

CLASS 9 · HOTS · OLYMPIAD PREPARATION · SHORT NOTES

Chapter 13: HOTS: Two Variables, One Line (Class 9)

Topic-wise short notes with solved examples

Higher order thinking questions on linear equations in two variables for Class 9: solving a pair by elimination and substitution, the slope of a line, points on a line and word problems, each with a full solution.

1 Solved HOTS questions

- The graph of $ax + by = c$ is a straight line, and every point on it is a solution. The slope of the line through (x_1, y_1) and (x_2, y_2) is $\frac{y_2 - y_1}{x_2 - x_1}$. A pair of lines meets at one point (one solution), is parallel (no solution), or is the same line (infinitely many solutions).

Example 1.1 Solve $x + y = 10$ and $x - y = 2$.

SOLUTION

Adding the two equations: $2x = 12$, so $x = 6$.

Then $y = 10 - 6 = 4$.

$x = 6$ and $y = 4$

Example 1.2 Find the slope of the line through $(1, 2)$ and $(4, 8)$.

SOLUTION

Slope = $\frac{8 - 2}{4 - 1} = \frac{6}{3}$.

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Example 1.3 Solve $2x + 3y = 12$ and $4x - y = 10$ by substitution.

SOLUTION

From the second equation $y = 4x - 10$.

$2x + 3(4x - 10) = 12$, so $14x = 42$ and $x = 3$.

$y = 4 \times 3 - 10 = 2$.

$x = 3$ and $y = 2$

Example 1.4 Find k if the point $(2, 3)$ lies on the line $kx + 2y = 12$.

SOLUTION

Substituting: $2k + 6 = 12$, so $k = 3$.

$$k = 3$$

Example 1.5 The sum of two numbers is 45 and their difference is 9. Find the numbers.

SOLUTION

$x + y = 45$ and $x - y = 9$. Adding: $2x = 54$, so $x = 27$.

$$y = 45 - 27 = 18.$$

27 and 18