

## Simple Equations

- In algebra, a *variable* means something that has no fixed value
- A variable takes on different numerical values and is denoted usually by small letters of the alphabets
- Algebraic expressions are formed by performing operations like addition, subtraction, multiplication and division on the variables
- The value of an expression depends on the value of the variable
- An **equation** is a condition on a variable such that two expressions, one on LHS and the other on RHS have equal value.
- Here, at least one of the two expressions must contain the variable
- Solution of an equation: Finding the solution to the equation or solving the equation is finding the value of the unknown or variable; value that satisfies the equation thus ensuring that the value of expression on LHS = value of expression on RHS

### Rules while solving equations

- The equation remains same when both sides of the expression are interchanged : LHS      RHS
- If we (i) add the same number to both the sides, or (ii) subtract the same number from both the sides, or (iii) multiply both sides by the same non-zero number or (iv) divide both sides by the same non-zero number, the balance remains undisturbed.
- Transposing means moving from one side to the other. When a term is transposed from one side of the equation to the other side, its sign gets changed :  $ax + b = c$        $ax = c - b$  , b is transposed from LHS to RHS
- Transposition of an expression can be carried out in the same way as the transposition of a term



A balanced equation is like a weighing balance with equal weights in two pans analogous to the two sides ; LHS and RHS

### Procedure for solving simple equations :

- To solve, make use of the rules
- Apply a series of identical mathematical operations on both sides till we get just the variable on one of the sides, and the constant on the other side (Take care of the proper sign changes while transposing)
- The last step gives the solution

Ex . Solve :  $3x + 6 = 18$

1	$3x + 6 = 18$	given
2	$3x = 18 - 6$	Transposing 6 from LHS to RHS, sign change
3	$3x = 12$	LHS= $18 - 6 = 12$
4	$x =$	Multiplication as a reverse process of division (or $3 \times 4 = 12$ , x has to be 4)
5	Hence $x = 4$	Step of solution, when $x = 4$ , LHS = RHS

It is also possible to form equations given the solution

- Say  $x = p$  is given , where x is a variable, p is some constant
- Multiply by m both sides:  $mx = mp$  , m is another constant
- Add a constant , say n to both sides:  $mx + n = mp + n$
- Let  $mp + n = c$ , c is a constant

Ex.  $x = 3$  ,

Multiplying by 5 both sides:  $5x = 15$

Adding 7 both sides :  $5x + 7 = 22$  , is the equation formed

To solve practical problems:

- Read the problem carefully and as per the constraint / mathematical condition, formulate the word problem into mathematical statements
- Denote the unknown quantity by variable x, y etc.
- Form the equation according to the given conditions.
- Solve the equation : find the value of the unknown quantity (variable).