Class X Maths

TO FIND THE MISSING QUANTITY WITH GIVEN CONDITION

PAIR OF EQUATIONS

CONSISTENT

UNIQUE SOLUTION

$$\frac{a1}{a2} \neq \frac{b1}{b2}$$

Intersecting lines (interdependent)

INFINITE SOLUTIONS

$$\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$$

Coincident lines (DEPENDENT)

INCONSISTENT

NO SOLUTION

$$\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$$

Parallel lines (Not dependent)

Eg. 15 NCERT

- **For which values of p does the pair of equations has unique solutions ?**
- **4x + py + 8 = 0**
- **2x + 2y + 2 =0**
- **Solution : For unique solutions ,** $\frac{a1}{a2} \neq \frac{b1}{b2}$
- According to equations $\frac{a1}{a2} = \frac{4}{2} = 2$, $\frac{b1}{b2} = \frac{p}{2}$
- $2 \neq \frac{p}{2}$
- **P≠ 4 Ans.**

Eg. 16 NCERT

- **For what values of k will the following pair of linear equations have infinitely many solutions ?**
- **K x + 3y – (k – 3) = 0**
- **12 x + k y – k = 0**
- **Solution : For infinitely many solutions** $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$
- $\therefore \frac{k}{12} = \frac{3}{k} = \frac{-(k-3)}{-k}$
- **Consider ,** $\frac{k}{12} = \frac{3}{k}$
- $k^2 = 36$
- **k =** ± 6 $\quad because\ [(6)^2 = 36, (-6)^2 = 36]$
- **continue….**

- Now consider , $\frac{3}{k} = \frac{k-3}{k}$
- $3k = k^2 - 3k$
- $6k = k^2$
- $6k - k^2 = 0$
- $k(6 - k) = 0$
- either $k = 0$
- or $(6 - k) = 0 \Rightarrow k = 6$
- The value of k that satisfies both conditions is
- **k = 6 Ans.**

Ex. 3.5 Ncert Q2 (i)

- For which values of a and b does the following pair of linear equations have an infinite number of solutions ?
- $2x + 3y = 7$
- $(a - b)x + (a + b)y = 3a + b - 2$
- **Solution : First write both equations in standard form**
- $2x + 3y - 7 = 0$
- $(a - b)x + (a + b)y - (3a + b - 2) = 0$
- **For infinitely many solutions** $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$
- $\therefore \frac{2}{a-b} = \frac{3}{a+b} = \frac{-7}{-(3a + b - 2)}$
- $\frac{2}{a-b} = \frac{3}{a+b} = \frac{7}{3a + b - 2}$

- **Consider** $\frac{2}{a-b} = \frac{3}{a+b}$
- $\Rightarrow 2(a+b) = 3(a-b)$
- $\Rightarrow$ **2 a + 2 b = 3 a – 3 b**
- $\Rightarrow$ **2 b + 3 b = 3 a – 2 a**
- $\Rightarrow$ **5 b = a ..... (1)**

- **Also ,** $\frac{3}{a+b} = \frac{7}{3a+b-2}$
- $\Rightarrow$ **3(3 a + b – 2) = 7 (a + b)**
- $\Rightarrow$ **9 a + 3b – 6 = 7 a + 7 b**
- $\Rightarrow$ **9 a – 7 a + 3b – 7 b = 6**
- $\Rightarrow$ **2 a – 4 b = 6 ..... (2)**
- **Put a= 5 b from eq.(1)in (2)**
- $\Rightarrow$ **2 (5b) – 4 b = 6**
- $\Rightarrow$ **10 b – 4 b= 6**
- $\Rightarrow 6$ **b = 6**
- $\Rightarrow$ **b =** $\frac{6}{6} = 1$
- $\Rightarrow$ **a = 5 (1) = 5**
- $\Rightarrow$ **a = 5 , b = 1 Ans.**

Ex. 3.5 Ncert Q2 (ii)

- For which value of k will the pair of equations have no solutions ?
- 3x + y = 1
- (2k – 1) x + (k – 1) y = 2k + 1
- Solution : First write both equations in standard form
- 3x + y – 1 = 0
- (2k – 1) x + (k – 1) y – (2k + 1) = 0

- For no solution $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$

$$\frac{3}{2k-1} = \frac{1}{k-1} \neq \frac{-1}{-(2k+1)}$$

- **Consider** $\frac{3}{2k-1} = \frac{1}{k-1}$
- $\Rightarrow 3(k-1) = 2k-1$
- $\Rightarrow$ **3k – 3 = 2k – 1**
- $\Rightarrow$ **3k – 2k = -1 + 3**
- $\Rightarrow$ **k = 2**

- **Also ,** $\frac{1}{k-1} \neq \frac{-1}{-(2k+1)}$
- $\Rightarrow$ **2k + 1** $\neq k-1$
- $\Rightarrow$ **2k – k** $\neq$ **- 1 – 1**
- $\Rightarrow$ **k** $\neq$ **- 2**

HOME WORK

- Do Ex 3.5 Q 1 , 4 ,6 , 7 with all parts of Reference Book B.K. Singh Pg no. 128 in Maths Main register.