1.3a: Solving Equations

KEY

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

$3(x-8)$

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

x^3+4x

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

p^3+4p a number cubed plus the product of 4 and that number (may be other ways to express it)

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

$2c=c^2-4$ 2 times a number is equal to that number squared, minus 4.

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

For any real numbers, a, b, and c		
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 **7**x = 21

(5+2) replaced with 7.

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

If $-11a+2=-3a$, then $-3a=-11a+2$ Symmetric

Additional **Properties of Equality**

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

For any real number 'a'	
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 **• 3** = a **• 3**
Division	if a = a then a **÷ 7** = a **÷ 7**

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

a) $x-14.29=25$

+14.29 +14.29

$x=39.29$ (Addition)

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

$y=-27$ (Multiplication)

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

$-10x+12x-6=6$ (Distributive)

$2x-6=6$ (Substitution)

$2x=12$ (Addition)

$x=6$ (Division)

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.

$2\cdot A=\frac{1}{2}h(b_1+b_2)\cdot 2$

$2A=h(b_1+b_2)$ – Multiplication

$\frac{2A}{b_1+b_2}=\frac{h(b_1+b_2)}{b_1+b_2}$

$\frac{2A}{b_1+b_2}=h$ – Division

(it'd also be possible to distribute h into (b_1+b_2), it'd just require more steps. Which is cool.)