NCERT Solutions for Class 10th Maths Chapter 3 Pair of Linear Equations in Two Variables Ex 3.6

## Question-31

**Solve the following pairs of equations by reducing them to a pair of linear equation:**

(i) $\frac{1}{2x}+\frac{1}{3y}=2$

$\frac{1}{3x}+\frac{1}{2y}=\frac{13}{6}$

(ii) $\frac{2}{\sqrt{x}}+\frac{3}{\sqrt{y}}=2$

$\frac{4}{\sqrt{x}}-\frac{9}{\sqrt{y}}=-1$

## Solution:

(i) $\frac{1}{2x}+\frac{1}{3y}=2$ .....(1)

$\frac{1}{3x}+\frac{1}{2y}=\frac{13}{6}$ .....(2)

Let $\frac{1}{x}=a, \frac{1}{y}=b$

$\frac{a}{2}+\frac{b}{3}=2$ ..... (3)

$\frac{a}{3}+\frac{b}{2}=\frac{13}{6}$ ..... (4)

Multiplying (3) and (4) by 6

$\Rightarrow 3a+2b=12$ ..... (5)

$\Rightarrow 2a+3b=13$ ..... (6)

(5) × 2 and (6) × 3

$6a+4b=24$

$\underline{6a+9b=39}$

Subtracting $-5b=-15$

$b=3 \Rightarrow y=\frac{1}{b}=\frac{1}{3}$

put b = 3 in (5)

$3a+2(3)=12$

$3a=6$

$a=2 \Rightarrow x=\frac{1}{a}=\frac{1}{2}$

$\therefore x=\frac{1}{2}, y=\frac{1}{3}$

(ii) $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$

$\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$

$\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ ..... (1)

$\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1$ .....(2)

Let $\frac{1}{\sqrt{x}} = a$, $\frac{1}{\sqrt{y}} = b$

2a + 3b = 2 ..... (3)

4a – 9b = -1 ..... (4)

(3) × 2⇒ 4a + 6b = 4

(4) ⇒ 4a – 9b = 1

15b = 5

$\therefore b = \frac{5}{15} = \frac{1}{3}$

$\Rightarrow b = \frac{1}{\sqrt{y}} = \frac{1}{3}$

$\therefore \sqrt{y} = 3$

⇒ y = 9

(3) ⇒ $2a + 3(\frac{1}{3}) = 2$

2a +1 = 2

2a = 2 – 1

$a = \frac{1}{2}$

$a = \frac{1}{\sqrt{x}} = \frac{1}{2}$

$\Rightarrow \sqrt{x} = 2$ , x = 4

∴ x = 4, y = 9

## Question-32

**Solve the following pairs of equations by reducing them to a pair of linear equation:**

**(i)** $\frac{4}{x} + 3y = 14$

$\frac{3}{x} - 4y = 23$

**(ii)** $\frac{5}{x-1} + \frac{1}{y-2} = 2$

$\frac{6}{x-1} - \frac{3}{y-2} = 1$

**Solution:**

(i) $\frac{4}{x} + 3y = 14$

$\frac{3}{x} - 4y = 23$

Let $\frac{1}{x} = a$

4a + 3y = 14 ..... (3)

3a - 4y = 23 .....(4)

(3)× 4 ⇒16a + 12y = 56

(4) × 3⇒ 9a – 12y = 69

Adding 25a = 125

$a = \frac{125}{25} = 5$, $a = \frac{1}{x} = 5$

$\therefore x = \frac{1}{5}$

Substituting in (3), a = 5 we get

4(5) + 3y = 14

3y = 14 – 20 = -6

y = -2

$\therefore x = \frac{1}{5}$, y = -2

(ii) $\frac{5}{x-1} + \frac{1}{y-2} = 2$

$\frac{6}{x-1} - \frac{3}{y-2} = 1$

$\frac{5}{x-1} + \frac{1}{y-2} = 2$ ..... (1)

$\frac{6}{x-1} - \frac{3}{y-2} = 1$ ..... (2)

Let $\frac{1}{x-1} = a$, $\frac{1}{y-2} = b$

Substituting a, b in (1) and (2) we get,

5a + b = 2 .....(3)

6a – 3b = 1 .....(4)

(3) × 3 ⇒ 15a + 3b = 6

(4) ⇒ $\underline{6a - 3b = 1}$

$21a = 7$

$\therefore a = \frac{7}{21} = \frac{1}{3}$

Substituting in eq. (3)

$\frac{5}{3} + b = 2$

$\Rightarrow b = 2 - \frac{5}{3} = \frac{1}{3}$

$\therefore a = \frac{1}{3}, b = \frac{1}{3}$

Substitute in $\frac{1}{x-1} = a$

$\frac{1}{x-1} = \frac{1}{3}$

x - 1 = 3 ⇒ x = 4

$\frac{1}{y-2} = b$

$\frac{1}{y-2} = \frac{1}{3}$

⇒ y - 2 = 3

⇒ y = 5

Hence x = 4, y = 5.

## Question-33

**Solve the following pairs of equations by reducing them to a pair of linear equation:**

**(i)** $\frac{7x - 2y}{xy} = 5$

$\frac{8x + 7y}{xy} = 15$

**(ii) 6x + 3y = 6xy**

**2x + 4y = 5xy**

## Solution:

(i) $\frac{7x - 2y}{xy} = 5$

$\frac{8x + 7y}{xy} = 15$

$\frac{7x - 2y}{xy} = 5$ ..... (1)

$\frac{8x + 7y}{xy} = 15$ ..... (2)

Separating the fraction

$\frac{7x}{xy} - \frac{2y}{xy} = 5$

$\frac{7}{y} - \frac{2}{x} = 5 \Rightarrow -\frac{2}{x} + \frac{7}{y} = 5$

$\frac{8x}{xy} + \frac{7y}{xy} = 15$

$\frac{8}{y} + \frac{7}{x} = 15 \Rightarrow \frac{7}{x} + \frac{8}{y} = 15$

Let $\frac{1}{x} = a$, $\frac{1}{y} = b$

$-2a + 7b = 5$ .....(1)

$7a + 8b = 15$ ..... (2)

Multiply (1) with 7, (2) with 2, we get.

$-14a + 49b = 35$

$14a + 16b = 30$

$65b = 65$

$b = 1$

$b = \frac{1}{y} = 1$

=> y = 1

Substitute b =1 in (1)

-2a + 7(1) = 5

-2a = 5 – 7

$a = \frac{-2}{-2} = 1$

$a = \frac{1}{x} = 1$

=> x = 1

∴ x = 1, y = 1.

(ii) 6x + 3y = 6xy

2x + 4y = 5xy

6x + 3y = 6xy

2x + 4y = 5xy

÷ by xy

$\frac{6x}{xy} + \frac{3y}{xy} = \frac{6xy}{xy}$

$\frac{6}{y} + \frac{3}{x} = 6$ ……..(1)

2x + 4y = 5xy

÷ by xy

$\frac{2x}{xy} + \frac{4y}{xy} = \frac{5xy}{xy}$

$\frac{2}{y} + \frac{4}{x} = 5$ ……. (2)

substituting $\frac{1}{y} = a$ and $\frac{1}{y} = b$ in eq. (1) and (2)

a + 2b = 2 …… (3)

4a + 2b = 5 ……(4)

-3a = -3

a = 1

Substituting a = 1 in (3) we get,

1 + 2b = 2

2b = 1

$b = \frac{1}{2}$

Thus if $a = \frac{1}{x} = 1$

=> x = 1.

Thus if $b = \frac{1}{y} = \frac{1}{2}$

y = 2

Hence x = 1, y= 2.

********** END **********