REVISION

(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 $2x + 3y - 7 = 0$

$(a - b)x + (a + b)y - (3a + b - 2) = 0$

$\frac{a_1}{a_2} = \frac{2}{a-b}$

$\frac{b_1}{b_2} = \frac{3}{a+b}$

$\frac{c_1}{c_2} = \frac{7}{3a+b-2}$

For infinitely many solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{2}{a-b} = \frac{3}{a+b} = \frac{7}{3a+b-2}$

$\frac{2}{a-b} = \frac{7}{3a+b-2}$	$\frac{2}{a-b} = \frac{3}{a+b}$
$\Longrightarrow 2/a - b = 7/3a + b - 2$	$\Longrightarrow 2/a - b = 3/a+b$
$\Longrightarrow 6a + 2b - 4 = 7a - 7b$	$\Longrightarrow 2a + 2b = 3a - 3b$
$\therefore a - 9b = - 4$ ... **(i)**	$\therefore a - 5b = 0$ ... **(ii)**

Subtracting equation **(i)** from **(ii)**, we get

$\Longrightarrow 4b = 4$

$\therefore b = 1$

Putting this value in equation **(ii)**, we get

$a - 5 \times 1 = 0$

$\therefore a = 5$

Hence, a = 5 and b = 1 are the values for which the given equations give infinitely many solution.

(ii) For which value of k will the following pair of linear equations have no solution?

$$x + y = 1$$
$$(2k - 1)x + (k - 1)y = 2k + 1$$

Solution: $3x + y - 1 = 0$

$(2k - 1)x + (k - 1)y - (2k + 1) = 0$

$a_1/a_2 = 3/2k - 1$

$b_1/b_2 = 1/k - 1$ and

$c_1/c_2 = -1/-2k - 1 = 1/2k + 1$

For no solutions,

$a_1/a_2 = b_1/b_2 \neq c_1/c_2$

$\Longrightarrow 3/2k - 1 = 1/k\text{-}1 \neq 1/2k + 1$

$\Longrightarrow 3/2k - 1 = 1/k - 1$

$\Longrightarrow 3k - 3 = 2k - 1$

$\therefore k = 2$

Hence, for k = 2, the given equation has no solution.

Do your Self

1. For which value of p does the pair of equations given below has unique solution?

$$4x + py + 8 = 0 \text{ and } 2x + 2y + 2 = 0.$$

2. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction.

3. Given a linear equation $2x + 3y - 8 = 0$. Write another linear equation in two variables such that the geometrical representation of the pair so formed is intersecting lines.

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