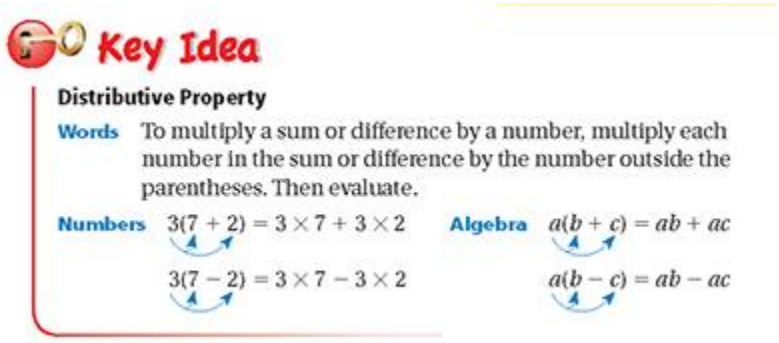
3.0 Distributive Property and Expressions Teacher Notes

Distributive Property: To multiply a sum or difference by a number, multiply each number in the sum or difference by the number outside of the parentheses.



Steps for using the distributive property ("Jump the Fence"):

1.) The number outside the parentheses "jumps the fence" (distributes).
2.) The number tags everyone inside (tag = multiply).
3.) Simplify the expression by combining like terms if needed.

*__Like Terms:__ terms within an expression that have the same variables raised to the same exponent; constant terms (numbers) are also like terms

Simplify each expression:

1.) 8(2x) = **16x**	**2.)** 7(x + 5) **7x + 35**
3.) 9(2b – 6) **18b - 54**	**4.)** 3(5w + 2) + 7w **15w + 6 + 7w** **22w + 6**
5.) 6(3x + y + 4) **18x + 6y + 24**	**6.)** 5 + 2(4x + 6) **5 + 8x + 12** **8x + 17**

Simplify:

7.) $2(2x^2 + 4x) - 3x^2 - 2x^3$ $4x^2 + 8x - 3x^2 - 2x^3$ $\mathbf{- 2x^3 + x^2 + 8x}$	**8.)** $2xy - 5y - 3(x + y) - 5xy$ $2xy - 5y - 3x + -3y - 5xy$ $\mathbf{-3xy + -3x + -8y}$

Are the expressions equivalent? Simplify. Then explain why or why not.

9.) $4(3x + 2) + 3$ and $12x + 20$

No, the expressions are not equivalent.

$12x + 8 + 3 = 12x + 11$ (not equivalent to $12x + 20$)

Section 3.1: Algebraic Expressions Teacher Notes

POD: Simplify.

1.) 3x + 2x + x **2.) 5y – 2y + 3y**

6x **6y**

Objective: Students will be able to simplify algebraic expressions.

Vocabulary:

1.) Variable – a letter that represents an unknown number
2.) Like Terms- Terms that have the same variables raised to the same exponents
3.) Coefficient – The numerical factor of a term that contains a variable
4.) Constant – A term without a variable.

Identify the terms and like terms

1.) 9x – 2 + 7 - x Terms: 9x, -2, 7, -1x Like terms: 9x and -1x; -2 and 7	2.) $z^2 + 5z - 3z^2 + z$ Terms: z^2, 5z , $3z^2$, z Like terms: z^2 and $3z^2$; 5z and 1z

How to Simplify a Variable Expression:

1.) Combine "like terms" (variables with variables, numbers with numbers)

3.) 7y + 6 – 1 + 12y **19y + 5**	4.) 5x + 2y + 3x + 4 **8x + 2y + 4**
5.) 4(3d + 2) + 5d 12d + 8 + 5d **17d + 8**	6.) $\frac{3}{4}y + 12 - \frac{1}{2}y - 6$ $\mathbf{\frac{1}{4}y + 6}$
7.) $3x^2 + 2x + 4x - x^2$ $\mathbf{2x^2 + 6x}$	8.) $3x^2 + 2x + 6 + 2x^2 - x + 12$ $\mathbf{5x^2 + x + 18}$

Determine whether the expressions are the same. Explain your reasoning.

9.) $3x + 2y + y + 5x$ and $8x + 3y$ Yes, the first expression simplifies so it equals the second expression.	10.) $3(2x + 4) + 2x$ and $8x + 4$ No, it should be $8x + 12$, you need to make sure to distribute to both terms in parentheses.

Section 3.2: Adding and Subtracting Linear Expressions Notes

POD: Simplify

1.) $3y - 2 + y + 6$ **2.) $2(3x + 4) + 6x$**

$2y + 4$ **$12x + 8$**

Objective: Students will be able to add and subtract linear expressions.

Vocabulary:

1.) Linear Expression: An algebraic expression in which the exponent of the variable is 1.

Example: $3x + 6$ NOT: $3x^2 + 6$

Find each sum.

1.) $(x - 2) + (3x + 8)$ **Don't need parentheses!** **Rewrite:** $1x + -2 + 3x + 8$ **$4x + 6$**	2.) $(-4y + 3) + 2(6y - 5)$ **Distribute:** $(-4y + 3) + (12y - 10)$ **Rewrite:** $-4y + 3 + 12y + -10$ **$8y + -7$**

Find each difference.

3.) $(5x + 6) - (-2x + 4)$ **Rewrite to Addition:** $5x + 6 + 2x + -4$ **$7x + 2$**	4.) $(7y + 5) - 2(4y - 3)$ Distribute: $7y + 5 - 8y + 6$ Rewrite: $7y + 5 + -8y + 6$ **$-1y + 11$**

5.) $\frac{1}{2}(3x + 6) - (5x - 24)$ Distribute: $(1\frac{1}{2}x + 3) - (5x - 24)$ Rewrite: $1\frac{1}{2}x + 3 + -5x + 24$ **$-3\frac{1}{2}x + 27$**	6.) $(4 - 5y) - 2(3.5y - 8)$ Distribute: $4 - 5y - 7y + 16$ Rewrite: $4 + -5y + -7y + 16$ **$-12y + 20$**

Section 3.3: Solving Equations by Adding or Subtracting Teacher Notes

POD: Find each sum or difference

1.) $(-3y + 16) + 3(5y - 4)$ 2.) $(5x + 7) - (3x - 2)$

$12y + 4$ **$2x + 9$**

Objective: Students will solve simple equations using addition and subtraction.

Vocabulary:

1. variable – a letter that represents an unknown number
2. inverse operations – operations that undo each other

Operation	Inverse Operation
Adding	Subtracting
Subtracting	Adding
Multiplying	Dividing
Dividing	Multiplying

Steps/Rules for Solving an Equation:

1. You want the variable to be alone on one side of the equation.
2. Use inverse operations to get the variable alone.
3. Check your solution using the original equation.

**Think of an equation as a balance scale. When you do something to one side of the equation, you must do the same thing to the other side of the equation to keep it "balanced".

Examples:

1. $n + 84 = 157$
$-84 \quad -84$
$n = 73$

Check: $n + 84 = 157$
$73 + 84 = 157$
$157 = 157$ ✓

2. $w + 115 = -17$

$-115 \quad -115$

$w = -132$

Check: $w + 115 = -17$

$-132 + 115 = -17$

$-17 = -17$ ✓

3. $18 + x = 137$

$x + 18 = 137$

$-18 \quad -18$

$x = 119$

Check: $18 + x = 137$

$18 + 119 = 137$

$137 = 137$ ✓

4. $179 = h + (-148)$

$+148 \quad +148$

$h = 327$

Check: $179 = h + (-148)$

$179 = 327 + (-148)$

$179 = 179$ ✓

5. $-9.3 = x - 3.4$

$+3.4 \quad +3.4$

$x = -5.9$

Check: $-9.3 = -5.9 - 3.4$

$-9.3 = -9.3$ ✓

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

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

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

$x = \frac{12}{15} - \frac{10}{15}$

$\mathbf{x = \frac{2}{15}}$

Check: $\frac{2}{15} + \frac{2}{3} = \frac{4}{5}$

$\frac{4}{5} = \frac{4}{5}$ ✓

7.) Find the number: 4 less than a number n is -15.

$n - 4 = -15$

$+4 \quad +4$ **$n = -11$**

3.4 Solving Equations by Multiplying or Dividing Teacher Notes

POD: Solve each equation.

1.) $-6 + x = -18$ 2.) $-11 = 7 + x$

x = -12 **x = -18**

Objective: Students will be able to solve equations using multiplication or division.

Rules/Steps for Solving an Equation:

4. You want the variable to be alone on one side of the equation.
5. Use inverse operations to get the variable alone.
6. Check your solution using the original equation and substitution.

**Think of an equation as a balance scale. When you do something to one side of the equation, you must do the same thing to the other side of the equation to keep it "balanced".

Examples:

1. $7x = 91$ $\frac{7x}{7} = \frac{91}{7}$ **x = 13**	2. $\frac{y}{-5.5} = -23$ $-5.5 \cdot \frac{y}{-5.5} = -23 \cdot -5.5$ **y = 126.5**
3. $-4n = -21.6$ $\frac{-4n}{-4} = \frac{-21.6}{-4}$ **n = 5.4**	4. $8.2 = \frac{x}{-3}$ $-3 \cdot 8.2 = \frac{x}{-3} \cdot -3$ **x = -24.6**
5. $\frac{2}{3}x = -4$ $\frac{3}{2} \cdot \frac{2}{3}x = -4 \cdot \frac{3}{2}$ $x = \frac{-12}{2}$ **x = -6**	6. $-\frac{8}{5}x = 5$ $\frac{-5}{8} \cdot \frac{-8}{5}x = 5 \cdot \frac{-5}{8}$ $x = \frac{-25}{8}$ $x = -3\frac{1}{8}$

Find the number.

7.) The product of 15 and a number is -75.

$15x = -75$

15 15 **x = -5**

Challenge Problem:

$$4/5 - 2/3\,x = -21$$

Section 3.5: Solving Two Step Equations Teacher Notes

POD: Solve each equation.

1.) -6x = 49.2 **x = -8.2**

2.) $7 = -\frac{x}{4.2}$ **x = 29.4**

Objective: Students will be able to solve two-step equations.

Vocabulary:

1.) Variable – a letter that represents an unknown number
2.) Inverse Operations – operations that undo each other

Operation	Inverse Operation
Adding	Subtracting
Subtracting	Adding
Multiplying	Dividing
Dividing	Multiplying

Steps for Solving an Equation:

7. Locate the variable.
8. Undo addition or subtraction.
9. Undo multiplication or division.
10. Check your solution using the original equation.

1.) 3n – 6 = 15

3n – 6 = 15
+6 +6
3n = 21
3 3 n = 7

2.) $11 = 13 + \frac{x}{3}$

$\frac{x}{3}$ + 13 = 11
- 13 -13
(3) $\frac{x}{3}$ = -2(3) x = -6

3.) $8 - \frac{x}{4} = -6$

-8 -8
(-4) $\frac{x}{-4}$ = -14(-4) x = 56

4.) -5.8 + 6n = -23.8
+5.8 = +5.8
6n = -18
6 6
n = -3

5.) 12x – 8x = -52
4x = -52
4 4

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

x = -13	$\frac{x}{4} = \frac{6}{12} + \frac{10}{12} = \frac{16}{12}$ $4 \cdot \frac{x}{4} = \frac{4}{3} \cdot 4$ $x = \frac{16}{3} = \mathbf{5\ \frac{1}{3}}$

7.) $5 - x = -10$
$-5 \quad -5$
$\frac{-1x}{-1} = \frac{-15}{-1}$
$x = 15$

Section 3.5E/3.6: Two-Step Equation Word Problems Notes

POD: Solve each equation.

1.) $-6x + 4 = -20$ **x = 4**

2.) $\frac{x}{4} + 7 = 10$ **x = 12**

Objective: Students will be able to solve two-step word problems.

Steps for Writing an Equation:

1.) Read the problem to determine the number that represents the total – put this number after the equal sign.
2.) Determine what is missing – make this the variable.
3.) Determine the operation of the word problem.
4.) Solve the equation and label the solution with the correct unit.

Examples: Write an equation for each problem. Then solve.

1.) It costs $2.50 to rent bowling shoes. Each game costs $2.25. You have $9.25. How many games can you bowl?

Equation:

$2.50 + 2.25x = 9.25$
$-2.50 \quad -2.50$
$\frac{2.25x}{2.25} = \frac{6.75}{2.25}$

Answer:

x = 3 games

2.) The length of a rectangle is 4 meters more than twice its width. If the length of the rectangle is 14 feet, what is the width of the rectangle?

Equation:

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

Answer:

$\frac{2w}{2} = \frac{10}{2}$

w = 5 feet

3.) Kyle bought a Nintendo Wii for $199 and some games that cost $46.99 each. The total cost was $386.96. Write and solve an equation to find how many games Kyle bought.

Equation: **Answer:**

$199 + 46.99x = 386.96$

$-199 \quad -199$

$\frac{46.99x}{46.99} = \frac{187.96}{46.99}$

x = 4 games

4.) Joe's Grandpa is 75 years old. This is nine years less than seven times Joe's age. How old is Joe?

Equation: **Answer:**

$7x - 9 = 75$

$+9 \quad +9$

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

x = 12 years old