Algebra 1 Name _____
Chapter 3 Note Packet

Sec 3.1 "Solving Equations Using Addition and Subtraction"

*Goal of Solving an Equation:
To **ISOLATE the VARIABLE** **(get variable by itself)** by making equivalent equations

Transformations:
Operations on equations to produce equivalent equations (adding, subtracting, multiplying, or dividing)

- ➔ The GOLDEN RULE: What you do on one side of an equations, you MUST do on the other side-keep the balance!
- ➔ Draw a line down the equal sign…make sure everything you do, you do to both sides of that line!

Transformations to Try:

1) Add the same number to each side:

$x - 3 = 5$

2) Subtract the same number from each side

$x + 6 = 10$

3) Simplify one or both side by combining like terms

$x = 8 - 3$

4) Interchange the sides

$7 = x$

Examples

Ex 5: $3 - x = 0$

Ex 6: $x + 7 = 4$

Ex 7: $-2 = X + 3$

Ex 8: $x = 5 + 4$

Ex 9: $x - 5 = 2$

Ex 10: $-6 = x - 10$

Sec 3.2 "Solving Equations Using Multiplication and Division"

*Remember that multiplication and division are _____ operations! They "undo" each other.

Transformations to try:

Ex 1: Multiply each side of the equation by the same non-zero number:

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

Ex 2: Divide each side of the equation by the same non-zero number:

$$4x = 12$$

Ex 3: Multiply both sides by the RECIPROCAL to cancel a fraction:

$$\frac{7}{9}x = 6$$

Properties of Equality:

+ Property of Equality: If a = b, then a + c = b + c

- Property of Equality: If a = b then a – c = b – c

(·) Property of Equality: If a = b then ac = bc

÷ Property of Equality: If a = b then a/c = b/c

Examples

Ex 4: $\frac{3}{5}x = 7$

Ex 5: $-3x = 6$

Ex 6: $\frac{x}{5} = 2$

Now can you put yesterday's lesson and today's lesson together?

Ex 7: $4x + 3 = 15$

Ex 8: $\frac{7}{2}x - 1 = 2$

Sec 3.3 "Solving Multi-Step Equations"

*The GOAL is still to ISOLATE the VARIABLE

Steps to try:

1) Simplify using the distributive property (if needed)
2) Combine like terms on left and right sides (if needed)
3) Move all constant terms to the opposite side using addition/subtraction
4) Multiply or divide to solve for the variable

Examples

Ex 1: $2x + 4 = 12$

Ex 2: $\frac{1}{3}x - 3 = 9$

Ex 3: $-3(x - 2) = 6$

Ex 4: $\frac{1}{2}(x + 8) = 16$

Ex 5: $17 = 2(3x + 1) - x$

Sec 3.4 "Solving Equations with Variables on Both Sides"

*When equations have variables on BOTH sides, collect the variables together on the side with the greater variable coefficient! (move them by adding or subtracting)

Ex 1: $7x + 19 = -2x + 55$

Steps to try:

1) Simplify using the distributive property (if needed)
2) Combine like terms on left and right sides (if needed)
3) Move all variables to one side (the side with the greater variable coefficient) using addition/subtraction
4) Move all constant terms to the opposite side using addition/subtraction
5) Multiply or divide to solve for the variable

*ALWAYS REMEMBER: What you do to one side of an equation, you HAVE to do to the other side….the equal sign is like a balance!

Ex 2: $16d + 8d = 450 + 6d$

Ex 3: $\frac{1}{2}(12n - 4) = 14 - 10n$

Identity: An equation that is true for ALL values of the variable

Ex 4: $3(x + 2) = 3x + 6$ Any value for x will give the same answer on BOTH sides!

Some equations have **NO SOLUTION**!

Ex 5: $3x + 2 - 2x = x + 4$

Sec 3.6 "Solving Decimal Equations"

Place Name	Position Related to the Decimal Point
Thousands	
Hundreds	
Tens	
Ones	
Tenths	
Hundredths	
Thousandths	
Ten-Thousandths	

Rounding "Rules":

1) First, determine which "place" you are rounding to
2) Look at the number to the RIGHT of the place value
    a) Is it 5 or greater? If yes, round your place number up
    b) Is it less than 5? If yes, leave your place number as it is

*When you use decimals, you will encounter "**Round-Off Error**", where your answer will be slightly "off" because you rounded the decimal.

➔ When you plug a rounded-off answer back into an equation to check it, it will give a very close, but not quite exact, answer.

Examples: Round answers to the hundredths place, then check answers.

Ex 1: $12x - 5 = 11$

Ex 2: $39.21x + 2.65 = -31.68 + 42.03x$

Ex 3:
You have $35.76 to spend at your favorite clothing store, where the sales tax is 5.5%. You have $33.50 in merchandise you'd like to buy. Do you have enough money?

Sec 3.5 "Linear Equations and Problem Solving"

Solve each problem by defining a variable and setting up an equation.

Ex 1: Twelve more than a number is 83.

Ex 2: The product of 5 and a number, plus 2 is 10.

Ex 3: The product of 5 and a number plus 2 is 10.

Ex 4: The sum of three consecutive odd numbers is 129. What are the three numbers?

Ex 5: Jace had a pocket full of change. When he pulled out all the coins he had three more dimes than nickels and twice as many quarters as nickels. Jace had $4.85 altogether. How many of each coin did Jace have?

Steps for Solving Word Problems:

1) Draw a picture
2) Decide what the variable is, and how other values relate to the variable
3) Set up the equation, then read through to make sure it "fits" the problem and your picture
4) Solve for the variable
5) Plug the answer back into your equation to check it

Ex 6: A triangle has a perimeter of 76cm. The second side is twice as long as the first side. The third side is 4cm shorter than the second side. How long is the first side?

Step 1: Draw a picture

Step 2: Decide what the variable is

Step 3: Set up the equation

Step 4: Solve for the variable

Step 5: Check your answer

Ex 7:
Logan HS is creating a new School Magazine. They want to put three pictures across the cover. The magazine cover is 10" x 13" (the pictures will go along the 10" side). They would like a ½' margin on each side, and a ¼' space between each of the pictures. How wide can the three pictures each be to fit across the magazine cover?

Step 1: Draw a picture

Step 2: Decide what the variable is

Step 3: Set up the equation

Step 4: Solve for the variable:

Step 5: Check your answer

Sec 3.7 "Formulas and Functions"

Formula: An algebraic equation that relates two or more real life quantities

Ex 1:
Area of a triangle: A = ½ bh

a) Solve for h: b) Solve for b:

Ex 2:
Distance traveled: d = rt

a) Solve for r: b) Solve for t:

Ex 3:
Simple Interest: I = PRT

a) Solve for P: b) Solve for R: c) Solve for T:

Rewriting equations in "Function Form":

Re-write with "y as a function of x" this means to *solve for y*:

Ex 4A: $2x + y = 6$

Ex 5A: $2y + 3x = 4$

Find y when x = -2, -1, 0, 1, 2 for both…

Ex 4B:

x					
$y = -2x + 6$					

Ex 5B:

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

Re-write with "x as a function of y" means to *solve for x*:

Ex 6A: $2x + y = 6$

Ex 7A: $2y + 3x = 4$

Find x when y = -2, -1, 0, 1, 2 for both…

Ex 6B:

y					
$x = -\frac{1}{2}y + 3$					

Ex 7B:

y					
$x = -\frac{2}{3}y + \frac{4}{3}$					

Sec 3.8 "Rates, Ratios, and Percents"

* If x and y are two quantities measured in different units, then the **rate of 'x' per 'y'** is x/y.

* A **Unit Rate** is a rate per one given unit, such as 60 miles per 1 gallon = 60miles/1 gallon

For example: You drive 200 miles in 4 hours…unit rate = $\frac{200 miles}{4 hrs} =$ _____

Unit Analysis: Line units up so that they cancel, and you are left with the desired unit

Ex 1: Change 7.8 feet into yards (Unit rate: 3ft = 1yd)

Ex 2: How many euros in $213? (Unit rate: $1.066 = 1 euro)

Ex 3: How many dollars in 300 euros?

Ratios- Compare quantities (usually written as fractions) measured in the same unit

Proportions – Equations stating that two ratios are equal

Ex 4:
A company made 5000 T-shirts, inspected a random sampling of 100, and found that 31 had holes in them. Use this info to write a ratio to estimate the number of defective T-shirts in the whole lot:

Writing Equations and Solving for Unknowns

Ex 5: 76% of 320 is what number? $\frac{"is"}{"of"} = \frac{\%}{100}$

Ex 6: 45% of what number is 427?

Ex 7: What percent of 25 is 17?