

$$\begin{array}{r} 7n - 25 < -39 \\ +25 \quad +25 \\ \hline 7n < -14 \\ \frac{7n}{7} < \frac{-14}{7} \\ n < -2 \end{array}$$

Inequality

$\frac{2}{3}X + 17 \geq 29$

Solution

$X \geq 18$

Inequality

$7n - 25 < -39$

Solution

$n < -2$

5. "Ten minus three times a number is no more than 61."

$$\begin{array}{r} 10 - 3X < 61 \\ -10 \quad -10 \\ \hline -3X < 51 \\ \frac{-3X}{-3} < \frac{51}{-3} \quad X > -17 \end{array}$$

6. "The sum of a number and 9, divided by 4, is greater than or equal to -2."

$$\begin{array}{r} 4 \cdot \frac{X+9}{4} \geq -2 \cdot 4 \\ X+9 \geq -8 \\ -9 \quad -9 \quad X \geq -17 \end{array}$$

Inequality

$10 - 3X < 61$

Solution

$X > -17$

Inequality

$\frac{X+9}{4} \geq -2$

Solution

$X \geq -17$

7. "-5 increased by one-half of a number is a maximum of 3."

$$\begin{array}{r} -5 + \frac{1}{2}X \leq 3 \\ +5 \quad +5 \\ \hline 2 \cdot \frac{1}{2}X \leq 8 \cdot 2 \\ X \leq 16 \end{array}$$

8. "14 less than twice a number is at most 50."

$$\begin{array}{r} 2X - 14 \leq 50 \\ +14 \quad +14 \\ \hline 2X \leq 64 \\ \frac{2X}{2} \leq \frac{64}{2} \quad X \leq 32 \end{array}$$

Inequality

$-5 + \frac{1}{2}X \leq 3$

Solution

$X \leq 16$

Inequality

$2X - 14 \leq 50$

Solution

$X \leq 32$

<p>9. Sally is going furniture shopping using her credit card. If her credit card has a limit of \$2,000 and she is currently holding a balance of \$763, how much can she afford to spend on furniture?</p> <p>let $X = \\$ to spend</p> $\begin{array}{r} 763 + X \leq 2000 \\ -763 \quad -763 \\ \hline X \leq 1237 \end{array}$		<p>10. Connor is taking a multiple-choice test in which each question is worth 4 points. How many questions must he get correct to score at least 90 points?</p> <p>let $X = \#$ questions</p> $\begin{array}{r} 4X \geq 90 \\ \frac{4X}{4} \geq \frac{90}{4} \\ X \geq 22.5 \end{array}$	
Inequality	Solution	Inequality	Solution
$763 + X \leq 2000$	$X \leq \$1237$	$4X \geq 90$	$X \geq 23 \text{ questions}$
<p>11. Mrs. Hillard is purchasing candy hearts to distribute to the 28 students in her math class on Valentine's Day. If she would like each student to get a minimum of 15 candy hearts, how many will she need to purchase?</p> <p>let $X = \#$ candies</p> $28 \cdot \frac{X}{28} \geq 15 \cdot 28$ $X \geq 420$		<p>12. Ralph is on a diet. He currently weighs 248 pounds. How many pounds would he need to lose if he wishes to weigh at most 195 pounds?</p> <p>let $X = \#$ lbs. to lose</p> $\begin{array}{r} 248 - X \leq 195 \\ -248 \quad -248 \\ \hline -X \leq -53 \\ \frac{-X}{-1} \geq \frac{-53}{-1} \\ X \geq 53 \end{array}$	
Inequality	Solution	Inequality	Solution
$\frac{X}{28} \geq 15$	$X \geq 420 \text{ candies}$	$248 - X \leq 195$	$X \geq 53 \text{ lbs.}$
<p>13. Blake needed at least 225 votes to become president of his seventh-grade class. If three-fourths of the seventh-grade students voted for him and he won, how many seventh-grade students could there be?</p> <p>let $X = \#$ 7th graders</p> $\frac{4}{3} \cdot \frac{3}{4} X \geq 225 \cdot \frac{4}{3}$ $X \geq 300$		<p>14. Vera is saving up to buy a \$426 laptop. She already has \$75 saved from her birthday. If she works part time at the grocery store making \$9 per hour, how many hours must she work to purchase the laptop?</p> <p>let $X = \#$ hours</p> $\begin{array}{r} 75 + 9X \geq 426 \\ -75 \quad -75 \\ \hline 9X \geq 351 \\ \frac{9X}{9} \geq \frac{351}{9} \\ X \geq 39 \end{array}$	
Inequality	Solution	Inequality	Solution
$\frac{3}{4} X \geq 225$	$X \geq 300 \text{ students}$	$75 + 9X \geq 426$	$X \geq 39 \text{ hours}$
<p>15. Maggie is stocking up on chicken noodle soup for the winter season. If each can is \$1.25 and she has a \$2 coupon, how many cans can she buy if she can spend no more than \$30?</p> <p>let $X = \#$ cans</p> $\begin{array}{r} 1.25X - 2 \leq 30 \\ +2 \quad +2 \\ \hline 1.25X \leq 32 \\ \frac{1.25X}{1.25} \leq \frac{32}{1.25} \\ X \leq 25.6 \end{array}$		<p>16. It costs the theater \$750 to put on each performance. If tickets are \$8 each, how many tickets must they sell for their next performance to profit at least \$1,200?</p> <p>let $X = \#$ tickets</p> $\begin{array}{r} 8X - 750 \geq 1200 \\ +750 \quad +750 \\ \hline 8X \geq 1950 \\ \frac{8X}{8} \geq \frac{1950}{8} \\ X \geq 243.75 \end{array}$	
Inequality	Solution	Inequality	Solution
$1.25X - 2 \leq 30$	$X \leq 25 \text{ cans}$	$8X - 750 \geq 1200$	$X \geq 244 \text{ tickets}$

Name: _____

Math 7

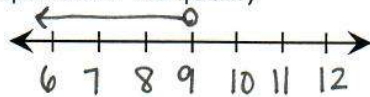
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Unit 3: Equations & Inequalities

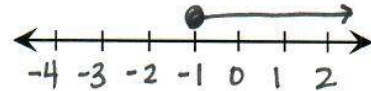
Quiz 3-3: Inequalities

Directions: Graph each inequality

1. $x < 9$

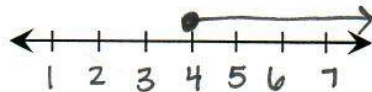


2. $w \geq -1$



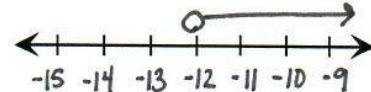
3. $4 \leq p$

$p \geq 4$



4. $-12 < n$

$n > -12$



Directions: Translate into an inequality using a variable.

5. "A number is greater than 15."

6. "A number is at most -7."

5. $x > 15$

6. $x \leq -7$

Directions: Solve and graph each inequality.

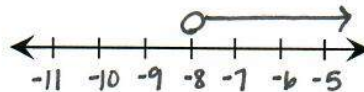
7. $x + 4 \leq 9$

$$\begin{array}{r} x + 4 \leq 9 \\ -4 \quad -4 \\ \hline x \leq 5 \end{array}$$



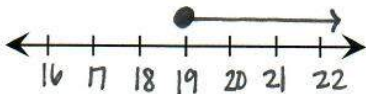
8. $-4 \cdot \frac{k}{-4} < 2 \cdot -4$

$k > -8$



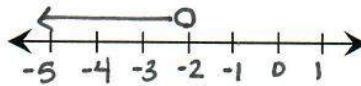
9. $p - 6 \geq 13$

$$\begin{array}{r} p - 6 \geq 13 \\ +6 \quad +6 \\ \hline p \geq 19 \end{array}$$



10. $\frac{-14}{7} > \frac{7v}{7}$

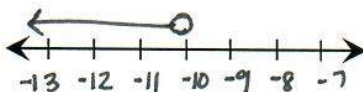
$-2 > v \quad v < -2$



11. $\frac{c}{5} + 13 < 11$

$$\begin{array}{r} \frac{c}{5} + 13 < 11 \\ -13 \quad -13 \\ \hline \frac{c}{5} < -2 \end{array}$$

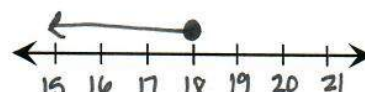
$c < -10$



12. $-2r + 19 \geq -17$

$$\begin{array}{r} -2r + 19 \geq -17 \\ -19 \quad -19 \\ \hline -2r \geq -36 \\ \hline \frac{-2r}{-2} \geq \frac{-36}{-2} \\ r \geq 18 \end{array}$$

$r \geq 18$

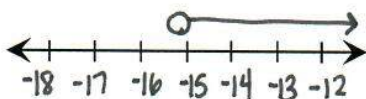


$$13. \frac{2}{5}a + 10 > 4$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \end{array}$$

$$\frac{5}{2} \cdot \frac{2}{5}a > -6 \cdot \frac{5}{2}$$

$$a > -15$$

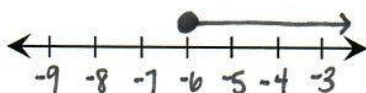


$$15. 29 \geq -13 - 7m$$

$$\begin{array}{r} +13 \quad +13 \\ \hline \end{array}$$

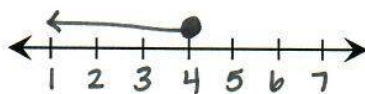
$$\frac{42 \geq -7m}{-1 \quad -1}$$

$$-6 \leq m \quad m \geq -6$$



$$14. \frac{-3 \cdot w - 10}{-3} \geq 2 \cdot -3$$

$$\begin{array}{r} w - 10 \leq -6 \\ +10 \quad +10 \\ \hline w \leq 4 \end{array}$$

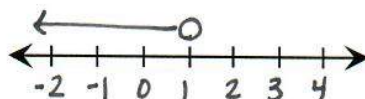


$$16. -17 + 9y < -8$$

$$\begin{array}{r} +17 \quad +17 \\ \hline \end{array}$$

$$\frac{9y < 9}{9 \quad 9}$$

$$y < 1$$



$$13. a > -15$$

$$14. w \leq 4$$

$$15. m \geq -6$$

$$16. y < 1$$

Directions: For each problem (a) translate into an inequality using a variable, then (b) solve.

17. "5 subtracted from a number is a maximum of 14."

$$\begin{array}{r} x - 5 \leq 14 \\ +5 \quad +5 \\ \hline x \leq 19 \end{array}$$

$$17. (a) x - 5 \leq 14$$

$$(b) x \leq 19$$

18. "The product of a number and -3 increased by 8 is no less than 35."

$$\begin{array}{r} -3x + 8 \geq 35 \\ -8 \quad -8 \\ \hline \end{array}$$

$$\frac{-3x \geq 27}{-3 \quad -3}$$

$$x \leq -9$$

$$18. (a) -3x + 8 \geq 35$$

$$(b) x \leq -9$$

19. Marvin can fit no more than 18.5 gallons in his gas tank. If he stops at the gas station with 3.7 gallons already in his tank, how much gas can he fit in his tank? let $x = \# \text{ gallons}$

$$\begin{array}{r} 3.7 + x \leq 18.5 \\ -3.7 \quad -3.7 \\ \hline \end{array}$$

$$x \leq 14.8$$

$$19. (a) 3.7 + x \leq 18.5$$

$$(b) x \leq 14.8 \text{ gal}$$

$$20. (a) 120 + 8x \geq 400$$

$$(b) x \geq 35 \text{ min}$$

20. Ana wants to burn at least 400 calories at the gym. She burned 120 calories on the bike, then moved to the treadmill. If she burns 8 calories per minute on the treadmill, how many more minutes does she need to exercise? let $x = \# \text{ minutes}$

$$\begin{array}{r} 120 + 8x \geq 400 \\ -120 \quad -120 \\ \hline \end{array}$$

$$\frac{8x \geq 280}{8 \quad 8}$$

$$x \geq 35$$

Unit 3 Test Study Guide

(Equations & Inequalities)

Name: _____

Date: _____ Per: _____

Topic 1: One-Step Equations

Directions: Solve each equation. Check all solutions.

1. $x + 6 = 22$

$$\begin{array}{r} -6 \quad -6 \\ \hline x = 16 \end{array}$$

$$16 + 6 = 22$$

$$22 = 22 \checkmark$$

2. $-13 = y - 4$

$$\begin{array}{r} +4 \quad +4 \\ \hline -9 = y \end{array}$$

$$-13 = -9 - 4$$

$$-13 = -13 \checkmark$$

3. $\frac{a}{-4} = -16 \cdot -4$

$$\boxed{a = 64}$$

$$\frac{64}{-4} = -16$$

$$-16 = -16 \checkmark$$

4. $k + 10.6 = 9.7$

$$\begin{array}{r} -10.6 \quad -10.6 \\ \hline k = -0.9 \end{array}$$

$$-0.9 + 10.6 = 9.7$$

$$9.7 = 9.7 \checkmark$$

5. $5.1v = -22.44$

$$\begin{array}{r} 5.1 \quad 5.1 \\ \hline v = -4.4 \end{array}$$

$$5.1(-4.4) = -22.44$$

$$-22.44 = -22.44 \checkmark$$

6. $j - 7.5 = 16.937$

$$\begin{array}{r} +7.5 \quad +7.5 \\ \hline j = 24.437 \end{array}$$

$$24.437 - 7.5 = 16.937$$

$$16.937 = 16.937 \checkmark$$

7. $3\frac{5}{6} = m + 1\frac{1}{3}$

$$3\frac{5}{6} = 2\frac{1}{2} + 1\frac{1}{3}$$

$$3\frac{5}{6} = 3\frac{5}{6} \checkmark$$

$$\begin{array}{r} \frac{23}{6} = m + \frac{4}{3} \\ -\frac{4}{3} \quad -\frac{4}{3} \\ \hline \frac{5}{2} = m \end{array}$$

8. $17 = -\frac{17}{10}n \cdot -\frac{10}{17}$

$$\boxed{-10 = n}$$

$$17 = -\frac{17}{10}(-10)$$

$$17 = 17 \checkmark$$

9. $c - \frac{5}{8} = \frac{1}{2}$

$$1\frac{1}{8} - \frac{5}{8} = \frac{1}{2}$$

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

$$\begin{array}{r} +\frac{5}{8} \quad +\frac{5}{8} \\ \hline c = \frac{9}{8} \end{array}$$

Directions: Translate and solve each equation. Show your work and check your solution.

10. "Three more than a number is nineteen."

$$\begin{array}{r} x + 3 = 19 \\ -3 \quad -3 \\ \hline x = 16 \end{array}$$

$$16 + 3 = 19$$

$$19 = 19 \checkmark$$

11. "One half of a number is eight."

$$2 \cdot \frac{1}{2}x = 8 \cdot 2$$

$$\boxed{x = 16}$$

$$\frac{1}{2}(16) = 8$$

$$8 = 8 \checkmark$$

12. "Four fifths more than a number is one third."

$$\begin{array}{r} x + \frac{4}{5} = \frac{1}{3} \\ -\frac{4}{5} \quad -\frac{4}{5} \\ \hline x = -\frac{7}{15} \end{array}$$

$$-\frac{7}{15} + \frac{4}{5} = \frac{1}{3}$$

$$\frac{1}{3} = \frac{1}{3} \checkmark$$

13. "The product of a number and -4 is 80."

$$\begin{array}{r} -4x = 80 \\ -4 \quad -4 \\ \hline x = -20 \end{array}$$

$$-4(-20) = 80$$

$$80 = 80 \checkmark$$

14. "Two-thirds of a number is negative 20."

$$\frac{2}{3} \cdot \frac{3}{2}x = -20 \cdot \frac{3}{2}$$

$$\boxed{x = -30}$$

$$\frac{2}{3}(-30) = -20$$

$$-20 = -20 \checkmark$$

15. "9 less than a number is zero."

$$\begin{array}{r} x - 9 = 0 \\ +9 \quad +9 \\ \hline x = 9 \end{array}$$

$$9 - 9 = 0$$

$$0 = 0 \checkmark$$

Topic 2: One-Step Equations Word Problems

Directions: For each problem, define a variable and set up an equation, then solve.			
16. Luca has thirteen more crayons than Sam. If Luca has 42 crayons, how many does Sam have? let $x = \#$ crayons		$\begin{array}{r} x + 13 = 42 \\ -13 \quad -13 \\ \hline x = 29 \end{array}$	
17. Rachel harvested half as many watermelons as strawberries. If there were 28 watermelons, how many strawberries did she get? let $x = \#$ strawberries		$\begin{array}{l} 2 \cdot \frac{1}{2}x = 28 \cdot 2 \\ x = 56 \end{array}$	
Equation	Solution	Equation	Solution
$x + 13 = 42$	29 crayons	$\frac{1}{2}x = 28$	56 strawberries
18. Marcus completed five fewer passes this season than Sean. If Marcus completed 122 passes, how many did Sean complete? let $x = \#$ passes		19. The number of DVDs Danielle owns is four times the number that Ben owns. If Danielle owns 92 DVDs, how many does Ben own? let $x = \#$ DVDs	
$\begin{array}{r} x - 5 = 122 \\ +5 \quad +5 \\ \hline x = 127 \end{array}$		$\begin{array}{r} 4x = 92 \\ \frac{4x}{4} = \frac{92}{4} \\ x = 23 \end{array}$	
Equation	Solution	Equation	Solution
$x - 5 = 122$	127 passes	$4x = 92$	23 DVDs

Topic 3: Two-Step Equations

Directions: Solve each equation. Check all solutions.			
20. $4x + 8 = 24$ $\begin{array}{r} 4x + 8 = 24 \\ -8 \quad -8 \\ \hline 4x = 16 \\ \frac{4x}{4} = \frac{16}{4} \\ x = 4 \end{array}$		21. $76 = 10m - 4$ $\begin{array}{r} 76 = 10m - 4 \\ +4 \quad +4 \\ \hline 80 = 10m \\ \frac{80}{10} = \frac{10m}{10} \\ 8 = m \end{array}$	
22. $8 = 7 + \frac{v}{6}$ $\begin{array}{r} 8 = 7 + \frac{v}{6} \\ -7 \quad -7 \\ \hline 1 = \frac{v}{6} \\ 6 \cdot 1 = \frac{v}{6} \cdot 6 \\ 6 = v \end{array}$		23. $\frac{-4 + y}{6} = -3 \cdot 6$ $\begin{array}{r} \frac{-4 + y}{6} = -3 \cdot 6 \\ -4 + y = -18 \\ +4 \quad +4 \\ \hline y = -14 \end{array}$	

24. $-1 + \frac{5}{4}x = -16$ $+1 \quad +1$ $\frac{4}{5} \cdot \frac{5}{4} X = -15 \cdot \frac{4}{5}$ $X = -12$	$-1 + \frac{5}{4}(-12) = -16$ $-1 - 15 = -16$ $-16 = -16 \checkmark$	25. $\frac{n-7}{9} = -3 \cdot 9$ $n-7 = -27$ $+7 \quad +7$ $n = -20$	$\frac{-20-7}{9} = -3$ $\frac{-27}{9} = -3$ $-3 = -3 \checkmark$
--------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------	-------------------------------------------------------------------------------	------------------------------------------------------------------------

Directions: Translate and solve each equation. Show your work and check your solution.

26. "Six more than one third of a number is three." $\frac{1}{3}X + 6 = 3$ $-6 \quad -6$ $3 \cdot \frac{1}{3}X = -3 \cdot 3$ $X = -9$	$\frac{1}{3}(-9) + 6 = 3$ $-3 + 6 = 3$ $3 = 3 \checkmark$	27. "The sum of three and a number, divided by three, is five." $3 \cdot \frac{3+X}{3} = 5 \cdot 3$ $3+X = 15$ $-3 \quad -3$ $X = 12$	$\frac{3+12}{3} = 5$ $\frac{15}{3} = 5$ $5 = 5 \checkmark$
28. "Seven less than the quotient of a number and six is negative ten." $\frac{X}{6} - 7 = -10$ $+7 \quad +7$ $6 \cdot \frac{X}{6} = -3 \cdot 6$ $X = -18$	$\frac{-18}{6} - 7 = -10$ $+7 \quad +7$ $\frac{-18}{6} = -3$ $-3 = -3 \checkmark$	29. "Twelve plus the product of twelve and a number is seventy-two." $12X + 12 = 72$ $-12 \quad -12$ $12X = 60$ $\frac{12}{12} \quad \frac{60}{12}$ $X = 5$	$12(5) + 12 = 72$ $60 + 12 = 72$ $72 = 72 \checkmark$

Topic 4: Two-Step Equations Word Problems

Directions: For each problem, define a variable and set up an equation, then solve.

30. Caroline bought movie tickets for three children and a bucket of popcorn for \$9.50. If she spent a total of \$35.75, how much was each movie ticket? let $X =$ ticket cost $3X + 9.50 = 35.75$ $-9.50 \quad -9.50$ $3X = 26.25$ $\frac{3X}{3} = \frac{26.25}{3}$ $X = 8.75$	31. This year the Cobra's football team has two more than triple the number of players as last year. If there are 152 players this year, how many were there last year? let $X =$ # players $3X + 2 = 152$ $-2 \quad -2$ $3X = 150$ $\frac{3X}{3} = \frac{150}{3}$ $X = 50$
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Equation	Solution	Equation	Solution
$3X + 9.50 = 35.75$	\$8.75	$3X + 2 = 152$	50 players

<p>32. Half the gas in the tank was used when Michelle drove to visit her sister. She put 6 more gallons of gas in the tank when she got there. After putting in gas, she had 16 gallons in the tank. How much gas did she have before she drove to her sister's house?</p> <p>let $x = \#$ gallons</p> $\begin{array}{r} \frac{1}{2}x + 6 = 16 \\ -6 \quad -6 \\ \hline 2 \cdot \frac{1}{2}x = 10 \cdot 2 \\ x = 20 \end{array}$	<p>33. A preschool field trip required 7 buses. Thirteen children rode in cars with their parents and the rest rode on a bus. If there were 258 children on the trip altogether, how many were on each bus?</p> <p>let $x = \#$ per bus</p> $\begin{array}{r} 7x + 13 = 258 \\ -13 \quad -13 \\ \hline 7x = 245 \\ \frac{7x}{7} = \frac{245}{7} \\ x = 35 \end{array}$		
<p>Equation</p> $\frac{1}{2}x + 6 = 16$	<p>Solution</p> <p>20 gallons</p>	<p>Equation</p> $7x + 13 = 258$	<p>Solution</p> <p>35 children</p>

Topic 5: Multi-Step Equations

Directions: Solve each equation. Check all solutions.

<p>34. $1 - 7x - 7 = 15$</p> $\begin{array}{r} -7x - 6 = 15 \\ +6 \quad +6 \\ \hline -7x = 21 \\ \frac{-7x}{-7} = \frac{21}{-7} \\ x = -3 \end{array}$	<p>35. $8 = 4y - 8 + 4$</p> $\begin{array}{r} 8 = 4y - 4 \\ +4 \quad +4 \\ \hline 12 = 4y \\ \frac{12}{4} = \frac{4y}{4} \\ 3 = y \end{array}$
<p>36. $-2(1 + 6n) = 94$</p> $\begin{array}{r} -2 - 12n = 94 \\ +2 \quad +2 \\ \hline -12n = 96 \\ \frac{-12n}{-12} = \frac{96}{-12} \\ n = -8 \end{array}$	<p>37. $132 = -6 + 3(1 - 5p)$</p> $\begin{array}{r} 132 = -6 + 3 - 15p \\ 132 = -3 - 15p \\ +3 \quad +3 \\ \hline 135 = -15p \\ \frac{135}{-15} = \frac{-15p}{-15} \\ -9 = p \end{array}$
<p>38. $-4(4a - 6) = -40 - 8a$</p> $\begin{array}{r} -16a + 24 = -40 - 8a \\ +16a \quad +16a \\ \hline 24 = -40 + 8a \\ +40 \quad +40 \\ \hline 64 = 8a \\ \frac{64}{8} = \frac{8a}{8} \\ 8 = a \end{array}$	<p>39. $6(-3m + 6) - m = -12 - 7m$</p> $\begin{array}{r} -18m + 36 - m = -12 - 7m \\ -19m + 36 = -12 - 7m \\ +19m \quad +19m \\ \hline 36 = -12 + 12m \\ +12 \quad +12 \\ \hline 48 = 12m \\ \frac{48}{12} = \frac{12m}{12} \\ m = 4 \end{array}$

Topic 6: Writing and Graphing Inequalities

Directions: Translate each inequality. Graph your solution on the number line.

40. "A number is at least four."

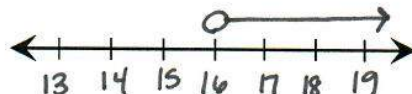
$$x \geq 4$$



41. "Sixteen is less than a number."

$$16 < x$$

$$x > 16$$



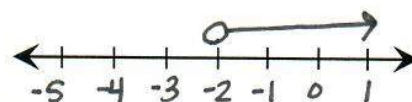
42. "A number is no more than nine."

$$x \leq 9$$



43. "A number is more than negative two."

$$x > -2$$

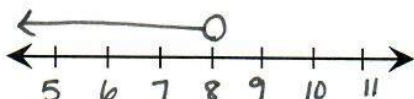


Topic 7: Solving and Graphing inequalities

Directions: Solve each inequality. Graph your solution on the number line.

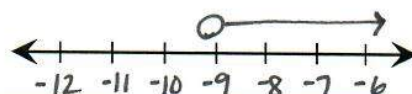
44. $k - 1 < 7$

$$\begin{array}{r} +1 \quad +1 \\ \hline k < 8 \end{array}$$



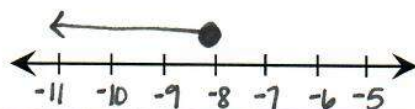
45. $-3 < p + 6$

$$\begin{array}{r} -6 \quad -6 \\ \hline -9 < p \\ p > -9 \end{array}$$



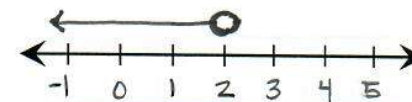
46. $\frac{8n}{8} \leq \frac{-64}{8}$

$$n \leq -8$$



47. $5 - 9r > -13$

$$\begin{array}{r} -5 \quad -5 \\ \hline -9r > -18 \\ \frac{-9r}{-9} > \frac{-18}{-9} \\ r < 2 \end{array}$$



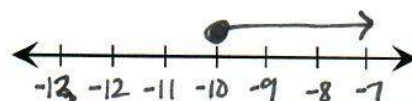
48. $\frac{x}{5} - 2 \geq 1$

$$\begin{array}{r} +2 \quad +2 \\ \hline 5 \cdot \frac{x}{5} \geq 3 \cdot 5 \\ x \geq 15 \end{array}$$



49. $-9 \leq \frac{y}{2} - 4$

$$\begin{array}{r} +4 \quad +4 \\ \hline 2 \cdot -5 \leq \frac{y}{2} \cdot 2 \\ -10 \leq y \\ y \geq -10 \end{array}$$



Directions: Solve each inequality. Then, check each number that is a solution.	
50. $4v + 3 \leq -21$ $\begin{array}{r} -3 \quad -3 \\ \hline 4x \leq \frac{-24}{4} \\ x \leq -6 \end{array}$ <div style="display: flex; flex-direction: column; align-items: flex-end;"> <input checked="" type="checkbox"/> -7 <input checked="" type="checkbox"/> -6 <input type="checkbox"/> -5 <input type="checkbox"/> -4 <input type="checkbox"/> -3 </div>	51. $-5x - 4 > -44$ $\begin{array}{r} +4 \quad +4 \\ \hline -5x > \frac{-40}{-5} \\ x < 8 \end{array}$ <div style="display: flex; flex-direction: column; align-items: flex-end;"> <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 </div>

Directions: Translate each inequality. Graph your solution on the number line.	
52. "Three more than twice a number is no more than eleven." $\begin{array}{r} 2x + 3 \leq 11 \\ -3 \quad -3 \\ \hline 2x \leq \frac{8}{2} \end{array}$ <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">$x \leq 4$</div> </div>	53. "The sum of two and a number, divided by three is greater than negative ten." $\begin{array}{r} 3 \cdot \frac{2+x}{3} > -10 \cdot 3 \\ \hline 2+x > -30 \\ -2 \quad -2 \\ \hline x > -32 \end{array}$

Topic 8: Inequality Word Problems

Directions: Define a variable and set up an inequality, then solve.			
54. A shipping container can hold a maximum of 3,000 pounds of cargo. How many 150- pound boxes can go inside the container? let $x = \# \text{ boxes}$ $\frac{150x}{150} \leq \frac{3000}{150}$ $x \leq 20$		55. It costs \$40 to register for Karate, then \$15 per lesson. If Rachel is taking lessons and wants to spend no more than \$250, how many lessons can she take? let $x = \# \text{ lessons}$ $\begin{array}{r} 40 + 15x \leq 250 \\ -40 \quad -40 \\ \hline 15x \leq \frac{210}{15} \\ x \leq 14 \end{array}$	
Inequality	Solution	Inequality	Solution
$150x \leq 3000$	$x \leq 20 \text{ boxes}$	$40 + 15x \leq 250$	$x \leq 14 \text{ lessons}$
56. Greg is saving up for a new cell phone that will cost him \$550. He already has \$300 saved. If would like to buy the phone in four weeks, how much must he save each week if he plans to have at least \$550? let $x = \$ \text{ per week}$ $\begin{array}{r} 300 + 4x \geq 550 \\ -300 \quad -300 \\ \hline 4x \geq \frac{250}{4} \\ x \geq 62.5 \end{array}$		57. Liz needs to keep no less than \$500 in her checking account to avoid fees. She had \$524.75 before writing a check for \$65.99. How much does she need to deposit into her account to avoid a fee? let $x = \$ \text{ to deposit}$ $\begin{array}{r} 458.76 + x \geq 500 \\ -458.76 \quad -458.76 \\ \hline x \geq 41.24 \end{array}$	
Inequality	Solution	Inequality	Solution
$300 + 4x \geq 550$	$x \geq \$62.50$	$458.76 + x \geq 500$	$x \geq \$41.24$

Name: _____

Date: _____ Per: _____

Unit 3 Test

Equations & Inequalities

For questions 1-8, solve the equation. Show all work and check each solution.

$$1. \begin{array}{r} x + 9 = -7 \\ -9 \quad -9 \\ \hline x = -16 \end{array}$$

$$\begin{array}{r} -16 + 9 = -7 \\ -7 = -7 \checkmark \end{array}$$

$$x = -16$$

$$2. \begin{array}{r} 8p = -40 \\ \frac{8}{8} \quad \frac{8}{8} \\ \hline p = -5 \end{array}$$

$$\begin{array}{r} 8(-5) = -40 \\ -40 = -40 \checkmark \end{array}$$

$$p = -5$$

$$3. \begin{array}{r} -8 = -19 + c \\ +19 \quad +19 \\ \hline 11 = c \end{array}$$

$$\begin{array}{r} -8 = -19 + 11 \\ -8 = -8 \checkmark \end{array}$$

$$c = 11$$

$$4. \begin{array}{r} -2 \cdot \frac{n}{-2} = -17 \cdot -2 \\ \hline n = 34 \end{array}$$

$$\begin{array}{r} \frac{34}{-2} = -17 \\ -17 = -17 \checkmark \end{array}$$

$$n = 34$$

$$5. \begin{array}{r} 6.5 + r = 1.48 \\ -6.5 \quad -6.5 \\ \hline r = -5.02 \end{array}$$

$$\begin{array}{r} 6.5 - 5.02 = 1.48 \\ 1.48 = 1.48 \checkmark \end{array}$$

$$r = -5.02$$

$$6. \begin{array}{r} 0.8 \cdot -4.5 = \frac{y}{0.8} \cdot 0.8 \\ \hline -3.6 = y \end{array}$$

$$\begin{array}{r} -4.5 = \frac{-3.6}{0.8} \\ -4.5 = -4.5 \checkmark \end{array}$$

$$y = -3.6$$

$$7. \begin{array}{r} w - 2\frac{2}{9} = 1\frac{1}{6} \\ w - \frac{20}{9} = \frac{7}{6} \\ +\frac{20}{9} \quad +\frac{20}{9} \\ \hline w = \frac{61}{18} \end{array}$$

$$\begin{array}{r} 3\frac{1}{18} - 2\frac{2}{9} = 1\frac{1}{6} \\ 1\frac{1}{6} = 1\frac{1}{6} \checkmark \end{array}$$

$$w = 3\frac{7}{18}$$

$$8. \begin{array}{r} -35 = -\frac{7}{8}a \cdot -\frac{8}{7} \\ \hline 40 = a \end{array}$$

$$\begin{array}{r} -35 = -\frac{7}{8} \cdot 40 \\ -35 = -35 \checkmark \end{array}$$

$$a = 40$$

For questions 9-10, translate the equation using a variable, then solve. Check each solution.

9. "The quotient of a number and -4 is -9."

$$\begin{array}{r} -4 \cdot \frac{x}{-4} = -9 \cdot -4 \\ \hline x = 36 \end{array}$$

$$\begin{array}{r} \frac{36}{-4} = -9 \\ -9 = -9 \checkmark \end{array}$$

Equation

Solution

$$\frac{x}{-4} = -9$$

$$x = 36$$

10. "Seven subtracted from a number is -18."

$$\begin{array}{r} x - 7 = -18 \\ +7 \quad +7 \\ \hline x = -11 \end{array}$$

$$\begin{array}{r} -11 - 7 = -18 \\ -18 = -18 \checkmark \end{array}$$

Equation

Solution

$$x - 7 = -18$$

$$x = -11$$

For questions 11-12, write an equation to model the problem using a variable, then solve.

11. Six people went out to dinner, split the check, and each paid \$18. How much was the check?

$$6 \cdot \frac{x}{6} = 18 \cdot 6$$

$$x = 108$$

$$\frac{108}{6} = 18$$

$$18 = 18 \checkmark$$

Equation

$$\frac{x}{6} = 18$$

Solution

$$x = 108$$

12. Water boils at 212 degrees Fahrenheit. If a pot of water is 145 degrees, find the change in temperature needed for the water to boil.

$$\begin{array}{r} 145 + x = 212 \\ -145 \quad -145 \\ \hline x = 67 \end{array}$$

$$145 + 67 = 212$$

$$212 = 212 \checkmark$$

Equation

$$145 + x = 212$$

Solution

$$x = 67$$

For questions 13-18, solve the equation. Show all work and check each solution.

$$13. \begin{array}{r} 7m - 13 = 43 \\ +13 \quad +13 \\ \hline 7m = 56 \\ \frac{7m}{7} = \frac{56}{7} \\ m = 8 \end{array}$$

$$7(8) - 13 = 43$$

$$56 - 13 = 43$$

$$43 = 43 \checkmark$$

$$m = 8$$

$$14. \begin{array}{r} 2 = 9 + \frac{s}{2} \\ -9 \quad -9 \\ \hline 2 - 9 = \frac{s}{2} \cdot 2 \\ -14 = s \end{array}$$

$$2 = 9 + \frac{-14}{2}$$

$$2 = 9 - 7$$

$$2 = 2 \checkmark$$

$$s = -14$$

$$15. \begin{array}{r} -15 - 4x = -11 \\ +15 \quad +15 \\ \hline -4x = 4 \\ \frac{-4x}{-4} = \frac{4}{-4} \\ x = -1 \end{array}$$

$$-15 - 4(-1) = -11$$

$$-15 + 4 = -11$$

$$-11 = -11 \checkmark$$

$$x = -1$$

$$16. \begin{array}{r} -\frac{3}{16} \cdot \frac{v+8}{-3} = 6 \cdot -3 \\ \hline v+8 = -18 \\ -8 \quad -8 \\ \hline v = -26 \end{array}$$

$$\frac{-26+8}{-3} = 6$$

$$\frac{-18}{-3} = 6$$

$$6 = 6 \checkmark$$

$$v = -26$$

$$17. \begin{array}{r} -22 = -5a - 7 \\ +7 \quad +7 \\ \hline -15 = -5a \\ \frac{-15}{-5} = \frac{-5a}{-5} \\ 3 = a \end{array}$$

$$-22 = -5(3) - 7$$

$$-22 = -15 - 7$$

$$-22 = -22 \checkmark$$

$$a = 3$$

$$18. \begin{array}{r} \frac{3}{4}c + 7 = -5 \\ -7 \quad -7 \\ \hline \frac{3}{4}c = -12 \\ \frac{4}{3} \cdot \frac{3}{4}c = -12 \cdot \frac{4}{3} \\ c = -16 \end{array}$$

$$\frac{3}{4}(-16) + 7 = -5$$

$$-12 + 7 = -5$$

$$-5 = -5 \checkmark$$

$$c = -16$$

For questions 19-20, translate the equation using a variable, then solve. Check each solution.

19. "The sum of a number and 5, divided by -8, is 2."

$$-8 \cdot \frac{X+5}{-8} = 2 \cdot -8$$

$$\begin{array}{r} X+5 = -16 \\ -5 \quad -5 \end{array} \quad X = -21$$

Equation

Solution

$$\frac{X+5}{-8} = 2$$

$$X = -21$$

20. "Nineteen less than one-half of a number is -13."

$$\frac{1}{2}X - 19 = -13$$

$$\begin{array}{r} +19 \quad +19 \end{array}$$

$$2 \cdot \frac{1}{2}X = 6 \cdot 2$$

$$X = 12$$

Equation

Solution

$$\frac{1}{2}X - 19 = -13$$

$$X = 12$$

For questions 21-22, write an equation to model the problem using a variable, then solve.

21. Mitch and Tom are playing a video game. Mitch has eight less than triple the points that Tom has. If Mitch has 79 points, how many points does Tom have?

let $X = \#$ points

$$\begin{array}{r} 3X - 8 = 79 \\ +8 \quad +8 \end{array}$$

$$\frac{3X}{3} = \frac{87}{3} \quad X = 29$$

Equation

Solution

$$3X - 8 = 79$$

$$29 \text{ points}$$

22. Karen is reading The Great Gatsby in English class. So far, she has read 30 pages. If she reads 18 pages a day and there are 192 pages in the book, how many days will it take her to finish the book?

let $X = \#$ days

$$\begin{array}{r} 30 + 18X = 192 \\ -30 \quad -30 \end{array}$$

$$\frac{18X}{18} = \frac{162}{18} \quad X = 9$$

Equation

Solution

$$30 + 18X = 192$$

$$9 \text{ days}$$

For questions 23-28, solve the equation. Show all work and check each solution.

23. $-18 + x - 4x + 5 = -64$

$$\begin{array}{r} -3X - 13 = -64 \\ +13 \quad +13 \end{array}$$

$$\begin{array}{r} -3X = -51 \\ -3 \quad -3 \end{array}$$

$$X = 17$$

$$x = 17$$

24. $3(4g + 15) - 7 = -10$

$$12g + 45 - 7 = -10$$

$$\begin{array}{r} 12g + 38 = -10 \\ -38 \quad -38 \end{array}$$

$$\frac{12g}{12} = \frac{-48}{12}$$

$$g = -4$$

$$g = -4$$

25. $-4k - 17 = k + 23$

$$\begin{array}{r} +4k \quad +4k \\ -17 = 5k + 23 \\ -23 \quad -23 \end{array}$$

$$\begin{array}{r} -40 = 5k \\ 5 \quad 5 \end{array}$$

$$-8 = k$$

$$k = -8$$

26. $6y + 11 = 8y - 15$

$$\begin{array}{r} -8y \quad -8y \\ -2y + 11 = -15 \\ -11 \quad -11 \end{array}$$

$$\begin{array}{r} -2y = -26 \\ -2 \quad -2 \end{array}$$

$$y = 13$$

$$y = 13$$

27. $3(5m - 7) = 2(3m - 33)$

$$\begin{array}{r} 15m - 21 = 6m - 66 \\ -6m \quad -6m \\ \hline \end{array}$$

$$\begin{array}{r} 9m - 21 = -66 \\ +21 \quad +21 \\ \hline \end{array}$$

$$\frac{9m}{9} = \frac{-45}{9}$$

$$m = -5$$

$$m = -5$$

28. $\frac{1}{2}(10 - 2p) = 3(2p - 3)$

$$\begin{array}{r} 5 - p = 6p - 9 \\ +p \quad +p \\ \hline \end{array}$$

$$\begin{array}{r} 5 = 7p - 9 \\ +9 \quad +9 \\ \hline \end{array}$$

$$\frac{14}{7} = \frac{7p}{7}$$

$$2 = p$$

$$p = 2$$

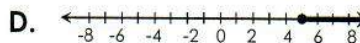
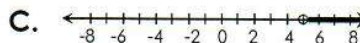
29. Using a variable, write an inequality to represent the solutions shown on the graph below.



$$x > -1$$

30. If a number is at most 5, which graph represents this number?

$$x \leq 5$$



$$B$$

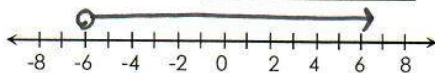
For questions 31-34, solve and graph each inequality.

31. $x + 7 > 1$

$$\begin{array}{r} x + 7 > 1 \\ -7 \quad -7 \\ \hline \end{array}$$

$$x > -6$$

$$x > -6$$



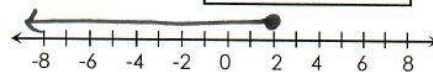
32. $-18 \leq -9w$

$$\begin{array}{r} -18 \leq -9w \\ -9 \quad -9 \\ \hline \end{array}$$

$$2 \geq w$$

$$w \leq 2$$

$$w \leq 2$$



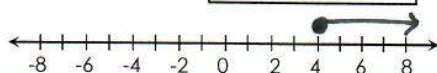
33. $-13 + \frac{n}{2} \geq -11$

$$\begin{array}{r} -13 + \frac{n}{2} \geq -11 \\ +13 \quad +13 \\ \hline \end{array}$$

$$2 \cdot \frac{n}{2} \geq 2 \cdot 2$$

$$n \geq 4$$

$$n \geq 4$$

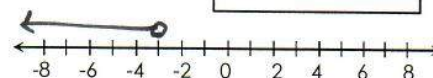


34. $\frac{-4}{-4} \cdot \frac{r+27}{-4} > -6 \cdot -4$

$$\begin{array}{r} r + 27 < 24 \\ -27 \quad -27 \\ \hline \end{array}$$

$$r < -3$$

$$r < -3$$



For questions 35-36, solve the inequality, then check the values that represent solutions.

$$35. \frac{2}{3}x + 10 \geq -4$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \frac{2}{3}x \geq -14 \end{array}$$

$$\frac{3}{2} \cdot \frac{2}{3}x \geq -14 \cdot \frac{3}{2}$$

$$\boxed{x \geq -21}$$

- ☐ -24
☐ -23
☐ -22
☒ -21
☒ -20

$$36. 23 - 6x > -25$$

$$\begin{array}{r} -23 \quad -23 \\ \hline -6x > -48 \end{array}$$

$$\begin{array}{r} -6x > -48 \\ \hline -6 \quad -6 \\ \hline x < 8 \end{array}$$

- ☒ 5
☒ 6
☒ 7
☐ 8
☐ 9

For questions 37-38, translate the equation using a variable, then solve. Check each solution.

37. "The product of -4 and a number is greater than or equal to 8."

$$\begin{array}{r} -4x \geq 8 \\ -4 \quad -4 \\ \hline x \leq -2 \end{array}$$

Inequality

Solution

$$\boxed{-4x \geq 8}$$

$$\boxed{x \leq -2}$$

38. "The difference between twice a number and 17 is no more than 13"

$$\begin{array}{r} 2x - 17 \leq 13 \\ +17 \quad +17 \\ \hline 2x \leq 30 \\ \hline \frac{2x}{2} \leq \frac{30}{2} \\ x \leq 15 \end{array}$$

Inequality

Solution

$$\boxed{2x - 17 \leq 13}$$

$$\boxed{x \leq 15}$$

39. Grant went on an 8-week diet. If he lost at least 1.5 pounds each week, which inequality gives his total weight loss? (let p = total pounds)

- A. $8p \leq -1.5$
 B. $8p \geq -1.5$
 C. $\frac{p}{8} \leq -1.5$
 D. $\frac{p}{8} \geq -1.5$

☒ D

40. Admission to the carnival costs \$4, then each game costs \$0.50. If Kailyn can spend no more than \$10, how many games can she play?

let x = # games

$$\begin{array}{r} 4 + .50x \leq 10 \\ -4 \quad -4 \\ \hline .50x \leq 6 \\ \hline .5 \quad .5 \\ \hline x \leq 12 \end{array}$$

Inequality

Solution

$$\boxed{4 + 0.50x \leq 10}$$

$$\boxed{x \leq 12 \text{ games}}$$

BONUS: Solve the equation below for k .

$$8k - 3(2k + 1) = -17 + \frac{1}{3}(k - 3)$$

$$\begin{array}{r} 8k - 6k - 3 = -17 + \frac{1}{3}k - 1 \\ 2k - 3 = \frac{1}{3}k - 18 \\ +3 \quad +3 \\ \hline 2k = \frac{1}{3}k - 15 \\ -\frac{1}{3}k \quad -\frac{1}{3}k \\ \hline \frac{5}{3}k = -15 \end{array}$$

$$\frac{3}{5} \cdot \frac{5}{3}k = -15 \cdot \frac{3}{5} \quad k = -9$$

$$\boxed{k = -9}$$

CREDITS

I use clipart and
fonts in my products by:



Art with Jenny K



Many thanks to these
talented artists!