PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1.Intoduction:

Akhila went to a fair in her village. She wanted to enjoy rides on the Giant Wheel and play Hoopla (a game in which you throw a ring on the items kept in a stall, and if the ring covers any object completely, you get it). The number of times she played Hoopla is half the number of rides she had on the Giant Wheel. If each ride costs Rs 3, and a game of Hoopla costs Rs 4, how would you find out the number of rides she had and how many times she played Hoopla, provided she spent Rs 20.

2.Notes:

- a1 x + b1 y + c1 = 0 a2 x + b2 y + c2 = 0 where a1 , a2 , b1 , b2 , c1 , c2 are real numbers, such that 22 22 11 22 ab ab +≠ +≠ 0, 0.
- A pair of linear equations in two variables can be represented, and solved, by the: (i) graphical method (ii) algebraic method
- Algebraic Methods : We have discussed the following methods for finding the solution(s) of a pair of linear equations : (i) Substitution Method (ii) Elimination Method (iii) Cross-multiplication Method

3.Example Sums:

*find whether the following pair of equations has no solution, unique solution or infinitely many.

solutions: 5x – 8y + 1 = 0 (1) 3x – 24 5 y + 3 5 = 0 (2) Solution : Multiplying Equation (2) by 5 , 3 we get 5x – 8y + 1 = 0 But, this is the same as Equation (1).

Hence the lines represented by Equations (1) and (2) are coincident. Therefore, Equations (1) and (2) have infinitely many solutions. Plot few points on the graph and verify it yourself.

*Two rails are represented by the equations $x + 2y − 4 = 0$ and $2x + 4y − 12 = 0$. Represent this situation geometrically.

solution: The pair of linear equations formed were: $x + 2y − 4 = 0$ (1) $2x + 4y − 12 = 0$ (2) We express x in terms of y from Equation (1) to get $x = 4 − 2y$ Now, we substitute this value of x in Equation (2) to get $2(4 − 2y) + 4y − 12 = 0$ i.e., $8 − 12 = 0$ i.e., $− 4 = 0$ which is a false statement. Therefore, the equations do not have a common solution. So, the two rails will not cross each other.

4.Practice Sums:

*Solve $2x + 3y = 11$ and $2x − 4y = − 24$ and hence find the value of 'm' for which $y = mx + 3$.

*Form the pair of linear equations in the following problems, and find their solutions (if they exist) by the elimination method : Meena went to a bank to withdraw Rs 2000. She asked the cashier to give her Rs 50 and Rs 100 notes only. Meena got 25 notes in all. Find how many notes of Rs 50 and Rs 100 she received.