

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.



Key Idea

Distributive Property

Words To multiply a sum or difference by a number, multiply each number in the sum or difference by the number outside the parentheses. Then evaluate.

Numbers $3(7 + 2) = 3 \times 7 + 3 \times 2$

$$3(7 - 2) = 3 \times 7 - 3 \times 2$$

Algebra $a(b + c) = ab + ac$

$$a(b - c) = ab - ac$$

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.) $2(2x^2 + 4x) - 3x^2 - 2x^3$ $4x^2 + 8x - 3x^2 - 2x^3$ $- 2x^3 + x^2 + 8x$	8.) $2xy - 5y - 3(x + y) - 5xy$ $2xy - 5y - 3x + -3y - 5xy$ $-3xy + -3x + -8y$
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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.

$$12x + 8 + 3 = 12x + 11 \text{ (not equivalent to } 12x + 20\text{)}$$

3.0**The Distributive Property (1 day)**

Name _____ Date _____

Use the Distributive Property and mental math to find the product.

1. 4×31

2. 7×49

$$\begin{array}{l} (\text{ } \times \text{ }) + (\text{ } \times \text{ }) = \text{ } \\ \text{ } = \text{ } \end{array}$$

$$(\text{ } \times \text{ }) + (\text{ } \times \text{ })$$

3. $6(38)$

$$(\text{ } \times \text{ }) + (\text{ } \times \text{ }) = \text{ }$$

Use the Distributive Property to simplify the expression. Combine like terms if needed.

4. $8(5 + w)$

5. $11(9 + d)$

6. $15(p - 4 + 2)$

Simplify the expression by combining like terms.

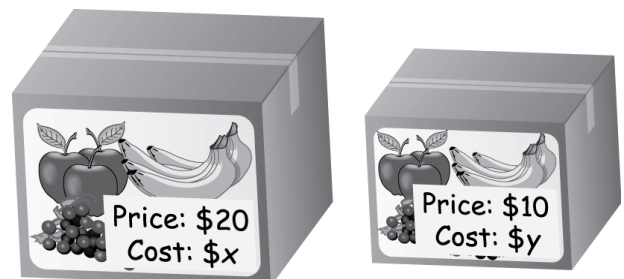
7. $2x - 4 + 3x$

8. $4y - 1 - 3y + 2$

9. $x + 2(x - 4)$

10. A jazz band sells 31 large boxes of fruit and 74 small boxes of fruit for a fundraiser.

- a. Use the Distributive Property to write and simplify an expression for the profit.



Profit = Price – Cost

- b. A large box of fruit costs \$9 and a small box of fruit costs \$4. What is the jazz band's profit?

Section 3.1: Algebraic Expressions Teacher Notes

POD: Simplify.

1.) $3x + 2x + x$

$6x$

2.) $5y - 2y + 3y$

$6y$

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 $1z$
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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.) $\frac{3}{4}y + 12 - \frac{1}{2}y - 6$ $\frac{1}{4}y + 6$
7.) $3x^2 + 2x + 4x - x^2$ $2x^2 + 6x$	8.) $3x^2 + 2x + 6 + 2x^2 - x + 12$ $5x^2 + x + 18$

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

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

3.1**Algebraic Expressions Homework Day 1**

Name _____ Date _____

Identify the terms and like terms in the expression.

1. $3x + 4 - 7x - 6$

2. $-9 + 2.5y - 0.7y + 1 + 6.4y^2$

Simplify the expression.

3. $5a^2 + a - 2a^2 + 6a$

4. $m - \frac{1}{6} - 4m + \frac{5}{6}$

5. $3x^2 + 5x + 4 + x^2 - x + 5$

6. $7(d - 1) + 2$

7. $13g + 2(4k - g)$

8. $20(p + 2) + 16(-3 - p)$

9. Write an expression in simplest form that represents the cost for shampooing and cutting w women's hair and m men's hair.

	Women	Men
Cut	\$15	\$7
Shampoo	\$5	\$2

3.1 Algebraic Expressions Homework Day 2

Identify the terms and like terms in the expression.

1. $-4y + 7 + 9y - 3$

2.

$3n^2 - 1.4n + 5n^2 - 6.4$

Simplify the expression.

3. $-15m + 9m$

4. $8k - 2(4 - 3k)$

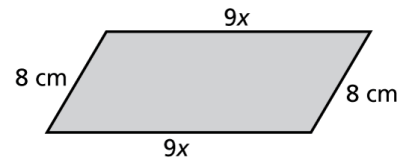
5. $3.2 - 9x + 7.1 - 3x$

6. $25x - 6x^2 - 12x - 2x^2$

7. $19a^2 - 7 - 3a + 2a^2 + 2$

8. $\frac{5}{2}(6x - 7) + \frac{4}{3}(2 + 9x)$

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



10. Are the expressions $8a^2 - 4b + 7a^2$ and $5(3a^2 - 2b) + 6b$ equivalent? Explain your reasoning.

Section 3.2: Adding and Subtracting Linear Expressions Notes

POD: Simplify

1.) $3y - 2 + y + 6$

$$2y + 4$$

2.) $2(3x + 4) + 6x$

$$12x + 8$$

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: $4 + -5y + -7y + 16$

$$-12y + 20$$

3.2**Adding and Subtracting Linear Expressions Homework Day 1**

Name _____ Date _____

Find the sum or difference.

1. $(x - 2) + (x + 6)$

2. $(2n - 4) - (4n - 3)$

3. $2(-3y - 1) + (2y + 7)$

4. $(1 - 3k) - 4(2 + 2.5k)$

5. $(6g - 9) + \frac{1}{3}(15 - 9g)$

6. $\frac{1}{2}(2r + 4) - \frac{1}{4}(16 - 8r)$

7. You earn $(4x + 12)$ points after completing x levels of a video game and then lose $(2x - 5)$ points. Write an expression that represents the total number of points you have now.

3.2**Adding and Subtracting Expressions Homework Day 2****Find the sum.**

1. $(p - 3) + (p - 7)$

2. $(3n - 1) + (4 - n)$

3. $(3c + 2) + 4(1.3c - 5)$

4. $(-6y - 2) + 5(3 + 2.5y)$

5. After a week of rain, tadpoles appeared in your pond. After t minutes, you have $(7t + 5)$ tadpoles and your friend has $(8t - 3)$ tadpoles. Write an expression that represents the number of tadpoles you and your friend caught together.

Find the difference.

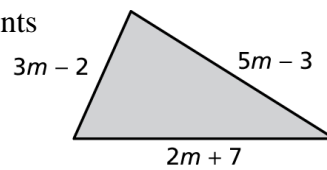
6. $(k + 3) - (3k - 5)$

7. $(-6d + 2) - (7 + 2d)$

8. $(7 - 3t) - 5(-1.6t + 5)$

9. $(3x + 8) - 6(2.5x - 3)$

10. Write a simplified expression that represents the perimeter of the triangle.



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:

$$\begin{array}{r} 1. \ n + 84 = 157 \\ \quad - 84 \quad - 84 \\ \hline \quad \quad n = 73 \end{array}$$

$$\begin{array}{l} \text{Check: } n + 84 = 157 \\ \quad \quad 73 + 84 = 157 \\ \quad \quad 157 = 157 \checkmark \end{array}$$

$$\begin{array}{r} 2. \ w + 115 = -17 \\ \quad - 115 \quad - 115 \\ \hline \quad \quad w = -132 \end{array}$$

$$\begin{array}{l} \text{Check: } w + 115 = -17 \\ \quad \quad -132 + 115 = -17 \\ \quad \quad -17 = -17 \checkmark \end{array}$$

$$\begin{array}{r} 3. \ 18 + x = 137 \\ \quad x + 18 = 137 \\ \quad \quad - 18 \quad - 18 \\ \hline \quad \quad x = 119 \end{array}$$

$$\begin{array}{l} \text{Check: } 18 + x = 137 \\ \quad \quad 18 + 119 = 137 \\ \quad \quad 137 = 137 \checkmark \end{array}$$

$$\begin{array}{r}
 4. \quad 179 = h + (-148) \\
 + 148 \quad \cancel{+148} \\
 \hline
 h = 327
 \end{array}$$

$$\begin{array}{l}
 \text{Check: } 179 = h + (-148) \\
 179 = 327 + (-148) \\
 179 = 179 \quad \checkmark
 \end{array}$$

$$\begin{array}{r}
 5. \quad -9.3 = x - 3.4 \\
 + 3.4 \quad \cancel{+3.4} \\
 x = -5.9
 \end{array}$$

$$\begin{array}{l}
 \text{Check: } -9.3 = -5.9 - 3.4 \\
 -9.3 = -9.3 \quad \checkmark
 \end{array}$$

$$\begin{array}{r}
 6. \quad x + \frac{2}{3} = \frac{4}{5} \\
 -\frac{2}{3} \quad -\frac{2}{3}
 \end{array}$$

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

$$\frac{4}{5} = \frac{4}{5} \quad \checkmark$$

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

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

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

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

$$\begin{array}{r}
 n - 4 = -15 \\
 +4 \quad +4 \quad n = -11
 \end{array}$$

Name: _____

Section 3.3: Solving Equations by Adding and Subtracting Homework Day 1

1.) $x - 6 = -55$	2.) $-455 = n - 255$	3.) $-83.4 + m = 122$
4.) $x - 32.8 = -27$	5.) $-37 + h = -42$	6.) $q - 16 = 40$
7.) $k - (-17) = 29$	8.) $261.9 + d = -48$	9.) $x + 34 = 212$

10.) Find the number: 10 more than a number x is 3.

3.3**Solving Equations by Adding and Subtracting Homework Day 2**

Name _____ Date _____

Solve the equation. Check your solution. Circle your final answer.

1. $x + 3 = 10$

2. $b - 6 = -14$

3. $5 = n + 9$

4. $y - 2.1 = 7.5$

5. $-6.4 = x + 4.3$

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

7. $10.5 + p = -8.32$

8. $3\frac{3}{4} = r + \frac{1}{8}$

9. $m + 1.06 = 5$

Find each number.10. 5 more than a number y is -2 .11. -13 is 4 less than a number n .

3.4 Solving Equations by Multiplying or Dividing Teacher Notes

POD: Solve each equation.

$$1.) -6 + x = -18$$

$$x = -12$$

$$2.) -11 = 7 + x$$

$$x = -18$$

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:

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

Find the number.

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

3.4**Solving Equations with Multiplication and Division Homework Day 1**

Name _____ Date _____

Solve the equation. Check your solution.

1. $\frac{d}{5} = -6$

2. $8x = -6$

3. $-15 = \frac{z}{-2}$

4. $3.2n = -0.8$

5. $-\frac{3}{10}h = 15$

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

Write the word sentence as an equation. Then solve.7. A number divided by -8 is 7 .8. The product of -12 and a number is 60 .9. You earn $\$0.85$ for every cup of hot chocolate you sell. How many cups do you need to sell to earn $\$55.25$?

3.4**Solving Equations with Multiplication and Division Homework Day 2**

Name _____ Date _____

Solve the equation. Check your solution.

1. $\frac{1}{4}b = 24$

2. $-7n = 35$

3. $\frac{y}{-3} = 33$

4. $\frac{p}{5} = -32$

5. $-3t = -4.2$

6. $1.5q = -8.4$

7. $-\frac{1}{5}d = -3$

8. $14 = 3y$

9. $\frac{5}{8}j = -10$

Find the number.

10. A number multiplied by -5.5 is 22.

11. The quotient of a number and 0.2 is -2.6.

Solve.

12. You earn \$7.50 per hour at a fast food restaurant. You earned \$123.75 last week. How many hours did you work last week?

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.

<p>1.) $3n - 6 = 15$</p> $\begin{array}{r} 3n - 6 = 15 \\ +6 \quad +6 \\ \hline 3n = 21 \\ \div 3 \quad \div 3 \\ \hline n = 7 \end{array}$	<p>2.) $11 = 13 + \frac{x}{3}$</p> $\begin{array}{r} \frac{x}{3} + 13 = 11 \\ -13 \quad -13 \\ \hline \frac{x}{3} = -2 \\ \cdot 3 \quad \cdot 3 \\ \hline x = -6 \end{array}$
<p>3.) $8 - \frac{x}{4} = -6$</p> $\begin{array}{r} 8 - \frac{x}{4} = -6 \\ -8 \quad -8 \\ \hline -\frac{x}{4} = -14 \\ \cdot (-4) \quad \cdot (-4) \\ \hline x = 56 \end{array}$	<p>4.) $-5.8 + 6n = -23.8$</p> $\begin{array}{r} -5.8 + 6n = -23.8 \\ +5.8 \quad +5.8 \\ \hline 6n = -18 \\ \div 6 \quad \div 6 \\ \hline n = -3 \end{array}$
<p>5.) $12x - 8x = -52$</p> $\begin{array}{r} 12x - 8x = -52 \\ -4x = -52 \\ \div 4 \quad \div 4 \\ \hline x = -13 \end{array}$	<p>6.) $\frac{x}{4} - \frac{5}{6} = \frac{1}{2}$</p> $\begin{array}{r} \frac{x}{4} - \frac{5}{6} = \frac{1}{2} \\ +\frac{5}{6} \quad +\frac{5}{6} \\ \hline \frac{x}{4} = \frac{6}{12} + \frac{10}{12} = \frac{16}{12} \\ \cdot 4 \quad \cdot 4 \\ \hline x = \frac{16}{3} = 5\frac{1}{3} \end{array}$

$$7.) \quad 5 - x = -10$$

$$\quad -5 \quad -5$$

$$\quad \underline{-1x = -15}$$

$$\quad -1 \quad -1 \quad x = 15$$

Name: _____

Section 3.5: Solving Two Step Equations Homework Day 1

Solve each equation.

1.) $82 = -4x + 2$	2.) $5 - x = 19$
3.) $14 = -4 + \frac{x}{5}$	4.) $12 + 3x = -54$
5.) $-8.15 - \frac{b}{2} = -6.3$	6.) $-20 = -6 - 7x$
7.) $7n + 16 = 100$	8.) $5x + 3x = 48$
9.) How do you check to make sure an equation is correct? Explain how you would check #7.	

3.5**Solving Two Step Equations Homework Day 2**

Name _____ Date _____

Solve the equation. Check your solution.

1. $3k - 2 = 10$

2. $-10 = 2 + 5p$

3. $-4x + 3 = -11$

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

5. $-1 - 5h = 14$

6. $2.5 = -7 + 1.25r$

7. $-4k + 3.6 = 7.8$

8. $-6 - n = 3$

9. $3 - \frac{x}{4} = -6$

10. $7c - 2c = 45$

11. $\frac{5}{6} + 3j = -\frac{2}{3}$

12. $3(k - 5) = -16$

13. The quotient of a number and -1.5 is 21. Find the number.

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

POD: Solve each equation.

$$\begin{array}{l} 1.) -6x + 4 = -20 \\ x = 4 \end{array}$$

$$\begin{array}{l} 2.) \frac{x}{4} + 7 = 10 \\ x = 12 \end{array}$$

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:

$$\begin{array}{r} 2.50 + 2.25x = 9.25 \\ -2.50 \quad -2.50 \\ \hline 2.25x = 6.75 \\ \underline{2.25} \quad \underline{2.25} \end{array}$$

Answer:

$$x = 3 \text{ games}$$

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:

$$\begin{array}{r} 2w + 4 = 14 \\ -4 \quad -4 \\ \hline 2w = 10 \\ \underline{2} \quad \underline{2} \end{array}$$

Answer:

$$w = 5 \text{ feet}$$

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:

$$199 + 46.99x = 386.96$$

$$\begin{array}{r} 199 + 46.99x = 386.96 \\ -199 \qquad \qquad -199 \\ \hline \end{array}$$

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

$$x = 4$$

Answer:

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:

$$7x - 9 = 75$$

$$\begin{array}{r} 7x - 9 = 75 \\ +9 \quad +9 \\ \hline \end{array}$$

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

$$x = 12$$

Answer:

x = 12 years old

Name _____

3.5E: Two Step Word Problems Homework Day 1

- 1.) Claire bought a vase that cost \$5.99 and roses that cost \$1.25 each. The total cost was \$20.99. How many roses did Claire buy? Write an equation and solve.

- 2.) Susie wanted to make a poster for her math presentation. She bought markers that cost \$0.79 each and a poster board that cost \$1.25. The total cost was \$7.57. How many markers did she buy? Write an equation and solve.

- 3.) Maggie is 29 years old which is 2 more than 3 times Vic's age. How old is Vic? Write an equation and solve.

- 4.) Molly rented a moving van for a flat rate of \$45 plus \$0.27 for each mile driven. When Molly returned the van, she paid \$77.40. How many miles did Molly drive? Write an equation and solve.

- 5.) A skating rink rents skates at \$3.95 for the first hour plus \$1.25 for each additional hour. When you returned the skates, you paid \$7.70. How many additional hours did you keep the skates? Write an equation and solve.

- 6.) An online company is having a sale, DVD are on sale, DVDs cost 6.95 each plus shipping & handling of \$5.25. You only have \$40.00 to spend. How many DVDs can you buy? Write an equation and solve.