Solving Equations

Example 1 (unknowns on one side)

Solve the following.

a $5x - 3 = 17$ b $2x + 7 = 23$ c $3x + 5 = 19$

a Start by copying down the equation: $5x - 3 = 17$
Add 3 to both sides: $5x = 20$
Divide both sides by 5: $x = 4$

b Start by copying down the equation: $2x + 7 = 23$
Subtract 7 from both sides: $2x = 16$
Divide both sides by 2: $x = 8$

c Start by copying down the equation: $3x + 5 = 19$
Subtract 5 from both sides: $3x = 14$
Divide both sides by 3: $x = \frac{14}{3}$
This can be written as: $x = 4\frac{2}{3}$

Example 2 (unknowns on both sides)

Solve the following.

a $6x + 7 = 2x + 23$ b $x - 3 = 12 - 4x$

Focus on the xs (unknowns). Eliminate the smallest number from each side.

a Start by copying down the equation: $6x + 7 = 2x + 23$
Subtract $2x$ from both sides (since $2x < 6x$): $4x + 7 = 23$
Subtract 7 from both sides: $4x = 16$
Divide both sides by 4: $x = 4$

b Start by copying down the equation: $x - 3 = 13 - 4x$
Add $4x$ to both sides (since $-4x < x$): $5x - 3 = 13$
Add 3 to both sides: $5x = 16$
Divide both sides by 5: $x = \frac{16}{5}$
This can be written as: $x = 3\frac{1}{5}$

Example 3 (with brackets)

Solve the following.

a $3(2x + 1) = 27$ b $2(3x - 3) = 4x + 18$

a Start by copying down the equation: $3(2x + 1) = 27$
Multiply out the brackets: $6x + 3 = 27$
Subtract 3 from both sides: $6x = 24$
Divide both sides by 6: $x = 4$

b Start by copying down the equation: $2(3x - 3) = 4x + 18$
Multiply out the brackets: $6x - 6 = 4x + 18$

Example 4 (with fractions)

Rule :- Always **ELIMINATE** the fractions at the very beginning .....
by **MULTIPLYING every term** by the l.c.m. of all the fractional denominators.

Remember - l.c.m. means "lowest common multiple".

Example 1 :-

Multiply BOTH sides by **2** to eliminate the fraction $\frac{1}{2}$.

$\frac{1}{2}x + 5 = 9$

$2 \times \frac{1}{2}x + 2 \times 5 = 2 \times 9$

$\Rightarrow \quad x + 10 = 18$

$\Rightarrow \quad x = 8$

* note - every term must be multiplied by 2

Example 2 :-

Multiply BOTH sides by **20** to eliminate the two fractions, since the l.c.m. of 4 and 5 is **20.**

$\frac{3}{4}x + \frac{2}{5} = 1$

$20 \times \frac{3}{4}x + 20 \times \frac{2}{5} = 20 \times 1$

$\Rightarrow \quad 15x + 8 = 20$

$\Rightarrow \quad 15x = 12$

$\Rightarrow \quad x = \frac{12}{15} = \frac{4}{5}$