

**1.3a: Solving Equations**

**Translating Verbal Expressions and Algebraic Expressions**

Ex#1:

- a) Please translate the verbal expressions into an algebraic expressions.

*three times the difference of a number and eight*

*the cube of a number increased by 4 times the same number*

- b) Please translate the algebraic expression into a verbal expression.

$$p^3 + 4p$$

Ex#2: Please write a verbal sentence to represent the equation.

$$2c = c^2 - 4$$

**Properties of Equality** – common math operations, used to solve equations

<i>For any real numbers, a, b, and c</i>		
Property	Using only symbols	Additional examples
Reflexive	$a = a$	$b + 8 = b + 8$
Symmetric	If $a = b$ , then $b = a$	If $2b + c = 20$ , Then $20 = 2b + c$
Transitive	If $a = b$ , and $b = c$ , then $a = c$	If $2a + 12 = 30$ , and $30 = 5c - 8$ , then $2a + 12 = 5c - 8$
Substitution	If $a = b$ , then a can be replaced by b b can be replaced by a	If $(5 + 2)x = 21$ , Then $7x = 21$

Ex#3: Please name the property illustrated by the following statement.

$$\text{If } -11a + 2 = -3a, \text{ then } -3a = -11a + 2$$

**Additional Properties of Equality**

“Whatever operation you do to one side of the equation, you must do to the other.”

<i>For any real number 'a'</i>	
Property	Example
Addition	if $a = a$ then $a + 8 = a + 8$
Subtraction	if $a = a$ then $a - 4 = a - 4$
Multiplication	if $a = a$ then $a \cdot 3 = a \cdot 3$
Division	if $a = a$ then $a \div 7 = a \div 7$

Ex#4: Please solve the following equations, noting which property of equality is being utilized.

a)  $x - 14.29 = 25$

b)  $\frac{2}{3}y = -18$

c)  $-10x + 3(4x - 2) = 6$

Ex#5: Please solve for  $h$  in the following formula for area of a trapezoid.  $A = \frac{1}{2}h(b_1 + b_2)$

*Please note the property used for each step.*