CHAPTER 3

Expressions and Equations

Terms that You Will Hear and Master

- Variables
- Distributive Property
- Combine Like Terms
- Simplify
- Evaluate
- Solve for a Variable

Identify the terms and like terms in each expression.

a. $9x - 2 + 7 - x$

b. $z^2 + 5z - 3z^2 + z$

Simplify $\frac{3}{4}y + 12 - \frac{1}{2}y - 6.$

YOU TRY!!!

Identify the terms and like terms in the expression.

1. $y + 10 - \frac{3}{2}y$

2. $2r^2 + 7r - r^2 - 9$

3. $7 + 4p - 5 + p + 2q$

Simplify the expression.

4. $14 - 3z + 8 + z$

5. $2.5x + 4.3x - 5$

6. $\frac{3}{8}b - \frac{3}{4}b$

Simplify $-\frac{1}{2}(6n + 4) + 2n.$

3.1 Day 2

HW: WB pg. 43/46/50
Online 3.1 HW

All Expressions
Are
Math Sentences

It's how you READ' EM

Simplify the expression.

7. $3(q + 1) - 4$

8. $-2(g + 4) + 7g$

9. $7 - 4\left(\frac{3}{4}x - \frac{1}{4}\right)$

Each person in a group buys a ticket, a medium drink, and a large popcorn. Write an expression in simplest form that represents the amount of money the group spends at the movies. Interpret the expression.

SO

WHAT IF? Each person buys a ticket, a large drink, and a small popcorn. How does the expression change? Explain.

Answers

Mini-Assessment

Identify the terms and like terms in the expression.

1. $4r + 2 - 6 + 3r$

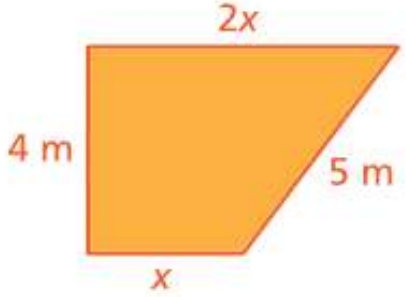
2. $5h^2 - 3h^2 - 4h + 3h + 7$

Simplify the expression.

3. $6m + 7 - 3m - 1$

4. $3(5b + 2) - 4$

5. Write an expression in simplest form that represents the perimeter of the polygon.



3.2 Day 1

HW: WB pg. 43/46/50
Online 3.1/3.2 HW

Adding and Subtraction Of Expressions

Find each sum.

a. $(x - 2) + (3x + 8)$

b. $(-4y + 3) + (11y - 5)$

Find $2(-7.5z + 3) + (5z - 2)$.

Find the sum.

1. $(x + 3) + (2x - 1)$
2. $(-8z + 4) + (8z - 7)$
3. $(4 - n) + 2(-5n + 3)$
4. $\frac{1}{2}(w - 6) + \frac{1}{4}(w + 12)$

Find the sum.

1. $(x + 3) + (2x - 1)$ $3x + 2$
2. $(-8z + 4) + (8z - 7)$ -3
3. $(4 - n) + 2(-5n + 3)$ $-11n + 10$
4. $\frac{1}{2}(w - 6) + \frac{1}{4}(w + 12)$ $\frac{3}{4}w$

Monday 11/15

Review 3.1 and 3.2

HW: MASTER this!!

https://www.youtube.com/watch?v=x9hoPIMNPw4

Keep following rules
&
WTS (Watch the signs)

3.2 Day 2

HW: WB pg. 48-50
MASTER Rev. WS
3.2 online HW

Subtraction Of Expressions

Find each difference.

a. $(5x + 6) - (-x + 6)$

b. $(7y + 5) - 2(4y - 3)$

The original price of a cowboy hat is d dollars. You use a coupon and buy the hat for $(d - 2)$ dollars. You decorate the hat and sell it for $(2d - 4)$ dollars. Write an expression that represents your earnings from buying and selling the hat. Interpret the expression.

Find the difference.

5. $(m - 3) - (-m + 12)$

6. $-2(c + 2.5) - 5(1.2c + 4)$

7. **WHAT IF?** In Example 4, you sell the hat for $(d + 2)$ dollars. How much do you earn from buying and selling the hat?

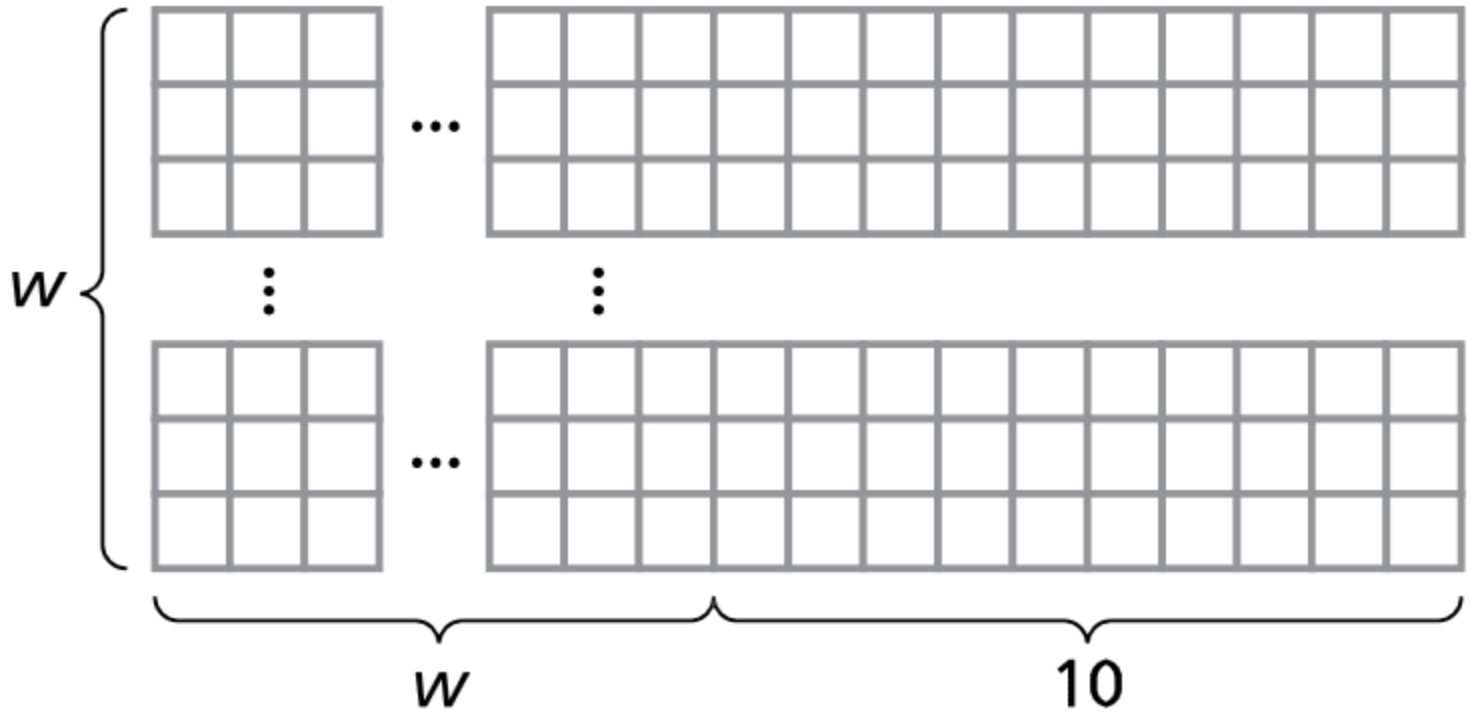
The original price of a cowboy hat is d dollars. You use a coupon and buy the hat for $(d - 2)$ dollars. You decorate the hat and sell it for $(2d - 4)$ dollars. Write an expression that represents your earnings from buying and selling the hat. Interpret the expression.

5. $(m - 3) - (-m + 12)$ $2m - 15$

6. $-2(c + 2.5) - 5(1.2c + 4)$ $-8c - 25$

7. **WHAT IF?** In Example 4, you sell the hat for $(d + 2)$ dollars. How much do you earn from buying and selling the hat? $4

So what if you had to find the Perimeter of this shape?



Perimeter = 2L+ 2W OR ADD up sides

- **Exit Ticket:** Find the sum or difference.

  $2(3x - 4) + (2x - 5)$ $\qquad\qquad$ $2(3x - 4) - (2x - 5)$

Use the index card- this is a Formative grade: 0 or 1 point each

3.2 Also

FACTORING

GCF–Greatest Common Factor

HW: WB pp. 51
&
3.3 online HW

Factor $24x - 18$ using the GCF.

Factor -2 out of $-4p + 10$.

Factor $\frac{1}{2}$ out of $\frac{1}{2}x + \frac{3}{2}$.

Match the algebraic expression on the left with its factored form on the right.

1.	$12x + 6$	**A.**	$-6(2x - 1)$
2.	$12x - 6$	**B.**	$6(2x - 1)$
3.	$-12x - 6$	**C.**	$6(2x + 1)$
4.	$-12x + 6$	**D.**	$-6(2x + 1)$

1.	$12x + 6$ C	**A.**	$-6(2x - 1)$
2.	$12x - 6$ B	**B.**	$6(2x - 1)$
3.	$-12x - 6$ D	**C.**	$6(2x + 1)$
4.	$-12x + 6$ A	**D.**	$-6(2x + 1)$

Reminder:
HW pg. 51 Workbook
Online 3.3 Due Th. Midnight

3.1-3.2 Quiz Friday 11/20

Then I will give you a week off!!

HW: WB 48–50, Online 3.1/3.2
DUE THURSDAY/FRIDAY

Identify the terms and like terms

1. $11x + 2x$
3. $21x + 6 - x - 5$

Simplify the expression. *(Sectio*

5. $2(3x + x)$
7. $2x + 4 - 3x + 2 + 3x$

Find the sum or difference. *(Sec*

9. $(s + 12) + (3s - 8)$
11. $(2 - k) + 3(-4k + 2)$
13. $(n - 8) - (-2n + 2)$

Factor out the coefficient of the v

15. $5c - 15$
16. $\frac{2}{9}j + \frac{2}{3}$

1. Terms: $11x$, $2x$;
   Like terms: $11x$ and $2x$
3. Terms: $21x$, 6, $-x$, -5;
   Like terms: $21x$ and $-x$;
   6 and -5
5. $8x$
7. $2x + 6$
9. $4s + 4$
11. $-13k + 8$
13. $3n - 10$
15. $5(c - 3)$

When **factoring an expression**, you write the expression as a product of factors. You can use the Distributive Property to factor expressions.

Remember D-Property?
3(y+7)

Distributive Property- Khan Academy

https://www.youtube.com/watch?v=gl_-E6iVAg4

Factor D-property backwards!!

3(y+7)= 3y+21 Now- Factor OUT the 3!!!

3.3 DAY 1 and 2

HW: Pg. 56 WB
Online 3.3
DUE FRIDAY!!!!

MP4 Model with Mathematics

Edyta Pawlowska/Shutterstock.com

- Apply mathematics to solve problems arising in everyday life
- Simplify a complicated situation
- Identify quantities in situations and map their relationship using diagrams, tables, graphs, and formulas
- Analyze relationships mathematically to draw conclusions
- Interpret the results and make sure the answer makes sense

BIG IDEAS LEARNING

a. Solve $x - 5 = -1$.

Undo the subtraction. →

b. Solve $z + \frac{3}{2} = \frac{1}{2}$.

Undo the addition. →

Solve the equation. Check your solution.

1. $p - 5 = -2$

2. $w + 13.2 = 10.4$

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

Solve the equation. Check your solution.

1. $p - 5 = -2$

$p = 3$

2. $w + 13.2 = 10.4$

$w = -2.8$

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

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

4. A company has a profit of \$120.50 today. This profit is \$145.25 less than the profit P yesterday. Write an equation that can be used to find P.

4. A company has a profit of \$120.50 today. This profit is \$145.25 less than the profit P yesterday. Write an equation that can be used to find P. $P - 145.25 = 120.50$

A company has a profit of $750 this week. This profit is $900 more than the profit P last week. Which equation can be used to find P?

(A) $750 = 900 - P$

(B) $750 = P + 900$

(C) $900 = P - 750$

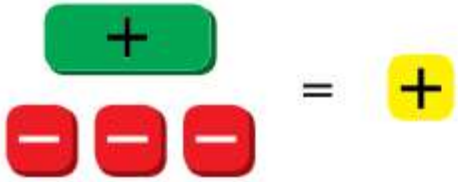
(D) $900 = P + 750$

3.3 Cont. Day 2

HW: Pg. 56,
Online 3.3
Quiz retake DUE MON.

Discuss with a partner, using an example, how inverse operations are used to solve equations.

- Translate the following model into symbols and explain in words how it could be solved.



Sample answer: $x - 3 = 1$; Add three yellow tiles to each side. The result will be $x = 4$.

Solve the equation. Check your solution.

1. $x + 5 = 10$

$x = 5$

2. $y - 2 = 16$

$y = 18$

3. $n - 13 = 65$

$n = 78$

4. $18 = p + 3$

$p = 15$

5. $34 = t - 23$

$t = 57$

6. $z + 14 = 21$

$z = 7$

You have 7 less points than your cousin. Your brother has 8 more points than your sister.

Write an expression to model each situation. Use p as your variable. Can each expression be written in more than one way? Explain.

Expression 1	Expression 2

Mini-Assessment

Solve the equation.

1. $x + 3.6 = -4.75$
2. $-15.8 = y - 24.3$
3. $t - 2\frac{2}{3} = -\frac{5}{2}$
4. $-\frac{5}{6} = z + \frac{1}{8}$
5. You withdrew \$47.25 from your checking account. Now your balance is −\$23.75. Write and solve an equation to find the amount of money in your account before you withdrew the money.

3.4 DAY 1&2

HW TO DO:
P. 60 Workbook (finish 57–59)
Online HW 3.4

Essential Question How can you use multiplication or division to solve equations?

MP1 Make Sense of Problems and Persevere in Solving Them

Horst Petzold/Shutterstock.com

- Explain the meaning of a problem
- Look for entry points to a solution
- Analyze givens, constraints, relationships, and goals
- Make conjectures about the meaning of the solution
- Make a plan
- Consider similar problems
- Check progress and change course if necessary

BIG IDEAS LEARNING®

Essential Question How can you use multiplication or division to solve equations?

Work with your Teammate:

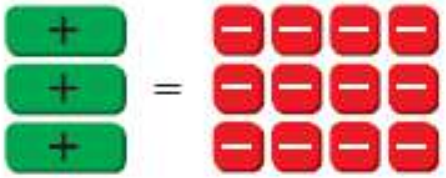
1. Complete page 57-58 in WB
2. Check HW with teammate if you finish.

1 ACTIVITY: Using Division to Solve Equations

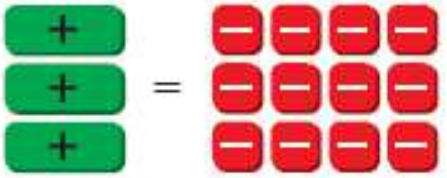
Work with a partner. Use algebra tiles to model and solve the equation.

a. $3x = -12$

Model the equation $3x = -12$.



Your goal is to get one variable tile by itself. Because there are ____ variable tiles, divide the ____ tiles into ____ equal groups. Circle the groups.



Keep one of the groups. This shows the value of x.

∴ So, $x =$ ____.

b. $2k = -8$

c. $-15 = 3t$

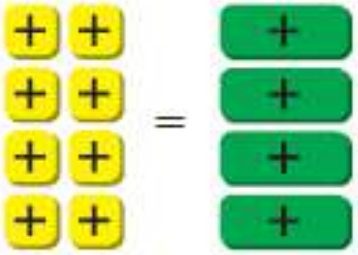
d. $-20 = 5m$

e. $4h = -16$

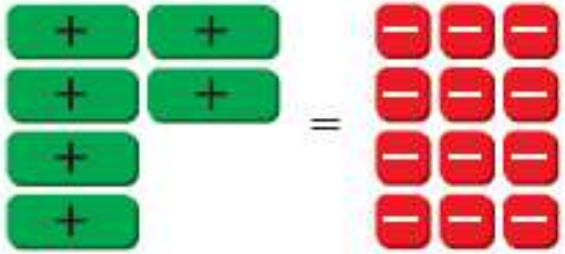
2 ACTIVITY: Writing and Solving Equations

Work with a partner. Write an equation shown by the algebra tiles. Then solve.

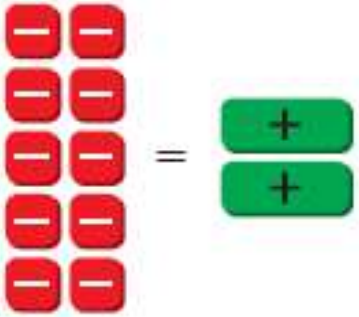
a.



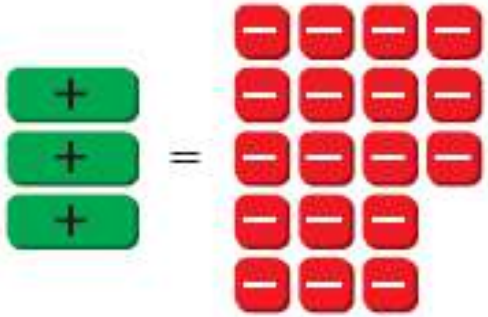
b.



c.



d.



Key Ideas

Multiplication Property of Equality

Words Multiplying each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality

Words Dividing each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \div c = b \div c, c \neq 0$.

Remember

Multiplication and division are inverse operations.

a. Solve $\frac{x}{3} = -6$.

Undo the division. →

b. Solve $18 = -4y$.

Undo the multiplication. →

Solve the equation. Check your solution.

1. $\frac{x}{5} = -2$ $x = -10$ **2.** $-a = -24$ $a = 24$ **3.** $3 = -1.5n$ $n = -2$

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

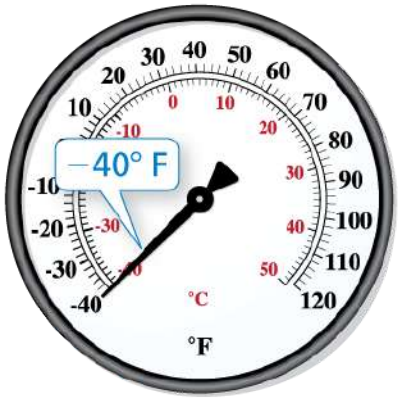
Multiply each side by $-\frac{5}{4}$, the reciprocal of $-\frac{4}{5}$.

Solve the equation. Check your solution.

4. $-14 = \frac{2}{3}x$ $x = -21$

5. $-\frac{8}{5}b = 5$ $b = -3\frac{1}{8}$

6. $\frac{3}{8}h = -9$ $h = -24$



Record low temperature in Arizona

The record low temperature in Arizona is 1.6 times the record low temperature in Rhode Island. What is the record low temperature in Rhode Island?

The record low temperature in Hawaii is –0.15 times the record low temperature in Alaska. The record low temperature in Hawaii is 12°F. What is the record low temperature in Alaska? $-80°F$

Exit Ticket: Solve $\frac{x}{2} = -14$ and $2x = -14$.

Place Post-it note below each expression:

$\frac{x}{2} = -14$

$2x = -14$

3.5 DAY 1&2

Essential Question How can you use algebra tiles to solve a two-step equation?

HW:
P. 64 Workbook (finish 61-63)
Online 3.5

3.3-3.5 QUIZ on 12/16-12/18

Chapter 3 test will be January 7th-8th

1 ACTIVITY: Solving a Two-Step Equation

Work with a partner. Use algebra tiles to model and solve $2x - 3 = -5$.

Model the equation $2x - 3 = -5$.

Remove the ____ red tiles on the left side by adding ____ yellow tiles to each side.

How many *zero pairs* can you remove from each side? ____
Circle them.

Because there are ____ green tiles, divide the red tiles into ____ equal groups. Circle the groups.

Keep one of the groups. This shows the value of x.

∴ So, $x =$ ____.

Solve $-3x + 5 = 2$. Check your solution.

Undo the addition. →

Undo the multiplication. →

Solve $3y - 8y = 25$.

Solve $\frac{x}{8} - \frac{1}{2} = -\frac{7}{2}$. Check your solution.

Solve the equation. Check your solution.

1. $2x + 12 = 4$

2. $-5c + 9 = -16$

3. $3(x - 4) = 9$

1. $2x + 12 = 4$

$x = -4$

2. $-5c + 9 = -16$

$c = 5$

3. $3(x - 4) = 9$

$x = 7$

Solve the equation. Check your solution.

4. $\frac{m}{2} + 6 = 10$

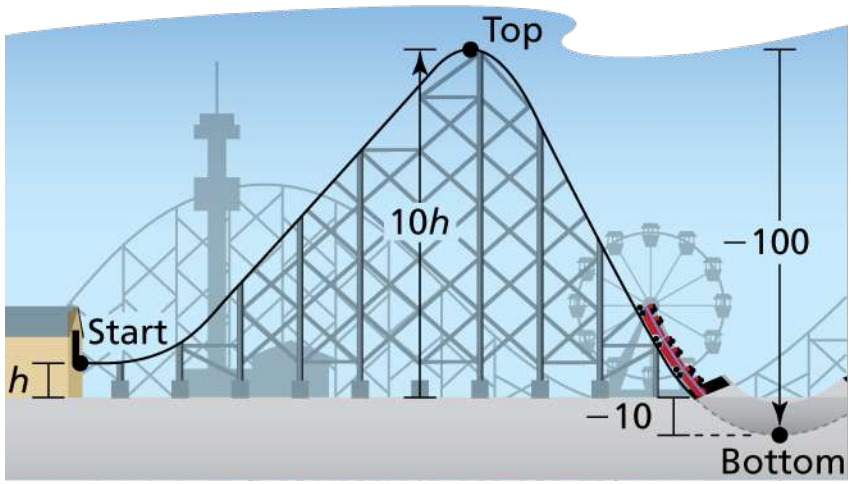
$m = 8$

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

$z = -12$

6. $\frac{2}{5} + 4a = -\frac{6}{5}$

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



The height at the top of a roller coaster hill is 10 times the height h of the starting point. The height decreases 100 feet from the top to the bottom of the hill. The height at the bottom of the hill is −10 feet. Find h.

Can you write the equation??

Top of hill	The height at the top of the hill is 10 times the starting height h.	$10h$
Bottom of hill	The height decreases by 100 feet. So, subtract 100.	$10h - 100$

Location	Verbal Description	Expression
Start	The height at the start is h.	h
Top of hill	The height at the top of the hill is 10 times the starting height h.	$10h$
Bottom of hill	The height decreases by 100 feet. So, subtract 100.	$10h - 100$

The height at the bottom of the hill is -10 feet. Solve $10h - 100 = -10$ to find h.

Work on Workbook pages 61-62 with your partner

You have 20 minutes!!!

Match the equation with the first step used in solving the equation.

Equation	First Step in Solving
1) $4x - 3 = -7$	A) Divide by -3.
2) $5 = -2x + 4$	B) Subtract 2.
3) $-3x + 2 = 6$	C) Multiply by $\frac{1}{3}$.
4) $-4 = 3x - 2$	D) Add 3.
	E) Add 2.
	F) Subtract 4.

Answers: 1D, 2F, 3B, 4E

Review Chapter 3

What does it mean to *isolate the variable term*?

What are like or similar terms? Give examples.

Explain how the solutions of the two equations are similar.

$$4x - 5 = 7 \qquad \frac{4}{3}x - \frac{5}{3} = \frac{7}{3}$$

Review Key Vocabulary

like terms, *p. 82*
simplest form, *p. 82*
linear expression, *p. 88*
factoring an expression, *p. 92*
equivalent equations, *p. 98*

REVIEW: Properties of Equality

Na

Key Concept and Vocabulary

Addition Property of Equality:

If $a = b$, then $a + c = b + c$.

Subtraction Property of Equality:

If $a = b$, then $a - c = b - c$.

Multiplication Property of Equality:

If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality:

If $a = b$, then $a \div c = b \div c, c \neq 0$.

3.1 Algebraic Expressions *(pp. 80–85)*

a. Identify the terms and like terms in the expression $6y + 9 + 3y - 7$.

Rewrite as a sum of terms.

$$\underbrace{6y} + \underbrace{9} + \underbrace{3y} + \underbrace{(-7)}$$

Terms: $6y$, 9, $3y$, -7

Like terms: $6y$ and $3y$, 9 and -7

b. Simplify $\frac{2}{3}y + 14 - \frac{1}{6}y - 8$.

$$\frac{2}{3}y + 14 - \frac{1}{6}y - 8 = \frac{2}{3}y + 14 + \left(-\frac{1}{6}y\right) + (-8) \quad \text{Rewrite as a sum.}$$

$$= \frac{2}{3}y + \left(-\frac{1}{6}y\right) + 14 + (-8) \quad \text{Commutative Property of Addition}$$

$$= \left[\frac{2}{3} + \left(-\frac{1}{6}\right)\right]y + 14 + (-8) \quad \text{Distributive Property}$$

$$= \frac{1}{2}y + 6 \quad \text{Combine like terms.}$$

3.2 Adding and Subtracting Linear Expressions *(pp. 86–93)*

a. Find $(5z + 4) + (3z - 6)$.

$$\begin{array}{r} 5z + 4 \\ +\ 3z - 6 \\ \hline 8z - 2 \end{array}$$

Align like terms vertically and add.

b. Factor $\frac{1}{4}$ out of $\frac{1}{4}x - \frac{3}{4}$.

Write each term as a product of $\frac{1}{4}$ and another factor.

$$\frac{1}{4}x = \frac{1}{4} \cdot x \qquad -\frac{3}{4} = \frac{1}{4} \cdot (-3)$$

Use the Distributive Property to factor out $\frac{1}{4}$.

$$\frac{1}{4}x - \frac{3}{4} = \frac{1}{4} \cdot x + \frac{1}{4} \cdot (-3) = \frac{1}{4}(x - 3)$$

∴ So, $\frac{1}{4}x - \frac{3}{4} = \frac{1}{4}(x - 3)$.

3.3 Solving Equations Using Addition or Subtraction *(pp. 96–101)*

Solve $x - 9 = -6$.

$x - 9 = -6$		Write the equation.
Undo the subtraction. →	$+9 \quad +9$	Addition Property of Equality
$x = 3$		Simplify.

Check

$x - 9 = -6$

$3 - 9 \stackrel{?}{=} -6$

$-6 = -6$ ✓

3.4 Solving Equations Using Multiplication or Division *(pp. 102–107)*

Solve $\frac{x}{5} = -7$.

$\frac{x}{5} = -7$		Write the equation.
Undo the division. →	$5 \cdot \frac{x}{5} = 5 \cdot (-7)$	Multiplication Property of Equality
$x = -35$		Simplify.

Check

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

$\frac{-35}{5} \stackrel{?}{=} -7$

$-7 = -7$ ✓

3.5 Solving Two-Step Equations *(pp. 108–113)*

Solve $-6y + 7 = -5$. Check your solution.

$-6y + 7 = -5$	Write the equation.
$-7 \quad -7$	Subtraction Property of Equality
$-6y = -12$	Simplify.
$\frac{-6y}{-6} = \frac{-12}{-6}$	Division Property of Equality
$y = 2$	Simplify.

∴ The solution is $y = 2$.

Check

$-6y + 7 = -5$

$-6(2) + 7 \stackrel{?}{=} -5$

$-12 + 7 \stackrel{?}{=} -5$

$-5 = -5$ ✓

Complete Online Review

3.3-3.5 QUIZ

Expectations QUIETLY:

1. **Get out Pencil and Calculator**
2. **Complete the Paper quiz**
3. **TURN IN-**
4. **GET the Math Work out that needs to be complete to turn in FRIDAY!!!**

Chapter 3 test This week or next

Lesson 3.1 Variables and Expressions. Intro to Algebra

HW will be to finish the packet.

Foundations of ALGEBRA

Variable
Expression
Equation
Properties- Communitive
and
Associative

3.2 OPENER

1. Alana and José completed magic number puzzles for homework. Although their puzzles had the same steps, Alana and José came out with different results. The work for each puzzle is shown side-by-side. Tell whose result is correct and explain why that result is correct. Your explanation should include a numerical example that follows the steps in the puzzle to support your case.

Alana

Directions	For any number, n
Step 1. Write down a number.	n
Step 2. Add 3.	$n + 3$
Step 3. Multiply by 4.	$4n + 3$

José

Directions	For any number, n
Step 1. Write down a number.	n
Step 2. Add 3.	$n + 3$
Step 3. Multiply by 4.	$4n + 12$

Whose result is correct? Be sure to provide an explanation with example(s) to support your case:

Review Ch. 3 cont…

Write an algebraic expression for each phrase (1 point each)

1. 100 less than **x** _____

2. 4 more than the product of 3 and ***m*** _____

3. the quotient of **k** and 8 minus 12 _____

4. 6 times the quantity **x** plus 4 _____

Plug in and Solve!!

Evaluate each expression given m = –2, n = 4, x = 3, y = –5.

18. $m + n \div 2$

19. $x(m + n) + y$

Practice Simplifying (this is NOT Solving)

- Look for PEMDAS
- Note the like terms: circle/Box/triangle
- Then break down or simplify correctly.

Simplify Each Expression

1. $12 + 8(6 - 7)$
2. $\left(\frac{4}{5}\right)^2$
3. $10 \div \frac{4}{5}$

Simplify each expression.

9. $7xy - 3xy$
10. $7x + 10 - 2x + 4$
11. $8x - 3y + 4x + 15$

Review Practice test today!!!

1. Complete Practice test TODAY
2. Set up the problem
3. Show your work step by Step

**We will be doing a check later.

******HW– Finish Practice test.****

Monday: Team Review- with teammate.
Finish for HW

Tuesday: Grade Team review
HW is Worksheet practice.

Wed.-Graphing Lesson
Finish HW packet.

Thursday- Complete Practice test Ch. 3,
HW- finish that over weekend.

Friday Math Meet

Links for Instructional videos

http://www.yaymath.org/#!index/c125u

Input output machine:

https://www.youtube.com/watch?v=ycPd34cFX64

https://www.youtube.com/watch?v=KM1JDDe5P3E