

NOTES – Solving Equations

Starter

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What is the operation between the variable and each of the following numbers.

- 1) $2x$ Operation Multiply 2) $-2x$ Operation Mult. 3) $2 + x$ Operation Add!
 3) $x - 4$ Operation Subtr. 4) $-\frac{1}{2}(-x)$ Operation mult. 5) $\frac{x}{2}$ Operation DIV

opposite of mult. — DIV
 " " add — subtr

NOTES – Solving Equations – One Step by using inverse operations

You must get the variable by itself

Step 1: Undo either Addition/Subtraction on Multiplication/Division by using the inverse (opposite) operation.

Example 1:

$$\begin{array}{r|l} x + 4 & = 10 \\ \hline -4 & -4 \\ \hline x + 0 & \\ \hline \boxed{x = 6} \end{array}$$

Undo Add:

Example 2:

Undo Subtract:

$$\begin{array}{r|l} x - 4 & = 10 \\ \hline +4 & +4 \\ \hline x & \\ \hline \boxed{x = 14} \end{array}$$

Example 3:

$$\frac{2x}{2} = \frac{10}{2}$$

Undo Multiply: ~~2~~ ~~2~~

$$1x = 5$$

$$x = 5$$

~~$$\frac{2}{1} \cdot \frac{1}{2} x = \frac{10}{1} \cdot \frac{2}{1}$$~~

$$x = 20$$

Example 4:

$$\frac{x}{2} = 10$$

$$\frac{1}{2}x = 10$$

Undo Divide:

~~$$\frac{2}{1} \cdot \frac{x}{2} = 10 \cdot 2$$~~

$$1x = 20$$

$$x = 20$$

You Try!

1)

$$\begin{array}{r} 3 + y = 15 \\ -3 \quad -3 \\ \hline y = -18 \end{array}$$

2)

$$\begin{array}{r} x - 7 = -8 \\ +7 \quad +7 \\ \hline x = -1 \end{array}$$

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

reiprocal

4) $\frac{3}{1} \cdot \frac{1}{3} x = -5 \cdot \frac{3}{1}$
 $x = -15$

NOTES – Solving Equations – Two Step
 You must get the variable by itself

Step 1: Undo either Addition/Subtraction first by using the inverse (opposite) operation.

Example 1: $2x + 4 = 10$
 Undo Add: $\frac{-4}{-4} = -4$
 $2x = 6$
 Step 2: Undo either Multiplication/Division next by using the inverse (opposite) operation.
 Undo Multiply: $\frac{2}{2} = 2$
 $x = 3$

Example 2: $2x - 4 = 10$
 Undo Subtract: $\frac{+4}{+4} = +4$
 $2x = 14$
 Undo Multiply: $\frac{2}{2} = 2$
 $x = 7$

Example 3: $\frac{1}{2}x + 3 = 10$

Undo Add: $\frac{1}{2}x + 3 - 3 = 10 - 3$

$\frac{1}{2}x = 7$

$\Rightarrow \frac{1}{2}x = 7 \cdot 2$

Undo Divide: $x = 14$

Example 4: $6 - \frac{x}{2} = 10$

Undo Add: $6 - \frac{x}{2} - 6 = 10 - 6$

$-\frac{x}{2} = 4$

Undo divide: $x = -8$

$6 - \frac{x}{2} = 10$

$-6 - 6$

$-\frac{x}{2} = 4$

$x = -8$

$-\frac{x}{2} + 6 = 10$

$-6 - 6$

$-\frac{x}{2} = 4$

You Try!

1) $3 + 6y = -15$

$$6y + 3 = -15$$

2) $3x - 7 = -10$

$$3) \quad -4x + 2 = -10$$

$$4) \quad 2 - \frac{1}{3}x = -5$$

