Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

ONE-STEP EQUATIONS

Steps to Solve:

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!

INVERSE OPERATIONS

Inverse operations can be used to solve equations:

ADDITION ⟷ SUBTRACTION

MULTIPLICATION ⟷ DIVISION

SET 1: Addition & Subtraction

Directions: Solve each equation. Check all solutions.

1. $x + 7 = -1$

$-7 \quad -7$

$x = -8$

2. $m - 11 = -9$

$+11 \quad +11$

$m = 2$

3. $9 = 14 + h$

$-14 \quad -14$

$-5 = h$

4. $-15 + w = 14$

$+15 \quad +15$

$w = 29$

5. $-21 = k - 8$

$+8 \quad +8$

$-13 = k$

6. $-1 = -4 + v$

$+4 \quad +4$

$3 = v$

SET 2: Multiplication & Division

Directions: Solve each equation. Check all solutions.

7. $\frac{4a}{4} = \frac{-24}{4}$

$a = -6$

8. $\frac{-56}{-7} = \frac{-7p}{-7}$

$8 = p$

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9. $\frac{n}{5} = 9 \cdot 5$ (·5)

$n = 45$

10. $2 = \frac{r}{-8} \cdot -8$ (·−8)

$-16 = r$

11. $\frac{-k}{-1} = \frac{7}{-1}$

$k = -7$

12. $\frac{x}{-6} = -12 \cdot -6$ (·−6)

$x = 72$

SET 3: Mixed Practice

Directions: Solve each equation. Check all solutions.

13. $x - 11 = -3$

$+11 \quad +11$

$x = 8$

14. $\frac{-10d}{-10} = \frac{40}{-10}$

$d = -4$

15. $a + 15 = 2$

$-15 \quad -15$

$a = -13$

16. $24 = -3 + h$

$+3 \quad +3$

$27 = h$

17. $-4 = \frac{m}{-3} \cdot -3$ (·−3)

$12 = m$

18. $\frac{9}{-1} = \frac{-y}{-1}$

$-9 = y$

19. $-47 + w = -10$

$+47 \quad +47$

$w = 37$

20. $\frac{p}{9} = -9 \cdot 9$ (·9)

$p = -81$

21. $\frac{-48}{-16} = \frac{-16a}{-16}$

$3 = a$

22. $k - 9 = -38$

$+9 \quad +9$

$k = -29$

23. $-20 = \frac{v}{-4} \cdot -4$ (·−4)

$80 = v$

24. $\frac{6n}{6} = \frac{0}{6}$

$n = 0$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 1:** One-Step Equations

Directions: Solve each equation. Check all solutions.

1. $\frac{x}{7} = 4$ ·7

$x = 28$

2. $10 = n + 19$

$-19 \quad -19$

$-9 = n$

3. $-13 = m - 7$

$+7 \quad +7$

$-6 = m$

4. $4k = 52$

$\frac{4k}{4} = \frac{52}{4}$

$k = 13$

5. $-16 + k = -11$

$+16 \quad +16$

$k = 5$

6. $72 = -8w$

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

$-9 = w$

7. $3 = \frac{v}{-6}$ ·(-6)

$-18 = v$

8. $24 = c - 17$

$+17 \quad +17$

$41 = c$

9. $\frac{r}{-4} = -15$ ·(-4)

$r = 60$

10. $k + 37 = 54$

$-37 \quad -37$

$k = 17$

11. $-w = 16$

$\frac{-w}{-1} = \frac{16}{-1}$

$w = -16$

12. $-27 = 9h$

$\frac{-27}{9} = \frac{9h}{9}$

$-3 = h$

13. $4 = -4 + a$

$+4 \quad +4$

$8 = a$

14. $\frac{s}{8} = -5$ ·8

$s = -40$

15. $27 + p = 11$

$-27 \quad -27$

$p = -16$

16. $0 = -7k$

$\frac{0}{-7} = \frac{-7k}{-7}$

$0 = k$

17. $c - 4 = -23$

$+4 \quad +4$

$c = -19$

18. $-16 = \frac{r}{-2}$ ·(-2)

$32 = r$

19. Amanda's work and solution to the equation $-4k = 20$ is shown below. Is she correct? If not, correct her work. Incorrect!

$-4k = 20$

$+4 \quad +4$

$k = 24$

$\frac{-4k}{-4} = \frac{20}{-4}$

$k = -5$

20. Ryan's work and solution to the equation $-16 = -1 + m$ is shown below. Is he correct? If not, correct his work. Incorrect!

$-16 = -1 + m$

$+1 \quad +1$

$m = -17$

$-16 = -1 + m$

$+1 \quad +1$

$m = -15$

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Name:	Date:
Topic:	Class:

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 I: Equations with Decimals

Directions: Solve each equation. Check all solutions.

1. $a - 17.9 = 32.4$

$+17.9 \quad +17.9$

$a = 50.3$

2. $14.7 = 15.3 + n$

$-15.3 \quad -15.3$

$-0.6 = n$

3. $-4.5p = -60.3$

$\frac{-4.5p}{-4.5} = \frac{-60.3}{-4.5}$

$p = 13.4$

4. $-8.5 + k = -27.8$

$+8.5 \quad +8.5$

$k = -19.3$

5. $\frac{16}{0.3} = \frac{0.3y}{0.3} \cdot 0.3$

$4.8 = y$

6. $\frac{1.6m}{1.6} = \frac{-9.44}{1.6}$

$m = -5.9$

7. $7.84 = 2.67 + w$

$-2.67 \quad -2.67$

$5.17 = w$

8. $\frac{c}{-8.4} \cdot -8.4 = 6.2 \cdot -8.4$

$c = -52.08$

9. $-8.01 = p - 4.49$

$+4.49 \quad +4.49$

$-3.52 = p$

10. $\frac{0.26n}{0.26} = \frac{1.95}{0.26}$

$n = 7.5$

11. $-0.75 = \frac{25.2r}{25.2} \cdot 25.2$

$-18.9 = r$

12. $-19.4 + x = -32.1$

$+19.4 \quad +19.4$

$x = -12.7$

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Set 2: Equations with Fractions

Directions: Solve each equation. Check all solutions.

13. $n + \frac{1}{4} = \frac{5}{6}$

$-\frac{1}{4} \quad -\frac{1}{4}$

$n = \frac{7}{12}$

$\frac{5}{6} - \frac{1}{4}$

$\frac{10}{12} - \frac{3}{12} = \frac{7}{12}$

14. $\frac{11}{18} = x - 3\frac{2}{3}$

$\frac{11}{18} = x - \frac{11}{3}$

$+\frac{11}{3} \quad +\frac{11}{3}$

$\frac{77}{18} = x$ $(4\frac{5}{18})$

$\frac{11}{18} + \frac{11}{3}$

$\frac{11}{18} + \frac{66}{18}$

$\frac{77}{18}$

15. $-\frac{1}{8} + m = -\frac{7}{24}$

$+\frac{1}{8} \quad +\frac{1}{8}$

$m = -\frac{1}{6}$

$-\frac{7}{24} + \frac{1}{8}$

$-\frac{7}{24} + \frac{3}{24}$

$-\frac{4}{24}$

16. $a + 8\frac{1}{2} = 5\frac{1}{3}$

$a + \frac{17}{2} = \frac{16}{3}$

$-\frac{17}{2} \quad -\frac{17}{2}$

$a = -\frac{19}{6}$ $(-3\frac{1}{6})$

$\frac{16}{3} - \frac{17}{2}$

$\frac{32}{6} - \frac{51}{6}$

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

17. $\frac{2}{3}x = 48 \cdot \frac{3}{2}$

$\frac{3}{2}\cdot$

$x = 72$

18. $7 \overset{\cdot -3}{=} -\frac{1}{3}w \cdot \frac{-3}{1}$

$-21 = w$

19. $60 = -\frac{4}{5}k \cdot -\frac{5}{4}$

$-\frac{5}{4}\cdot$

$-75 = k$

20. $\frac{1}{4}p \overset{\cdot 4}{=} -9 \cdot \frac{4}{1}$

$p = -36$

21. $\frac{2}{3}x = -\frac{4}{9} \cdot \frac{3}{2}$

$\frac{3}{2}\cdot$

$x = \frac{-12}{18}$

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

22. $-1\frac{1}{3} = 2r$

$\frac{1}{2}\cdot \quad -\frac{4}{3} = 2r \quad \cdot\frac{1}{2}$

$-\frac{4}{6} = r$

$-\frac{2}{3} = r$

23. $7\frac{4}{7}v = -106$

$\frac{7}{53}\cdot \quad \frac{53}{7}v = -106 \cdot \frac{7}{53}$

$v = -14$

24. $-2\frac{1}{12} = \frac{3}{4}c$

$\frac{4}{3}\cdot \quad -\frac{25}{12} = \frac{3}{4}c \cdot \frac{4}{3}$

$\frac{-100}{36} = c$

$c = -\frac{25}{9}$ $(-2\frac{7}{9})$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 2:** Rational Equations

Directions: Solve each equation. Check all solutions.

1. $-5.51 = n + 3.35$

$-3.35 \quad -3.35$

$-8.86 = n$

2. $-3.4k = -59.5$

$\frac{-3.4k}{-3.4} = \frac{-59.5}{-3.4}$

$k = 17.5$

3. $0.85 = \frac{a}{-7.2}$ $\cdot -7.2$

$-6.12 = a$

4. $-2.25 + p = -0.59$

$+2.25 \quad +2.25$

$p = 1.66$

5. $x + \frac{3}{8} = -\frac{1}{12}$

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

$x = -\frac{11}{24}$

$-\frac{1}{12} - \frac{3}{8}$

$-\frac{2}{24} - \frac{9}{24} = -\frac{11}{24}$

6. $-\frac{6}{5}k = -\frac{24}{25}$ $\cdot -\frac{5}{6}$

$k = \frac{120}{150}$

$k = \frac{4}{5}$

7. $28 = -\frac{1}{2}k$ $\cdot -2$

$-56 = k$

8. $w - 4\frac{2}{5} = \frac{1}{10}$

$w - \frac{22}{5} = \frac{1}{10}$

$+\frac{22}{5} \quad +\frac{22}{5}$

$w = 9/2 \quad (4\frac{1}{2})$

$\frac{1}{10} + \frac{22}{5}$

$\frac{1}{10} + \frac{44}{10} = \frac{45}{10}$

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

$-\frac{9}{4} = -\frac{7}{5} + y$

$+\frac{7}{5} \quad +\frac{7}{5}$

$-\frac{17}{20} = y$

$-\frac{9}{4} + \frac{7}{5}$

$-\frac{45}{20} + \frac{28}{20} = -\frac{17}{20}$

10. $1\frac{7}{15} = -\frac{11}{28}k$

$\frac{22}{15} = -\frac{11}{28}k$ $\cdot \frac{28}{-11}$

$\frac{-56}{15} = k \quad (-3\frac{11}{15})$

11. $m - 3\frac{2}{9} = 1\frac{2}{3}$

$m - \frac{29}{9} = \frac{5}{3}$

$+\frac{29}{9} \quad +\frac{29}{9}$

$m = \frac{44}{9} \quad (4\frac{8}{9})$

$\frac{5}{3} + \frac{29}{9}$

$\frac{15}{9} + \frac{29}{9} = \frac{44}{9}$

12. $-\frac{5}{9}m = 1\frac{11}{12}$ $\cdot -\frac{9}{5}$

$m = \frac{-69}{20} \quad (-3\frac{9}{20})$

$\frac{23}{12} \cdot -\frac{9}{5}$

$= \frac{-69}{20}$

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Name:	Date:
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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.

1. $9a - 2 = -65$

$+2 \quad +2$

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

$\boxed{a = -7}$

2. $-4x + 7 = 31$

$-7 \quad -7$

$\frac{-4x}{-4} = \frac{24}{-4}$

$\boxed{x = -6}$

3. $\frac{k}{3} - 11 = -5$

$+11 \quad +11$

$3 \cdot \frac{k}{3} = 6 \cdot 3$

$\boxed{k = 18}$

4. $8 = 23 - 5w$

$-23 \quad -23$

$\frac{-15}{-5} = \frac{-5w}{-5}$

$\boxed{3 = w}$

5. $8m - 11 = -11$

$+11 \quad +11$

$\frac{8m}{8} = \frac{0}{8}$

$\boxed{m = 0}$

6. $-6 = 1 + \frac{n}{-4}$

$-1 \quad -1$

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

$\boxed{28 = n}$

7. $19 - x = 30$

$-19 \quad -19$

$\frac{-x}{-1} = \frac{11}{-1}$

$\boxed{x = -11}$

8. $-17 + \frac{r}{2} = -25$

$+17 \quad +17$

$2 \cdot \frac{r}{2} = -8 \cdot 2$

$\boxed{r = -16}$

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9. $0.4x + 9 = 11$

$-9 \quad -9$

$0.4x = 2$

$\frac{0.4x}{0.4} = \frac{2}{0.4}$

$\boxed{x = 5}$

10. $-18 = -10 - 1.5m$

$+10 \quad +10$

$-8 = -1.5m$

$\frac{-8}{-1.5} = \frac{-1.5m}{-1.5}$

$\boxed{5.\bar{3} = m}$

11. $\frac{v}{-0.8} + 14 = 39$

$-14 \quad -14$

$-0.8 \cdot \frac{v}{-0.8} = 25 \cdot -0.8$

$\boxed{v = -20}$

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

$+7 \quad +7$

$\frac{3}{2} \cdot \frac{2}{3}x = 12 \cdot \frac{3}{2}$

$\boxed{x = 18}$

13. $-1 = -\frac{5}{8}c + 9$

$-9 \quad -9$

$-\frac{8}{5} \cdot -10 = -\frac{5}{8}c \cdot -\frac{8}{5}$

$\boxed{16 = c}$

14. $\frac{1}{3}m - 16 = -1$

$+16 \quad +16$

$\frac{3}{1} \cdot \frac{1}{3}m = 15 \cdot \frac{3}{1}$

$\boxed{m = 45}$

TWO-STEP EQUATIONS:

$$\frac{x+q}{p} = r$$

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

15. $\frac{x-1}{6} = 2 \cdot 6$

$x - 1 = 12$

$+1 \quad +1$

$\boxed{x = 13}$

16. $9 = \frac{m+17}{-2} \cdot -2$

$-18 = m + 17$

$-17 \quad -17$

$\boxed{-35 = m}$

17. $-3 = \frac{k-5}{16} \cdot 16$

$-48 = k - 5$

$+5 \quad +5$

$\boxed{-43 = k}$

18. $\frac{p+20}{7} = -4 \cdot 7$

$p + 20 = -28$

$-20 \quad -20$

$\boxed{p = -48}$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 3:** Two-Step Equations

**** This is a 2-page document! ****

Directions: Solve each equation. Check all solutions.

1. $3x - 4 = -31$

$+4 \quad +4$

$\frac{3x}{3} = \frac{-27}{3}$

$x = -9$

2. $33 = -2a + 7$

$-7 \quad -7$

$\frac{26}{-2} = \frac{-2a}{-2}$

$-13 = a$

3. $\frac{w}{-4} + 17 = 9$

$-17 \quad -17$

$-4 \cdot \frac{w}{-4} = -8 \cdot -4$

$w = 32$

4. $-1 - 7p = 13$

$+1 \quad +1$

$\frac{-7p}{-7} = \frac{14}{-7}$

$p = -2$

5. $-5k - 16 = 39$

$+16 \quad +16$

$\frac{-5k}{-5} = \frac{55}{-5}$

$k = -11$

6. $-28 = \frac{r}{7} - 26$

$+26 \quad +26$

$7 \cdot -2 = \frac{r}{7} \cdot 7$

$-14 = r$

7. $-14 = -11 + \frac{n}{5}$

$+11 \quad +11$

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

$-15 = n$

8. $26 - f = 40$

$-26 \quad -26$

$\frac{-f}{-1} = \frac{14}{-1}$

$f = -14$

9. $2.8k - 11 = 45$

$+11 \quad +11$

$\frac{2.8k}{2.8} = \frac{56}{2.8}$

$k = 20$

10. $1 + \frac{r}{-1.5} = 9$

$-1 \quad -1$

$-1.5 \cdot \frac{r}{-1.5} = 8 \cdot -1.5$

$r = -12$

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11. $25 = 9 - 3.2h$

$-9 \quad -9$

$\frac{16}{-3.2} = \frac{-3.2h}{-3.2}$

$\boxed{-5 = h}$

12. $-0.7 + 2.4k = 18.02$

$+0.7 \quad +0.7$

$\frac{2.4k}{2.4} = \frac{18.72}{2.4}$

$\boxed{k = 7.8}$

13. $\frac{1}{2}y - 5 = -7$

$+5 \quad +5$

$2 \cdot \frac{1}{2}y = -2 \cdot 2$

$\boxed{y = -4}$

14. $-\frac{2}{9}n + 14 = 6$

$-14 \quad -14$

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

$\boxed{n = 36}$

15. $-14 + \frac{5}{6}v = 1$

$+14 \quad +14$

$\frac{6}{5} \cdot \frac{5}{6}v = 15 \cdot \frac{6}{5}$

$\boxed{v = 18}$

16. $-\frac{3}{4}c + 7 = 31$

$-7 \quad -7$

$-\frac{4}{3} \cdot -\frac{3}{4}c = 24 \cdot -\frac{4}{3}$

$\boxed{c = -32}$

17. $\frac{k-15}{7} = -1$ ·7

$k - 15 = -7$

$+15 \quad +15$

$\boxed{k = 8}$

18. $\frac{x+19}{-2} = 5$ ·−2

$x + 19 = -10$

$-19 \quad -19$

$\boxed{x = -29}$

19. $-9 = \frac{m-1}{-3}$ ·−3

$27 = m - 1$

$+1 \quad +1$

$\boxed{28 = m}$

20. $\frac{v+25}{4} = 9$ ·4

$v + 25 = 36$

$-25 \quad -25$

$\boxed{v = 11}$

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RIDDLE: How do you make Seven an even number?

Directions: Solve each equation. 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

K. $2x+9=17$ $2x=8$ $x=4$

U. $-5=\frac{x}{3}-8$ $3=\frac{x}{3}$ $x=9$

E. $95=-8x+7$ $88=-8x$ $x=-11$

T. $\frac{x}{-6}+17=14$ $\frac{x}{-6}=-3$ $x=18$

G. $25=21-4x$ $4=-4x$ $x=-1$

3. $\frac{x}{9}-14=-12$ $\frac{x}{9}=2$ $x=18$

11. $16-2x=38$ $-2x=22$ $x=-11$

8. $7x-3=-10$ $7x=-7$ $x=-1$

5. $\frac{x}{-2}+34=32$ $\frac{x}{-2}=-2$ $x=4$

14. $15-x=6$ $-x=-9$ $x=9$

SET 2

O. $7-n=15$ $-n=8$ $n=-8$

I. $-3n+7=-41$ $-3n=-48$ $n=16$

T. $-18=\frac{n}{4}-25$ $\frac{n}{4}=7$ $n=28$

T. $10-7n=73$ $-7n=63$ $n=-9$

B. $-17+\frac{n}{-3}=-12$ $\frac{n}{-3}=5$ $n=-15$

9. $5n-11=-56$ $5n=-45$ $n=-9$

15. $\frac{n}{-2}+19=5$ $\frac{n}{-2}=-14$ $n=28$

1. $41-2n=71$ $-2n=30$ $n=-15$

13. $-77=9n-5$ $-72=9n$ $n=-8$

6. $-11+\frac{n}{-8}=-13$ $\frac{n}{-8}=-2$ $n=16$

SET 3

A. $\frac{3}{2}a-13=5$ $\frac{3}{2}a=18$ $a=12$

H. $-\frac{1}{5}a+21=23$ $-\frac{1}{5}a=2$ $a=-10$

Y. $-41=-13+\frac{4}{3}a$ $-28=\frac{4}{3}a$ $a=-21$

S. $\frac{a+16}{4}=-2$ $a+16=-8$ $a=-24$

N. $3=\frac{a-18}{-8}$ $a-18=-24$ $a=-6$

12. $21=-\frac{5}{6}a+1$ $20=-\frac{5}{6}a$ $a=-24$

4. $-14=\frac{1}{4}a-17$ $\frac{1}{4}a=3$ $a=12$

10. $\frac{a-18}{7}=-4$ $a-18=-28$ $a=-10$

7. $-7=\frac{a+20}{-2}$ $14=a+20$ $a=-6$

2. $\frac{3}{7}a+19=10$ $\frac{3}{7}a=-9$ $a=-21$

ANSWER:

1.	2.		3.	4.	5.	6.	7.	8.		9.	10.	11.		12.		13.	14.	15.	
B	Y		T	A	K	I	N	G		T	H	E		S		O	U	T	!

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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

Solving Equations by Square Roots

New Inverse Operation: When a variable is squared (x^2), you can square root both sides to solve for the variable.

SQUARED ⟷ SQUARE ROOT

****Watch out!**** These equations can have more than one solution!

Steps to Solve

1. Locate the variable.
2. Isolate x^2 by using inverse operations to remove the constant/coefficient.
3. Take the square root of both sides.
4. Check your solution(s)!

Directions: Solve each equation. Check all solutions.

1. $\sqrt{x^2} = \sqrt{36}$

$x = \pm 6$

2. $\sqrt{289} = \sqrt{y^2}$

$\pm 17 = y$

3. $\sqrt{m^2} = \sqrt{121}$

$m = \pm 11$

4. $\sqrt{400} = \sqrt{k^2}$

$\pm 20 = k$

5. $\sqrt{a^2} = \sqrt{0}$

$a = 0$

*There is not a +0 or -0.

6. $\sqrt{r^2} = \sqrt{196}$

$r = \pm 14$

7. $x^2 - 10 = 39$

$+10 \quad +10$

$\sqrt{x^2} = \sqrt{49}$

$x = \pm 7$

8. $m^2 + 24 = 33$

$-24 \quad -24$

$\sqrt{m^2} = \sqrt{9}$

$m = \pm 3$

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9. $\frac{192}{3} = \frac{3w^2}{3}$

$\sqrt{64} = \sqrt{w^2}$

$\pm 8 = w$

10. $\frac{k^2}{-5} = -20 \cdot -5$

$\sqrt{k^2} = \sqrt{100}$

$k = \pm 10$

11. $341 = p^2 + 52$

$-52 \quad -52$

$\sqrt{289} = \sqrt{p^2}$

$\pm 17 = p$

12. $\frac{m^2}{2} = 72 \cdot 2$

$\sqrt{m^2} = \sqrt{144}$

$m = \pm 12$

13. $\frac{-p^2}{-1} = \frac{-324}{-1}$

$\sqrt{p^2} = \sqrt{324}$

$p = \pm 18$

14. $\frac{4x^2}{4} = \frac{9}{4}$

$\sqrt{x^2} = \sqrt{\frac{9}{4}}$

$x = \pm \frac{3}{2}$

15. $\frac{81n^2}{81} = \frac{16}{81}$

$\sqrt{n^2} = \sqrt{\frac{16}{81}}$

$n = \pm \frac{4}{9}$

16. $\frac{-25q^2}{-25} = \frac{-49}{-25}$

$\sqrt{q^2} = \sqrt{\frac{49}{25}}$

$q = \pm \frac{7}{5}$

17. $-4a^2 - 37 = -137$

$+37 \quad +37$

$\frac{-4a^2}{-4} = \frac{-100}{-4}$

$\sqrt{a^2} = \sqrt{25}$

$a = \pm 5$

18. $\frac{w^2}{3} + 21 = 48$

$-21 \quad -21$

$3 \cdot \frac{w^2}{3} = 27 \cdot 3$

$\sqrt{w^2} = \sqrt{81}$

$w = \pm 9$

19. $18 - x^2 = -151$

$-18 \quad -18$

$\frac{-x^2}{-1} = \frac{-169}{-1}$

$\sqrt{x^2} = \sqrt{169}$

$x = \pm 13$

20. $4v^2 - 54 = -5$

$+54 \quad +54$

$\frac{4v^2}{4} = \frac{49}{4}$

$\sqrt{v^2} = \sqrt{\frac{49}{4}}$

$v = \pm \frac{7}{2}$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 4:** Solving Equations by Square Roots

Directions: Solve each equation. Check all solutions.

1. $\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

2. $\sqrt{256} = \sqrt{n^2}$

$\pm 16 = n$

3. $\sqrt{y^2} = \sqrt{144}$

$y = \pm 12$

4. $a^2 - 63 = 106$

$+63 \quad +63$

$\sqrt{a^2} = \sqrt{169}$

$a = \pm 13$

5. $\frac{w^2}{-2} = -128 \cdot -2$

$\sqrt{w^2} = \sqrt{256}$

$w = \pm 16$

6. $-14 = r^2 - 23$

$+23 \quad +23$

$\sqrt{9} = \sqrt{r^2}$

$\pm 3 = r$

7. $\frac{5n^2}{5} = \frac{245}{5}$

$\sqrt{n^2} = \sqrt{49}$

$n = \pm 7$

8. $k^2 + 8 = 8$

$-8 \quad -8$

$\sqrt{k^2} = \sqrt{0}$

$k = 0$

9. $27 = \frac{p^2}{12} \cdot 12$

$\sqrt{324} = \sqrt{p^2}$

$\pm 18 = p$

10. $\frac{4n^2}{4} = \frac{81}{4}$

$\sqrt{n^2} = \sqrt{\frac{81}{4}}$

$n = \pm \frac{9}{2}$

11. $\frac{121}{25} = \frac{25x^2}{25}$

$\sqrt{\frac{121}{25}} = \sqrt{x^2}$

$\pm \frac{11}{5} = x$

12. $\frac{100c^2}{100} = \frac{9}{100}$

$\sqrt{c^2} = \sqrt{\frac{9}{100}}$

$c = \pm \frac{3}{10}$

13. $2k^2 - 37 = 61$

$+37 \quad +37$

$\frac{2k^2}{2} = \frac{98}{2}$

$\sqrt{k^2} = \sqrt{49}$

$k = \pm 7$

14. $10 - 3a^2 = -2$

$-10 \quad -10$

$\frac{-3a^2}{-3} = \frac{-12}{-3}$

$\sqrt{a^2} = \sqrt{4}$

$a = \pm 2$

15. $64 = \frac{v^2}{5} + 19$

$-19 \quad -19$

$5 \cdot 45 = \frac{v^2}{5} \cdot 5$

$\sqrt{225} = \sqrt{v^2}$

$v = \pm 15$

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Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 3:** Equations & Inequalities

Quiz 3-1: One- and Two-Step Equations

Directions: Solve each equation. Show all work.

1. $x - 11 = -5$

$+11 \quad +11$

$x = 6$

2. $\frac{51}{-3} = \frac{-3n}{-3}$

$-17 = n$

3. $5.1 = y + 7.8$

$-7.8 \quad -7.8$

$-2.7 = y$

4. $\frac{a}{0.4} = 75 \cdot 0.4$ (0.4.)

$a = 30$

5. $\frac{3}{5}w = -1\frac{2}{25}$

$\frac{5}{3} \cdot \frac{3}{5}w = \frac{-27}{25} \cdot \frac{5}{3}$

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

6. $-2\frac{5}{8} = k - \frac{3}{4}$

$-\frac{21}{8} = k - \frac{3}{4}$

$+\frac{3}{4} \quad +\frac{3}{4}$

$-\frac{15}{8} = k$

$-\frac{21}{8} + \frac{3}{4}$

$-\frac{21}{8} + \frac{6}{8}$

7. $9x - 14 = 22$

$+14 \quad +14$

$\frac{9x}{9} = \frac{36}{9}$

$x = 4$

8. $-2p - 5 = -37$

$+5 \quad +5$

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

$p = 16$

9. $-1 = -8 + \frac{v}{-4}$

$+8 \quad +8$

$-4 \cdot 7 = \frac{v}{-4} \cdot -4$

$-28 = v$

10. $16 - 7c = -19$

$-16 \quad -16$

$\frac{-7c}{-7} = \frac{-35}{-7}$

$c = 5$

1.	$x = 6$
2.	$n = -17$
3.	$y = -2.7$
4.	$a = 30$
5.	$w = -\frac{9}{5}$ $(-1\frac{4}{5})$
6.	$k = \frac{-15}{8}$ $(-1\frac{7}{8})$
7.	$x = 4$
8.	$p = 16$
9.	$v = -28$
10.	$c = 5$

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11. $24 = 13 - a$

$-13 \quad -13$

$\frac{11}{-1} = \frac{-a}{-1}$

$-11 = a$

12. $\frac{m}{1.4} - 11 = -6$

$+11 \quad +11$

$1.4 \cdot \frac{m}{1.4} = 5 \cdot 1.4$

$m = 7$

13. $\frac{1}{4}k + 3 = -5$

$-3 \quad -3$

$4 \cdot \frac{1}{4}k = -8 \cdot 4$

$k = -32$

14. $27 = -\frac{5}{3}r + 17$

$-17 \quad -17$

$-\frac{3}{5} \cdot 10 = -\frac{5}{3}r \cdot -\frac{3}{5}$

$-6 = r$

2.

15. $-17 = \frac{x-8}{2} \cdot 2$

$-34 = x - 8$

$+8 \quad +8$

$-26 = x$

-4.

16. $\frac{m+11}{-4} = -5 \cdot -4$

$m + 11 = 20$

$-11 \quad -11$

$m = 9$

17. $\sqrt{v^2} = \sqrt{361}$

$v = \pm 19$

-7.

18. $\frac{r^2}{-7} = -28 \cdot -7$

$\sqrt{r^2} = \sqrt{196}$

$r = \pm 14$

19. $-2c^2 + 45 = 27$

$-45 \quad -45$

$\frac{-2c^2}{-2} = \frac{-18}{-2}$

$\sqrt{c^2} = \sqrt{9}$

$c = \pm 3$

20. $25m^2 - 17 = -1$

$+17 \quad +17$

$\frac{25m^2}{25} = \frac{16}{25}$

$\sqrt{m^2} = \sqrt{\frac{16}{25}}$

$m = \pm \frac{4}{5}$

BONUS: $1\frac{4}{15} - \frac{2}{3}x^2 = -12\frac{7}{30}$

$\frac{19}{15} - \frac{2}{3}x^2 = \frac{-367}{30}$ } ---> $\frac{-367}{30} - \frac{38}{30}$

$-\frac{19}{15} \quad -\frac{19}{15}$

$-\frac{3}{2} \cdot -\frac{2}{3}x^2 = \frac{-405}{30} \cdot -\frac{3}{2}$

$\sqrt{x^2} = \sqrt{\frac{81}{4}}$

$\boxed{x = \pm \frac{9}{2}}$

11.	$a = -11$
12.	$m = 7$
13.	$k = -32$
14.	$r = -6$
15.	$x = -26$
16.	$m = 9$
17.	$v = \pm 19$
18.	$r = \pm 14$
19.	$c = \pm 3$
20.	$m = \pm \frac{4}{5}$
B.	$x = \pm \frac{9}{2}$

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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

Multi-Step Equations

(Variables on One Side)

Steps to Solve:

①	Distribute (if needed).
②	Combine Like Terms (if needed).
③	Sovle the remaining equation.
④	Check your solution!

Examples

Directions: Solve each equation. Check all solutions.

1. $2x - 8x + 1 = 49$

$-6x + 1 = 49$

$-1 \quad -1$

$\frac{-6x}{-6} = \frac{48}{-6}$

$\boxed{x = -8}$

2. $-19 = -5 - 3a - 11$

$-19 = -16 - 3a$

$+16 \quad +16$

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

$\boxed{1 = a}$

3. $19 = 10 - 5w + 9w - 7$

$19 = 3 + 4w$

$-3 \quad -3$

$\frac{16}{4} = \frac{4w}{4}$

$\boxed{4 = w}$

4. $2k - 6 - 7 + 3k = -48$

$5k - 13 = -48$

$+13 \quad +13$

$\frac{5k}{5} = \frac{-35}{5}$

$\boxed{k = -7}$

5. $7(x - 6) = -14$

$7x - 42 = -14$

$+42 \quad +42$

$\frac{7x}{7} = \frac{28}{7}$

$\boxed{x = 4}$

6. $16 = -2(k + 9)$

$16 = -2k - 18$

$+18 \quad +18$

$\frac{34}{-2} = \frac{-2k}{-2}$

$\boxed{-17 = k}$

7. $-52 = 4(3n - 1)$

$-52 = 12n - 4$

$+4 \quad +4$

$\frac{-48}{12} = \frac{12n}{12}$

$\boxed{-4 = n}$

8. $-\frac{1}{2}(12p - 42) = -33$

$-6p + 21 = -33$

$-21 \quad -21$

$\frac{-6p}{-6} = \frac{-54}{-6}$

$\boxed{p = 9}$

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9. $5(y-2)-7y=-32$

$5y-10-7y=-32$

$-2y-10=-32$

$+10 \quad +10$

$\frac{-2y}{-2}=\frac{-22}{-2}$

$y=11$

10. $-3+\frac{2}{3}(6n-42)=-51$

$-3+4n-28=-51$

$4n-31=-51$

$+31 \quad +31$

$\frac{4n}{4}=\frac{-20}{4}$

$n=-5$

11. $57=-3(4v+1)+2v$

$57=-12v-3+2v$

$57=-10v-3$

$+3 \quad +3$

$\frac{60}{-10}=\frac{-10v}{-10}$

$-6=v$

12. $7(3k-2)-13k=82$

$21k-14-13k=82$

$8k-14=82$

$+14 \quad +14$

$\frac{8k}{8}=\frac{96}{8}$

$k=12$

13. $-3=-15-2(c-1)-3c$

$-3=-15-2c+2-3c$

$-3=-13-5c$

$+13 \quad +13$

$\frac{10}{-5}=\frac{-5c}{-5}$

$-2=c$

14. $-18=5-(6k-19)$

$-18=5-6k+19$

$-18=-6k+24$

$-24 \quad -24$

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

$7=k$

15. $r-3(r-9)+4=5$

$r-3r+27+4=5$

$-2r+31=5$

$-31 \quad -31$

$\frac{-2r}{-2}=\frac{-26}{-2}$

$r=13$

16. $6(8-3x)-(2x+1)=107$

$48-18x-2x-1=107$

$-20x+47=107$

$-47 \quad -47$

$\frac{-20x}{-20}=\frac{60}{-20}$

$x=-3$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 5:** Multi-Step Equations (Variables on One Side)

**** This is a 2-page document! ****

Directions: Solve each equation. Check all solutions.

1. $3x - 8 - 8x = 42$

$-5x - 8 = 42$

$+8 \quad +8$

$-5x = 50$

$\frac{-5x}{-5} = \frac{50}{-5}$

$\boxed{x = -10}$

2. $-29 = 9 - 6k - 2k - 14$

$-29 = -8k - 5$

$+5 \quad +5$

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

$\boxed{3 = k}$

3. $-57 = 3(y - 7)$

$-57 = 3y - 21$

$+21 \quad +21$

$\frac{-36}{3} = \frac{3y}{3}$

$\boxed{-12 = y}$

4. $-8(2m + 5) = 8$

$-16m - 40 = 8$

$+40 \quad +40$

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

$\boxed{m = -3}$

5. $7(2a - 3) - 5a = -3$

$14a - 21 - 5a = -3$

$9a - 21 = -3$

$+21 \quad +21$

$\frac{9a}{9} = \frac{18}{9}$

$\boxed{a = 2}$

6. $19 = -23 + 6(2 - p)$

$19 = -23 + 12 - 6p$

$19 = -11 - 6p$

$+11 \quad +11$

$\frac{30}{-6} = \frac{-6p}{-6}$

$\boxed{-5 = p}$

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7. $5r + 2(3r - 1) = -46$

$5r + 6r - 2 = -46$

$11r - 2 = -46$

$+2 \quad +2$

$\frac{11r}{11} = \frac{-44}{11}$

$\boxed{r = -4}$

8. $-41 = -\frac{2}{5}(45n + 60) + n$

$-41 = -18n - 24 + n$

$-41 = -17n - 24$

$+24 \qquad +24$

$\frac{-17}{-17} = \frac{-17n}{-17}$

$\boxed{1 = n}$

9. $-61 = 8 - \frac{1}{3}(12w + 42) - w$

$-61 = 8 - 4w - 14 - w$

$-61 = -5w - 6$

$+6 \qquad +6$

$\frac{-55}{-5} = \frac{-5w}{-5}$

$\boxed{11 = w}$

10. $-4(5h + 7) + 16h = 40$

$-20h - 28 + 16h = 40$

$-4h - 28 = 40$

$+28 \quad +28$

$\frac{-4h}{-4} = \frac{68}{-4}$

$\boxed{h = -17}$

11. $-42 = 5(2c + 9) - 3(c + 8)$

$-42 = 10c + 45 - 3c - 24$

$-42 = 7c + 21$

$-21 \qquad -21$

$\frac{-63}{7} = \frac{7c}{7}$

$\boxed{-9 = c}$

12. $2(4v - 9) - (3v - 11) = -52$

$8v - 18 - 3v + 11 = -52$

$5v - 7 = -52$

$+7 \quad +7$

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

$\boxed{v = -9}$

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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. (Distribute/Combine)
2. Use inverse operations to move variables to one side.
3. Sovle the remaining equation.
4. Check your solution!

EXAMPLES

Directions: Solve each equation. Check all solutions.

1. $8x+17=2x+35$

$-2x \quad -2x$

$6x+17=35$

$-17 \quad -17$

$\frac{6x}{6}=\frac{18}{6}$

$x=3$

2. $7k+8=2k-37$

$-2k \quad -2k$

$5k+8=-37$

$-8 \quad -8$

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

$x=-9$

3. $m+3=9m-13$

$-m \quad -m$

$3=8m-13$

$+13 \quad +13$

$\frac{16}{8}=\frac{8m}{8}$

$2=m$

4. $-4y+6=-3y+12$

$+4y \quad +4y$

$6=y+12$

$-12 \quad -12$

$-6=y$

5. $6a+40=2a$

$-6a \quad -6a$

$\frac{40}{-4}=\frac{-4a}{-4}$

$-10=a$

6. $5w-29=55-2w$

$+2w \quad +2w$

$7w-29=55$

$+29 \quad +29$

$\frac{7w}{7}=\frac{84}{7}$

$w=12$

7. $5p-11=13p-43$

$-5p \quad -5p$

$-11=8p-43$

$+43 \quad +43$

$\frac{32}{8}=\frac{8p}{8}$

$4=p$

8. $-50-c=5c-2$

$+c \quad +c$

$-50=6c-2$

$+2 \quad +2$

$\frac{-48}{6}=\frac{6c}{6}$

$-8=c$

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9. $-5x-16+3x=-23-9x$

$-2x-16=-23-9x$

$+9x \qquad +9x$

$7x-16=-23$

$+16 \quad +16$

$\frac{7x}{7}=\frac{-7}{7}$

$\boxed{x=-1}$

10. $6r-5=1+8r-24$

$6r-5=8r-23$

$-6r \quad -6r$

$-5=2r-23$

$+23 \quad +23$

$\frac{18}{2}=\frac{2r}{2}$

$\boxed{9=r}$

11. $9a-7a=3a-33+2a$

$2a=5a-33$

$-5a \quad -5a$

$\frac{-3a}{-3}=\frac{-33}{-3}$

$\boxed{a=11}$

12. $-5+7m-20=20-2m$

$7m-25=20-2m$

$+2m \qquad +2m$

$9m-25=20$

$+25 \quad +25$

$\frac{9m}{9}=\frac{45}{9}$

$\boxed{m=5}$

13. $4(k-2)=2(k-9)$

$4k-8=2k-18$

$-2k \quad -2k$

$2k-8=-18$

$+8 \quad +8$

$\frac{2k}{2}=\frac{-10}{2}$

$\boxed{k=-5}$

14. $-6(n-3)=5(4-n)$

$-6n+18=20-5n$

$+6n \qquad +6n$

$18=20+n$

$-20 \quad -20$

$\boxed{-2=n}$

15. $-8(p+2)+p=4(p+3)+5$

$-8p-16+p=4p+12+5$

$-7p-16=4p+17$

$+7p \quad +7p$

$-16=11p+17$

$-17 \quad -17$

$\frac{-33}{11}=\frac{11p}{11}$

$\boxed{p=-3}$

16. $-\frac{1}{2}(12v-20)+4=-12-8v$

$-6v+10+4=-12-8v$

$-6v+14=-12-8v$

$+8v \qquad +8v$

$2v+14=-12$

$-14 \quad -14$

$\frac{2v}{2}=\frac{-26}{2}$

$\boxed{v=-13}$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 6:** Multi-Step Equations (Variables on Both Sides)

**** This is a 2-page document! ****

Directions: Solve each equation. Check all solutions.

1. $9x+16=4x-19$

$-4x \quad -4x$

$5x+16=-19$

$-16 \quad -16$

$\frac{5x}{5}=\frac{-35}{5}$

$x=-7$

2. $w-6=-4w-11$

$-w \quad -w$

$-6=-5w-11$

$+11 \quad +11$

$\frac{5}{-5}=\frac{-5w}{-5}$

$-1=w$

3. $4-6n=60-2n$

$+6n \quad +6n$

$4=60+4n$

$-60 \quad -60$

$\frac{-56}{4}=\frac{4n}{4}$

$-14=n$

4. $-7+11p=3p-47$

$-3p \quad -3p$

$-7+8p=-47$

$+7 \quad +7$

$\frac{8p}{8}=\frac{-40}{8}$

$p=-5$

5. $3a-28-7a=10a$

$-4a-28=10a$

$+4a \quad +4a$

$\frac{-28}{14}=\frac{14a}{14}$

$-2=a$

6. $17-5r+9r=-12+6r-1$

$17+4r=-13+6r$

$-4r \quad -4r$

$17=-13+2r$

$+13 \quad +13$

$\frac{30}{2}=\frac{2r}{2}$

$15=r$

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7. $8(y-7) = -2(y+3)$

$8y - 56 = -2y - 6$

$+2y \qquad +2y$

$10y - 56 = -6$

$+56 \quad +56$

$\frac{10y}{10} = \frac{50}{10}$

$\boxed{y = 5}$

8. $-3(8k+5) = 3(9-k)$

$-24k - 15 = 27 - 3k$

$+24k \qquad +24k$

$-15 = 27 + 21k$

$-27 \quad -27$

$\frac{-42}{21} = \frac{21k}{21}$

$\boxed{-2 = k}$

9. $2(3v-5) = 2(v-11) - 4$

$6v - 10 = 2v - 22 - 4$

$6v - 10 = 2v - 26$

$-2v \qquad -2v$

$4v - 10 = -26$

$+10 \quad +10$

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

$\boxed{v = -4}$

10. $-\frac{2}{3}(15x+3) = -3x - 9$

$-10x - 2 = -3x - 9$

$+10x \qquad +10x$

$-2 = 7x - 9$

$+9 \quad +9$

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

$\boxed{1 = x}$

11. $3(1-9a) + 22a = 2(2a-9) - 15$

$3 - 27a + 22a = 4a - 18 - 15$

$3 - 5a = 4a - 33$

$+5a \quad +5a$

$3 = 9a - 33$

$+33 \qquad +33$

$\frac{36}{9} = \frac{9a}{9}$

$\boxed{4 = a}$

12. $-3(3m-10) - 7 = -5(m+1) + 3m$

$-9m + 30 - 7 = -5m - 5 + 3m$

$-9m + 23 = -2m - 5$

$+9m \qquad +9m$

$23 = 7m - 5$

$+5 \quad +5$

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

$\boxed{4 = m}$

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RIDDLE: What happened to the plant in math class?

Directions: Solve each equation. 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

S. $5(x-1)=35$ $5x-5=35$ $x=8$

R. $40=15-9x-2$ $40=-9x+13$ $x=-3$

A. $-2(x-5)-4=-22$ $-2x+6=-22$ $x=14$

O. $-13=4(5x-1)-11x$ $-13=9x-4$ $x=-1$

T. $4-2(3x+1)=32$ $4-6x-2=32$ $x=-5$

10. $2(2x-9)=38$ $4x-18=38$ $x=14$

7. $3x-1-7x=-33$ $-4x=-32$ $x=8$

16. $-41=-18-(3-4x)$ $-41=-21+4x$ $x=-5$

4. $6(x-1)-x=-21$ $5x-6=-21$ $x=-3$

14. $24=28-9x+13x$ $24=28+4x$ $x=-1$

SET 2

G. $7n+15=5n-9$ $2n=-24$ $n=-12$

S. $-4n-1=2n-25$ $24=6n$ $n=4$

R. $16-2n=n-11$ $27=3n$ $n=9$

I. $-15-5n=3n+41$ $-56=8n$ $n=-7$

U. $n-26=28-2n$ $3n=54$ $n=18$

E. $11n+23=6n-47$ $5n=-70$ $n=-14$

9. $9n-14=5n+58$ $4n=72$ $n=18$

1. $18-4n=2n+60$ $-42=6n$ $n=-7$

5. $2n+23=-19-n$ $3n=-42$ $n=-14$

17. $-3n-16=4n-44$ $28=7n$ $n=4$

3. $-5n-34=14-n$ $-48=4n$ $n=-12$

13. $-6n+5=2n-67$ $72=8n$ $n=9$

SET 3

W. $2(3a+5)=2a+54$ $6a+10=2a+54$ $a=11$

E. $4-7a=3-a+13$ $4-7a=16-a$ $a=-2$

Q. $5(2a-3)=3(a-19)$ $10a-15=3a-57$ $a=-6$

T. $3(4-a)=2(a+6)$ $12-3a=2a+12$ $a=0$

R. $8-(2a+7)=a+40$ $-2a+1=a+40$ $a=-13$

O. $-2(6a-1)=-\frac{5}{3}(3a+15)+6$ $-12a+2=-5a-19$ $a=3$

15. $18a-9=5(2a+3)$ $18a-9=10a+15$ $a=3$

11. $16-5a+2a-1=41-a$ $-3a+15=41-a$ $a=-13$

2. $4(2a-9)=5(3a-7)-1$ $8a-36=15a-36$ $a=0$

12. $7(3a+4)=11(a-1)+19$ $21a+28=11a+8$ $a=-2$

6. $\frac{1}{2}(8a-20)=2(a+6)$ $4a-10=2a+12$ $a=11$

8. $6a+34=3-(2a+17)$ $6a+34=-2a-14$ $a=-6$

ANSWER:

1.	2.		3.	4.	5.	6.		7.	8.	9.	10.	11.	12.		13.	14.	15.	16.	17.	
I	T		G	R	E	W		S	Q	U	A	R	E		R	O	O	T	S	!

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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

Types of Solutions

Most equations we have solved so far have only one solution. However, there are **two special cases**: no solution and infinite solution. Solve the equations below to see what happens.

One Solution	No Solution	Infinite Solution
$3(2x+9) = -5-2x$ $6x+27 = -5-2x$ $+2x \quad +2x$ $8x+27 = -5$ $-27 \quad -27$ $\frac{8x}{8} = \frac{-32}{8}$ $\boxed{x=-4}$	$7x-9-3x = 4(x+3)+1$ $4x-9 = 4x+12+1$ $4x-9 = 4x+13$ $-4x \quad -4x$ $\boxed{-9 \neq 13}$	$-2(3x-5) = 2x+10-8x$ $-6x+10 = -6x+10$ $+6x \quad +6x$ $\boxed{10=10}$
What does this mean?	This is the **ONLY SOLUTION** that will make the equation true.	There is **NO SOLUTION** that will make the equation true. **Symbol:** $\varnothing$	**ALL SOLUTIONS** will make the equation true. **Symbol:** ∞

Examples

Directions: Solve each equation. Check all solutions.

1. $5x-3 = 3(2x-1)-x$

$5x-3 = 6x-3-x$

$5x-3 = 5x-3$

$-5x \quad -5x$

$-3 = -3$

$\boxed{\infty}$

2. $2n-5 = 9n+37$

$-2n \quad -2n$

$-5 = 7n+37$

$-37 \quad -37$

$\frac{-42}{7} = \frac{7n}{7}$

$\boxed{-6=n}$

3. $2(4-a) = -2(a-8)$

$8-2a = -2a+16$

$+2a \quad +2a$

$8 \neq 16$

$\boxed{\varnothing}$

4. $4(2k-3)+1 = 8k-11$

$8k-12+1 = 8k-11$

$8k-11 = 8k-11$

$-8k \quad -8k$

$-11 = -11$

$\boxed{\infty}$

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5. $3(3c+5)+1=2(c-20)$

$9c+15+1=2c-40$

$9c+16=2c-40$

$-2c \quad -2c$

$7c+16=-40$

$-16 \quad -16$

$\frac{7c}{7}=\frac{-56}{7}$

$\boxed{c=-8}$

6. $3-(4w+5)=\frac{1}{2}(8w+28)$

$3-4w-5=4w+14$

$-4w-2=4w+14$

$+4w \quad +4w$

$-2=8w+14$

$-14 \quad -14$

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

$\boxed{-2=w}$

7. $-13+12p-4=6(2p-1)$

$12p-17=12p-6$

$-12p \quad -12p$

$-17 \neq -6$

$\boxed{\emptyset}$

8. $-7(m-5)=4(4-m)+1$

$-7m+35=16-4m+1$

$-7m+35=-4m+17$

$+4m \quad +4m$

$-3m+35=17$

$-35 \quad -35$

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

$\boxed{m=6}$

9. $2(8r+5)-3=4(4r-1)+11$

$16r+10-3=16r-4+11$

$16r+7=16r+7$

$-16r \quad -16r$

$7=7$

$\boxed{\infty}$

10. $12-4(2x+9)=-8(x+3)$

$12-8x-36=-8x-24$

$-8x-24=-8x-24$

$+8x \quad +8x$

$-24=-24$

$\boxed{\infty}$

11. $3(8k-3)=-6(7-4k)$

$24k-9=-42+24k$

$+24k \quad -24k$

$-9 \neq -42$

$\boxed{\emptyset}$

12. $7v-(2v-16)=5(v+4)$

$7v-2v+16=5v+20$

$5v+16=5v+20$

$-5v \quad -5v$

$16 \neq 20$

$\boxed{\emptyset}$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 7:** Equations with Special Solutions

**** This is a 2-page document! ****

Directions: Solve each equation. Check all solutions.

1. $2(x+10) = 2(3x-8)$

$2x+20 = 6x-16$

$-2x \quad -2x$

$20 = 4x-16$

$+16 \quad +16$

$\frac{36}{4} = \frac{4x}{4}$

$9 = x$

2. $2(12-w) = -2(w-17)-10$

$24-2w = -2w+34-10$

$24-2w = -2w+24$

$+2w \quad +2w$

$24 = 24$

∞

3. $2(a+11) = -3(16-a)$

$2a+22 = -48+3a$

$-2a \quad -2a$

$22 = -48+a$

$+48 \quad +48$

$70 = a$

4. $4(3q+10) = 6(2q-9)$

$12q+40 = 12q-54$

$-12q \quad -12q$

$40 \neq -54$

$\emptyset$

5. $3k-14 = 3(k-5)+1$

$3k-14 = 3k-15+1$

$3k-14 = 3k-14$

$-3k \quad -3k$

$-14 = -14$

∞

6. $-3(3c+5) = 2(10-c)$

$-9c-15 = 20-2c$

$+9c \quad +9c$

$-15 = 20+7c$

$-20 \quad -20$

$\frac{-35}{7} = \frac{7c}{7}$

$-5 = c$

7. $-2(n-12)+1 = -2n+25$

$-2n+24+1 = -2n+25$

$-2n+25 = -2n+25$

$+2n \quad +2n$

$25 = 25$

∞

8. $15-2w-2 = 2(w-15)-1$

$-2w+13 = 2w-30-1$

$-2w+13 = 2w-31$

$+2w \quad +2w$

$13 = 4w-31$

$+31 \quad +31$

$\frac{44}{4} = \frac{4w}{4}$

$11 = w$

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9. $5(6p-3)-2=2(15p-11)+5$

$30p-15-2=30p-22+5$

$30p-17=30p-17$

$-30p \quad -30p$

$-17=-17$

∞

10. $13(m-2)=-4(11+m)+1$

$13m-26=-44-4m+1$

$13m-26=-4m-43$

$+4m \quad +4m$

$17m-26=-43$

$+26 \quad +26$

$\frac{17m}{17}=\frac{-17}{17}$

$m=-1$

11. $10-4(3-2y)=8y-5$

$10-12+8y=8y-5$

$-2+8y=8y-5$

$-8y \quad -8y$

$-2 \neq -5$

$\emptyset$

12. $2(12-y)=23-(2y-1)$

$24-2y=23-2y+1$

$24-2y=-2y+24$

$+2y \quad +2y$

$24=24$

∞

13. $\frac{1}{3}(24x-54)=11(x-4)+5$

$8x-18=11x-44+5$

$8x-18=11x-39$

$-8x \quad -8x$

$-18=3x-39$

$+39 \quad +39$

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

$7=x$

14. $k+11=-3k-25+2k$

$k+11=-k-25$

$+k \quad +k$

$2k+11=-25$

$-11 \quad -11$

$\frac{2k}{2}=\frac{-36}{2}$

$k=-18$

15. $4(2r+3)=15r-11+1-7r$

$8r+12=8r-10$

$-8r \quad -8r$

$12 \neq -10$

$\emptyset$

16. $1-(2n+9)=4(n-2)$

$1-2n-9=4n-8$

$-2n-8=4n-8$

$+2n \quad +2n$

$-8=6n-8$

$+8 \quad +8$

$\frac{0}{6}=\frac{6n}{6}$

$0=n$

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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

Warm-Up

Directions: Solve each equation.

1. $x+\frac{5}{6}=\frac{3}{8}$

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

$\frac{3}{8}-\frac{5}{6}$

$\frac{9}{24}-\frac{20}{24}$

$-\frac{11}{24}$

$\boxed{x=-\frac{11}{24}}$

2. $-8=\frac{4}{5}x$ $\cdot\frac{5}{4}$

$-\frac{40}{4}=x$

$\boxed{-10=x}$

3. $\frac{7}{4}m-\frac{1}{10}=-\frac{107}{20}$

$\frac{35}{20}m-\frac{2}{20}=-\frac{107}{20}$

$+\frac{2}{20}\quad +\frac{2}{20}$

$\frac{20}{35}\cdot\frac{35}{20}m=-\frac{105}{20}\cdot\frac{20}{35}$

$\boxed{m=-3}$

4. $\frac{5}{12}=\frac{3}{2}c+\frac{8}{3}$

$\frac{5}{12}=\frac{18}{12}c+\frac{32}{12}$

$-\frac{32}{12}\quad -\frac{32}{12}$

$\frac{12}{18}\cdot\frac{-27}{12}=\frac{18}{12}c\cdot\frac{12}{18}$

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

Clearing the Fractions

Rather than working with the fractions, it can be easier to use a process called *clearing the fractions*. **Steps to solve:**

①	Identify the **least common denominator** (LCD).
②	Multiply the entire equation by the LCD. This will clear the fractions.
③	Solve the remaining equation.
④	Check your solution!

Examples

Directions: Solve each equation by clearing the fractions.

5. $\left[\frac{13}{7}x+\frac{4}{7}=-\frac{9}{7}\right]\cdot 7$ LCD? 7

$13x+4=-9$

$-4\quad -4$

$\frac{13x}{13}=\frac{-13}{13}$

$\boxed{x=-1}$

6. $\left[\frac{3}{2}a-2=-\frac{13}{4}\right]\cdot 4$ LCD? 4

$6a-8=-13$

$+8\quad +8$

$\frac{6a}{6}=\frac{-5}{6}$

$\boxed{a=-\frac{5}{6}}$

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7. $\left[\frac{101}{20}=\frac{13}{10}w+\frac{15}{4}\right]\cdot 20$ LCD? 20

$101=26w+75$
$-75 \quad -75$

$\frac{26}{26}=\frac{26w}{26}$

$\boxed{1=w}$

8. $\left[7n-\frac{1}{2}=\frac{20}{9}\right]\cdot 18$ LCD? 18

$126n-9=40$
$+9 \quad +9$

$\frac{126n}{126}=\frac{49}{126}$

$\boxed{n=\frac{7}{18}}$

9. $\left[-\frac{18}{5}-\frac{1}{2}k=-\frac{13}{5}\right]\cdot 10$ LCD? 10

$-36-5k=-26$
$+36 \quad +36$

$\frac{-5k}{-5}=\frac{10}{-5}$

$\boxed{k=-2}$

10. $\left[\frac{11}{12}=\frac{3}{2}x+\frac{5}{3}\right]\cdot 12$ LCD? 12

$11=18x+20$
$-20 \quad -20$

$\frac{-9}{18}=\frac{18x}{18}$

$\boxed{-\frac{1}{2}=x}$

11. $\left[r+\frac{1}{4}=-\frac{3}{2}+\frac{1}{2}r\right]\cdot 4$ LCD? 4

$4r+1=-6+2r$
$-2r \quad -2r$

$2r+1=-6$
$-1 \quad -1$

$\frac{2r}{2}=\frac{-7}{2}$

$\boxed{r=-\frac{7}{2}}$

12. $\left[\frac{1}{3}a+\frac{11}{4}=\frac{39}{20}-a\right]\cdot 60$ LCD? 60

$20a+165=117-60a$
$+60a \quad +60a$

$80a+165=117$
$-165 \quad -165$

$\frac{80a}{80}=\frac{-48}{80}$

$\boxed{a=\frac{-3}{5}}$

13. $\left[-\frac{13}{24}+\frac{3}{4}w=w-\frac{2}{3}\right]\cdot 24$ LCD? 24

$-13+18w=24w-16$
$-18w \quad -18w$

$-13=6w-16$
$+16 \quad +16$

$\frac{3}{6}=\frac{6w}{6}$

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

14. $\left[2p+\frac{6}{5}=\frac{5}{4}p-\frac{9}{5}\right]\cdot 20$ LCD? 20

$40p+24=25p-36$
$-25p \quad -25p$

$15p+24=-36$
$-24 \quad -24$

$\frac{15p}{15}=\frac{-60}{15}$

$\boxed{p=-4}$

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 8:** Solving Equations by Clearing the Fractions

**** This is a 2-page document! ****

Directions: Identify the LCD, then solve each equation by clearing the fractions.

1. $\left[\frac{9}{4}x+1=\frac{11}{2}\right]\cdot 4$ LCD? 4

$9x+4=22$

$-4 \quad -4$

$\frac{9x}{9}=\frac{18}{9}$

$\boxed{x=2}$

2. $\left[\frac{1}{2}k-\frac{1}{4}=-\frac{3}{28}\right]\cdot 28$ LCD? 28

$14k-7=-3$

$+7 \quad +7$

$\frac{14k}{14}=\frac{4}{14}$

$\boxed{k=\frac{2}{7}}$

3. $\left[-m-\frac{7}{4}=-\frac{31}{4}\right]\cdot 4$ LCD? 4

$-4m-7=-31$

$+7 \quad +7$

$\frac{-4m}{-4}=\frac{-24}{-4}$

$\boxed{m=6}$

4. $\left[\frac{1}{3}=\frac{1}{4}-\frac{1}{2}v\right]\cdot 12$ LCD? 12

$4=3-6v$

$-3 \quad -3$

$\frac{1}{-6}=\frac{-6v}{-6}$

$\boxed{-\frac{1}{6}=v}$

5. $\left[-\frac{7}{3}+\frac{5}{3}n=6\right]\cdot 3$ LCD? 3

$-7+5n=18$

$+7 \quad +7$

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

$\boxed{n=5}$

6. $\left[\frac{191}{10}=\frac{3}{2}-\frac{11}{5}c\right]\cdot 10$ LCD? 10

$191=15-22c$

$-15 \quad -15$

$\frac{176}{-22}=\frac{-22c}{-22}$

$\boxed{-8=c}$

7. $\left[-\frac{33}{10}=2y+\frac{1}{2}\right]\cdot 10$ LCD? 10

$-33=20y+5$

$-5 \quad -5$

$\frac{-38}{20}=\frac{20y}{20}$

$\boxed{\frac{-19}{10}=y}$

8. $\left[\frac{7}{5}+\frac{3}{4}m=\frac{26}{15}\right]\cdot 60$ LCD? 60

$84+45m=104$

$-84 \quad -84$

$\frac{45m}{45}=\frac{20}{45}$

$\boxed{m=\frac{4}{9}}$

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9. $\left[x-\frac{3}{2}=2x-\frac{11}{2}\right]\cdot 2$ LCD? 2

$2x-3=4x-11$
$-2x \quad -2x$
$-3=2x-11$
$+11 \quad +11$
$\frac{8}{2}=\frac{2x}{2}$

$\boxed{x=4}$

10. $\left[\frac{5}{6}x-1=\frac{1}{3}x+7\right]\cdot 6$ LCD? 6

$5x-6=2x+42$
$-2x \quad -2x$
$3x-6=42$
$+6 \quad +6$
$\frac{3x}{3}=\frac{48}{3}$

$\boxed{x=16}$

11. $\left[8-\frac{1}{4}x=\frac{2}{5}x+14\right]\cdot 20$ LCD? 20

$160-5x=8x+280$
$+5x \quad +5x$
$160=13x+280$
$-280 \quad -280$
$\frac{-120}{13}=\frac{13x}{13}$

$\boxed{x=\frac{-120}{13}}$

12. $\left[5r-\frac{11}{8}=\frac{9}{8}r-\frac{21}{4}\right]\cdot 8$ LCD? 8

$40r-11=9r-42$
$-9r \quad -9r$
$31r-11=-42$
$+11 \quad +11$
$\frac{31r}{31}=\frac{-31}{31}$

$\boxed{r=-1}$

13. $\left[-\frac{11}{6}a+\frac{13}{4}=-\frac{2}{3}a-\frac{5}{8}a\right]\cdot 24$ LCD? 24

$-44a+78=-16a-15a$
$-44a+78=-31a$
$+44a \quad +44a$
$\frac{78}{13}=\frac{13a}{13}$

$\boxed{6=a}$

14. $\left[p+\frac{13}{4}=\frac{5}{36}-\frac{4}{3}p\right]\cdot 36$ LCD? 36

$36p+117=5-48p$
$+48p \quad +48p$
$84p+117=5$
$-117 \quad -117$
$\frac{84p}{84}=\frac{-112}{84}$

$\boxed{p=\frac{-4}{3}}$

15. $\left[\frac{1}{5}c-\frac{5}{6}=\frac{4}{5}c+\frac{1}{2}\right]\cdot 30$ LCD? 30

$6c-25=24c+15$
$-6c \quad -6c$
$-25=18c+15$
$-15 \quad -15$
$\frac{-40}{18}=\frac{18c}{18}$

$\boxed{c=\frac{-20}{9}}$

16. $\left[\frac{7}{6}v-\frac{21}{40}=\frac{3}{8}-\frac{10}{3}v\right]\cdot 120$ LCD? 120

$140v-63=45-400v$
$+400v \quad +400v$
$540v-63=45$
$+63 \quad +63$
$\frac{540v}{540}=\frac{108}{540}$

$\boxed{v=\frac{1}{5}}$

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Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 3:** Equations & Inequalities

Quiz 3-2: Multi-Step Equations

Directions: Solve each equation. Show all work.

1. $10x - 29 - 7x = -53$

$3x - 29 = -53$

$+29 \quad +29$

$\frac{3x}{3} = \frac{-24}{3}$

$x = -8$

2. $-2(2w - 9) = -38$

$-4w + 18 = -38$

$-18 \quad -18$

$\frac{-4w}{-4} = \frac{-56}{-4}$

$w = 14$

3. $\frac{1}{2}(10k - 16) + 11 = -2$

$5k - 8 + 11 = -2$

$5k + 3 = -2$

$-3 \quad -3$

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

$k = -1$

4. $24 = -3(2a - 15) - a$

$24 = -6a + 45 - a$

$24 = -7a + 45$

$-45 \quad -45$

$\frac{-21}{-7} = \frac{-7a}{-7}$

$3 = a$

5. $2(4m - 5) - (6m + 11) = 33$

$8m - 10 - 6m - 11 = 33$

$2m - 21 = 33$

$+21 \quad +21$

$\frac{2m}{2} = \frac{54}{2}$

$m = 27$

6. $93 = 5 - 2(p - 8) - 4p$

$93 = 5 - 2p + 16 - 4p$

$93 = -6p + 21$

$-21 \quad -21$

$\frac{72}{-6} = \frac{-6p}{-6}$

$-12 = p$

7. $15r + 8 = 11r - 20$

$-11r \quad -11r$

$4r + 8 = -20$

$-8 \quad -8$

$\frac{4r}{4} = \frac{-28}{4}$

$r = -7$

8. $-10n + 5 = -31 - 8n$

$+10n \quad +10n$

$5 = -31 + 2n$

$+31 \quad +31$

$\frac{36}{2} = \frac{2n}{2}$

$18 = n$

1.	$x = -8$
2.	$w = 14$
3.	$k = -1$
4.	$a = 3$
5.	$m = 27$
6.	$p = -12$
7.	$r = -7$
8.	$n = 18$

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9. $11k - 16 - 2k = 17k$

$9k - 16 = 17k$

$-9k \quad -9k$

$-16 = 8k$

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

$-2 = k$

10. $-4c + 18 - 9c = 18 - 7c$

$-13c + 18 = 18 - 7c$

$+7c \quad +7c$

$-6c + 18 = 18$

$-18 \quad -18$

$-6c = 0$

$\frac{-6c}{-6} = \frac{0}{-6}$

$c = 0$

11. $8(v - 2) = 5(v + 3) + 8$

$8v - 16 = 5v + 15 + 8$

$8v - 16 = 5v + 23$

$-5v \quad -5v$

$3v - 16 = 23$

$+16 \quad +16$

$\frac{3v}{3} = \frac{39}{3}$ $\quad v = 13$

12. $\frac{3}{4}(20h - 4) = 8h - 45$

$15h - 3 = 8h - 45$

$-8h \quad -8h$

$7h - 3 = -45$

$+3 \quad +3$

$\frac{7h}{7} = \frac{-42}{7}$

$h = -6$

13. $2(4x - 2) = 8(x - 7)$

$8x - 4 = 8x - 56$

$-8x \quad -8x$

$-4 \neq -56$

14. $-3(a + 17) = 3(a - 5)$

$-3a - 51 = 3a - 15$

$+3a \quad +3a$

$-51 = 6a - 15$

$+15 \quad +15$

$\frac{-36}{6} = \frac{6a}{6}$ $\quad a = -6$

15. $-4x + 29 - x = 2(x - 17)$

$-5x + 29 = 2x - 34$

$+5x \quad +5x$

$29 = 7x - 34$

$+34 \quad +34$

$\frac{63}{7} = \frac{7x}{7}$ $\quad x = 9$

16. $3(8m + 5) = 4(6m + 7) - 13$

$24m + 15 = 24m + 28 - 13$

$24m + 15 = 24m + 15$

$-24m \quad -24m$

$15 = 15$

BONUS: $-\frac{1}{10}\left(7x + \frac{5}{2}\right) = \frac{1}{4}\left(\frac{16}{5}x - 25\right)$

$\left[-\frac{7}{10}x - \frac{1}{4} = \frac{4}{5}x - \frac{25}{4}\right] \cdot 20$

$-14x - 5 = 16x - 125$

$+14x \quad +14x$

$-5 = 30x - 125$

$+125 \quad +125$

$\frac{120}{30} = \frac{30x}{30}$ $\quad x = 4$

9.	$k = -2$
10.	$c = 0$
11.	$v = 13$
12.	$h = -6$
13.	$\emptyset$
14.	$a = -6$
15.	$x = 9$
16.	∞
B.	$x = 4$

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TRANSLATING and SOLVING Equations

	Translate	Solve
1	"The product of a number and -7 is 63."	$\frac{-7n}{-7} = \frac{63}{-7}$
	Equation: $-7n = 63$	$\boxed{n = -9}$
2	"10 subtracted from a number is 15."	$n - 10 = 15$ $+10 \quad +10$ $\boxed{n = 25}$
	Equation: $n - 10 = 15$	
3	"Two-fifths of a number is -12."	$\frac{5}{2} \cdot \frac{2}{5} n = -12 \cdot \frac{5}{2}$
	Equation: $\frac{2}{5} n = -12$	$\boxed{n = -30}$
4	"8% of a number is 20."	$\frac{.08n}{.08} = \frac{20}{.08}$
	Equation: $.08n = 20$	$\boxed{n = 250}$
5	"The sum of twice a number and 17 is -1."	$2n + 17 = -1$ $-17 \quad -17$ $\frac{2n}{2} = \frac{-18}{2}$ $\boxed{n = -9}$
	Equation: $2n + 17 = -1$	
6	"Nine less than the product of a number and -4 is 35."	$-4n - 9 = 35$ $+9 \quad +9$ $\frac{-4n}{-4} = \frac{44}{-4}$ $\boxed{n = -11}$
	Equation: $-4n - 9 = 35$	
7	"Seven more than the quotient of a number and 3 equals 11."	$\frac{n}{3} + 7 = 11$ $-7 \quad -7$ $\frac{3}{1} \cdot \frac{n}{3} = 4 \cdot \frac{3}{1}$ $\boxed{n = 12}$
	Equation: $\frac{n}{3} + 7 = 11$	

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8	"The difference between half a number and 11 is -25."	$\frac{1}{2}n - 11 = -25$ $+11 \quad +11$ $2 \cdot \frac{1}{2}n = -14 \cdot 2$ $\boxed{n = -28}$
	Equation: $\frac{1}{2}n - 11 = -25$	
9	"A number subtracted from 14 is 2."	$14 - n = 2$ $-14 \quad -14$ $-n = -12$ $\frac{-n}{-1} = \frac{-12}{-1}$ $\boxed{n = 12}$
	Equation: $14 - n = 2$	
10	"Three-fourths of a number, decreased by 19, is -1."	$\frac{3}{4}n - 19 = -1$ $+19 \quad +19$ $\frac{4}{3} \cdot \frac{3}{4}n = 18 \cdot \frac{4}{3}$ $\boxed{n = 24}$
	Equation: $\frac{3}{4}n - 19 = -1$	
11	"The sum of negative one-third of a number and 16 is 11."	$-\frac{1}{3}n + 16 = 11$ $-16 \quad -16$ $-3 \cdot -\frac{1}{3}n = -5 \cdot -3$ $\boxed{n = 15}$
	Equation: $-\frac{1}{3}n + 16 = 11$	
12	"60 percent of a number, minus 17, is -65."	$.6n - 17 = -65$ $+17 \quad +17$ $.6n = -48$ $\boxed{n = -80}$
	Equation: $.60n - 17 = -65$	
13	"The sum of a number and 7, divided by -3, is 2."	$-3 \cdot \frac{n+7}{-3} = 2 \cdot -3$ $n + 7 = -6$ $-7 \quad -7$ $\boxed{n = -13}$
	Equation: $\frac{n+7}{-3} = 2$	
14	"The quotient of five less than a number and 6 is -4."	$6 \cdot \frac{n-5}{6} = -4 \cdot 6$ $n - 5 = -24$ $+5 \quad +5$ $\boxed{n = -19}$
	Equation: $\frac{n-5}{6} = -4$	
15	"A number squared increased by 5, is 41."	$n^2 + 5 = 41$ $-5 \quad -5$ $\sqrt{n^2} = \sqrt{36}$ $\boxed{n = \pm 6}$
	Equation: $n^2 + 5 = 41$	

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 4:** Translating & Solving Equations

Directions: Translate each equation. Then solve.

1. "The quotient of a number and 4 is -7."

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

$\boxed{n = -28}$

2. "Seven-eighths of a number is 63."

$\frac{8}{7} \cdot \frac{7}{8} n = 63 \cdot \frac{8}{7}$

$\boxed{n = 72}$

3. "The product of a number and -3, increased by 8, is 20."

$-3n + 8 = 20$

$-8 \quad -8$

$\frac{-3n}{-3} = \frac{12}{-3}$

$\boxed{n = -4}$

4. "Eleven subtracted from the quotient of a number and five is -13."

$\frac{n}{5} - 11 = -13$

$+11 \quad +11$

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

$\boxed{n = -10}$

5. "Twenty-seven less than twice a number is -1."

$2n - 27 = -1$

$+27 \quad +27$

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

$\boxed{n = 13}$

6. "The sum of 5% of a number and 9 is 16."

$.05n + 9 = 16$

$-9 \quad -9$

$\frac{.05n}{.05} = \frac{7}{.05}$

$\boxed{n = 140}$

7. "A number subtracted from 16 is -3."

$16 - n = -3$

$-16 \quad -16$

$\frac{-n}{-1} = \frac{-19}{-1}$

$\boxed{n = 19}$

8. "The difference between five-halves of a number and 17 is 48."

$\frac{5}{2}n - 17 = 48$

$+17 \quad +17$

$\frac{2}{5} \cdot \frac{5}{2} n = 65 \cdot \frac{2}{5}$

$\boxed{n = 26}$

9. "Ten more than 32% of a number is 26."

$10 + .32n = 26$

$-10 \quad -10$

$\frac{.32n}{.32} = \frac{16}{.32}$

$\boxed{n = 50}$

10. "Seven less than a number, divided by 5, is -2."

$5 \cdot \frac{n-7}{5} = -2 \cdot 5$

$n - 7 = -10$

$+7 \quad +7$

$\boxed{n = -3}$

11. "The quotient of a number increased by 13 and -7 is -4."

$-7 \cdot \frac{n+13}{-7} = -4 \cdot -7$

$n + 13 = 28$

$-13 \quad -13$

$\boxed{n = 15}$

12. "The product of -7 and a number squared is -28."

$\frac{-7n^2}{-7} = \frac{-28}{-7}$

$\sqrt{n^2} = \sqrt{4}$

$\boxed{n = \pm 2}$

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USING EQUATIONS TO SOLVE WORD PROBLEMS

1. **DEFINE A VARIABLE**
What are you trying to find? Use a "let statement" to define a variable.

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: Define a variable, set up an equation, then solve.

1. Connor deposited $84 into his checking account. If his new balance is $451, what was his balance before the deposit?

let x = checking act. balance

$84 + x = 451$
$-84 \quad -84$
$x = 367$

$367

2. Six adult tickets to a movie at the theater cost $52.50. Find the price for one ticket.

let x = each ticket cost

$\frac{6x}{6} = \frac{52.50}{6}$

$x = 8.75$

$8.75

3. Three-fourths of the 8th graders at Kingston Middle School went on the class trip. If 252 students went on the trip, how many 8th graders are there?

let x = # of 8th graders

$\frac{4}{3} \cdot \frac{3}{4} x = 252 \cdot \frac{4}{3}$

$x = 336$

336 students

4. After falling 23° F, the temperature is now 51° F. What was the starting temperature?

let x = starting temp

$x - 23 = 51$
$+23 \quad +23$
$x = 74$

74°

5. Ms. Karen has 7 children in her preschool class. She would like to give each student an equal number of M&M's. If each child got 23 M&M's, how many did she start with?

let x = # of M+Ms at the start

$7 \cdot \frac{x}{7} = 23 \cdot 7$

$x = 161$

161 M+Ms

6. Braden scored 9 fewer points on his math test than Ava did. If Ava scored an 86, what was Braden's score?

let x = Braden's score

$86 - x = 9$
$-86 \quad -86$
$\frac{-x}{-1} = \frac{-77}{-1}$ $x = 77$

77

7. Pocket folders are $0.39 each at the store. If Carolyn paid $7.02, how many did she buy?

let x = # of folders purchased

$\frac{0.39x}{0.39} = \frac{7.02}{0.39}$

$x = 18$

18 folders

8. Scott takes two-thirds of his body weight and drinks that amount of water in ounces per day. If he drinks 118 ounces each day, what does he weigh?

let x = body weight

$\frac{3}{2} \cdot \frac{2}{3} x = 118 \cdot \frac{3}{2}$

$x = 177$

177 pounds

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9. Driving at an average speed of 52 mph, how long will it take someone to take a 390 mile road trip?

let x = length of time

$\frac{52x}{52} = \frac{390}{52}$

$x = 7.5$

7.5 hours

10. Kate has 79 more envelopes to stamp before she can send off her wedding invitations. If If she is sending 234 invitations in all, how many has she stamped so far?

let x = # stamped envelopes

$234 - x = 79$

$-234 \quad -234$

$\frac{-x}{-1} = \frac{-155}{-1}$

$x = 155$

155 envelopes

11. Jack is two weeks into his diet and now weighs 197 pounds. If he lost 3 pounds the first week and 6 pounds the second week, what was his starting weight?

let x = Jack's starting weight

$x - 3 - 6 = 197$

$x - 9 = 197$

$+9 \quad +9$

$x = 206$

206 pounds

12. The perimeter of a square is 86 inches. How long is each side?

let x = side length

$\frac{4x}{4} = \frac{86}{4}$

$x = 21.5$

21.5 inches

13. A plant is 14 inches tall. If it grows 3 inches per year, how many years will it take to reach a height of 38 inches?

let x = # years

$14 + 3x = 38$

$-14 \quad -14$

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

$x = 8$

8 years

14. Tessa received $50 from her Grandma for her birthday. She decided to put this money away and save an additional $12 per week so she can buy a $398 tablet. How many weeks will it take her to save?

let x = # weeks

$50 + 12x = 398$

$-50 \quad -50$

$\frac{12x}{12} = \frac{348}{12}$

$x = 29$

29 weeks

15. One-third of the students in the marching band signed up for the pep band. Then, five students changed their mind. If there there are 31 students in the pep band, how many students are in the marching band?

let x = # in marching band

$\frac{1}{3}x - 5 = 31$

$+5 \quad +5$

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

$x = 108$

108 students

16. Five less than the area of a square is 59 square feet. Find the side length of the square.

let x = side length

$x^2 - 5 = 59$

$+5 \quad +5$

$\sqrt{x^2} = \sqrt{64}$

$x = 8, \cancel{-8}$

8 feet

since its length, 8 is the only answer.

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 10:** Word Problems (One and Two-Step Equations)

**** This is a 2-page document! ****

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

1. Cans of soup are on sale for $1.79 each. If Jack spent $25.06 on soup, how many cans did he buy?

let x = # cans

$$\frac{1.79x}{1.79} = \frac{25.06}{1.79}$$

$$x = 14$$

14 cans

2. Carley beat the school record for the 400 meter run by 1.3 seconds. If she ran the race in 55.7 seconds, what was the record?

let x = previous record

$$x - 1.3 = 55.7$$
$$+1.3 \quad +1.3$$
$$x = 57$$

57 sec

3. Mrs. Lincoln has a bucket full of pencils that she would like to divide up equally to her 28 students. If each student got 3 pencils, how many did she start with?

let x = # pencils at start

$$28 \cdot \frac{x}{28} = 3 \cdot 28$$

$$x = 84$$

84 pencils

4. The library charges a fine each day that a book is late. If Ben recently paid a $3.77 fine for a book that was 13 days late, what is the daily fine?

let x = fine amount

$$\frac{13x}{13} = \frac{3.77}{13}$$

$$x = .29$$

$0.29

5. Sydney is driving 245 miles to her parents' lake house for the weekend. If she has already driven 97 miles, how many more miles does she have to go?

let x = miles left

$$x + 97 = 245$$
$$-97 \quad -97$$
$$x = 148$$

148 mi

6. Jack rented a moving truck for 7 hours and paid $153.65. How much did it cost per hour?

let x = cost per hr

$$\frac{7x}{7} = \frac{153.65}{7}$$

$$x = 21.95$$

$21.95

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7. Four-fifths of the senior class went to prom. If 324 seniors went to prom, how many are there in the senior class?

let x = # in senior class

$\frac{5}{4} \cdot \frac{4}{5} x = 324 \cdot \frac{5}{4}$

$x = 405$

405 students

8. Mark used his debit card to buy groceries for $87 on Saturday and gas for $41 on Sunday. If his bank account balance is now $542, what was his starting balance on Saturday?

let x = starting balance

$x - 87 - 41 = 542$

$x - 128 = 542$

$+128 \quad +128$

$x = 670$

$670

9. Lee filled up his gas tank before starting a road trip. If he has used 5.8 gallons two hours into the trip, and has 12.4 gallons remaining, how many gallons of gas did he start with?

let x = gallons to start

$x - 5.8 = 12.4$

$+5.8 \quad +5.8$

$x = 18.2$

18.2 gallons

10. The area of a square is 225 square feet. Find the side length of the square.

let x = side length

$\sqrt{x^2} = \sqrt{225}$

$x = 15, -15$

15 ft

11. An electrician charges $30 for a service call, plus $75 per hour of service. If he charged $210, how many hours did he work?

let x = # hours worked

$30 + 75x = 210$

$-30 \quad -30$

$\frac{75x}{75} = \frac{180}{75}$

$x = 2.4$

2.4 hours

12. To attend the football game, it costs $8 for parking plus $59 per ticket. If Bryan paid $362, how many tickets did he purchase?

let x = # tickets purchased

$8 + 59x = 362$

$-8 \quad -8$

$\frac{59x}{59} = \frac{354}{59}$

$x = 6$

6 tickets

13. Ariana plans to use $260 less than three-fourths of her savings to buy a car. If the purchase price of the car is $9,340, how much does she have in savings?

let x = amt. in savings

$\frac{3}{4}x - 260 = 9340$

$+260 \quad +260$

$\frac{4}{3} \cdot \frac{3}{4} x = 9600 \cdot \frac{4}{3}$

$x = 12{,}800$

$12,800

14. A kite has four equal sides. If 5 inches is added to each side, the new perimeter will be 56 inches. Find the side length of the original kite.

let x = original side length

$4(x+5) = 56$

$4x + 20 = 56$

$-20 \quad -20$

$\frac{4x}{4} = \frac{36}{4}$

$x = 9$

9 in

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USING EQUATIONS TO SOLVE WORD PROBLEMS

(Using Two Let Statements)

1. **DEFINE A VARIABLE** — Use "let statements" to define what you are finding with just ONE variable.
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: Define a variable using let statements, set up an equation, then solve.

1. One number is twelve less than another number. The total of the two numbers is 154. Find both numbers.

let x = number
let $x-12$ = other number

$x + x - 12 = 154$
$2x - 12 = 154$
$+12 \quad +12$
$\frac{2x}{2} = \frac{166}{2}$
$x = 83$

83, 71

2. The sum of two numbers is 80. The larger number is four more than three times the smaller number. Find both numbers.

let x = smaller #
let $3x+4$ = larger #

$x + 3x + 4 = 80$
$4x + 4 = 80$
$-4 \quad -4$
$\frac{4x}{4} = \frac{76}{4}$
$x = 19$

19, 61

3. In Mrs. Middleton's math class, there are 7 more boys than girls. If there are 29 total students in the class, how many boys are there?

let x = girls
let $x+7$ = boys

$x + x + 7 = 29$
$2x + 7 = 29$
$-7 \quad -7$
$\frac{2x}{2} = \frac{22}{2}$
$x = 11$

18 boys

4. Reese is seven years younger than Emily. If the sum of their ages is 37, find the age of each girl.

let x = Emily's age
let $x-7$ = Reese's age

$x + x - 7 = 37$
$2x - 7 = 37$
$+7 \quad +7$
$\frac{2x}{2} = \frac{44}{2}$
$x = 22$

Emily is 22, Reese is 15.

5. On their last history test, Eric scored five more than twice the points that his friend Josh did. If they scored 134 points altogether, find Eric's score.

let x = Josh's score
let $2x+5$ = Eric's score

$x + 2x + 5 = 134$
$3x + 5 = 134$
$-5 \quad -5$
$\frac{3x}{3} = \frac{129}{3}$
$x = 43$

91

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6. Ryan has one less than four times the number of songs on his iPod that Olivia has. In total, they have 469 songs. How many songs does Olivia have?

let x = Olivia's songs
let $4x-1$ = Ryan's songs

$x+4x-1=469$
$5x-1=469$
$+1 \quad +1$
$\frac{5x}{5}=\frac{470}{5}$ $x=94$

94 songs

7. Logan and Zoey went out to dinner. Zoey's dinner bill was $5 more than one-half of Logan's bill. If the total of the two bills combined was $60.26, what was Zoey's dinner bill?

let x = Logan's bill
let $\frac{1}{2}x+5$ = Zoey's bill

$x+\frac{1}{2}x+5=60.26$
$\frac{3}{2}x+5=60.26$
$-5 \quad -5$
$\frac{2}{3}\cdot\frac{3}{2}x=55.26\cdot\frac{2}{3}$ $x=36.84$

$23.42

8. The Giants scored fourteen less than three times the number of points than the Cowboys scored in their last football. Altogether, they scored 46 points. How many points did the Cowboys score?

let x = Cowboys score
let $3x-14$ = Giants score

$x+3x-14=46$
$4x-14=46$
$+14 \quad +14$
$\frac{4x}{4}=\frac{60}{4}$ $x=15$

15 points

9. Adalyn has nine more than twice the number of skittles that Morgan has. If twice the number of skittles that Adalyn has is two more than five times the number of skittles that Morgan has, how many does each girl have?

let x = Morgan's skittles
let $2x+9$ = Adalyn's skittles

$2(2x+9)=2+5x$
$4x+18=2+5x$
$-4x \quad -4x$
$18=2+x$
$-2 \quad -2$
$16=x$

Morgan has 16 and Adalyn has 41.

10. The sum of two consecutive integers is 113. Find the integers.

let x = 1st consec. integer
let $x+1$ = 2nd consec. integer

$x+x+1=113$
$2x+1=113$
$-1 \quad -1$
$\frac{2x}{2}=\frac{112}{2}$
$x=56$

56, 57

11. The sum of two consecutive integers is 187. Find the integers.

let x = 1st consec. integer
let $x+1$ = 2nd consec. integer

$x+x+1=187$
$2x+1=187$
$-1 \quad -1$
$\frac{2x}{2}=\frac{186}{2}$
$x=93$

93, 94

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 11:** Word Problems (Multi-Step Equations)

**** This is a 2-page document! ****

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

1. One number is nine more than another number. If the sum of the numbers is 65, find both numbers.

let x = one number
let $x+9$ = other number

$x + x + 9 = 65$
$2x + 9 = 65$
$-9 \quad -9$
$\frac{2x}{2} = \frac{56}{2}$
$x = 28$

28, 37

2. The sum of two numbers 146. The larger number is sixteen less than five times the smaller number. Find both numbers.

let x = smaller #
let $5x-16$ = larger #

$x + 5x - 16 = 146$
$6x - 16 = 146$
$+16 \quad +16$
$\frac{6x}{6} = \frac{162}{6}$
$x = 27$

27, 119

3. Eva and Liam are reading a novel in their English class. Liam has read 17 less pages than Eva has. If they have read 265 pages combined, how many pages has Liam read?

let x = Eva's pages
let $x-17$ = Liam's pages

$x + x - 17 = 265$
$2x - 17 = 265$
$+17 \quad +17$
$\frac{2x}{2} = \frac{282}{2}$
$x = 141$

124 pages

4. Roger has two golden retrievers, Sadie and Buddy. Buddy weighs 14 pounds more than Sadie. If their total weight is 136 pounds, how much does Sadie weigh?

let x = Sadie's weight
let $x+14$ = Buddy's weight

$x + x + 14 = 136$
$2x + 14 = 136$
$-14 \quad -14$
$\frac{2x}{2} = \frac{122}{2}$
$x = 61$

61 pounds

5. Beth and Carley are selling candy bars to raise money for new cheerleading uniforms. Beth has sold one less than twice the number of candy bars that Carley has sold. If they have sold 188 candy bars in all, how many has Beth sold?

let x = Carley's sales
let $2x-1$ = Beth's sales

$x + 2x - 1 = 188$
$3x - 1 = 188$
$+1 \quad +1$
$\frac{3x}{3} = \frac{189}{3}$
$x = 63$

125 candy bars

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6. Mark flew from Boston to Baltimore, then Baltimore to Orlando. The number of people on his first flight was five more than four times the number of people on his second flight. If there were 365 people altogether on the two flights, how many were on the flight from Baltimore to Orlando?

let x = # on second flight
let $4x+5$ = # on first flight

$x + 4x + 5 = 365$
$5x + 5 = 365$
$-5 \quad -5$
$\frac{5x}{5} = \frac{360}{5}$
$x = 72$

72 people

7. Morgan is making two cookie recipes. Recipe A calls for one-third less than twice the number of cups of sugar that Recipe B calls for. If she needs four and one-sixths cups of sugar in all, how many cups will she need for Recipe A?

let x = cups in Recipe B
let $2x - \frac{1}{3}$ = cups in Recipe A

$x + 2x - \frac{1}{3} = 4\frac{1}{6}$
$3x - \frac{1}{3} = \frac{25}{6}$
$+\frac{1}{3} \quad +\frac{1}{3}$
$\frac{1}{3} \cdot 3x = \frac{27}{6} \cdot \frac{1}{3}$
$x = \frac{3}{2}$

$2\frac{2}{3}$ cups

8. On the album "1989" by Taylor Swift, Blank Space is 12 seconds longer than Shake It Off. If the combined time of the two songs is 7 minutes and 30 seconds, how long is Shake It Off? Give your answer in minutes and seconds.

let x = length of Shake It Off
let $x + 12$ = length of Blank Space

7min 30sec → 450 sec

$x + x + 12 = 450$
$2x + 12 = 450$
$-12 \quad -12$
$\frac{2x}{2} = \frac{438}{2}$
$x = 219$

219 sec → 3min 39 sec

9. Rachel took a two-day road trip last weekend. She drove 65 miles less on Sunday than she did on Saturday. If twice the miles driven on Sunday is 373 more than the number of miles driven on Saturday, how many miles did she drive each day?

let x = Saturday's miles
let $x - 65$ = Sunday's miles

$2(x-65) = x + 373$
$2x - 130 = x + 373$
$-x \quad -x$
$x - 130 = 373$
$+130 \quad +130$
$x = 503$

503 mi Sat and
438 mi on Sun

10. The sum of two consecutive integers is 129. Find both integers.

let x = 1st cons. int
let $x+1$ = 2nd cons. int

$x + x + 1 = 129$
$2x + 1 = 129$
$-1 \quad -1$
$\frac{2x}{2} = \frac{128}{2}$
$x = 64$

64, 65

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Group Members: **Per:** _____

REVIEW: Equations & Applications

Directions: Work together to solve each equation. Do not divide up the work! Each person should be participating. At the end of class, one person's paper will be chosen at random and graded for the group.

PART I: SOLVING EQUATIONS

Directions: Solve each equation. Check all solutions.

1. $\frac{-9m}{-9} = \frac{45}{-9}$

$m = -5$

2. $k + \frac{1}{6} = \frac{7}{15}$

$-\frac{1}{6} \quad -\frac{1}{6}$

$k = \frac{3}{10}$

$\frac{7}{15} - \frac{1}{6}$

$\frac{14}{30} - \frac{5}{30}$

$\frac{9}{30}$

3. $4x + 1 = -47$

$-1 \quad -1$

$\frac{4x}{4} = \frac{-48}{4}$

$x = -12$

4. $\frac{3}{5}a - 11 = -56$

$+11 \quad +11$

$\frac{5}{3} \cdot \frac{3}{5}a = -45 \cdot \frac{5}{3}$

$a = -75$

5. $45 = \frac{w+14}{0.6}$ $\cdot 0.6$

$27 = w + 14$

$-14 \quad -14$

$13 = w$

6. $r^2 - 16 = -7$

$+16 \quad +16$

$\sqrt{r^2} = \sqrt{9}$

$r = \pm 3$

7. $64y^2 + 7 = 32$

$-7 \quad -7$

$\frac{64y^2}{64} = \frac{25}{64}$

$\sqrt{y^2} = \sqrt{\frac{25}{64}}$

$y = \pm \frac{5}{8}$

8. $7(-2x + 9) - 3x = 97$

$-14x + 63 - 3x = 97$

$-17x + 63 = 97$

$-63 \quad -63$

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

$x = -2$

9. $6c - 14 - c = 9c - 46$

$5c - 14 = 9c - 46$

$-5c \quad -5c$

$-14 = 4c - 46$

$+46 \quad +46$

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

$8 = c$

10. $-10(n + 3) = \frac{1}{2}(24 - 14n)$

$-10n - 30 = 12 - 7n$

$+10n \quad +10n$

$-30 = 12 + 3n$

$-12 \quad -12$

$\frac{-42}{3} = \frac{3n}{3}$

$-14 = n$

11. $-3(2p + 7) = 4 - 6(p + 3)$

$-6p - 21 = 4 - 6p - 18$

$-6p - 21 = -6p - 14$

$+6p \quad +6p$

$-21 \neq -14$

$\emptyset$

12. $8a - (15 - a) = 6(a - 7) + 15$

$8a - 15 + a = 6a - 42 + 15$

$9a - 15 = 6a - 27$

$-6a \quad -6a$

$3a - 15 = -27$

$+15 \quad +15$

$\frac{3a}{3} = \frac{-12}{3}$

$a = -4$

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PART II: TRANSLATING EQUATIONS

Directions: Translate each equation. Do not solve.

13. "Seven subtracted from the product of a number and -4 is -59." **13.** $-4n-7=-59$

14. "The sum of two-sevenths of a number and 3 is 9." **14.** $\frac{2}{7}n+3=9$

15. "The difference between a number squared and 14 is 50." **15.** $n^2-14=50$

16. "Ten less than 40% of a number is -4." **16.** $.4n-10=-4$

17. "The quotient of a number increasaed by 4 and -3 is 15." **17.** $\frac{n+4}{-3}=15$

PART III: APPLICATIONS

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

18. Alec is seven years younger than his older brother Ethan. If Alec is 24 years old, how old is Ethan?

let x = Ethan's age

$x-7=24$
$+7 \quad +7$
$x=31$

31 years old

19. Jane used $68 more than two-fifths of her last paycheck to purchase a new surfboard. If the surfboard cost $289, find the amount of her paycheck.

let x = paycheck amount

$\frac{2}{5}x+68=289$
$-68 \quad -68$

$\frac{5}{2}\cdot\frac{2}{5}x=221\cdot\frac{5}{2}$

$x=552.5$

#552.50

20. The sum of two numbers is 121. If the larger number is thirteen more than the smaller number, find both numbers.

let x = one number
let $x+13$ = second number

$x+x+13=121$
$2x+13=121$
$-13 \quad -13$
$\frac{2x}{2}=\frac{108}{2}$
$x=54$

54, 67

21. Caleb and Luke are playing a video game. Luke has scored fifteen less than twice the number of points that Caleb has. If they have scored 201 points altogether, how many has Luke scored?

let x = Caleb's points
let $2x-15$ = Luke's points

$x+2x-15=201$
$+15 \quad +15$
$\frac{3x}{3}=\frac{216}{3}$
$x=72$

129 points

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 12:** Equations & Applications Review

**** This is a 2-page document! ****

Directions: Solve each equation. Check all solutions.

1. $7x-6=-90$

$+6 \quad +6$

$\frac{7x}{7}=\frac{-84}{7}$

$\boxed{x=-12}$

2. $-\frac{3}{4}w-1=11$

$+1 \quad +1$

$-\frac{4}{3}\cdot-\frac{3}{4}w=12\cdot-\frac{4}{3}$

$\boxed{w=-16}$

3. $\frac{k-7}{-0.4}=85$ $\cdot -0.4$

$k-7=-34$

$+7 \quad +7$

$\boxed{k=-27}$

4. $4a^2+19=68$

$-19 \quad -19$

$\frac{4a^2}{4}=\frac{49}{4}$

$\sqrt{a^2}=\sqrt{\frac{49}{4}}$ $\boxed{a=\pm\frac{7}{2}}$

5. $6m-17=8m-31$

$-6m \quad -6m$

$-17=2m-31$

$+31 \quad +31$

$\frac{14}{2}=\frac{2m}{2}$ $\boxed{7=m}$

6. $\frac{1}{2}(4-14y)=y+50$

$2-7y=y+50$

$-y \quad -y$

$2-8y=50$

$-2 \quad -2$

$-8y=48$ $\boxed{y=-6}$

7. $12-(3r+2)=-7(r+6)$

$12-3r-2=-7r-42$

$-3r+10=-7r-42$

$+7r \quad +7r$

$4r+10=-42$

$-10 \quad -10$

$\frac{4r}{4}=\frac{-52}{4}$ $\boxed{r=-13}$

8. $4(2p-5)=-18-2(1-4p)$

$8p-20=-18-2+8p$

$8p-20=-20+8p$

$-8p \quad -8p$

$-20=-20$ $\boxed{\text{all}}$

9. $-3(n-5)=3(n-9)$

$-3n+15=3n-27$

$+3n \quad +3n$

$15=6n-27$

$+27 \quad +27$

$\frac{42}{6}=\frac{6n}{6}$ $\boxed{7=n}$

10. $8(3c-5)=7(c-8)-1$

$24c-40=7c-56-1$

$24c-40=7c-57$

$-7c \quad -7c$

$17c-40=-57$

$+40 \quad +40$

$\frac{17c}{17}=\frac{-17}{17}$ $\boxed{c=-1}$

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Directions: Translate each equation. **Do not solve!**

11. "Five less than a number squared is 76."

$n^2 - 5 = 76$

12. "The sum of 9 and the product of a number and -7 is -19."

$-7n + 9 = -19$

13. "The difference between four-ninths of a number and 7 is 5."

$\frac{4}{9}n - 7 = 5$

14. "The quotient of a number and 0.8, decreased by 11, is 31."

$\frac{n}{0.8} - 11 = 31$

15. "Twice a number, increased by 13, is -21."

$2n + 13 = -21$

16. "14 subtracted from a number, divided by 3, equals -8."

$\frac{n-14}{3} = -8$

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

17. Lynn put $3\frac{7}{8}$ gallons of gas in her gas tank. If there are now $18\frac{1}{6}$ gallons in the tank, how many gallons did she start with?

let x = gallons at start

$x + 3\frac{7}{8} = 18\frac{1}{6}$

$x + \frac{31}{8} = \frac{109}{6}$

$-\frac{31}{8} \quad -\frac{31}{8}$

$\frac{109}{6} - \frac{31}{8}$

$\frac{436}{24} - \frac{93}{24}$

$x = \frac{343}{24}$

$14\frac{7}{24}$ gallons

18. Max is already 224 miles into his road trip. If he is averaging 52 miles per hour and the trip is 640 miles total, how many more hours does he have left to drive?

let x = hours left

$52x = 640 - 224$

$\frac{52x}{52} = \frac{416}{52}$

$x = 8$

8 hours

19. The sum of two numbers is 91. The smaller number is thirteen less than the larger number. Find both numbers.

let x = larger #

let $x - 13$ = smaller #

$x + x - 13 = 91$

$2x - 13 = 91$

$+13 \quad +13$

$\frac{2x}{2} = \frac{104}{2}$

$x = 52$

52 and 39

20. Sean and Evan are selling rolls of wrapping paper to raise money for new football uniforms. Evan has sold seven more than one-half the number of rolls that Sean has. If they have sold a total of 121 rolls, how many has Ethan sold?

let x = Sean's sales

let $\frac{1}{2}x + 7$ = Evan's sales

$x + \frac{1}{2}x + 7 = 121$

$\frac{3}{2}x + 7 = 121$

$-7 \quad -7$

$\frac{2}{3} \cdot \frac{3}{2}x = 114 \cdot \frac{2}{3}$

$x = 76$

45 rolls

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Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 3:** Equations & Inequalities

Quiz 3-3: Equations & Applications

Directions: Solve each equation. Show all work.

1. $61 = 7 - 6x$

$-7 \quad -7$

$\frac{54}{-6} = \frac{-6x}{-6}$

$-9 = x$

2. $\frac{3}{2}a - 26 = -5$

$+26 \quad +26$

$\frac{2}{3} \cdot \frac{3}{2}a = 21 \cdot \frac{2}{3}$

$a = 14$

3. $4 = \frac{n-10}{-3} \cdot -3$

$-12 = n - 10$

$+10 \quad +10$

$-2 = n$

4. $\frac{k^2}{1.2} - 7 = 23$

$+7 \quad +7$

$1.2 \cdot \frac{k^2}{1.2} = 30 \cdot 1.2$

$\sqrt{k^2} = \sqrt{36}$

$k = \pm 6$

5. $4(2y+7) - (y+13) = -20$

$8y + 28 - y - 13 = -20$

$7y + 15 = -20$

$-15 \quad -15$

$\frac{7y}{7} = \frac{-35}{7}$ $y = -5$

6. $4p - 7 = 10p + 11$

$-4p \quad -4p$

$-7 = 6p + 11$

$-11 \quad -11$

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

$-3 = p$

7. $4(3c-2) = 12(c+2)$

$12c - 8 = 12c + 24$

$-12c \quad -12c$

$-8 \neq 24$

8. $13 - v + 3 = 2(v - 10)$

$-v + 16 = 2v - 20$

$+v \quad +v$

$16 = 3v - 20$

$+20 \quad +20$

$\frac{36}{3} = \frac{3v}{3}$ $12 = v$

9. $4(3r-4) = 3(r+9) + 2$

$12r - 16 = 3r + 27 + 2$

$12r - 16 = 3r + 29$

$-3r \quad -3r$

$9r - 16 = 29$

$+16 \quad +16$

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

10. $\frac{4}{5}(10m + 30) = -3(m+3)$

$8m + 24 = -3m - 9$

$+3m \quad +3m$

$11m + 24 = -9$

$-24 \quad -24$

$\frac{11m}{11} = \frac{-33}{11}$ $m = -3$

1.	$x = -9$
2.	$a = 14$
3.	$n = -2$
4.	$k = \pm 6$
5.	$y = -5$
6.	$p = -3$
7.	$\emptyset$
8.	$v = 12$
9.	$r = 5$
10.	$m = -3$

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Directions: Translate each equation. **Do not solve.**

11. "A number decreased by 24 is -1."

12. "The sum of half a number and 13 is 9."

13. "15 subtracted from the product of a number and 4 is -59."

14. "The difference between a number squared and 10 is 71."

15. "One more than three-eighths of a number is eleven."

16. "The quotient of a number increased by 9 and 4 is -2."

11. $n-24=-1$

12. $\frac{1}{2}n+13=9$

13. $4n-15=-59$

14. $n^2-10=71$

15. $\frac{3}{8}n+1=11$

16. $\frac{n+9}{4}=-2$

Directions: Define a variable, set up an equation, then solve. **Only algebraic solutions are accepted.**

17. Sam is an accountant. He finds that he spends two-fifths of his work day answering emails. If he spent 3.6 hours answering emails yesterday, how many hours did he work?

let x = hours worked

$\frac{5}{2} \cdot \frac{2}{5}x = 3.6 \cdot \frac{5}{2}$

$x = 9$

18. Elaina charged $83 on her credit card to buy groceries. If the balance is now $294, what was the balance before she bought groceries?

let x = beginning balance

$x+83=294$

$-83 \quad -83$

$x = 211$

19. Max spends three times as long on his math homework than he does on his science homework. If he spent a total of 64 minutes on math and science homework last night, how long did he spend on math homework?

let x = science HW

let $3x$ = Math HW

$x+3x=64$

$\frac{4x}{4}=\frac{64}{4}$

$x=16$

20. The Gardenview Hotel is seventeen less than twice the height of the Plaza Hotel. If their combined height is 361 feet, how tall is the Gardenview Hotel?

let x = Plaza height

let $2x-17$ = Gardenview height

$x+2x-17=361$

$3x-17=361$

$+17 \quad +17$

$\frac{3x}{3}=\frac{378}{3}$

$x = 126$

17.	9 hours
18.	$211
19.	48 minutes
20.	235 feet

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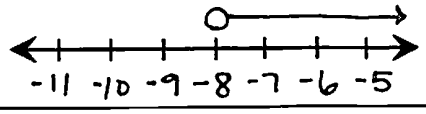
Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples			
inequality symbols	**LESS THAN**	**LESS THAN OR EQUAL TO**	**GREATER THAN**	**GREATER THAN OR EQUAL TO**
	$<$; ○	$\leq$; ●	$>$; ○	$\geq$; ●

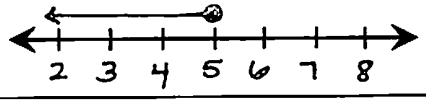
graphing inequalities

Directions: Graph each inequality on the number line.

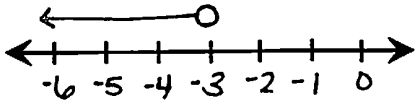
1. $x > -8$



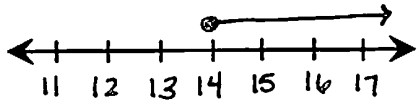
2. $k \leq 5$



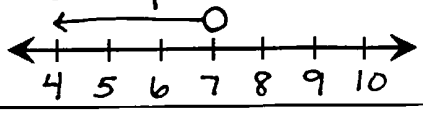
3. $m < -3$



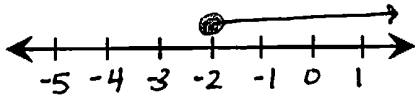
4. $p \geq 14$



5. $7 > p \rightarrow p < 7$



6. $-2 \leq n \rightarrow n \geq -2$

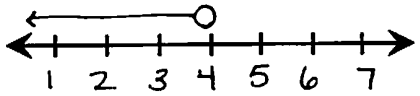


translating inequalities

Directions: Translate each inequality, then graph.

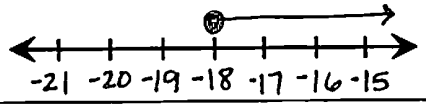
7. "A number is less than 4."

$n < 4$



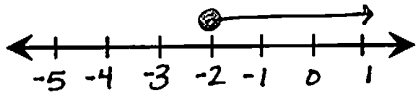
8. "A number is greater than or equal to -18."

$n \geq -18$



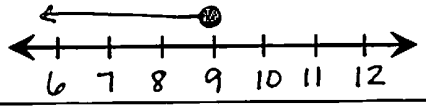
9. "A number is at least -2."

$n \geq -2$



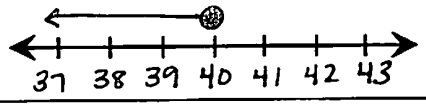
10. "A number is no more than 9."

$n \leq 9$



11. "A number is at most 40."

$n \leq 40$



solutions to inequalities

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

12. $x \geq -6$; 4

$4 \geq -6$; yes

13. $n < 8$; 11

$11 < 8$; no

14. $k \leq 2$; $\frac{4}{3}$

$\frac{4}{3} \leq 2$; yes

(1.3)

15. $a > 15$; 15

$15 > 15$; no

16. $w \leq -1.6$; 1.7

$1.7 \leq -1.6$; no

17. $r \geq -\frac{9}{5}; -\frac{3}{2}$

$-\frac{3}{2} \geq -\frac{9}{5}$; yes

(-1.5) (-1.8)

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solving inequalities

- To solve inequalities, you follow the **same steps** as solving equations.
- If you multiply or divide by a negative number, you must FLIP the inequality symbol!

two-step inequalities

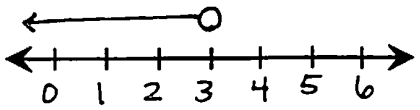
Directions: Solve each inequality and graph the solution.

18. $3x+1<10$

$-1 \quad -1$

$\frac{3x}{3} < \frac{9}{3}$

$x<3$

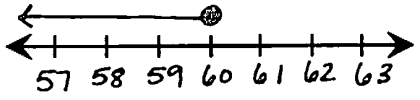


19. $\frac{a}{5}-6 \le 6$

$+6 \quad +6$

$5 \cdot \frac{a}{5} \le 12 \cdot 5$

$a \le 60$

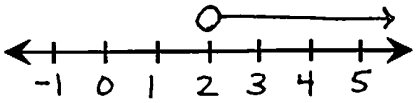


20. $-2y+22<18$

$-22 \quad -22$

$\frac{-2y}{-2} < \frac{-4}{-2}$

$y>2$

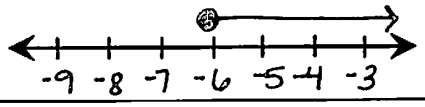


21. $7m+11 \ge -31$

$-11 \quad -11$

$\frac{7m}{7} \ge \frac{-42}{7}$

$m \ge -6$

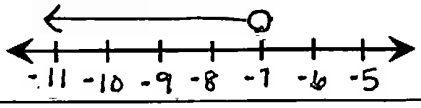


22. $\frac{w}{-7}+4>5$

$-4 \quad -4$

$-7 \cdot \frac{w}{-7} > 1 \cdot -7$

$w<-7$

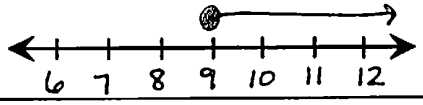


23. $4-3k \le -23$

$-4 \quad -4$

$\frac{-3k}{-3} \le \frac{-27}{-3}$

$k \ge 9$

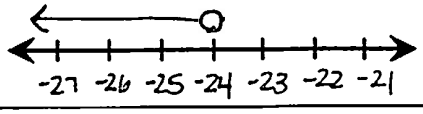


24. $\frac{3}{8}x-16<-25$

$+16 \quad +16$

$\frac{8}{3} \cdot \frac{3}{8}x < -9 \cdot \frac{8}{3}$

$x<-24$

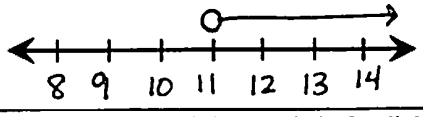


25. $\frac{-4 \cdot p+9}{-4} < -5 \cdot -4$

$p+9>20$

$-9 \quad -9$

$p>11$



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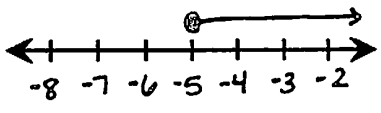
Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ Per: _____ **Homework 13:** Intro to Inequalities; Solving Two-Step Inequalities

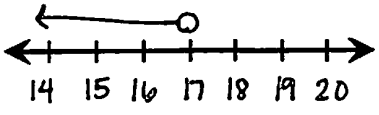
**** This is a 2-page document! ****

Directions: Graph each inequality on the number line.

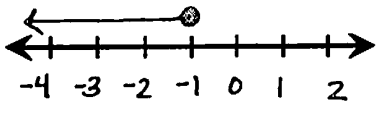
1. $x \geq -5$



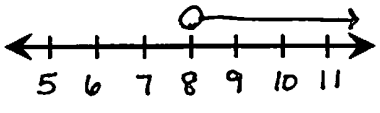
2. $n < 17$



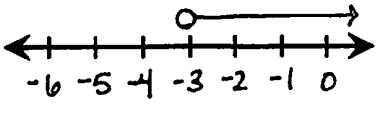
3. $k \leq -1$



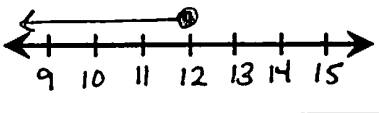
4. $a > 8$



5. $-3 < v \rightarrow v > -3$



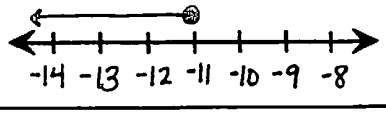
6. $12 \geq c \rightarrow c \leq 12$



Directions: Translate each inequality, then graph.

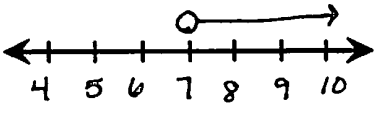
7. "A number is less than or equal to -11."

$n \leq -11$



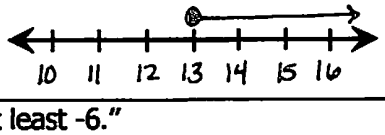
8. "A number is greater than 7."

$n > 7$



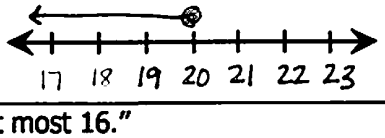
9. "A number is no less than 13."

$n \geq 13$



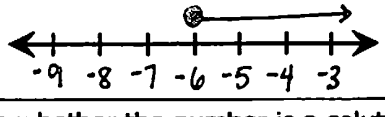
10. "A number is at maximum 20."

$n \leq 20$



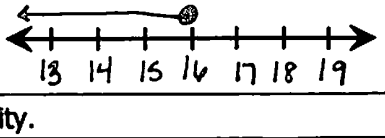
11. "A number is at least -6."

$n \geq -6$



12. "A number is at most 16."

$n \leq 16$



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

13. $x \leq -17; -15$

$-15 \leq -17$

no

14. $v > 9; 9$

$9 > 9$

no

15. $n \geq -\frac{2}{3}; -\frac{4}{9}$

$-\frac{4}{9} \geq -\frac{2}{3}$

$(-.4 \geq -.6)$

yes

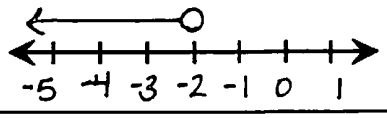
Directions: Solve each inequality and graph the solution on the number line.

16. $3x + 2 < -4$

$-2 \quad -2$

$\frac{3x}{3} < \frac{-6}{3}$

$x < -2$

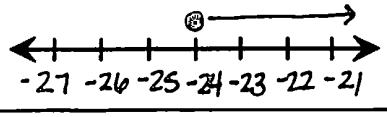


17. $\frac{k}{-8} - 5 \leq -2$

$+5 \quad +5$

$-8 \cdot \frac{k}{-8} \leq 3 \cdot -8$

$k \geq -24$



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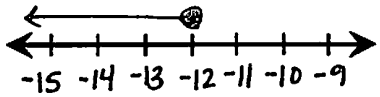
18. $-2y-11 \geq 13$

$+11 \quad +11$

$\frac{-2y}{-2} \geq \frac{24}{-2}$

$y \leq -12$

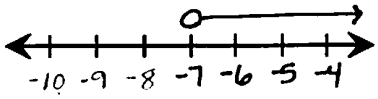


19. $4a+10 > -18$

$-10 \quad -10$

$\frac{4a}{4} > \frac{-28}{4}$

$a > -7$

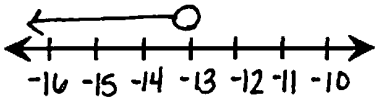


20. $2-5c > 67$

$-2 \quad -2$

$\frac{-5c}{-5} > \frac{65}{-5}$

$c < -13$

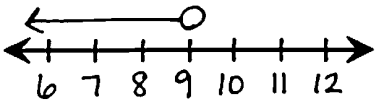


21. $16-k > 7$

$-16 \quad -16$

$\frac{-k}{-1} > \frac{-9}{-1}$

$k < 9$

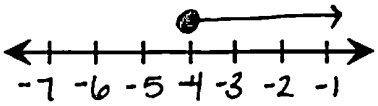


22. $-\frac{1}{2}c+5 \leq 7$

$-5 \quad -5$

$-2 \cdot -\frac{1}{2}c \leq 2 \cdot -2$

$c \geq -4$

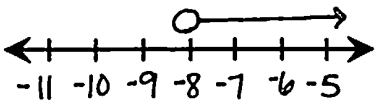


23. $\frac{5}{2}w-11 > -31$

$+11 \quad +11$

$\frac{2}{5} \cdot \frac{5}{2}w > -20 \cdot \frac{2}{5}$

$w > -8$

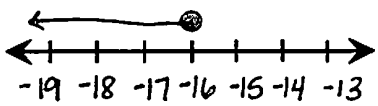


24. $\frac{x-5}{3} \leq -7$ ·3

$x-5 \leq -21$

$+5 \quad +5$

$x \leq -16$

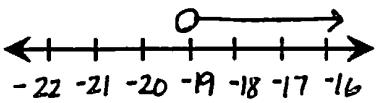


25. $\frac{r+7}{-0.6} < 20$ · -0.6

$r+7 > -12$

$-7 \quad -7$

$r > -19$



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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

MULTI-STEP INEQUALITIES

REMEMBER: You must FLIP the inequality symbol if you multiply or divide by a negative number!

Directions: Solve each inequality and graph the solution.

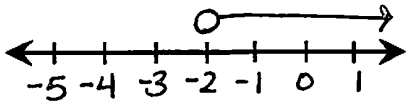
1. $3(x-4) > -18$

$3x - 12 > -18$

$+12 \quad +12$

$\frac{3x}{3} > \frac{-6}{3}$

$\boxed{x > -2}$



2. $-2(a-7) - 3a \geq -31$

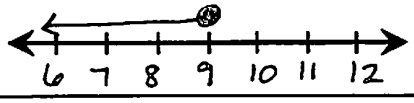
$-2a + 14 - 3a \geq -31$

$-5a + 14 \geq -31$

$-14 \quad -14$

$\frac{-5a}{-5} \geq \frac{-45}{-5}$

$\boxed{a \leq 9}$



3. $16 - 4(k+5) > -64$

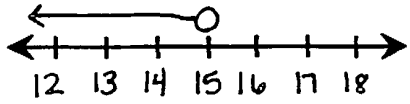
$16 - 4k - 20 > -64$

$-4k - 4 > -64$

$+4 \quad +4$

$\frac{-4k}{-4} > \frac{-60}{-4}$

$\boxed{k < 15}$



4. $\frac{4}{3}(6y+21) - 17 \geq 43$

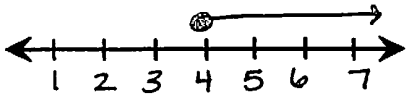
$8y + 28 - 17 \geq 43$

$8y + 11 \geq 43$

$-11 \quad -11$

$\frac{8y}{8} \geq \frac{32}{8}$

$\boxed{y \geq 4}$



5. $2w - 9 \geq 8w - 3$

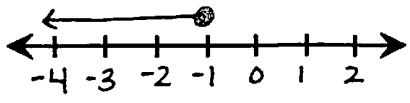
$-8w \quad -8w$

$-6w - 9 \geq -3$

$+9 \quad +9$

$\frac{-6w}{-6} \geq \frac{6}{-6}$

$\boxed{w \leq -1}$



6. $10 - r < 2r - 26$

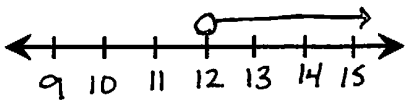
$-2r \quad -2r$

$10 - 3r < -26$

$-10 \quad -10$

$\frac{-3r}{-3} < \frac{-36}{-3}$

$\boxed{r > 12}$



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7. $-2(2m+9) > 2(5-4m)$

$-4m-18 > 10-8m$

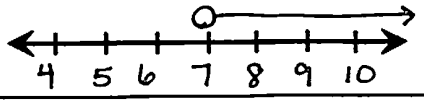
$+8m \qquad +8m$

$4m-18 > 10$

$+18 \quad +18$

$\frac{4m}{4} > \frac{28}{4}$

$\boxed{m > 7}$



8. $-3(3p-1) \le 7p+51$

$-9p+3 \le 7p+51$

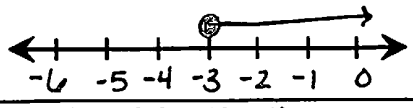
$-7p \qquad -7p$

$-16p+3 \le 51$

$-3 \quad -3$

$\frac{-16p}{-16} \le \frac{48}{-16}$

$\boxed{p \ge -3}$



9. $\frac{1}{2}(6c-14) \ge 5(c+6)+1$

$3c-7 \ge 5c+30+1$

$3c-7 \ge 5c+31$

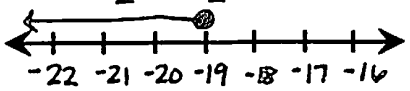
$-5c \qquad -5c$

$-2c-7 \ge 31$

$+7 \quad +7$

$\frac{-2c}{-2} \ge \frac{38}{-2}$

$\boxed{c \le -19}$



10. $13-(17-9v) > 4(v-1)$

$13-17+9v > 4v-4$

$-4+9v > 4v-4$

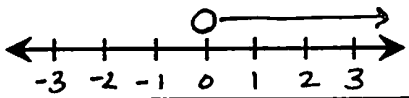
$-4v \quad -4v$

$-4+5v > -4$

$+4 \qquad +4$

$\frac{5v}{5} > \frac{0}{5}$

$\boxed{v > 0}$



11. $-2(4n-7) \le 10-3(n-8)$

$-8n+14 \le 10-3n+24$

$-8n+14 \le -3n+34$

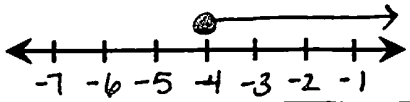
$+3n \qquad +3n$

$-5n+14 \le 34$

$-14 \quad -14$

$\frac{-5n}{-5} \le \frac{20}{-5}$

$\boxed{n \ge -4}$



12. $-n+2-n < -\frac{2}{3}(9n-63)$

$-2n+2 < -6n+42$

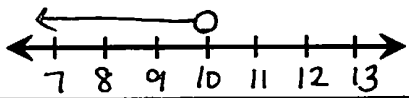
$+6n \qquad +6n$

$4n+2 < 42$

$-2 \quad -2$

$\frac{4n}{4} < \frac{40}{4}$

$\boxed{n < 10}$



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

13. $5x-16 < -64-x$

$+x \qquad +x$

$6x-16 < -64$

$+16 \quad +16$

$\frac{6x}{6} < \frac{-48}{6}$

$\boxed{x < -8}$

- ☑ -10
- ☑ -9
- ☐ -8
- ☐ -7
- ☐ -6

14. $-7(k-4) \le -1-2(8-k)$

$-7k+28 \le -1-16+2k$

$-7k+28 \le -17+2k$

$-2k \qquad -2k$

$-9k+28 \le -17$

$-28 \quad -28$

$\frac{-9k}{-9} \le \frac{-45}{-9}$

$\boxed{k \ge 5}$

- ☐ 4
- ☑ 5
- ☑ 6
- ☑ 7
- ☑ 8

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 14:** Multi-Step Inequalities

**** This is a 2-page document! ****

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

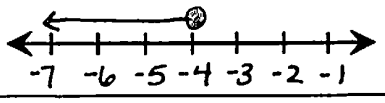
1. $6(x-1) \le -30$

$6x - 6 \le -30$

$+6 \quad +6$

$\frac{6x}{6} \le \frac{-24}{6}$

$x \le -4$



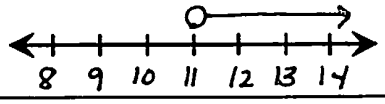
2. $-2(p-7) < -8$

$-2p + 14 < -8$

$-14 \quad -14$

$\frac{-2p}{-2} < \frac{-22}{-2}$

$p > 11$



3. $-2(4a+4)+5a > -35$

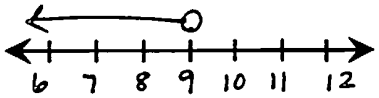
$-8a - 8 + 5a > -35$

$-3a - 8 > -35$

$+8 \quad +8$

$\frac{-3a}{-3} > \frac{-27}{-3}$

$a < 9$



4. $29 - 2(3-5w) \ge 13$

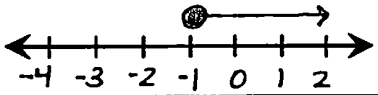
$29 - 6 + 10w \ge 13$

$23 + 10w \ge 13$

$-23 \quad -23$

$\frac{10w}{10} \ge \frac{-10}{10}$

$w \ge -1$



5. $3k + 23 < 7k - 41$

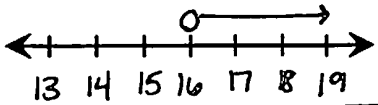
$-7k \quad -7k$

$-4k + 23 < -41$

$-23 \quad -23$

$\frac{-4k}{-4} < \frac{-64}{-4}$

$k > 16$



6. $10 - r \le -25 - 6r$

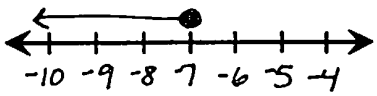
$+6r \quad +6r$

$10 + 5r \le -25$

$-10 \quad -10$

$\frac{5r}{5} \le \frac{-35}{5}$

$r \le -7$



7. $-2(5v-12) > 6 - v$

$-10v + 24 > 6 - v$

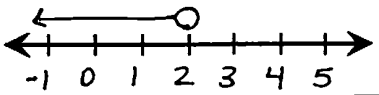
$+v \quad +v$

$-9v + 24 > 6$

$-24 \quad -24$

$\frac{-9v}{-9} > \frac{-18}{-9}$

$v < 2$



8. $4(3m+10) \ge -3m - 51 + 8m$

$12m + 40 \ge 5m - 51$

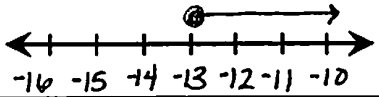
$-5m \quad -5m$

$7m + 40 \ge -51$

$-40 \quad -40$

$\frac{7m}{7} \ge \frac{-91}{7}$

$m \ge -13$



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9. $4(3h-7) \le 20(h-1)$

$12h - 28 \le 20h - 20$

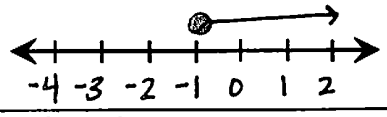
$-20h \quad -20h$

$-8h - 28 \le -20$

$+28 \quad +28$

$\frac{-8h}{-8} \le \frac{8}{-8}$

$h \ge -1$



10. $\frac{3}{2}(4y-10) \le 2(y+8)+1$

$6y - 15 \le 2y + 16 + 1$

$6y - 15 \le 2y + 17$

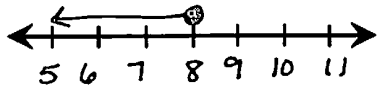
$-2y \quad -2y$

$4y - 15 \le 17$

$+15 \quad +15$

$\frac{4y}{4} \le \frac{32}{4}$

$y \le 8$



11. $7-3(6c+14) > 5(1-2c)$

$7 - 18c - 42 > 5 - 10c$

$-18c - 35 > 5 - 10c$

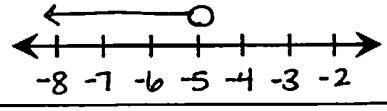
$+10c \quad +10c$

$-8c - 35 > 5$

$+35 \quad +35$

$\frac{-8c}{-8} > \frac{40}{-8}$

$c < -5$



12. $2(n+14) > -\frac{1}{2}(70+2n)$

$2n + 28 > -35 - n$

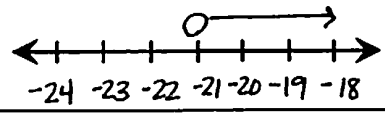
$+n \quad +n$

$3n + 28 > -35$

$-28 \quad -28$

$\frac{3n}{3} > \frac{-63}{3}$

$n > -21$



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

13. $2(2x-9) \le 6$

$4x - 18 \le 6$

$+18 \quad +18$

$\frac{4x}{4} \le \frac{24}{4}$

$x \le 6$

- ☑ 3
- ☑ 4
- ☑ 5
- ☑ 6
- ☐ 7

14. $4c - 9 < 6c + 25$

$-6c \quad -6c$

$-2c - 9 < 25$

$+9 \quad +9$

$\frac{-2c}{-2} < \frac{34}{-2}$

$c > -17$

- ☐ -18
- ☐ -17
- ☑ -16
- ☑ -15
- ☑ -14

15. $-3(2n-11) > n+26$

$-6n + 33 > n + 26$

$-n \quad -n$

$-7n + 33 > 26$

$-33 \quad -33$

$\frac{-7n}{-7} > \frac{-7}{-7}$

$n < 1$

- ☑ 0
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4

16. $2(6p-5) \ge 3(p-8)-1$

$12p - 10 \ge 3p - 24 - 1$

$12p - 10 \ge 3p - 25$

$-3p \quad -3p$

$9p - 10 \ge -25$

$+10 \quad +10$

$\frac{9p}{9} \ge \frac{-15}{9}$

$p \ge -\frac{5}{3}$ $(-1.\overline{6})$

- ☐ -2
- ☐ $-\frac{9}{5}$ (-1.8)
- ☑ $-\frac{3}{2}$ (-1.5)
- ☑ $-\frac{7}{8}$ $(.875)$
- ☑ $-\frac{1}{5}$ $(-.2)$

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RIDDLE: What do you Call a Number that can't Keep Still?

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

E. $3(2x-9) \le -3$ $6x-27 \le -3$ $x \le 4$

A. $-4(2x-5) < 76$ $-8x+20 < 76$ $x > -7$

R. $8-2(2x+9) < 42$ $-4x-10 < 42$ $x > -13$

L. $-\frac{1}{2}(8-14x) \le 59$ $-4+7x \le 59$ $x \le 9$

4. $7(x+3)-2x > -14$ $5x+21 > -14$ $x > -7$

14. $5x-(8x-17) \ge -10$ $-3x+17 \ge -10$ $x \le 9$

11. $-3(3x+5) \ge -51$ $-9x-15 \ge -51$ $x \le 4$

2. $\frac{3}{4}(8x+20)-4x > -11$ $2x+15 > -11$ $x > -13$

SET 2

I. $9a-13 \ge 12a+11$ $-3a \ge 24$ $a \le -8$

M. $7-a < a-15$ $-2a < -22$ $a > 11$

N. $6a-11 < 29-2a$ $8a < 40$ $a < 5$

A. $25-9a \ge 11-16a$ $7a \ge -14$ $a \ge -2$

U. $-a-29 < 2a+19$ $-3a < 48$ $a > -16$

7. $4a+21 > 10a-9$ $-6a > -30$ $a < 5$

9. $12a+52 > -28+7a$ $5a > -80$ $a > -16$

1. $14a+7 \ge -31-5a$ $19a \ge -3a$ $a \ge -2$

6. $5-2a \le -6a-27$ $4a \le -32$ $a \le -8$

10. $2a-3 < 7a-58$ $-5a < -55$ $a > 11$

SET 3

M. $10(k-3) \le 3(k+4)$ $10k-30 \le 3k+12$ $k \le 6$

R. $\frac{5}{6}(12k+30) \ge 2k+17$ $10k+25 \ge 2k+17$ $k \ge -1$

N. $-3(k+8) < 2(k+13)$ $-3k-24 < 2k+26$ $k > -10$

A. $5(k-5) > 3k-(2k-3)$ $5k-25 > k+3$ $k > 7$

O. $-2(5k-7) \le 11-3(k+6)$ $-10k+14 \le -3k-7$ $k \ge 3$

13. $-3(2k-9) < 3(k-12)$ $-6k+27 < 3k-36$ $k > 7$

5. $4(5-3k) \ge -4(2k+1)$ $20-12k \ge -8k-4$ $k \le 6$

3. $2(5k+6) \ge 2(2k+15)$ $10k+12 \ge 4k+30$ $k \ge 3$

12. $14-2(2k-11) \le 39-k$ $-4k+36 \le 39-k$ $k \ge -1$

8. $-3(4k-15) > -\frac{5}{3}(12k+21)$ $-12k+45 > -20k-35$ $k > -10$

ANSWER:

1.		2.	3.	4.	5.	6.	7.	'		8.	9.	10.	11.	12.	13.	14.	
A		R	O	A	M	I	N			N	U	M	E	R	A	L	!

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TRANSLATING & SOLVING *Inequalities*

	Translate	Solve
1	"Seven more than three times a number is greater than thirty-four."	$3n+7>34$ $-7\ \ -7$ $\frac{3n}{3}>\frac{27}{3}$ $\boxed{n>9}$
	Inequality: $3n+7>34$	
2	"Fifteen less than twice a number is less than or equal to -23."	$2n-15\le -23$ $+15\ \ +15$ $\frac{2n}{2}\le\frac{-8}{2}$ $\boxed{n\le -4}$
	Inequality: $2n-15\le -23$	
3	"The product of a number and -7, increased by 9, is at most 16."	$-7n+9\le 16$ $-9\ \ -9$ $\frac{-7n}{-7}\le\frac{7}{-7}$ $\boxed{n\ge -1}$
	Inequality: $-7n+9\le 16$	
4	"The difference between eleven and one-fourth of a number is no less than -8."	$11-\frac{1}{4}n\ge -8$ $-11\ \ -11$ $-4\cdot -\frac{1}{4}n\ge -19\cdot -4$ $\boxed{n\le 76}$
	Inequality: $11-\frac{1}{4}n\ge -8$	
5	"10 subtracted from the quotient of a number and -3 is at least -1."	$\frac{n}{-3}-10\ge -1$ $+10\ \ +10$ $-3\cdot\frac{n}{-3}\ge 9\cdot -3$ $\boxed{n\le -27}$
	Inequality: $\frac{n}{-3}-10\ge -1$	
6	"The sum of seven-eighths of a number and 20 is 34 at minimum."	$\frac{7}{8}n+20\ge 34$ $-20\ \ -20$ $\frac{8}{7}\cdot\frac{7}{8}n\ge 14\cdot\frac{8}{7}$ $\boxed{n\ge 16}$
	Inequality: $\frac{7}{8}n+20\ge 34$	
7	"A number decreased by 19, divided by -6, is no more than 5."	$-6\cdot\frac{n-19}{-6}\le 5\cdot -6$ $n-19\ge -30$ $+19\ \ +19$ $\boxed{n\ge -11}$
	Inequality: $\frac{n-19}{-6}\le 5$	

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MORE INEQUALITY WORD PROBLEMS

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

8 The school will not announce a snow day unless there is at least 10 inches of snow on the ground. If it has already snowed 1.5 inches, how much more must it snow before school is canceled?

let x = amt of snow

$x + 1.5 \geq 10$

$-1.5 \quad -1.5$

$x \geq 8.5$

At least 8.5 in

9 Mrs. Aries hired Jack, a math tutor, to help her son. Due to her budget, she can pay him no more than $420 per month. If Jack charges $35 per hour, how many hours can he tutor Mrs. Aries son each month?

let x = # hours

$\frac{35x}{35} \leq \frac{420}{35}$

$x \leq 12$

At most 12 hrs

10 The Parkview Middle School Football team will be playing in the state championship. The coach has free tickets that he will be distributing to his 52 football players to give to their friends and family. If he would like to give each player at least 3 tickets, how many total tickets must he have?

let x = # tickets

$52 \cdot \frac{x}{52} \geq 3 \cdot 52$

$x \geq 156$

Minimum of 156 tickets

11 Kevin is taking a two-part test in social studies Part 1 is multiple choice and worth 60 points. Part 2 is an essay portion and worth 40 points. He must earn at least 86 points to pass the class. If his teacher already graded Part 1 and he earned 54 points, how many points will he need to earn on Part 2?

let x = part 2 score

$54 + x \geq 86$

$-54 \quad -54$

$x \geq 32$

At least 32 points

12 Caitlyn works a part-time job at the bookstore which pays $55 a week. She has already saved $120 towards the purchase of a new $450 iPad. How many weeks must she work in order to have more than the amount of money to buy the iPad?

let x = # weeks worked

$55x + 120 > 450$

$-120 \quad -120$

$55x > 330$

$x > 6$

More than 6 weeks

13 The parking meter charges $2 for the first hour, then $0.75 for each hour thereafter. Nate only has $5. How many hours can he park?

let x = # hrs after 1st

$2 + 0.75x \leq 5$

$-2 \quad -2$

$0.75x \leq 3$

$\frac{0.75x}{0.75} \leq \frac{3}{0.75}$

$x \leq 4$

Maximum of 5 hours

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Name: _____ **Unit 3:** Equations & Inequalities

Date: _____ **Per:** _____ **Homework 15:** Inequality Word Problems

**** This is a 2-page document! ****

Directions: Translate and solve each inequality.

1. "Ten subtracted from the quotient of a number and 7 is less than -6."

$\frac{n}{7} - 10 < -6$

$+10 \quad +10$

$7 \cdot \frac{n}{7} < 4 \cdot 7$

$\boxed{n < 28}$

2. "The sum of -6 times a number and 17 is greater than or equal to -7."

$-6n + 17 \geq -7$

$-17 \quad -17$

$\frac{-6n}{-6} \geq \frac{-24}{-6}$

$\boxed{n \leq 4}$

3. "The difference between four-fifths of a number and 23 is greater than 1."

$\frac{4}{5}n - 23 > 1$

$+23 \quad +23$

$\frac{5}{4} \cdot \frac{4}{5} n > 24 \cdot \frac{5}{4}$

$\boxed{n > 30}$

4. "The product of a number and -8, decreased by 13 is less than or equal to 27."

$-8n - 13 \leq 27$

$+13 \quad +13$

$\frac{-8n}{-8} \leq \frac{40}{-8}$

$\boxed{n \geq -5}$

5. "Twenty-five less than three times a number is at least 26."

$3n - 25 \geq 26$

$+25 \quad +25$

$\frac{3n}{3} \geq \frac{51}{3}$

$\boxed{n \geq 17}$

6. "Negative one-fifth of a number, increased by 3, is at most 1."

$-\frac{1}{5}n + 3 \leq 1$

$-3 \quad -3$

$-5 \cdot -\frac{1}{5} n \leq -2 \cdot -5$

$\boxed{n \geq 10}$

7. "Twice a number subtracted from 11 is no less than 27."

$11 - 2n \geq 27$

$-11 \quad -11$

$\frac{-2n}{-2} \geq \frac{16}{-2}$

$\boxed{n \leq -8}$

8. "Nine more than a number, divided by -4, is a maximum of -2."

$\frac{n+9}{-4} \leq -2 \cdot -4$

$n + 9 \geq 8$

$-9 \quad -9$

$\boxed{n \geq -1}$

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Directions: Define a variable, set up an inequality, and solve. Only algebraic solutions are accepted.

9. Ben wrestles in the 132- to 138-pound weight class. If he currently weighs 133 pounds, how much weight can he gain if he wishes to stay in the same class?

let x = weight

$x + 133 \leq 138$

$-133 \quad -133$

$x \leq 5$

At most 5 lbs

10. Mikayla has three savings accounts that she distributes her money into each paycheck. If she wishes to put at least \$80 in each account this paycheck, how much money must she make?

let x = amt earned

$3 \cdot \frac{x}{3} \geq 80 \cdot 3$

$x \geq 240$

At least \$240

11. Trent's mom said he could spend no more than \$12 for rides at the carnival. If the rides cost \$0.75 each, how many rides can he go on?

let x = # rides

$\frac{0.75x}{0.75} \leq \frac{12}{0.75}$

$x \leq 16$

Maximum of 16 rides

12. Sally has 42 cookies. She wants to eat some and share some with her class. If she hopes to share at least 35 of them with her class, how many cookies can she eat?

let x = # cookies

$42 - x \geq 35$

$-42 \quad -42$

$\frac{-x}{-1} \geq \frac{-7}{-1}$

$x \leq 7$

At most 7 cookies

13. So far, two-thirds of the seniors bought prom tickets. If they need a minimum of 250 people to attend in order keep the venue, how many students must be in the senior class to ensure they sold enough tickets?

let x = # students

$\frac{3}{2} \cdot \frac{2}{3} x \geq 250 \cdot \frac{3}{2}$

$x \geq 375$

At least 375 students

14. Adalyn is stocking up on cans of soup for the winter. They are on sale for \$2.25 each and she has a \$3 coupon. If she can spend no more than \$30 on soup, how many cans can she buy?

let x = # cans

$2.25x - 3 \leq 30$

$+3 \quad +3$

$\frac{2.25x}{2.25} \leq \frac{33}{2.25}$

$x \leq 14.67$

At most 14 cans

15. Chris is on vacation at a lake house for the weekend and decided to rent a canoe for the day. They a charge \$10 service fee plus \$38 per hour and he can spend at most \$200, how many hours can he rent the canoe?

let x = # hours

$10 + 38x \leq 200$

$-10 \quad -10$

$\frac{38x}{38} \leq \frac{190}{38}$

$x \leq 5$

At most 5 hours

16. Kendall is selling bags of popcorn to raise money for her soccer team. If she has raised \$104 so far and the popcorn bags cost \$8 each, how many more must she sell in order to raise at least \$400?

let x = # bags

$104 + 8x \geq 400$

$-104 \quad -104$

$8x \geq 296$

$x \geq 37$

At least 37 bags

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Name: _____ **Pre-Algebra**

Date: _____ **Per:** _____ **Unit 3:** Equations & Inequalities

Quiz 3-4: Inequalities

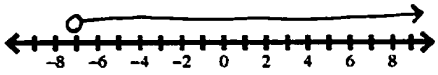
Directions: Solve each inequality, write your solution to the right, then graph.

1. $9x - 2 > -65$

$+2 \quad +2$

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

$x > -7$

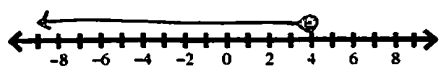


2. $-2m + 7 \geq -1$

$-7 \quad -7$

$\frac{-2m}{-2} \leq \frac{-8}{-2}$

$m \leq 4$

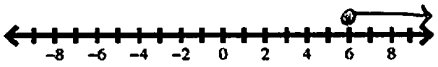


3. $-19 + \frac{7}{3}k \geq -5$

$+19 \quad +19$

$\frac{3}{7} \cdot \frac{7}{3}k \geq 14 \cdot \frac{3}{7}$

$k \geq 6$

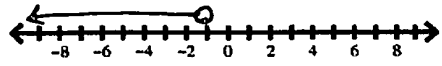


4. $\frac{a+13}{-3} > -4 \cdot -3$

$a + 13 < 12$

$-13 \quad -13$

$a < -1$



5. $-2(3v - 7) + v \geq 29$

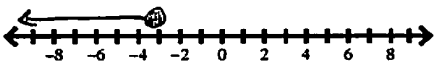
$-6v + 14 + v \geq 29$

$-5v + 14 \geq 29$

$-14 \quad -14$

$\frac{-5v}{-5} \leq \frac{15}{-5}$

$v \leq -3$



6. $-5p + 11 > 43 - 9p$

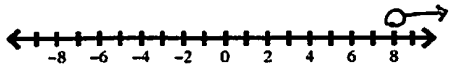
$+9p \quad +9p$

$4p + 11 > 43$

$-11 \quad -11$

$\frac{4p}{4} > \frac{32}{4}$

$p > 8$



7. $9 - (n + 17) > 3(2n + 9)$

$9 - n - 17 > 6n + 27$

$-n - 8 > 6n + 27$

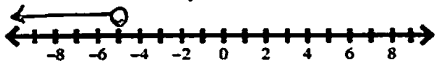
$-6n \quad -6n$

$-7n - 8 > 27$

$+8 \quad +8$

$-7n > 35$

$n < -5$



8. $-6(y - 1) \leq \frac{1}{3}(6y - 30)$

$-6y + 6 \leq 2y - 10$

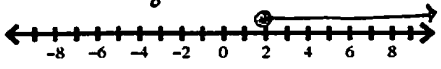
$-2y \quad -2y$

$-8y + 6 \leq -10$

$-6 \quad -6$

$\frac{-8y}{-8} \leq \frac{-16}{-8}$

$y \geq 2$



1.	$x > -7$
2.	$m \leq 4$
3.	$k \geq 6$
4.	$a < -1$
5.	$v \leq -3$
6.	$p > 8$
7.	$n < -5$
8.	$y \geq 2$

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9. Which numbers are solutions to the inequality below? Check all that apply.

$-4x - 19 > 33$

$+19 \quad +19$

$\frac{-4x}{-4} > \frac{52}{-4}$

$x < -13$

☑ -15 ☑ -14 ☐ -13 ☐ -12 ☐ -11 ☐ -10

Directions: Translate each inequality. **Do not solve.**

10. "The sum of twice a number and 15 is greater than 3."

11. "18 less than the quotient of a number and -5 is at most -2."

12. "Seven more than three-fourths of a number is no less than 31."

13. "The difference between 10 and the product of a number and 9 is -73 at maximum."

10. $2n + 15 > 3$

11. $\frac{n}{-5} - 18 \leq -2$

12. $\frac{3}{4}n + 7 \geq 31$

13. $10 - 9n \leq -73$

Directions: Define a variable, set up an inequality, then solve. **Only algebraic solutions are accepted.**

14. Meghan made $458 in her last paycheck. If she would like to save at least $175 of it, how much can she spend?

let x = money spent

$458 - x \geq 175$

$-458 \quad -458$

$\frac{-x}{-1} \geq \frac{-283}{-1}$

$x \leq 283$

14. $\leq \$283$

15. Ryan is planning a party for his parents' anniversary. The caterer charges a delivery fee of $14 plus an additional $5.25 per person. If he can spend no more than $350, how many people can he invite?

let x = # invited

$14 + 5.25x \leq 350$

$-14 \quad -14$

$\frac{5.25x}{5.25} \leq \frac{336}{5.25}$

$x \leq 64$

15. ≤ 64 people

16. The eighth grade class is planning a trip to Washington, D.C. this spring. They need a minimum of 75 people to attend in order to reserve buses. If one-third of the 8th grade class plus 17 parent chaperones have signed up and this is enough to satisfy the requirement, how many students must be in the 8th grade class?

let x = # students

$\frac{1}{3}x + 17 \geq 75$

$-17 \quad -17$

$3 \cdot \frac{1}{3}x \geq 58 \cdot 3$

$x \geq 174$

16. ≥ 174 students

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Unit 3 Test Study Guide
(Equations & Inequalities)

Name: _____

Date: _____ Per: _____

Topic 1: One- and Two-Step Equations

Directions: Solve each equation. Check all solutions.

1. $\frac{-4n}{-4} = \frac{-68}{-4}$

$n = 17$

2. $2.4 \cdot -5 = \frac{x}{2.4} \cdot 2.4$

$-12 = x$

3. $k + \frac{5}{3} = -\frac{7}{4}$

$-\frac{5}{3} \quad -\frac{5}{3}$

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

$-\frac{21}{12} - \frac{20}{12}$

$k = \frac{-41}{12}$

4. $7a - 3 = -31$

$+3 \quad +3$

$\frac{7a}{7} = \frac{-28}{7}$

$a = -4$

5. $16 = 40 - 3p$

$-40 \quad -40$

$\frac{-24}{-3} = \frac{-3p}{-3}$

$8 = p$

6. $-17 + \frac{1}{2}m = -29$

$+17 \quad +17$

$2 \cdot \frac{1}{2}m = -12 \cdot 2$

$m = -24$

7. $\frac{7}{3}w + 19 = -2$

$-19 \quad -19$

$\frac{3}{7} \cdot \frac{7}{3}w = -21 \cdot \frac{3}{7}$

$w = -9$

8. $6 \cdot \frac{r-7}{6} = -5 \cdot 6$

$r - 7 = -30$

$+7 \quad +7$

$r = -23$

9. $-8 \cdot -1.5 = \frac{c+13}{-8} \cdot -8$

$12 = c + 13$

$-13 \quad -13$

$-1 = c$

Topic 2: Solving Equations by Square Roots

Directions: Solve each equation. Check all solutions.

10. $-2 \cdot \frac{m^2}{-2} = -98 \cdot -2$

$\sqrt{m^2} = \sqrt{196}$

$m = \pm 14$

11. $9x^2 - 7 = 18$

$+7 \quad +7$

$\frac{9x^2}{9} = \frac{25}{9}$

$\sqrt{x^2} = \sqrt{\frac{25}{9}}$

$x = \pm \frac{5}{3}$

12. $\frac{3}{4}y^2 - 11 = 232$

$+11 \quad +11$

$\frac{4}{3} \cdot \frac{3}{4}y^2 = 243 \cdot \frac{4}{3}$

$\sqrt{y^2} = \sqrt{324}$

$y = \pm 18$

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Topic 3: Multi-Step Equations

Directions: Solve each equation. Check all solutions. *Watch out for special solutions!

13. $6x - 3 - 11 - 8x = 2$

$-2x - 14 = 2$

$+14 \quad +14$

$-2x = 16$

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

$\boxed{x = -8}$

14. $-9(m + 3) + 14 = -49$

$-9m - 27 + 14 = -49$

$-9m - 13 = -49$

$+13 \quad +13$

$\frac{-9m}{-9} = \frac{-36}{-9}$

$\boxed{m = 4}$

15. $13n + 26 = 8n - 29$

$-8n \quad -8n$

$5n + 26 = -29$

$-26 \quad -26$

$\frac{5n}{5} = \frac{-55}{5}$

$\boxed{n = -11}$

16. $5(2p - 6) = -4(p - 3)$

$10p - 30 = -4p + 12$

$+4p \quad +4p$

$14p - 30 = 12$

$+30 \quad +30$

$\frac{14p}{14} = \frac{42}{14}$

$\boxed{p = 3}$

17. $-2(3a - 8) = \frac{2}{3}(3a - 60)$

$-6a + 16 = 2a - 40$

$-2a \quad -2a$

$-8a + 16 = -40$

$-16 \quad -16$

$\frac{-8a}{-8} = \frac{-56}{-8}$

$\boxed{a = 7}$

18. $2(2v - 9) + 1 = -5v - 17 + 9v$

$4v - 18 + 1 = 4v - 17$

$4v - 17 = 4v - 17$

$-4v \quad -4v$

$-17 = -17$

$\boxed{\infty}$

19. $13 - 2(4r - 5) = 5 - (7 + 8r)$

$13 - 8r + 10 = 5 - 7 - 8r$

$-8r + 23 = -2 - 8r$

$+8r \quad +8r$

$23 \neq -2$

$\boxed{\emptyset}$

20. $3(3k - 10) + 1 = 8\left(\frac{3}{2}k + 2\right)$

$9k - 30 + 1 = 12k + 16$

$9k - 29 = 12k + 16$

$-12k \quad -12k$

$-3k - 29 = 16$

$+29 \quad +29$

$-3k = 45$

$\boxed{k = -15}$

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Topic 4: Translating Equations/Equations Word Problems

Directions: Translate each equation. **Do not solve.**

21. "Five less than the product of a number and -8 is -77."

$-8n - 5 = -77$

22. "The sum of two-ninths of a number and 17 is 21."

$\frac{2}{9}n + 17 = 21$

23. "Ten subtracted from the quotient of a number and 5 is 18."

$\frac{n}{5} - 10 = 18$

24. "The difference between twice a number and 41 is -23."

$2n - 41 = -23$

25. "Fifteen more than a number squared is 19."

$n^2 + 15 = 19$

26. "The quotient of a number decreased by 7 and -2 is -10."

$\frac{n-7}{-2} = -10$

Directions: Define a variable, set up an equation, and solve.

27. The population of Metsville is 1,274 people less than the population of Eden. If the population of Eden is 9,021 people, what is the population of Metsville?

let x = population of Metsville

$x + 1274 = 9021$

$-1274 \quad -1274$

$x = 7747$

7747 people

28. Three-eighths of the seventh grade students were taking advanced math at the beginning of the year, but seven dropped out by the end of the year. If there were 140 students taking advanced math at the end of the year, how many total 7th grade students are there?

let x = 7th graders

$\frac{3}{8}x - 7 = 140$

$+7 \quad +7$

$\frac{8}{3} \cdot \frac{3}{8}x = 147 \cdot \frac{8}{3}$

$x = 392$

392 students

29. The sum of two numbers is 61. If the larger number is seven less than three times the smaller number, find both numbers.

let x = smaller #

let $3x - 7$ = larger #

$x + 3x - 7 = 61$

$4x - 7 = 61$

$+7 \quad +7$

$\frac{4x}{4} = \frac{68}{4}$

$x = 17$

17 + 44

30. Caiden and Josh are practicing at a batting cage. Josh has hit nine more than one-half the number of balls that Caiden has. If the sum of their hits is 123, how many balls has Josh hit?

let x = Caiden's hits

let $\frac{1}{2}x + 9$ = Josh's hits

$x + \frac{1}{2}x + 9 = 123$

$\frac{3}{2}x + 9 = 123$

$-9 \quad -9$

$\frac{2}{3} \cdot \frac{3}{2}x = 114 \cdot \frac{2}{3}$

$x = 76$

47 hits

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Topic 5: Inequalities

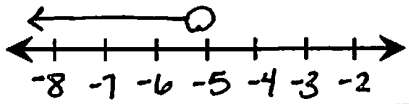
Directions: Solve each inequality. Graph your solution on the number line.

31. $9x - 13 < -58$

$+13 \quad +13$

$\frac{9x}{9} < \frac{-45}{9}$

$\boxed{x < -5}$

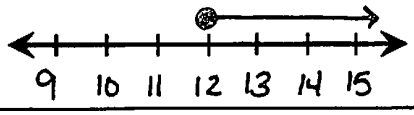


32. $\frac{a}{-3} + 18 \leq 14$

$-18 \quad -18$

$-3 \cdot \frac{a}{-3} \geq -4 \cdot -3$

$\boxed{a \geq 12}$

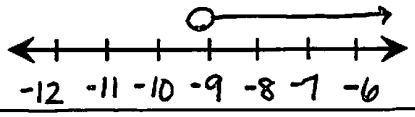


33. $19 - 4p < 55$

$-19 \quad -19$

$\frac{-4p}{-4} < \frac{36}{-4}$

$\boxed{p > -9}$

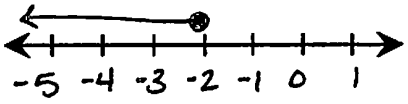


34. $\frac{5}{5} \cdot \frac{k-13}{5} \leq -3 \cdot 5$

$k - 13 \leq -15$

$+13 \quad +13$

$\boxed{k \leq -2}$



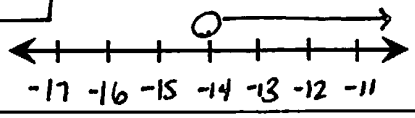
35. $-\frac{4}{7}(v + 28) < -8$

$-\frac{4}{7}v - 16 < -8$

$+16 \quad +16$

$-\frac{7}{4} \cdot -\frac{4}{7}v > 8 \cdot -\frac{7}{4}$

$\boxed{v > -14}$



36. $11n - 14 \leq 5n + 4$

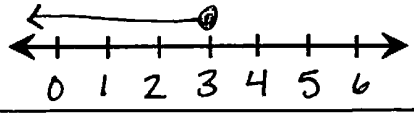
$-5n \quad -5n$

$6n - 14 \leq 4$

$+14 \quad +14$

$\frac{6n}{6} \leq \frac{18}{6}$

$\boxed{n \leq 3}$



37. $\frac{1}{2}(8c + 10) > 4(2c - 6) + 1$

$4c + 5 > 8c - 24 + 1$

$4c + 5 > 8c - 23$

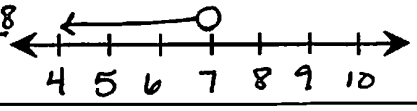
$-8c \quad -8c$

$-4c + 5 > -23$

$-5 \quad -5$

$\frac{-4c}{-4} > \frac{-28}{-4}$

$\boxed{c < 7}$



38. $8(5 - 2y) \geq 15 - 9(2y + 3)$

$40 - 16y \geq 15 - 18y - 27$

$40 - 16y \geq -18y - 12$

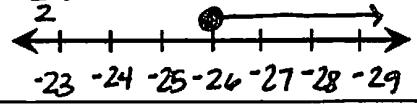
$+18y \quad +18y$

$40 + 2y \geq -12$

$-40 \quad -40$

$\frac{2y}{2} \geq \frac{-52}{2}$

$\boxed{y \geq -26}$



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Directions: Solve each inequality. Check the numbers that represent solutions.

39. $-8x+19<-13$

$-19 \quad -19$

$\frac{-8x<-32}{-8 \quad -8}$

$x>4$

- ☐ 2
- ☐ 3
- ☐ 4
- ☑ 5
- ☑ 6

40. $38-m \leq 4(2-m)$

$38-m \leq 8-4m$

$+4m \quad +4m$

$38+3m \leq 8$

$-38 \quad -38$

$\frac{3m \leq -30}{3 \quad 3}$

$m \leq -10$

- ☑ -13
- ☑ -12
- ☑ -11
- ☑ -10
- ☐ -9

Topic 6: Translating Inequalities/Inequality Word Problems

Directions: Translate each inequality. **Do not solve.**

41. "A number is less than or equal to 4."

$n \leq 4$

42. "The product of a number and -7 is greater than 42."

$-7n > 42$

43. "Five less than the quotient of a number and 3 is no less than 11."

$\frac{n}{3} - 5 \geq 11$

44. "The sum of one and three-fifths of a number is at most 42."

$1 + \frac{3}{5}n \leq 42$

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

45. Michelle is taking a 50 question science test in which each question is worth 2 points each. If she must get at least a 92 on the test to make an A for the class, how many questions must she get correct?

let x = # correct

$\frac{2x}{2} \geq \frac{92}{2}$

$x \geq 46$

≥ 46 questions

46. Camille stopped at the grocery store to buy milk. While at the store, she spotted cans of soup on sale for $2.25 each. If the milk costs $3.50 and she can spend no more than $35, how many cans of soup can she buy?

let x = # cans

$3.50 + 2.25x \leq 35$

$-3.50 \quad -3.50$

$\frac{2.25x \leq 31.50}{2.25 \quad 2.25}$

$x \leq 14$

≤ 14 cans

47. Jackson earns $25 per hour as a tutor at the college library. He set a weekly spending budget of $130 each week and puts the remaining money in his savings account. How many hours must he work this week in order to have at least an extra $50 to put in his savings account?

let x = # hours

$25x - 130 \geq 50$

$+130 \quad +130$

$\frac{25x \geq 180}{25 \quad 25}$

$x \geq 7.2$

≥ 7.2 hours

Name: _____

Date: _____ Per: _____

Unit 3 Test

Equations & Inequalities

1. Solve for m: $\frac{m}{-3} = 6$ ($\cdot -3$)

$m = -18$

$m = -18$

2. Solve for x: $-\frac{5}{4} = x - \frac{7}{10}$

$+\frac{7}{10} \quad +\frac{7}{10}$

$\frac{-11}{20} = x$

$-\frac{5}{4} + \frac{7}{10}$

$-\frac{25}{20} + \frac{14}{20}$

$x = \frac{-11}{20}$

3. Solve for a: $5a + 4 = -11$

$-4 \quad -4$

$\frac{5a}{5} = \frac{-15}{5}$

$a = -3$

$a = -3$

4. Solve for k: $-19 = -17 + \frac{k}{5}$

$+17 \quad +17$

$5 \cdot -2 = \frac{k}{5} \cdot 5$

$-10 = k$

$k = -10$

5. Solve for w: $\frac{4}{5}w + 13 = 25$

$-13 \quad -13$

$\frac{5}{4} \cdot \frac{4}{5}w = 12 \cdot \frac{5}{4}$

$w = 15$

$w = 15$

6. Solve for r: $\frac{r+15}{-7} = -2$ ($\cdot -7$)

$r + 15 = 14$

$-15 \quad -15$

$r = -1$

$r = -1$

7. Solve for y: $-3y^2 = -48$

$\frac{-3}{-3} \quad \frac{-48}{-3}$

$\sqrt{y^2} = \sqrt{16}$

$y = \pm 4$

$y = \pm 4$

8. Solve for n: $4n^2 - 22 = 27$

$+22 \quad +22$

$\frac{4n^2}{4} = \frac{49}{4}$

$\sqrt{n^2} = \sqrt{\frac{49}{4}}$

$n = \pm \frac{7}{2}$

$n = \pm \frac{7}{2}$

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9. Solve for c: $-4(2c-11)=-28$

$-8c+44=-28$

$-44 \quad -44$

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

$c=9$

$c = 9$

10. Solve for p: $17-4(6-p)=-59$

$17-24+4p=-59$

$-7+4p=-59$

$+7 \quad +7$

$\frac{4p}{4} = \frac{-52}{4}$

$p=-13$

$p = -13$

11. Solve for x: $6x-19=13x-5$

$-6x \quad -6x$

$-19=7x-5$

$+5 \quad +5$

$\frac{-14}{7} = \frac{7x}{7}$

$-2=x$

$x = -2$

12. Solve for h: $3(3h-10)=2(2h+5)$

$9h-30=4h+10$

$-4h \quad -4h$

$5h-30=10$

$+30 \quad +30$

$\frac{5h}{5} = \frac{40}{5}$

$h=8$

$h = 8$

13. Solve for v: $10-(3v-1)=5(9-v)$

$10-3v+1=45-5v$

$11-3v=45-5v$

$+5v \quad +5v$

$11+2v=45$

$-11 \quad -11$

$\frac{2v}{2} = \frac{34}{2}$

$v=17$

$v = 17$

14. Solve for a: $\frac{2}{3}(3a-15)=4(2a+5)$

$2a-10=8a+20$

$-2a \quad -2a$

$-10=6a+20$

$-20 \quad -20$

$\frac{-30}{6} = \frac{6a}{6}$

$-5=a$

$a = -5$

15. Solve each equation then match the equation with its type of solution by writing the letter of the equation in the box beside its corresponding solution.

Equation A: $12(x-5)=4(3x+5)$ $12x-60=12x+20$

Equation B: $4(3x-1)=-6+2(6x+1)$ $12x-4=12x-4$

Equation C: $6(2x+7)=-6(2x+1)$ $12x+42=-12x-6$

[C] **One Solution**

[A] **No Solution**

[B] **Infinite Solution**

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For questions 16-17, translate the equation.

16. "Fourteen subtracted from the quotient of a number and 3 is -26."

A. $14-3n=-26$

B. $14-\frac{n}{3}=-26$

C. $\frac{n-14}{3}=-26$

D. $\frac{n}{3}-14=-26$

D

17. "The sum of twice a number and 15 is 9."

A. $2n+15=9$

B. $n^2+15=9$

C. $15n+2=9$

D. $\frac{2n}{15}=9$

A

For questions 18-19, determine which equation could be used to solve the given problem.

18. Mark borrowed $125 from his Dad to pay some bills. If he has already paid back $30, how much does he still owe? (let a = amount owed)

A. $a+125=30$

B. $a+30=125$

C. $a-30=125$

D. $a-125=30$

B

19. Eight hot dogs at the baseball park cost $28. How much does one hot dog cost? (let h = price of one hot dog)

A. $\frac{h}{8}=28$

B. $8+h=28$

C. $28h=8$

D. $8h=28$

D

For questions 20-21, define a variable, set up an equation, then solve. Write the final answer in the box.

20. One-third of the seventh grade class bought tickets for the seventh grade dance. Then, 32 students bought tickets at the door. If there were 158 students at the dance, how many total students are there in the seventh grade?

let x = # students

$\frac{1}{3}x+32=158$

$-32 \quad -32$

$3\cdot\frac{1}{3}x=126\cdot 3$

$x=378$

378 students

21. Sadie finished her math test in sixteen minutes less than three times the amount of time it took her friend Laura to finish. If their combined time was 1 hour and 8 minutes, how long did it take Sadie?

let x = Laura's time

let $3x-16$ = Sadie's time

68 min

$x+3x-16=68$

$4x-16=68$

$+16 \quad +16$

$\frac{4x}{4}=\frac{84}{4}$ $x=21$

47 min

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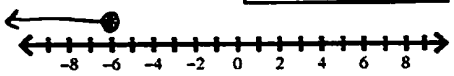
22. Solve and graph: $\frac{x}{3}+17 \le 15$

$-17 \quad -17$

$3 \cdot \frac{x}{3} \le -2 \cdot 3$

$x \le -6$

$x \le -6$



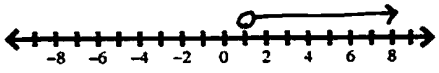
23. Solve and graph: $23-4n<19$

$-23 \quad -23$

$\frac{-4n}{-4} < \frac{-4}{-4}$

$n > 1$

$n > 1$



24. Solve and graph: $-\frac{3}{4}(8k-24) > -12$

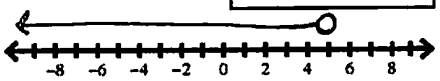
$-6k + 18 > -12$

$-18 \quad -18$

$\frac{-6k}{-6} > \frac{-30}{-6}$

$k < 5$

$k < 5$



25. Solve and graph: $-r+9 \ge -11-6r$

$+6r \quad +6r$

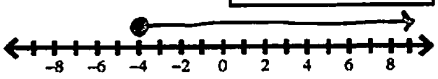
$5r+9 \ge -11$

$-9 \quad -9$

$\frac{5r}{5} \ge \frac{-20}{5}$

$r \ge -4$

$r \ge -4$



26. Solve: $4(3y-7) \ge 8(y+2)$

$12y - 28 \ge 8y + 16$

$-8y \quad -8y$

$4y - 28 \ge 16$

$+28 \quad +28$

$\frac{4y}{4} \ge \frac{44}{4}$

$y \ge 11$

$y \ge 11$

27. Solve: $2-3(m+7) > 1+4(m+9)$

$2 - 3m - 21 > 1 + 4m + 36$

$-3m - 19 > 4m + 37$

$-4m \quad -4m$

$-7m - 19 > 37$

$+19 \quad +19$

$\frac{-7m}{-7} > \frac{56}{-7}$

$m < -8$

$m < -8$

28. Which numbers represent solutions to the inequality below? Check all that apply.

$2 \cdot \frac{v-11}{2} \le -7 \cdot 2$

$v - 11 \le -14$

$+11 \quad +11$

$v \le -3$

- ☑ -5
- ☑ -4
- ☑ -3
- ☐ -2
- ☐ -1

29. Which numbers represent solutions to the inequality below? Check all that apply.

$4(2c-3) < 11c + 30$

$8c - 12 < 11c + 30$

$-11c \quad -11c$

$-3c - 12 < 30$

$+12 \quad +12$

$\frac{-3c}{-3} < \frac{42}{-3}$

$c > -14$

- ☐ -17
- ☐ -16
- ☐ -15
- ☐ -14
- ☑ -13

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For questions 30-31, translate the inequality.

30. "The difference of a number and 8 is no more than 13."

A. $\frac{n}{8} \le 13$

B. $\frac{n}{8} \ge 13$

C. $n - 8 \le 13$

D. $n - 8 \ge 13$

C

31. "Seventeen more than the product of a number and -3 is less than -29."

A. $\frac{n}{-3} + 17 < -29$

B. $-3n + 17 < -29$

C. $17 > -29 - 3n$

D. $17 > \frac{n}{-3} - 29$

B

For questions 32-33, determine which inequality could be used to solve the given problem.

32. Mrs. Walker would like to give each of her 32 students no less than three stickers. How many stickers must she have? (let s = number of stickers)

A. $32s \le 3$

B. $\frac{s}{32} \le 3$

C. $32s \ge 3$

D. $\frac{s}{32} \ge 3$

D

33. The balance on Lily's credit card is \$784. How much money should she send for her next payment if she wishes the balance to be a maximum of \$575? (let p = payment amount)

A. $784 - p \le 575$

B. $784 - p \ge 575$

C. $784 + p \le 575$

D. $784 + p \le 575$

A

For questions 34, define a variable, set up an inequality, then solve. Write the final answer in the box.

34. Ethan needs to save at least \$500 to purchase a new dirt bike. So far, he has saved \$175. If he hopes to use two-fifths of his next paycheck to cover the remaining amount, how much money must he make in his paycheck?

let x = amt of paycheck

$175 + \frac{2}{5}x \ge 500$

$-175 \quad -175$

$\frac{5}{2} \cdot \frac{2}{5}x \ge 325 \cdot \frac{5}{2}$

$x \ge 812.5$

≥ \$812.50

BONUS: Solve the equation for x: $\frac{3}{2}\left(\frac{1}{2}x - \frac{10}{3}\right) = \frac{1}{6}(7x + 10)$

$\frac{3}{4}x - 5 = \frac{7}{6}x + \frac{5}{3}$

$-\frac{3}{4}x \quad -\frac{3}{4}x$

$-5 = \frac{5}{12}x + \frac{5}{3}$

$-\frac{5}{3} \quad -\frac{5}{3}$

$\frac{12}{5} \cdot -\frac{20}{3} = \frac{5}{12}x \cdot \frac{12}{5}$

$-16 = x$

$\frac{7}{6} - \frac{3}{4}$ $\quad -\frac{5}{1} - \frac{5}{3}$

$\frac{14}{12} - \frac{9}{12}$ $\quad -\frac{15}{3} - \frac{5}{3}$

$\frac{5}{12}$ $\quad -\frac{20}{3}$

$x = -16$

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