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Math 7 Manipulating Basic Algebraic Equations

There are four (4) basic algebraic equations that are used when solving problems involving unknowns (variables). Although these basic equations can be expanded to appear more complex, the basic approach to solving each is the same.

There are two main manipulation principles that we will use in order to change the form of the equation into a simpler format. These will be:

Simplify $\Rightarrow$ make the value $= 1$

Eliminate $\Rightarrow$ make the value $= 0$

Basic rules to follow are:

1) always simplify coefficients down to a value of 1

2) always eliminate constant down to a value of 0 (unless the value is only on one side of the equation)

3) whatever you do to one side of the equation you <u>must</u> do to the other side

Four Basic Types of Algebraic Equations

1) $y = ax$

2) $y = \dfrac{x}{a}$

3) $y = ax + b$

4) $y = \dfrac{x}{a} + b$

We are going to look at how to solve each one of these with two examples for each.

1) $y = mx$ ← variable, coefficient

↳ answer

ex) $-12 = 3x$

3 is multiplying the x therefore we do the opposite ⇒ divide to simplify down to 1

* must remember what you do to one side, must do to the other side

$\dfrac{-12}{3} = \dfrac{3x}{3}$

$-4 = 1x$

↑ 1 times x, is still just x

$-4 = x$

check
$-12 = 3x$
$-12 = 3(-4)$ ✓ yes
$-12 = -12$ ✓

ex) $-4.2x = 23.94$

↓

$\dfrac{-4.2x}{-4.2} = \dfrac{23.94}{-4.2}$

$1x = -5.7$

check

$-4.2x = 23.94$

$-4.2(-5.7) = 23.94$

$23.94 = 23.94$ ✓

yes

2) $y = \dfrac{x}{a}$

ex) $-15 = \dfrac{x}{4}$

the 4 is dividing the x
therefore the opposite
is => multiply both sides
that way coefficient = 1

(4) $-15 = \dfrac{(4) \, x}{4}$

$-60 = 1x$

$-60 = x$

check

$-15 = \dfrac{x}{4}$

$-15 = \dfrac{-60}{4}$

$-15 = -15$ ✓

$\underline{\underline{yes}}$

ex) $\dfrac{x}{-3.7} = 32.93$

$(-3.7)\dfrac{x}{-3.7} = 32.93 (-3.7)$

$1x = -121.841$

check

$\dfrac{x}{-3.7} = 32.93$

$\dfrac{-121.841}{-3.7} = 32.93$

$32.93 = 32.93$ ✓

$\underline{\underline{yes}}$

Part 2 of Notes Next Week Monday