Chapter 6A Notes (Equations)

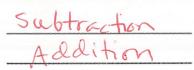
- 6.1 One Step Equations (Add/Subtract)
- 6.2 One Step Equations (Multiply/Divide)
- 6.3 Equations with Rational Coefficients
 - 6.4 Two Step Equations
 - 6.5 More Two Step Equations

Lesson 6.1 (One Step Equations using Addition and Subtraction)

- Equation a mathematical sentence stating that two quantities are <u>equal</u>.
- Solution the value of a variable that makes an equation true.
- **Equivalent Equations** equations with the same solution
 - o Example: x + 2 = 6 and x = 4 (both have a solution of 4)
- The goal of solving an equation is to find the value of the variable.
 - We do this by <u>isolating</u> the variable on one side of the equation using <u>Inverse Operations!</u>
 - Inverse operations "undo" each other!

Inverse of addition?

Inverse of subtraction?



- <u>Subtraction Property of Equality</u> the two sides of an equation remain equal when you subtract the <u>50 ml</u> number from each side
- 1. Solve each equation. Check your solution.

a.
$$x + 6 = 4$$

b.
$$-5 = b + 8$$

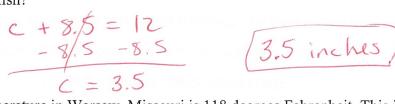
c.
$$y + 6 = 9$$

 $-6 - 6$
 $y = 3$

d.
$$x + 3 = 1$$

e.
$$-3 = a + 4$$

2. An angelfish can grow to be 12 inches long. If an angelfish is 8.5 inches longer than a clown fish, how long is a clown fish?



- 3. The highest recorded temperature in Warsaw, Missouri is 118 degrees Fahrenheit. This is 158 degrees greater than the lowest recorded temperature. Find the lowest recorded temperature.

$$L + 158 = 118$$
 $-158 - 158$
 $L = 40$



- Addition Property of Equality the two sides of an equation remain equal when you add the Same number to each side
- 4. Solve each equation. Check your solution

a.
$$x-2=1$$

$$+2+2$$

$$1$$

$$1$$

$$1$$

c.
$$r-4 = -2$$

+4 +4

b.
$$y-3=4 + 3 + 3$$

d.
$$q - 8 = -9$$

+8 +8

5. A pair of shoes costs \$25. This is \$14 less than the cost of a pair of jeans. Find the cost of the J= cost of jeans jeans.

Lesson 6.2 (One Step Equations using Multiplication and Division)

- The goal of solving an equation is to find the value of the variable.
 - We do this by isolating the variable on one side of the equation using Inverse Operations!
 - Inverse operations "undo" each other!

Inverse of multiplication?

Division

Inverse of division?

Multiplication

- The expression 3x means $3 + mes \times x$.
- <u>Coefficient</u> the numerical factor of a multiplication expression like $3x \implies 3$
- <u>Division Property of Equality</u> the two sides of an equation remain equal when you divide each side by the same <u>Nonzero</u> number
- 1. Solve each equation. Check your solution.

a.
$$20 = 4x$$

b.
$$-8y = 24$$

d.
$$\frac{1}{6a} = \frac{36}{-6}$$

e.
$$-9d = -72$$

c.
$$\frac{30}{6} = 6x$$

2. Lelah sent 574 text messages last week. On average, how many messages did she send each day?

$$M = \# \text{ messages per day}$$

$$7m = 574 \implies m = [82] \text{ messages}$$

3. Mrs. Acosta's car can travel an average of 24 miles on each gallon of gas. Write and solve an equation to find how many gallons of gas she will need for a trip of 348 miles.

$$g = \text{# of gallons}$$

 $24g = 348 \Rightarrow g = [14.5 \text{ gallons}]$

- <u>Multiplication Property of Equality</u> the two sides of an equation remain equal if you multiply each side by the <u>same</u> number.
- 4. Solve each equation. Check your solution.

$$a.-4 \cdot \frac{a}{-4} = -9 \cdot -4$$

$$a = 36$$

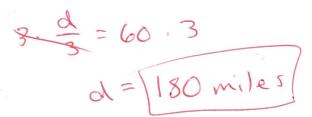
$$c.5 \cdot \frac{m}{5} = -7.5$$

$$m = -35$$

b.
$$3\frac{y}{23} = -8 \cdot -3$$

$$d. -6.30 = \frac{b}{-6} - 6$$

5. The distance d Tina travels in her car while driving 60 miles per hour for 3 hours is given by the equation $\frac{d}{3} = 60$. How far did she travel?



Lesson 6.3 (Equations with Rational Coefficients)

Decimal Coefficients:

- If the coefficient is a decimal, divide each side by the <u>decimal</u>.
- 1. Solve each equation. Check your solution.

a.
$$\frac{16}{.25} = \frac{0.25n}{.25}$$

c.
$$-2.8p = 4.2$$

 -2.8
 $P = (-1.5)$

b.
$$\frac{6.4}{8} = \frac{0.8m}{8}$$

d.
$$-4.7k = -10.81$$

-4.7 -4.7 K = 2.3

2. Jaya's coach agreed to buy ice cream for all of the team members. Ice cream cones are \$2.40 each. Write and solve an equation to find how many cones the coach can buy with \$30.

$$\frac{2.40c}{2.40} = \frac{30}{2.40} \Rightarrow c = 12.5$$
 [cones]

Fraction Coefficients:

- If the coefficient is a fraction, multiply each side by the <u>reciprocol</u> of the coefficient.
- 3. Solve each equation. Check your solution.

a.
$$\frac{4}{3} \cdot \frac{3}{4}x = \frac{12}{20} \cdot \frac{4}{3}$$

$$b = \frac{9}{7} - \frac{7}{9}d = 5 - \frac{9}{7}$$

$$d = \left[-\frac{45}{7} \text{ or } -\frac{6^{3}}{7} \right]$$

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

$$e^{-\frac{8}{7}} - \frac{7}{8}x = -\frac{21}{64} - \frac{8}{7}$$

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

4. Valerie needs 2/3 yard of fabric to make a hat for the school play. Write and solve an equation to find how many hats she can make with 6 yards of fabric.

$$\frac{3}{2} \cdot \frac{2}{3} h = 6 \cdot \frac{3}{2}$$

Lesson 6.4 (Solving Two Step Equations)

- <u>Two-Step Equation</u> an equation that contains two different operations (multiplication and division)
 - \odot Example: 2x + 3 = 9
 - o To solve a two-step equation, undo the operations in ________ order of the order of operations.

Step 1

Undo the addition or subtraction first.

Step 2

Undo the multiplication or division.

1. Solve each equation. Check your solution.

a.
$$2x + 3 = 9$$

$$-3 - 3$$

$$2x = 6$$

$$2x = 6$$

d.
$$4/+\frac{1}{5}r = -1$$
 -4
 $5-\frac{1}{5}r = -5.5$
 $r = (-2.5)$

b.
$$3x + 2 = 23$$

 -2 -2
 $3x + 2 = 23$
 $4x +$

e.
$$-5s + 8 = -2$$

 -8
 -8
 -8
 -5
 -5
 -5
 -5

c.
$$-2y - 7 = 3$$
 $+7 + 7$
 $-2y = 10$
 $-2y = -2$
 $-2y = -2$

2. Toya had her birthday party at the movies. It cost \$27 for pizza and \$8.50 per friend for the movie tickets. How many friends did Toya have at her party if she spent \$78?

$$\frac{27 + 8.5f}{-27} = \frac{78}{8.5} = \frac{51}{8.5} \Rightarrow f = \frac{6}{6} + \frac{8}{7} = \frac{51}{8.5} = \frac{51}{8.5} = \frac{6}{8} + \frac{1}{8} = \frac{1}{8}$$

Lesson 6.5 (More Two Step Equations)

- Special Two Step Equation: p(x+q) = r
 - o Example: 2(w + 36) = 114
 - o It contains two factors, p and (x + q).
 - o 2 Solution Methods:
 - **Method 1** Distribute. Then solve.
 - Method 2 Divide by the number outside the parentheses. Then solve.
- 1. Solve 3(x + 5) = 45. Check your solution.
 - a. Distribute. Then solve.

$$3x + 18 = 45
-15 - 15
3x = 30
3x = (0)$$

b. Divide by the number outside the parentheses. Then solve.

$$3(x+5) = 45$$

 3
 $x+5 = 15$
 -5
 $x = (0)$

2. Solve each equation.

a.
$$5(n-2) = -30$$

$$5 = -4$$

$$1 = -4$$

$$1 = -4$$

b.
$$2(x+4) = 20$$

 $x+y = 10$
 $x = 6$

d.
$$-7(6+d) = 49$$

 $-7(6+d) = -7$
 -6
 -6

• Fractions and Decimals as the Factor

- o If the factor is a fraction, multiply by the Veciprocal of the factor.
- o If the factor is a decimal, divide by the <u>decimal</u>.
- 3. Solve each equation. Check your solution.

$$a \cdot \frac{3}{2} \cdot \frac{2}{3} (n+6) = 10 \cdot \frac{3}{2}$$

$$n + 6 = 15$$

$$-6 - 6$$

$$N = 9$$

b.
$$0.2(c-3) = -10$$

$$\begin{array}{c}
-3 = -50 \\
+3 \\
-47
\end{array}$$

$$c\frac{4}{4}(d-3) = -15 \cdot 4$$

$$d - \beta = -40$$

$$+3$$

$$d = (-57)$$

d.
$$0.75(6+d) = 12$$

 $.75$
 $.75$
 $.75$
 $.75$
 $.75$
 $.75$
 $.75$

e.
$$\frac{5}{5}(t+3) * \frac{5}{9} = 40 \cdot \frac{9}{5}$$

 $\frac{5}{5}(t+3) * \frac{5}{9} = 40 \cdot \frac{9}{5}$
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 $\frac{5}{5}(t+3) * \frac{5}{9} = 40 \cdot \frac{9}{5}$

4. Jamal and two cousins received the same amount of money to go to a movie. Each boy spent \$15. Afterward, the boys had \$30 altogether. Write and solve an equation to find the amount of money each boy received.

$$\frac{3(m-15)}{3} = \frac{30}{3}$$
 $m-15 = 10$

$$m - 15 = 10$$

+ 15 + 15
 $m = 1725$