Name: _____ Date: _____

MFM2P: Foundations of Mathematics 10 Numeracy and Algebra

Solving Equations

1. Solving an Equation by Inspection

   To **solve** an equation is to find any value(s) that make it true.
   For simple equations, it may be possible to "guess" this value. If $3x=12$, then $x=4$ since $3(4)=12$.

2. Solving an Equation by Isolating a Variable

   A variable is **isolated** if it has no operations applied to it. In the equation $y=mx+b$, y is isolated.
   To isolate a variable, apply **opposite operations** while performing BEDMAS **in reverse**.
   Remember to keep things in balance by performing the **same operation** on **both sides** of an equation.
   To check a solution, substitute the value into the original equation to check.

3. Examples

A. Solve $z+5=13$.
This is a relatively simple equation. Since $8+5=13$, it follows that $z=8$.

B. Solve $39+2k=-17$.
The values in this equation are a bit too large to visualize. Algebraically isolating *k* might be a better method.
Performing BEDMAS in reverse, cancel the 39 by subtracting it from both sides.

$$\begin{aligned} 39-39+2k &= -17-39 \\ 2k &= -56 \end{aligned}$$

To cancel the multiplication, divide both sides by 2.

$$\begin{aligned} \frac{2k}{2} &= \frac{-56}{2} \\ k &= -28 \end{aligned}$$

Therefore, $k=-28$. To check, note that $39+2(-28)=39-56=-17$.

C. Solve $2(4x-3)+5(x-2)=23$.
Use the distributive property twice to expand the expression, then collect like terms.

$$\begin{aligned} 2(4x-3)+5(x-2) &= 23 \\ 8x-6+5x-10 &= 23 \\ 13x-16 &= 23 \end{aligned}$$

Add 16 to both sides to cancel the -16.

$$\begin{aligned} 13x-16+16 &= 23+16 \\ 13x &= 39 \end{aligned}$$

Divide both sides by 13 to isolate *x*.

$$\begin{aligned} \frac{13x}{13} &= \frac{39}{13} \\ x &= 3 \end{aligned}$$

Therefore, $x=3$. Check by substitution.

$$\begin{aligned} 2(4x-3)+5(x-2) &= 2(4\cdot 3-3)+5(3-2) \\ &= 2(9)+5(1) \\ &= 18+5 \\ &= 23 \end{aligned}$$