

Exercise 3.3

Solve the following system of equations:

1. $11x + 15y + 23 = 0$
 $7x - 2y - 20 = 0$

Solution:

The given pair of equations are:

$11x + 15y + 23 = 0$ (i)

$7x - 2y - 20 = 0$ (ii)

From (ii)

$2y = 7x - 20$

$\Rightarrow y = (7x - 20)/2$ (iii)

Now, substituting y in equation (i) we get,

$\Rightarrow 11x + 15((7x - 20)/2) + 23 = 0$

$\Rightarrow 11x + (105x - 300)/2 + 23 = 0$

$\Rightarrow (22x + 105x - 300 + 46) = 0$

$\Rightarrow 127x - 254 = 0$

$\Rightarrow x = 2$

Next, putting the value of x in the equation (iii) we get,

$\Rightarrow y = (7(2) - 20)/2$

$\therefore y = -3$

Thus, the value of x and y is found to be 2 and -3 respectively.

2. $3x - 7y + 10 = 0$
 $y - 2x - 3 = 0$

Solution:

The given pair of equations are:

$3x - 7y + 10 = 0$ (i)

$y - 2x - 3 = 0$ (ii)

From (ii)

$y - 2x - 3 = 0$

$y = 2x + 3$ (iii)

Now, substituting y in equation (i) we get,

$\Rightarrow 3x - 7(2x + 3) + 10 = 0$

$\Rightarrow 3x - 14x - 21 + 10 = 0$

$\Rightarrow -11x = 11$

$\Rightarrow x = -1$

Next, putting the value of x in the equation (iii) we get,

$\Rightarrow y = 2(-1) + 3$

$\therefore y = 1$

Thus, the value of x and y is found to be -1 and 1 respectively.

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3. $0.4x + 0.3y = 1.7$
 $0.7x - 0.2y = 0.8$

Solution:

The given pair of equations are:

$$0.4x + 0.3y = 1.7$$

$$0.7x - 0.2y = 0.8$$

Let's, multiply LHS and RHS by 10 to make the coefficients as an integer

$$4x + 3y = 17 \dots\dots\dots (i)$$

$$7x - 2y = 8 \dots\dots\dots (ii)$$

From (ii)

$$7x - 2y = 8$$

$$x = (8 + 2y)/7 \dots\dots\dots (iii)$$

Now, substituting x in equation (i) we get,

$$\Rightarrow 4[(8 + 2y)/7] + 3y = 17$$

$$\Rightarrow 32 + 8y + 21y = (17 \times 7)$$

$$\Rightarrow 29y = 87$$

$$\Rightarrow y = 3$$

Next, putting the value of y in the equation (iii) we get,

$$\Rightarrow x = (8 + 2(3))/7$$

$$\Rightarrow x = 14/7$$

$$\therefore x = 2$$

Thus, the value of x and y is found to be 2 and 3 respectively.

4. $x/2 + y = 0.8$
 $7/(x + y/2) = 10$

Solution:

The given pair of equations are:

$$x/2 + y = 0.8 \quad \Rightarrow x + 2y = 1.6 \dots\dots (a)$$

$$7/(x + y/2) = 10 \quad \Rightarrow 7 = 10(x + y/2) \quad \Rightarrow 7 = 10x + 5y$$

Let's, multiply LHS and RHS of equation (a) by 10 for easy calculation

So, we finally get

$$10x + 20y = 16 \dots\dots\dots (i) \text{ And,}$$

$$10x + 5y = 7 \dots\dots\dots (ii)$$

Now, subtracting two equations we get,

$$\Rightarrow (i) - (ii)$$

$$15y = 9$$

$$\Rightarrow y = 3/5$$

Next, putting the value of y in the equation (i) we get,

$$x = [16 - 20(3/5)]/10$$

$$\Rightarrow (16 - 12)/10 = 4/10$$

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$$\therefore x = 2/5$$

Thus, the value of x and y obtained are 2/5 and 3/5 respectively.

5. $7(y + 3) - 2(x + 2) = 14$

$$4(y - 2) + 3(x - 3) = 2$$

Solution:

The given pair of equations are:

$$7(y+3) - 2(x+2) = 14 \dots \dots \dots (i)$$

$$4(y-2) + 3(x-3) = 2 \dots \dots \dots (ii)$$

From (i), we get

$$7y + 21 - 2x - 4 = 14$$

$$7y = 14 + 4 - 21 + 2x$$

$$\Rightarrow y = (2x - 3)/7$$

From (ii), we get

$$4y - 8 + 3x - 9 = 2$$

$$4y + 3x - 17 - 2 = 0$$

$$\Rightarrow 4y + 3x - 19 = 0 \dots \dots \dots (iii)$$

Now, substituting y in equation (iii)

$$4[(2x - 3)/7] + 3x - 19 = 0$$

$$8x - 12 + 21x - (19 \times 7) = 0 \quad \text{[after taking LCM]}$$

$$29x = 145$$

$$\Rightarrow x = 5$$

Now, putting the value of x and in the equation (ii)

$$4(y-2) + 3(5-3) = 2$$

$$\Rightarrow 4y - 8 + 6 = 2$$

$$\Rightarrow 4y = 4$$

$$\therefore y = 1$$

Thus, the value of x and y obtained are 5 and 1 respectively.

6. $x/7 + y/3 = 5$

$$x/2 - y/9 = 6$$

Solution:

The given pair of equations are:

$$x/7 + y/3 = 5 \dots \dots \dots (i)$$

$$x/2 - y/9 = 6 \dots \dots \dots (ii)$$

From (i), we get

$$x/7 + y/3 = 5$$

$$\Rightarrow 3x + 7y = (5 \times 21) \quad \text{[After taking LCM]}$$

$$\Rightarrow 3x = 105 - 7y$$

$$\Rightarrow x = (105 - 7y)/3 \dots \dots \dots (iv)$$

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From (ii), we get

$$x/2 - y/9 = 6$$

$$\Rightarrow 9x - 2y = 108 \dots\dots\dots (iii) \quad \text{[After taking LCM]}$$

Now, substituting x in equation (iii) we get,

$$9[(105 - 7y)/3] - 2y = 108$$

$$\Rightarrow 945 - 63y - 2y = 324 \quad \text{[After taking LCM]}$$

$$\Rightarrow 945 - 324 = 69y$$

$$\Rightarrow 69y = 621$$

$$\Rightarrow y = 9$$

Now, putting the value of y in the equation (iv)

$$x = (105 - 7(9))/3$$

$$\Rightarrow x = (105 - 63)/3 = 42/3$$

$$\therefore x = 14$$

Thus, the value of x and y obtained are 14 and 9 respectively.

7. $x/3 + y/4 = 11$

$$5x/6 - y/3 = -7$$

Solution:

The given pair of equations are:

$$x/3 + y/4 = 11 \dots\dots\dots (i)$$

$$5x/6 - y/3 = -7 \dots\dots\dots (ii)$$

From (i), we get

$$x/3 + y/4 = 11$$

$$\Rightarrow 4x + 3y = (11 \times 12) \quad \text{[After taking LCM]}$$

$$\Rightarrow 4x = 132 - 3y$$

$$\Rightarrow x = (132 - 3y)/4 \dots\dots\dots (iv)$$

From (ii), we get

$$5x/6 - y/3 = -7$$

$$\Rightarrow 5x - 2y = -42 \dots\dots\dots (iii) \quad \text{[After taking LCM]}$$

Now, substituting x in equation (iii) we get,

$$5[(132 - 3y)/4] - 2y = -42$$

$$\Rightarrow 660 - 15y - 8y = -42 \times 4 \quad \text{[After taking LCM]}$$

$$\Rightarrow 660 + 168 = 23y$$

$$\Rightarrow 23y = 828$$

$$\Rightarrow y = 36$$

Now, putting the value of y in the equation (iv)

$$x = (132 - 3(36))/4$$

$$\Rightarrow x = (132 - 108)/4 = 24/4$$

$$\therefore x = 6$$

Thus, the value of x and y obtained are 6 and 36 respectively.

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8. $4/x + 3y = 8$
 $6/x - 4y = -5$

Solution:

Taking $1/x = u$

Then the two equation becomes,

$$4u + 3y = 8 \dots\dots\dots (i)$$

$$6u - 4y = -5 \dots\dots\dots (ii)$$

From (i), we get

$$4u = 8 - 3y$$

$$\Rightarrow u = (8 - 3y)/4 \dots\dots\dots (iii)$$

Substituting u in (ii)

$$[6(8 - 3y)/4] - 4y = -5$$

$$\Rightarrow [3(8 - 3y)/2] - 4y = -5$$

$$\Rightarrow 24 - 9y - 8y = -5 \times 2$$

[After taking LCM]

$$\Rightarrow 24 - 17y = -10$$

$$\Rightarrow -17y = -34$$

$$\Rightarrow y = 2$$

Putting $y=2$ in (iii) we get,

$$u = (8 - 3(2))/4$$

$$\Rightarrow u = (8 - 6)/4$$

$$\Rightarrow u = 2/4 = 1/2$$

$$\Rightarrow x = 1/u = 2$$

$$\therefore x = 2$$

So, the solution of the pair of equations given is $x=2$ and $y=2$.

9. $x + y/2 = 4$
 $2y + x/3 = 5$

Solution:

The given pair of equations are:

$$x + y/2 = 4 \dots\dots\dots (i)$$

$$2y + x/3 = 5 \dots\dots\dots (ii)$$

From (i) we get,

$$x + y/2 = 4$$

$$\Rightarrow 2x + y = 8$$

[After taking LCM]

$$\Rightarrow y = 8 - 2x \dots\dots (iv)$$

From (ii) we get,

$$x + 6y = 15 \dots\dots\dots (iii)$$

[After taking LCM]

Substituting y in (iii), we get

$$x + 6(8 - 2x) = 15$$

$$\Rightarrow x + 48 - 12x = 15$$

$$\Rightarrow -11x = 15 - 48$$

$$\Rightarrow -11x = -33$$

$$\Rightarrow x = 3$$

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Putting $x = 3$ in (iv), we get

$$y = 8 - (2 \times 3)$$

$$\therefore y = 8 - 6 = 2$$

Hence, the solution of the given system of equation are $x = 3$ and $y = 2$ respectively.

10. $x + 2y = 3/2$

$2x + y = 3/2$

Solution:

The given pair of equations are:

$$x + 2y = 3/2 \dots\dots\dots (i)$$

$$2x + y = 3/2 \dots\dots\dots (ii)$$

Let us eliminate y from the given equations. The coefficients of y in the given equations are 2 and 1 respectively. The L.C.M of 2 and 1 is 2. So, we make the coefficient of y equal to 2 in the two equations.

Multiplying equation (i)x1 and (ii)x2 \Rightarrow

$$x + 2y = 3/2 \dots\dots\dots (iii)$$

$$4x + 2y = 3 \dots\dots\dots (iv)$$

Subtracting equation (iii) from (iv)

$$(4x - x) + (2y - 2y) = 3x = 3 - (3/2)$$

$$\Rightarrow 3x = 3/2$$

$$\Rightarrow x = 1/2$$

Putting $x = 1/2$ in equation (iv)

$$4(1/2) + 2y = 3$$

$$\Rightarrow 2 + 2y = 3$$

$$\therefore y = 1/2$$

The solution of the system of equation is $x = 1/2$ and $y = 1/2$

11. $\sqrt{2}x - \sqrt{3}y = 0$

$\sqrt{3}x - \sqrt{8}y = 0$

Solution:

The given pair of equations are:

$$\sqrt{2}x - \sqrt{3}y = 0 \dots\dots\dots (i)$$

$$\sqrt{3}x - \sqrt{8}y = 0 \dots\dots\dots (ii)$$

From equation (i)

$$x = \sqrt{(3/2)}y \dots\dots\dots (iii)$$

Substituting this value in equation (ii) we obtain

$$\sqrt{3}x - \sqrt{8}y = 0$$

$$\Rightarrow \sqrt{3}(\sqrt{(3/2)}y) - \sqrt{8}y = 0$$

$$\Rightarrow (3/\sqrt{2})y - \sqrt{8}y = 0$$

$$\Rightarrow 3y - 4y = 0$$

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$$\Rightarrow y = 0$$

Now, substituting y in equation (iii) we obtain

$$\Rightarrow x = 0$$

Thus, the value of x and y obtained are 0 and 0 respectively.

12. $3x - (y + 7)/11 + 2 = 10$

$2y + (x + 11)/7 = 10$

Solution:

The given pair of equations are:

$$3x - (y + 7)/11 + 2 = 10 \dots\dots\dots (i)$$

$$2y + (x + 11)/7 = 10 \dots\dots\dots (ii)$$

From equation (i)

$$33x - y - 7 + 22 = (10 \times 11) \quad \text{[After taking LCM]}$$

$$\Rightarrow 33x - y + 15 = 110$$

$$\Rightarrow 33x + 15 - 110 = y$$

$$\Rightarrow y = 33x - 95 \dots\dots\dots (iv)$$

From equation (ii)

$$14 + x + 11 = (10 \times 7) \quad \text{[After taking LCM]}$$

$$\Rightarrow 14y + x + 11 = 70$$

$$\Rightarrow 14y + x = 70 - 11$$

$$\Rightarrow 14y + x = 59 \dots\dots\dots (iii)$$

Substituting (iv) in (iii) we get,

$$14(33x - 95) + x = 59$$

$$\Rightarrow 462x - 1330 + x = 59$$

$$\Rightarrow 463x = 1389$$

$$\Rightarrow x = 3$$

Putting $x = 3$ in (iii) we get,

$$\Rightarrow y = 33(3) - 95$$

$$\therefore y = 4$$

The solution for the given pair of equations is $x = 3$ and $y = 4$ respectively.

13. $2x - (3/y) = 9$

$3x + (7/y) = 2, y \neq 0$

Solution:

The given pair of equations are:

$$2x - (3/y) = 9 \dots\dots\dots (i)$$

$$3x + (7/y) = 2 \dots\dots\dots (ii)$$

Substituting $1/y = u$ the above equations becomes,

$$2x - 3u = 9 \dots\dots\dots (iii)$$

$$3x + 7u = 2 \dots\dots\dots (iv)$$

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From (iii)

$$2x = 9 + 3u$$

$$\Rightarrow x = (9+3u)/2$$

Substituting the value of x from above in the equation (iv) we get,

$$3[(9+3u)/2] + 7u = 2$$

$$\Rightarrow 27 + 9u + 14u = (2 \times 2)$$

$$\Rightarrow 27 + 23u = 4$$

$$\Rightarrow 23u = -23$$

$$\Rightarrow u = -1$$

So, $y = 1/u = -1$

And putting $u = -1$ in $x = (9 + 3u)/2$ we get,

$$\Rightarrow x = [9 + 3(-1)]/2 = 6/2$$

$$\therefore x = 3$$

The solution of the pair of equations given are $y = -1$ and $x = 3$ respectively.

14. $0.5x + 0.7y = 0.74$

$0.3x + 0.5y = 0.5$

Solution:

The given pair of equations are:

$$0.5x + 0.7y = 0.74 \dots\dots\dots (i)$$

$$0.3x - 0.5y = 0.5 \dots\dots\dots (ii)$$

Now, let's multiply LHS and RHS by 100 for both (i) and (ii) for making integral coefficients and constants.

(i) $\times 100 \Rightarrow$

$$50x + 70y = 74 \dots\dots\dots (iii)$$

(ii) $\times 100 \Rightarrow$

$$30x + 50y = 50 \dots\dots\dots (iv)$$

From (iii)

$$50x = 74 - 70y$$

$$x = (74-70y)/ 50 \dots\dots\dots (v)$$

Now, substituting x in equation (iv) we get,

$$30[(74-70y)/ 50] + 50y = 50$$

$$\Rightarrow 222 - 210y + 250y = 250$$

$$\Rightarrow 40y = 28$$

$$\Rightarrow y = 0.7$$

[After taking LCM]

Now, by putting the value of y in the equation (v), we get

$$\Rightarrow x = [74 - 70(0.7)]/ 50 = 0$$

$$\Rightarrow x = 25/ 50 = 1/2$$

$$\therefore x = 0.5$$

Thus, the value of x and y so obtained are 0.5 and 0.7 respectively.

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15. $\frac{1}{7x} + \frac{1}{6y} = 3$
 $\frac{1}{2x} - \frac{1}{3y} = 5$

Solution:

The given pair of equations are:

$$\frac{1}{7x} + \frac{1}{6y} = 3 \dots\dots\dots(i)$$
$$\frac{1}{2x} - \frac{1}{3y} = 5 \dots\dots\dots(ii)$$

Multiplying (ii) by $\frac{1}{2}$ we get,

$$\frac{1}{4x} - \frac{1}{6y} = \frac{5}{2} \dots\dots\dots(iii)$$

Now, solving equations (i) and (iii)

$$\frac{1}{7x} + \frac{1}{6y} = 3 \dots\dots\dots(i)$$
$$\frac{1}{4x} - \frac{1}{6y} = \frac{5}{2} \dots\dots\dots(iii)$$

Adding (i) + (iii) we get,

$$\frac{1}{x}(\frac{1}{7} + \frac{1}{4}) = 3 + \frac{5}{2}$$
$$\Rightarrow \frac{1}{x}(\frac{11}{28}) = \frac{11}{2}$$
$$\Rightarrow x = \frac{1}{14}$$

Using $x = \frac{1}{14}$ we get, in (i)

$$\frac{1}{7(\frac{1}{14})} + \frac{1}{6y} = 3$$
$$\Rightarrow 2 + \frac{1}{6y} = 3$$
$$\Rightarrow \frac{1}{6y} = 1$$
$$\Rightarrow y = \frac{1}{6}$$

The solution for the given pair of equations is $x = \frac{1}{14}$ and $y = \frac{1}{6}$ respectively.

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

Solution:

Let $\frac{1}{x} = u$ and $\frac{1}{y} = v$,

So the given equations becomes,

$$\frac{u}{2} + \frac{v}{3} = 2 \dots\dots\dots(i)$$
$$\frac{u}{3} + \frac{v}{2} = \frac{13}{6} \dots\dots\dots(ii)$$

From (i), we get

$$\frac{u}{2} + \frac{v}{3} = 2$$
$$\Rightarrow 3u + 2v = 12$$
$$\Rightarrow u = \frac{(12 - 2v)}{3} \dots\dots\dots(iii)$$

Using (iii) in (ii)

$$\frac{[(12 - 2v)/3]}{3} + \frac{v}{2} = \frac{13}{6}$$
$$\Rightarrow \frac{(12 - 2v)}{9} + \frac{v}{2} = \frac{13}{6}$$
$$\Rightarrow 24 - 4v + 9v = (\frac{13}{6}) \times 18$$
$$\Rightarrow 24 + 5v = 39$$
$$\Rightarrow 5v = 15$$

[after taking LCM]

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$$\Rightarrow v = 3$$

Substituting v in (iii)

$$u = (12 - 2(3))/3$$
$$\Rightarrow u = 2$$

Thus, $x = 1/u \Rightarrow x = 1/2$ and
 $y = 1/v \Rightarrow y = 1/3$

The solution for the given pair of equations is $x = 1/2$ and $y = 1/3$ respectively.

**17. $15/u + 2/v = 17$
 $1/u + 1/v = 36/5$**

Solution:

Let $1/x = u$ and $1/y = v$

So, the given equations becomes

$$15x + 2y = 17 \dots\dots\dots (i)$$

$$x + y = 36/5 \dots\dots\dots (ii)$$

From equation (i) we get,

$$2y = 17 - 15x$$

$$\Rightarrow y = (17 - 15x)/2 \dots\dots\dots (iii)$$

Substituting (iii) in equation (ii) we get,

$$= x + (17 - 15x)/2 = 36/5$$

$$2x + 17 - 15x = (36 \times 2)/5$$

$$-13x = 72/5 - 17$$

$$= -13x = -13/5$$

$$\Rightarrow x = 1/5$$

$$\Rightarrow u = 1/x = 5$$

Putting $x = 1/5$ in equation (ii), we get

$$1/5 + y = 36/5$$

$$\Rightarrow y = 7$$

$$\Rightarrow v = 1/y = 1/7$$

The solution of the pair of equations given are $u = 5$ and $v = 1/7$ respectively.

**18. $3/x - 1/y = -9$
 $2/x + 3/y = 5$**

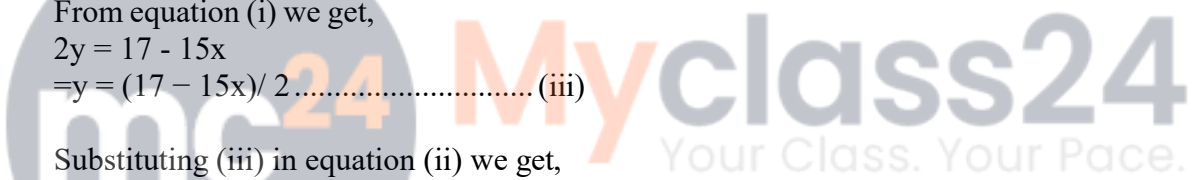
Solution:

Let $1/x = u$ and $1/y = v$

So, the given equations becomes

$$3u - v = -9 \dots\dots\dots (i)$$

$$2u + 3v = 5 \dots\dots\dots (ii)$$



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Multiplying equation (i) x 3 and (ii) x 1 we get,

$$9u - 3v = -27 \dots\dots\dots (iii)$$

$$2u + 3v = 5 \dots\dots\dots (iv)$$

Adding equation (iii) and (iv) we get ,

$$9u + 2u - 3v + 3v = -27 + 5$$

$$\Rightarrow 11u = -22$$

$$\Rightarrow u = -2$$

Now putting $u = -2$ in equation (iv) we get,

$$2(-2) + 3v = 5$$

$$\Rightarrow 3v = 9$$

$$\Rightarrow v = 3$$

Hence, $x = 1/u = -1/2$ and,

$$y = 1/v = 1/3$$

19. $2/x + 5/y = 1$

$60/x + 40/y = 19$

Solution:

Let $1/x = u$ and $1/y = v$

So, the given equations becomes

$$2u + 5v = 1 \dots\dots\dots (i)$$

$$60u + 40v = 19 \dots\dots\dots (ii)$$

Multiplying equation (i) x 8 and (ii) x 1 we get,

$$16u + 40v = 8 \dots\dots\dots (iii)$$

$$60u + 40v = 19 \dots\dots\dots (iv)$$

Subtracting equation (iii) from (iv) we get,

$$60u - 16u + 40v - 40v = 19 - 8$$

$$\Rightarrow 44u = 11$$

$$\Rightarrow u = 1/4$$

Now putting $u = 1/4$ in equation (iv) we get,

$$60(1/4) + 40v = 19$$

$$\Rightarrow 15 + 40v = 19$$

$$\Rightarrow v = 4/40 = 1/10$$

Hence, $x = 1/u = 4$ and,

$$y = 1/v = 10$$

20. $1/(5x) + 1/(6y) = 12$

$1/(3x) - 3/(7y) = 8$

Solution:

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Let $1/x = u$ and $1/y = v$

So, the given equations becomes

$$u/5 + v/6 = 12 \dots\dots\dots (i)$$

$$u/3 - 3v/7 = 8 \dots\dots\dots (ii)$$

Taking LCM for both equations, we get

$$6u + 5v = 360 \dots\dots\dots (iii)$$

$$7u - 9v = 168 \dots\dots\dots (iv)$$

Subtracting (iii) from (iv)

$$7u - 9v - (6u + 5v) = 168 - 360$$

$$\Rightarrow u - 14v = -192$$

$$\Rightarrow u = (14v - 192) \dots\dots\dots (v)$$

Using (v) in equation (iii), we get

$$6(14v - 192) + 5v = 360$$

$$\Rightarrow 84v - 1152 + 5v = 360$$

$$\Rightarrow 89v = 1512$$

$$\Rightarrow v = 1512/89$$

$$\Rightarrow y = 1/v = 89/1512$$

Now, substituting v in equation (v), we find u

$$u = 14 \times (1512/89) - 192$$

$$\Rightarrow u = 4080/89$$

$$\Rightarrow x = 1/u = 89/4080$$

Hence, the solution for the given system of equations is $x = 89/4080$ and $y = 89/1512$

21. $4/x + 3y = 14$

$3/x - 4y = 23$

Solution:

Taking $1/x = u$, the given equation becomes

$$4u + 3y = 14 \dots\dots\dots (i)$$

$$3u - 4y = 23 \dots\dots\dots (ii)$$

Adding (i) and (ii), we get

$$4u + 3y + 3u - 4y = 14 + 23$$

$$\Rightarrow 7u - y = 37$$

$$\Rightarrow y = 7u - 37 \dots\dots\dots (iii)$$

Using (iii) in (i),

$$4u + 3(7u - 37) = 14$$

$$\Rightarrow 4u + 21u - 111 = 14$$

$$\Rightarrow 25u = 125$$

$$\Rightarrow u = 5$$

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$$\Rightarrow x = 1/u = 1/5$$

Putting $u=5$ in (iii), we find y

$$y = 7(5) - 37$$

$$\Rightarrow y = -2$$

Hence, the solution for the given system of equations is $x = 1/5$ and $y = -2$

22. $4/x + 5y = 7$

$$3/x + 4y = 5$$

Solution:

Taking $1/x = u$, the given equation becomes

$$4u + 5y = 7 \dots\dots\dots (i)$$

$$3u + 4y = 5 \dots\dots\dots (ii)$$

Subtracting (ii) from (i), we get

$$4u + 5y - (3u + 4y) = 7 - 5$$

$$\Rightarrow u + y = 2$$

$$\Rightarrow u = 2 - y \dots\dots\dots (iii)$$

Using (iii) in (i),

$$4(2 - y) + 5y = 7$$

$$\Rightarrow 8 - 4y + 5y = 7$$

$$\Rightarrow y = -1$$

Putting $y = -1$ in (iii), we find u

$$u = 2 - (-1)$$

$$\Rightarrow u = 3$$

$$\Rightarrow x = 1/u = 1/3$$

Hence, the solution for the given system of equations is $x = 1/3$ and $y = -1$

23. $2/x + 3/y = 13$

$$5/x - 4/y = -2$$

Solution:

Let $1/x = u$ and $1/y = v$

So, the given equations becomes

$$2u + 3v = 13 \dots\dots\dots (i)$$

$$5u - 4v = -2 \dots\dots\dots (ii)$$

Adding equation (i) and (ii) we get,

$$2u + 3v + 5u - 4v = 13 - 2$$

$$\Rightarrow 7u - v = 11$$

$$\Rightarrow v = 7u - 11 \dots\dots\dots (iii)$$

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Using (iii) in (i), we get

$$\begin{aligned}2u + 3(7u - 11) &= 13 \\ \Rightarrow 2u + 21u - 33 &= 13 \\ \Rightarrow 23u &= 46 \\ \Rightarrow u &= 2\end{aligned}$$

Substituting $u = 2$ in (iii), we find v

$$\begin{aligned}v &= 7(2) - 11 \\ \Rightarrow v &= 3\end{aligned}$$

Hence, $x = 1/u = 1/2$ and,
 $y = 1/v = 1/3$

24. $2/x + 3/y = 2$

$$4/x - 9/y = -1$$

Solution:

Let $1/\sqrt{x} = u$ and $1/\sqrt{y} = v$,

So, the given equations becomes

$$2u + 3v = 2 \dots\dots\dots (i)$$

$$4u - 9v = -1 \dots\dots\dots (ii)$$

Multiplying (ii) by 3 and

Adding equation (i) and (ii)x3 we get,

$$\begin{aligned}6u + 9v + 4u - 9v &= 6 - 1 \\ \Rightarrow 10u &= 5 \\ \Rightarrow u &= 1/2\end{aligned}$$

Substituting $u = 1/2$ in (i), we find v

$$\begin{aligned}2(1/2) + 3v &= 2 \\ \Rightarrow 3v &= 2 - 1 \\ \Rightarrow v &= 1/3\end{aligned}$$

Since, $1/\sqrt{x} = u$ we get $x = 1/u^2$

$$\Rightarrow x = 1/(1/2)^2 = 4$$

And,

$$1/\sqrt{y} = v \quad y = 1/v^2$$

$$\Rightarrow y = 1/(1/3)^2 = 9$$

Hence, the solution is $x = 4$ and $y = 9$.

25. $(x + y)/xy = 2$

$$(x - y)/xy = 6$$

Solution:

The given pair of equations are:

$$(x + y)/xy = 2 \Rightarrow 1/y + 1/x = 2 \dots\dots\dots (i)$$

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$$(x - y)/xy = 6 \Rightarrow 1/y - 1/x = 6 \dots\dots\dots(ii)$$

Let $1/x = u$ and $1/y = v$, so the equation (i) and (ii) becomes

$$v + u = 2 \dots\dots\dots (iii)$$

$$v - u = 6 \dots\dots\dots(iv)$$

Adding (iii) and (iv), we get

$$2v = 8$$

$$\Rightarrow v = 4$$

$$\Rightarrow y = 1/v = 1/4$$

Substituting $v = 4$ in (iii) to find x ,

$$4 + u = 2$$

$$\Rightarrow u = -2$$

$$\Rightarrow x = 1/u = -1/2$$

Hence, the solution is $x = -1/2$ and $y = 1/4$.

26. $2/x + 3/y = 9/xy$
 $4/x + 9/y = 21/xy$

Solution:

Taking LCM for both the given equations, we have

$$(2y + 3x)/xy = 9/xy \Rightarrow 3x + 2y = 9 \dots\dots\dots(i)$$

$$(4y + 9x)/xy = 21/xy \Rightarrow 9x + 4y = 21 \dots\dots\dots(ii)$$

Performing (ii) - (i)x2 \Rightarrow

$$9x + 4y - 2(3x + 2y) = 21 - (9 \times 2)$$

$$\Rightarrow 3x = 3$$

$$\Rightarrow x = 1$$

Using $x = 1$ in (i), we find y

$$3(1) + 2y = 9$$

$$\Rightarrow y = 6/2$$

$$\Rightarrow y = 3$$

Thus, the solution for the given set of equations is $x = 1$ and $y = 3$.