Equations

…. are mathematical sentences stating that two expressions are equivalent

How do you solve an equation?

Start with an equation $2x + 4 = 10 - x$

Step 1 Variables need to be on the left side. Add x to both sides

$2x + 4 + x = 10 - x + x$

Whatever you do to one side you must do to the other too

Step 2 Combine "like" terms

$3x + 4 = 10$

Step 3 Numbers need to be on right side. Subtract 4 from both sides.

$3x + 4 - 4 = 10 - 4$

Step 4 Combine "like" terms

$3x = 6$

Step 5 Divide by the coefficient to get the value of 1x

$\frac{3x}{3} = \frac{6}{3}$

Step 6 There is your solution

$x = 2$

How do you know if you were correct?

Equations can be checked quickly and easily by YOU.

In our example $2x + 4 = 10 - x$ our solution was x=2

Substitute the value you found for x back into the equation to see if the two sides are equal to each other. If they are equal then you were right ☺

If $x = 2$ $\quad 2(2) + 4 \overset{?}{=} 10 - 2$

$4 + 4 = 8$

$8 = 8$ ☑

Example 2

Solve the following equation $7x - 6 = 22 + 3x$

Step 1	Variables need to be on the left side. Subtract 3x from both sides	$7x - 6 \quad -3x = 22 + 3x \quad -3x$ Whatever you do to one side you must do to the other too
Step 2	Combine "like" terms	$4x - 6 = 22$
Step 3	Numbers need to be on right side. Add 6 to both sides.	$4x - 6 \quad +6 = 22 \quad +6$
Step 4	Combine "like" terms	$4x = 28$
Step 5	Divide by the coefficient to get the value of 1x	$\frac{4x}{4} = \frac{28}{4}$
Step 6	There is your solution	$x = 7$

Example 3

Solve the following equation $-3x + 5 = 20 + 2x$

Step 1 Variables need to be on the left side. ~~Subtract~~ $2x$ from both sides

$-3x + 5 - 2x = 20 + 2x - 2x$

Whatever you do to one side you must do to the other too

Step 2 Combine "like" terms

$-5x + 5 = 20$

Step 3 Numbers need to be on right side. Subtract 5 from both sides.

$-5x + 5 - 5 = 20 - 5$

Step 4 Combine "like" terms

$-5x = 15$

Step 5 Divide by the coefficient to get the value of 1x

$\frac{-5x}{-5} = \frac{15}{-5}$

Step 6 There is your solution

$x = -3$

Check

$-3(-3) + 5 \stackrel{?}{=} 20 + 2(-3)$

$9 + 5 \stackrel{?}{=} 20 - 6$

$14 = 14$ ✓

Solving Equations That Look Like... Fractions !!!

Example #4 $\frac{3x}{4} = \frac{6}{2}$

Step 1 Cross multiply. $\frac{3x}{4} \times \frac{6}{2}$

$3x(2) = 4(6)$

$6x = 24$

Step 2 Divide by coefficient $\frac{6x}{6} = \frac{24}{6}$

$x = 4$

Step 3 Check $\frac{3(4)}{4} = \frac{6}{2}$

$3 = 3$

Try it on your own!

Example #5 $\frac{9x}{10} = \frac{16}{6}$

Step 1 Cross multiply. $\frac{9x}{10} = \frac{16}{6}$

$54x = 160$

Step 2 Divide by coefficient $\frac{54x}{54} = \frac{160}{54}$

$x = 2.96$

Step 3 Check $\frac{9(2.96)}{10} = \frac{16}{6}$

$2.66 = 2.66$ 

Try it on your own!

Workbook:

P. 75 #1 & 2

Example #6 $\frac{(x + 1)}{2} + \frac{(x - 1)}{3} = -4$

Step 1 Find a common denominator for 2 and 3

$$\frac{(x + 1)}{2} + \frac{(x - 1)}{3} = -4$$

$$\frac{3(x + 1)}{6} + \frac{2(x - 1)}{6} = -4$$

$$\frac{3x + 3}{6} + \frac{2x - 2}{6} = -4$$

Step 2 Simplify

$$\frac{5x + 1}{6} = -4$$

$$5x + 1 = -24$$

$$5x + 1 - 1 = -24 - 1$$

Step 3 Divide by coefficient

$$\frac{5x}{5} = \frac{-25}{5}$$

$$x = -5$$

Don't forget to check to see if you are correct