Lesson 4 **Section 1.3**

You may remember that subtraction 'undoes' addition and vice versa; multiplication 'undoes' division and vice versa. Whatever **term** is subtracted on one side of an equation would be added on the other side; whatever **term** is multiplied on one side would be the divisor on the other side.

A **Simple Equations**

Examples:

Solve each equation for the variable.

1) $y + 4.3 = 11.2$ 2) $9t = 60$

3) $3x - 13 = 29$ 4) $\frac{2}{7}n + 1 = 9$

B **Combining Like Terms**

A **Term** can be a variable, a number, or a product of variables and numbers.
If variable factors are the same, the terms are said to be **LIKE TERMS**.
A **COEFFICIENT** of a term is the number factor.

LIKE terms can be combined (added/subtracted) by combining the COEFFICIENTS.

Some textbooks may use the terminology 'collect like term' rather than combine like terms.

Examples: Combine the like terms in these expressions.

1) $15x - x$ 2) $3a - 11a + 2a - 6a$

3) $13p + 5 - 4p + 8$ 4) $-9n + 8n^2 - 2n^2 - 3n + n$

C Sometimes the **distributive property** must be used before combining like terms.

5) $x - (5x + 9)$ 6) $8x - 9 - 2(7x - 5)$

7) $12m-[9-7(5m-6)]$

8) $4(7x-2)-5(8-2x)$

D **<u>Solve more Equations:</u>**

Examples:

1) $3x+7x+1=151$

2) $\frac{3}{5}r-\frac{1}{2}r=3$

3) $3(2y+5)=8y$

4) $14x+20=2(4x-11)$

5) $\frac{3}{4}(16x-4)=\frac{1}{5}(10x-20)$

6) $9m-15-2m=6m-1-m$

7) $3[2-4(x-1)]=3-4(x+2)$

8) $\frac{2}{3}(x+5)=\frac{3}{4}x-2$

E Types of Equations

The equations solved so far are called **linear equations** in one variable, because the variable is only to the first power. Linear equations can be one of 3 types.

1. A conditional equation
2. An identity equation
3. A contradiction equation

All the equations are the first two pages are conditional equations. A **conditional equation** is one that can be true or false depending on what number is substituted for the variable. In a linear equation, a conditional equation only has one solution.

An example of a conditional equation is $2u-8=9$, where the solution is $u=\frac{17}{2}$.

An **identity equation** is an equation that is always true no matter what number replaces the variable. In other words, an identity has a solution of **all real numbers** or any number.

An example of an identity is $2(x+3)=2x+6$. No matter what number is substituted for *x*, this equation will be true.

A **contradiction** is an equation that is never true, no matter what number is substituted for the variable. In other words, this type of equation has **no solution.**

An example of a contradiction is $3(x+5)=\frac{3}{2}(2x+2)$. No number exists that will make this equation be true.

How will you identify identity equations or contradiction equations? The variables will 'drop out' of the equation (or be eliminated). An equation is an identity if there is a **true statement** after the variables drop out, such as 5 = 5 or 0 = 0. An equation is a contradiction if there is a **false statement** after the variables drop out, such as 5 = 10 or 0 = -7.

Solve each equation and describe the solution. Identify each as a conditional, an identity, or a contradiction equation.

1) $3x+5+x=4(x+1)+1$

2) $21-6(7y-4)=-40y+45$

3) $\frac{3}{4}(16x+8)=11x+5-8+x$