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Linear Equations Formulae

Sahi Prep Hai Toh Life Set Hai

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Linear equation:

- A mathematical statement that has an equal to the "=" symbol is called an equation. Linear equations are equations of degree 1.

- A linear equation is an equation which gives straight line when plotted on a graph.

- Linear equations can be of one variable or two variable or three variable.

- Let a, b, c and d are constants and x, y and z are variables.
  A general form of single variable linear equation is ax + b = 0.
  A general form of two variable linear equation is ax + by = c.
  A general form of three variable linear equation is ax + by + cz = d.

Important points:

- The values of the variable that makes a linear equation true are called the solution or root of the linear equation.
- The solution of a linear equation is unaffected if the same number is added, subtracted, multiplied, or divided into both sides of the equation.
- The graph of a linear equation in one or two variables is a straight line.

Equations with two variables:

- Consider two equations ax + by = c and mx + ny = p. Each of these equations represent two lines on the x-y co-ordinate plane. The solution of these equations is the point of intersection.

- If $\frac{a}{m} = \frac{b}{n} \neq \frac{c}{p}$ then the slope of the two equations is equal and so they are parallel to each other. Hence, no point of intersection occurs. Therefore no solution.

- If $\frac{a}{m} \neq \frac{b}{n}$ then the slope is different and so they intersect each other at a single point. Hence, it has a single solution.

- If $\frac{a}{m} = \frac{b}{n} = \frac{c}{p}$ then the two lines are same and they have infinite points common to each other. So, infinite solutions occurs

General procedure to solve linear equation:

- Aggregate the constant terms and variable terms
- For equations with more than one variable, eliminate variables by substituting equations in their place.
- Hence, for two equations with two variables x and y, express y in terms of x and substitute this in the other equation.

Example:

- Let x + y = 8 and x + 3y = 12,
  Then x = 8 - y (from equation 1) substituting this in equation 2,
  We get 8 – y + 3y = 12
  Hence, y = 2 and x = 6.

Note:

For equations of the form ax + by = c and mx + ny = p, find the LCM of b and n. Multiply each equation with a constant to make the y term coefficient equal to the LCM. Then subtract equation 2 from equation 1.

Example: Let 2x + 3y = 13 and 3x + 4y = 18 are the given equations (1) and (2)
LCM of 3 and 4 is 12.
Multiplying (1) by 4 and (2) by 3,
We get 8x + 12y = 52 and 9x + 12y = 54.
(2) - (1) gives x = 2, y = 3

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