Vatsalya Sr. Sec. School, Vidisha (MP)

Class 10th
Mathematics
Monthly Planner

Good Morning students,

Win the battle against Covid-19 and study from home with the help of 'Extra Mark App'.

Use your school code Vatsalya School-GTS-MP- 0993

Chapter 3: Pair of linear equation in one variable

1st April to 8th April 2020

Learn concepts visually pair of linear equation in one variable. Read about graphical method of solution of a pair of linear equations.

See the videos to clear your doubts now open detailed learning option.

Read about algebraic methods of solving a pair of linear equation by substitution method, elimination method.

9th April to 14th April

Read about cross multiplication method and equation reducible to a pair of linear equation in two variables.

Now start solving exercise (NCERT textbook) in your copy.

Best of luck.

Work Sheet

Quesntion1. For which value(s) of *l*, do the pair of linear equations $lx + y = l^2$ and $x+ly = 1$ have
(i) no solution?

(ii) infinitely many solutions?

(iii) a unique solution?

Solution:
Given, $lx + y = l^2$ and $x + ly$ -1 ....(i)
Here, $a_1 = l$, $b_1, = 1$, $c, = -l^2$ and $a_2 = 1$, $b_2 = l$, $c_2 = -1$

(i) Condition for solution is,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\Rightarrow \quad \frac{\lambda}{1} = \frac{1}{\lambda} \neq \frac{-\lambda^2}{-1}$$

$$\Rightarrow \quad \lambda^2 - 1 = 0$$

$$\Rightarrow \quad (\lambda - 1)(\lambda + 1) = 0$$

So, $\lambda = 1$ or -1.

Ignore $\lambda = 1$ for which system of equations will have infinitely many solutions. Therefore, at $\lambda = 1$ set (i) has no solution.

(ii) Condition for infinitely many solutions is:

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\Rightarrow \quad \frac{\lambda}{1} = \frac{1}{\lambda} = \frac{\lambda^2}{1}$$

$$\Rightarrow \quad \frac{\lambda}{1} = \frac{\lambda^2}{1}$$

$$\Rightarrow \quad \lambda(\lambda - 1) = 0$$

Taking non-zero value, we have $\lambda = 1$ for which set (i) has infinitely many solutions.

(iii) Condition for a unique solution is:

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{\lambda}{1} \neq \frac{1}{\lambda}$$

$$\Rightarrow \lambda^2 \neq 1 \Rightarrow \lambda \neq \pm 1$$

Therefore, all real values of l except ±1 equation will have unique solution.

Quesntion2. For which value (s) of k will the pair of equations
$kx + 3y = k - 3$,
$12x + ky = k$
have no solution?

Solution:
Given,

$kx + 3y - (k - 3) = 0$ and $12x + ky - k = 0$
On comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ we have
Here, $a_1 = k$, $b_1 = 3$ and $c_1 = -(k - 3)$
And $a_2 = 12$, $b_2 = k$ and $c_2 = -k$ .....(i)
Condition for a pair of linear equations to have no solution is:

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \quad \text{....(ii)}$$

Using (i) and (ii), we get:

$$\frac{k}{12} = -\frac{3}{k} \neq \frac{-(k-3)}{-k}$$

$$\Rightarrow \quad \frac{k}{12} = \frac{3}{k}$$

$$\Rightarrow \quad k^2 = 36 \text{ or } k = \pm 6 \quad \text{.....(iii)}$$

Again, from (ii) we have:

$$\frac{3}{k} \neq \frac{k-3}{k}$$

$$\Rightarrow \quad 3k \neq k(k-3)$$

$$\Rightarrow \quad 3k - k(k-3) \neq 0$$

$$\Rightarrow \quad k(3 - k + 3) \neq 0$$

$$\Rightarrow \quad k(6 - k) \neq 0$$

$$\Rightarrow \quad k \neq 0 \text{ and } k \neq 6 \quad \text{.....(iv)}$$

Thus, from (iii) and (iv), it's clear that at $k = -6$ the given pair of linear equations will have no solution.

Quesntion3. For which values of a and b will the following pair of linear equations has infinitely many solutions?
$x + 2y = 1$
$(a - b)x + (a + b)y = a + b - 2$
Solution:
Given equation are:

$x + 2y - 1 = 0$ and $(a - b)x + (a + b)y - (a + b - 2) = 0$ ....(i)
On comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ we have:

$a_1 = 1, b_1 = 2, c_1 = -1$

And $a_2 = (a-b), b_2 = (a+b), c_2 = -(a+b-2)$

Condition for infinitely many solutions is:

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \quad \text{....(ii)}$$

$$\Rightarrow \quad \frac{1}{a-b} = \frac{2}{a+b} = \frac{-1}{-(a+b-2)}$$

$$\Rightarrow \quad \frac{1}{a-b} = \frac{2}{a+b}$$

$$\Rightarrow \quad \mathrm{a} + b = 2a - 2b$$

$$\Rightarrow \quad a = 3b \quad \text{.... (iii)}$$

Again usng (ii), we get:

$$\Rightarrow \quad \frac{2}{a+b} = \frac{1}{(a+b-2)}$$

$$\Rightarrow \quad 2a + 2b - 4 = a + b$$

$$\Rightarrow \quad a + b = 4 \text{ ...(iv)}$$

Now, solving (i) and (ii), we have

$$3b + b = 4$$

$$\Rightarrow \quad b = 1 \text{ and } a = 3.$$

Quesntion4. Find the values of *p* in (i) to (iv) and *p* and *q* in (v) for the following pair of equations
(i) $3x - y - 5 = 0$ and $6x - 2y - p = 0$, if the Lines represented by these equations are parallel.

(ii) $-x + py = 1$ and $px - y = 1$, if the pair of equations has no solution.
(iii) $-3x + 5y = 7$ and $2px - 3y = 1$
if the lines represented by these equations are intersecting at a unique point.

(iv) $2x + 3y - 5 = 0$ and $px - 6y - 8 = 0$,
if the pair of equations has a unique solution.

(v) $2x + 3y = 7$ and $2px + py = 28 - qy$,
if the pair of equations has infinitely many solutions.

Solution:
(*i*) Given, $3x - y - 5 = 0$ and $6x - 2y - p = 0$
On comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ we have:
$c_1 = 5$ and $a_2 = 6$, $b_2 = -2$, $c_2 = -p$
As, the lines represented by these equations are parallel, therefore

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\Rightarrow \quad \frac{3}{6} = \frac{-1}{-2} \neq \frac{-5}{-p}$$

$$\Rightarrow \quad \frac{-1}{-2} \neq \frac{-5}{-p}$$

$$\Rightarrow \quad \frac{1}{2} \neq \frac{5}{p}$$

$$\Rightarrow \quad p \neq 10.$$

Therefore, the given pair of linear equations are parallel for all real values of p except 10.
(ii) Given, $-x + py - 1 = 0$ and $px - y - 1 = 0$ .....(i)
We have, $a_1 = -1$, $b_1 = p$, $c_1 = -1$ and $a_2 = p$, $b_2 = -1$ and $c_2 = -1$
As, the pair of linear equations has no solution *i.e.,* both lines are parallel to each other.

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \qquad ....(\text{ii})$$

$$\Rightarrow \quad \frac{-1}{p} = \frac{p}{-1} \neq \frac{-1}{-1}$$

$$\Rightarrow \quad \frac{p}{-1} \neq \frac{-1}{-1}$$

$$\Rightarrow \quad p \neq -1$$

Again using (ii), we get:

$$\frac{-1}{p} = \frac{p}{-1}$$

$$\Rightarrow \quad p^2 = 1$$

$$\Rightarrow \quad p = \pm 1$$

But $p \neq -1$

$\therefore p = 1$

Therefore, the given pair of linear equations has no solution for $p = 1$.
(*iii*) Given, $-3x + 5y - 7 = 0$ and $2px - 3y - 1 = 0$
Here, $a_1 = -3$, $b_1 = 5$, $c_1 = -7$ and $a_2 = 2p$, $b_2 = -3$, $c_2 = -1$
As, the lines are intersecting at a unique point *i.e.,* it has a unique solution.

So, $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$$\Rightarrow \frac{-3}{2p} \neq \frac{5}{-3}$$

$$\Rightarrow p \neq \frac{9}{10}$$

Therefore, the lines represented by these equations are intersecting at a unique point for all great values of p except 9/10.
(iv) Given, $2x + 3y - 5 = 0$ and $px - 6y - 8 = 0$
Here, $c_1 = -5$ and $a_2 = p$, $b_2 = -6$, $c_2 = -8$
As, the pair of linear equations has a unique solution.

Here, $a_1 = 2, b_1 = 3, c_1 = -5$ and $a_2 = p, b_2 = -6, c_2 = -8$

As, the pair of linear equations has a unique solution.

$$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$$\Rightarrow \frac{2}{p} \neq \frac{3}{-6}$$

$$\Rightarrow p \neq -4$$

Given, the pair of linear equations has a unique solution for all values of p except -4.
(v) Given, $2x + 3y = 7$ and $2px + py = 28 - qy$
Here, $a_1 = 2$, $b_2, = 3$, $c_1 = -7$ and $a_2 = 2p$, $b_2 = (p + q)$, $c_2 = -28$
Since, the pair of equations has infinitely many solutions *i.e.,* both lines are coincident.

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\Rightarrow \frac{2}{2p} = \frac{3}{(p+q)} = \frac{-7}{-28} \qquad .....(i)$$

$$\Rightarrow \frac{2}{2p} = \frac{-7}{-28}$$

$$\Rightarrow \frac{1}{p} = \frac{1}{4}$$

$$\Rightarrow p = 4$$

Again using (i), we get:

$$\frac{3}{p+q} = \frac{-7}{-28}$$

$$\Rightarrow \frac{3}{p+q} = \frac{1}{4}$$

$$\Rightarrow p + q = 12$$

$\Rightarrow 4 + q = 12$
Therefore, $q = 8$
Therefore, the pair of equations has infinitely many solutions for the values of $p = 4$ and $q = 8$

Quesntion5. Two straight paths are represented by the equations x - 3y = 2 and -2x + 6y = 5. Check whether the paths cross each other or not.
Solution:

Given, $x - 3y - 2 = 0$ and $-2x + 6y - 5 = 0$

Here, $a_1 = 1$, $b_1 = -3$, $c_1 = -2$ and $a_2 = -2$, $b_2 = -6$, $c_2 = -5$

$$\text{Now, } \frac{a_1}{a_2} = \frac{1}{-2}, \frac{b_1}{b_2} = \frac{-3}{6} = -\frac{1}{2} \text{ and } \frac{c_1}{c_2} = \frac{-2}{-5} = \frac{2}{5}$$

$$i.e. \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

Hence, two straight paths represented by the given equations never cross each other because they are parallel to each other.

Quesntion6. Write a pair of linear equations which has the unique solution
x = - 1 and y 3. How many such pairs can you write?
Solution:

The pair of system to have unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Let the equations are, $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$

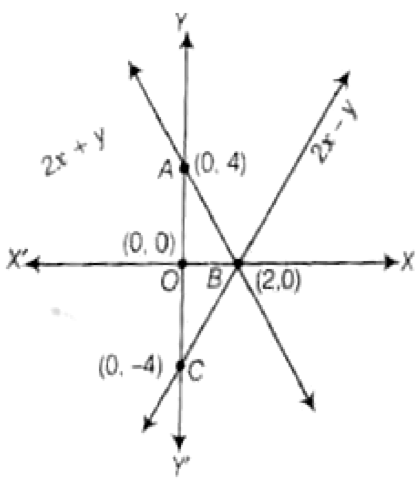
Now, $x = 1$ and $y = 3$ is the unique solution of these two equations, then

$a_1(-1) + b_1(3) + c_1 = 0$

$\Rightarrow a_1 + 3b_1 + c_1 = 0$ ...(i)

and $a_2(1) + b_2(3) + c_2 = 0$ or $a_2 + 3b_2 + c_2 = 0$ ...(ii)

So, the different values of a_1, a_2, b_1, b_2, c_1 and c_2 satisfy the equations (i) and (ii)



Hence, infinitely many pairs of linear equations are possible.

Quesntion7. If $2x + y = 23$ and $4x - y = 19$, then find the values of $5y - 2x$ and
Solution:

Given pair of linear equations is:

$$2x + y = 23 \ldots (i)$$

And $4x - y = 19 \ldots (ii)$

On adding (i) and (ii), we get:

$$6x = 42$$

$\Rightarrow x = 7$

Putting the value of x in equation (i), we get:

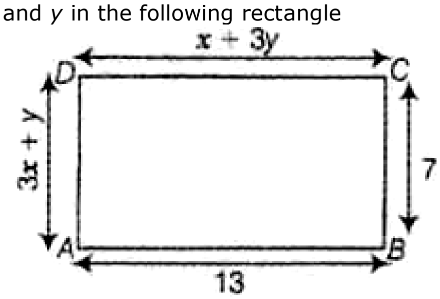
$$2(7) + y = 23$$
$$\Rightarrow 14 + y = 23$$
$$\Rightarrow y = 23 - 14$$
$$\Rightarrow y = 9$$

Thus, $5y - 2x = 5 \times 9 - 2 \times 7 = 31$

And $\frac{y}{x} - 2 = \frac{9}{7} - 2 = \frac{9-14}{7} = -\frac{5}{7}$.

Therefore, the values of $(5y - 2x)$ and $\left(\frac{y}{x} - 2\right)$ are 31 and $\frac{-5}{7}$ respectively.

Quesntion8. Find the values of x and y in the following rectangle



Solution:

As, lengths are equal $\Rightarrow CD = AB \Rightarrow x + 3y = 13$ ....(i)

As, breadth are equal, $\Rightarrow AD = BC \Rightarrow 3x + y = 7$ ....(ii)

On multiplying Eq. (*ii*) by 3 and then subtracting Eq. (*i*), we get

$$9x + 3y = 21$$
$$\underline{x + 3y = 13}$$
$$8x \quad = 8$$

$\Rightarrow x = 1$

On putting $x = 1$ in equation (i), we get $3y = 12 \Rightarrow y = 4$

Hence, the required values of x and y are 1 and 4, respectively.

Quesntion9. Solve the following pairs of equations

(i) $x+y=3.3,\qquad \dfrac{0.6}{3x-2x}=-1, 3x-2y\neq 0$

(ii) $\dfrac{x}{3}+\dfrac{y}{4}=15,\qquad \dfrac{5x}{6}-\dfrac{y}{8}=4$

(iii) $4x+\dfrac{6}{y}=4,\qquad 6x-\dfrac{8}{y}=14, y\neq 0$

(iv) $\dfrac{1}{2x}-\dfrac{1}{y}=-1,\qquad \dfrac{1}{x}+\dfrac{1}{2y}=8, x, y\neq 0$

(v) $43x+67y=-24,\qquad 67x+43y=24$

(vi) $\dfrac{x}{a}+\dfrac{y}{b}=a+b\qquad \dfrac{x}{a_2}+\dfrac{y}{b_2}=2, a, b\neq 0$

(vii) $\dfrac{2xy}{x+y}=\dfrac{3}{2},\qquad \dfrac{xy}{2x-y}+\dfrac{-3}{10}, x+y\neq 0, 2x-y\neq 0$

Solution:

(i) Given pair of linear equations are is

$x+y=33$ and $\dfrac{0.6}{3x-2y}=-1$

$\Rightarrow 0.6=-3x+2y$ or $3x-2y=-0.6$ ...(ii)

Now, $2\times$ (i) + (ii) gives:

$\Rightarrow 2x+2y=6.6$

$\Rightarrow 3x-2y=-0.6$

$\Rightarrow 5x=6=x=\dfrac{6}{5}=1.2$

Now, put the value of x in equation (i), we get

$1.2+y=3.3$

$\Rightarrow y=3.3-1.2$

$\Rightarrow y=2.1$

Hence, the required values of x and y are 1.2 and 2.1, respectively

Hence, the required values of x and y are 1.2 and 2.1, respectively

(ii) Given, pair of linear equations is $\frac{x}{3}+\frac{y}{4}=4$

On multiplying both sides by LCM (3, 4) = 12, we get

$$4x + 3y = 48 \qquad \text{...(i)}$$

And $\frac{5x}{6}-\frac{y}{8}=4$

On multiplying both sides by LCM (6, 8) = 24, we get

$$20x - 3y = 96 \qquad \text{...(ii)}$$

Now, adding equations, (i) and (ii), we get

$$24x = 144$$

$\Rightarrow x = 6$

Now, put the value of x in equation (i), we get:

$$4 \times 6 + 3y = 48$$

$\Rightarrow 3y = 48 - 24$

$\Rightarrow 3y = 24 = y = 8$

Hence, the required values of *x* and *y* are 6 and 8, respectively

(iii) Given, $4x+\frac{6}{y}=15$ ...(i) and $5x-\frac{8}{y}=14, y\neq 0$ ...(ii)

Putting, $u=\frac{1}{y}$ in equations (i) and (ii) we get:

$4x + 6u = 15$ ... (iii)

And $6x - 8u = 14$ ... (iv)

Now, $8 \times$ (iii) $+ 6 \times$ (iv) gives:

$32x + 48u = 120$

$\Rightarrow 36x - 48\ u = 84 \Rightarrow 68x = 20$

$\Rightarrow x = 3$

Now, put the value of x in equation (iii), we get

$4 \times 3 + 6u = 15$

$\Rightarrow \quad 6u = 15 - 12 = 6u = 3$

$\Rightarrow \quad u = \frac{1}{2}$

$\Rightarrow \quad \frac{1}{y} = \frac{1}{2} \qquad \left[\because u = \frac{1}{y}\right]$

$\Rightarrow \quad y = 2$

Hence, the required values of x and y are 3 and 2, respectively.

(iv) Given pair of linear equations is

$$\frac{1}{2x}-\frac{1}{y}=-1 \text{ and } \frac{1}{x}-\frac{1}{2y}=8; \quad x, y \neq 0$$

Let $u=\frac{1}{x}$ and $v=\frac{1}{y}$, then the above equations become:

$$\frac{u}{2}-v=-1$$

$$\Rightarrow \quad u-2v=-2 \qquad \text{....(iii)}$$

And $u+\frac{v}{2}=8$

$$\Rightarrow 2u+v=16 \qquad \text{....(iv)}$$

Now, $2 \times$ (iv) + (iii) gives:

$$4u+2v=32$$

$$\underline{u-2v=-32}$$

$$5u=30$$

$$\Rightarrow u=6$$

Now, put the value of u in (iv), we get

$$2 \times 6+v=16$$

$$\Rightarrow \quad v=16-12=4$$

$$\Rightarrow \quad v=4$$

Thus, $x=\frac{1}{u}=\frac{1}{6}$ and $y=\frac{1}{v}=\frac{1}{4}$

Hence, the required values of x and y are $\frac{1}{6}$ and $\frac{1}{4}$ respectively.

(v) Given pair of linear equations is

$43x + 67y = -24$ ...(i)

And $67x + 43y = 24$ ...(ii)

Now taking 43 × (i) + 67 ×(ii), we get

$(67)^2x + 43 \times 67y = 24 \times 67$

$$\begin{array}{l} \underset{-}{(43)^2x} + \underset{-}{43 \times 67y} = \underset{+}{-24 \times 43} \\ \hline \{(67)^2 - (43)^2\}x = 24(67 + 43) \end{array}$$

$\Rightarrow \quad (67 + 43)\ (67 - 43)x = 24 \text{x} 110$

$[\because (a^2 - b^2) = (a - b)(a + b)]$

$\Rightarrow \quad 110 \times 24x = 24 \times 110$

$\Rightarrow \quad x = 1$

Now, put the value of x in Eq. (i), we get

$43 \times 1 + 67y = -24$

$\Rightarrow \quad 67y = -24 - 43$

$\Rightarrow \quad 67y = -67$

$\Rightarrow \quad y = -1$

Hence, the required values of *x* and *y* are 1 and -1, respectively.

(vi) Given pair of linear equations is

$$\frac{x}{a}+\frac{y}{b}=a+b \qquad \text{... (i)}$$

And $\frac{x}{a^2}+\frac{y}{b^2}=2, a, b \neq 0 \qquad \text{...(ii)}$

Now, (ii) − (i) × $\frac{1}{a}$ gives:

$$\frac{x}{a^2}+\frac{y}{b^2}=2$$

$$\frac{x}{a^2}+\frac{y}{ab}=1+\frac{b}{2}$$

$$\underset{-}{}\quad \underset{-}{}\quad \underset{-}{}$$

$$y\left(\frac{1}{b^2}-\frac{1}{ab}\right)=2-1-\frac{b}{a}$$

$$\Rightarrow \quad y\left(\frac{a-b}{ab^2}\right)=1-\frac{b}{a}=\left(\frac{a-b}{a}\right)$$

$$\Rightarrow \quad y=\frac{ab^2}{a} \Rightarrow y=b^2$$

Now, put the value of y in equation (ii), we get:

$$\frac{x}{a^2}+\frac{b}{b^2}=2$$

$$\Rightarrow \quad \frac{x}{a^2}=2-1=1$$

$$\Rightarrow \quad x=a^2$$

Hence, the required values of x and y are a^2 and b^2, respectively.

(vii) Given pair of equations is

$$\frac{2xy}{x+y}=\frac{3}{2}, \text{ where } x+y\neq 0$$

$$\Rightarrow \quad \frac{x+y}{2xy}=\frac{2}{3}$$

$$\Rightarrow \quad \frac{x}{xy}+\frac{y}{xy}=\frac{4}{3}$$

$$\Rightarrow \quad \frac{1}{y}+\frac{1}{x}=\frac{4}{3} \quad \ldots\text{(i)}$$

And $\frac{xy}{2x-y}=\frac{-3}{10}$, where $2x-y\neq 0$

$$\Rightarrow \quad \frac{2x-y}{xy}=\frac{-10}{3}$$

$$\Rightarrow \quad \frac{2x}{xy}-\frac{y}{xy}=-\frac{-10}{3}$$

$$\Rightarrow \quad \frac{2}{y}-\frac{1}{x}=\frac{-10}{3} \quad \ldots\text{(ii)}$$

Now, put $\frac{1}{x}=u$ and $\frac{1}{y}=v$, in (i) and (ii):

$$v+u=\frac{3}{4} \quad \ldots\text{(iii)}$$

And $2v-u=\frac{-10}{3}$ ...(iv)

On adding both equations, we get

$$3v-\frac{4}{3}-\frac{10}{3}=\frac{-6}{3}$$
$$\Rightarrow 3v=-2$$
$$\Rightarrow v=\frac{-2}{3}$$

Now, put the value of v in equation (iii), we get:

$$\frac{-2}{3}+u=\frac{4}{3}$$
$$\Rightarrow u=\frac{4}{3}+\frac{2}{3}=\frac{6}{3}=2$$
$$\therefore x=\frac{1}{u}=\frac{1}{2}$$

And $y=\frac{1}{v}=\frac{1}{(-2/3)}=\frac{-3}{2}$

Hence, the required values of x and y are $\frac{1}{2}$ and $\frac{-3}{2}$, respectively

Quesntion10. Find the solution of the pair of equations $\frac{x}{10}+\frac{y}{5}-1=0$ and $\frac{x}{8}+\frac{y}{6}=15$ and find λ, if $y=\lambda x+5$.

Solution:

Given,

$$\frac{x}{10}+\frac{y}{5}-1=0 \ldots \text{(i)}$$

And $\frac{x}{8}+\frac{y}{6}=15 \ldots$(ii)

$$3x+4y=360$$
$$\underline{\underset{-}{2}x+\underset{-}{4}y=\underset{-}{2}0}$$
$$x=340$$

Put the value of x in equation (iii), we get:

$$340+2y=10$$
$$\Rightarrow \quad 2y=10-340=-330$$
$$\Rightarrow \quad y=-165$$

Given that, the linear relation between x, y and λ is

$$y=\lambda x+5$$

Now, put the values of x and y in above relation, we get

$$-165=\lambda(340)+5$$
$$\Rightarrow 340\lambda=-170$$
$$\Rightarrow \lambda=-\frac{1}{2}$$

Now, multiplying both sides of equation (i) by LCM (10, 5) = 10, we get

$x + 2y - 10 = 0$
Þ $x + 2y = 10$ ... (iii)

Again, multiplying both sides of (iv) by LCM (8, 6) = 24, we get

$3x + 4y = 360$ ... (iv)
Now, (iv) − 2 × (iii) gives:

$$\begin{array}{r} 3x + 4y = 360 \\ \underset{-}{2}x \underset{-}{+} 4y \underset{-}{=} 20 \\ \hline x = 340 \end{array}$$

Put the value of x in equation (iii), we get:

$$340 + 2y = 10$$

$$\Rightarrow \quad 2y = 10 - 340 = -330$$

$$\Rightarrow \quad y = -165$$

Given that, the linear relation between x, y and λ is

$$y = \lambda x + 5$$

Now, put the values of x and y in above relation, we get

$$-165 = \lambda(340) + 5$$

$$\Rightarrow 340\lambda = -170$$

$$\Rightarrow \lambda = -\frac{1}{2}$$

Hence, the solution of the pair of equations is $x = 340$, $y = -165$ and the required value of l is
Quesntion11. By the graphical method, find whether the following pair of equations are consistent or not. If consistent, solve them.
(i) $3x + y + 4 = 0$, $6x - 2y + 4 = 0$
(ii) $x - 2y = 6$, $3x - 6y = 0$
(iii) $x + y = 3$, $3x + 3y = 9$
Solution:
(i) Given pair of equations is:

$3x + y + 4 = 0$ and $6x - 2y + 4 = 0$
On comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ we have
and $c_1 = 4$ and $a_2 = 6$, $b_2 = -2$ and $c_2 = 4$

Here, $\frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}; \frac{b_1}{b_2} = \frac{1}{-2}$

$$\Rightarrow \quad \frac{a_1}{a_2} \neq \frac{b_1}{b_1}$$

So, the given pair of linear equations has a unique solution and thereby it is consistent.

We have, $3x + y + 4 = 0$
Þ $y = -4 - 3x$ ....(i)
If $x = 0$, $y = -4$
$x = -1$, $y = -1$
$x = -2$, $y = 2$

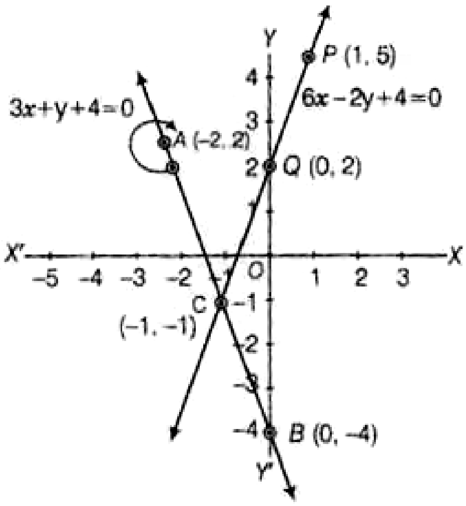
x	0	-1	-2
y	-4	-1	2
Points	*B*	*C*	*A*

And 6 - 2 + 4 = 0 .....(ii)

Þ $2y = 6x + 4$
Þ $y = 3x + 2$
If $x = 0$, $y = 2$
$x = -1$, $y = -1$
$x = 1$, $y = 5$

x	-1	0	1
y	-1	2	5
Points	C	Q	*P*

Plotting (i) and (ii) as per the respective values of *x* and *y*, we get two lines AB and PQ respectively that intersect at C (-1.-1).



(ii) Given pair of equations is:
$x - 2y = 6$ and $3x - 6y = 0$
On comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ we have:
$a_1 = 1, b_1 = -2$ and $c_1 = -3$
$a_2 = 3, b_2 = -6$ and $c_2 = 0$

$$\Rightarrow \frac{a_1}{a_2} = \frac{1}{3}, \frac{b_1}{b_1} \frac{-2}{-6} = \frac{1}{3} \text{ and } \frac{c_1}{c_2} = -\frac{-6}{0}$$

$$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_1} \neq \frac{c_1}{c_2}$$

Thus, the given pair of linear equations has no solution, i.e., inconsistent.

(iii) Given pair of equations is:

$x + y = 3$ and $3x + 3y = 9$
On comparing with $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ we have
$a_1 = 1$, $b_1 = 1$ and c_1, = - 3 and $a_2 = 3$, $b_2 = 3$ and$c_2 = -9$

$$\Rightarrow \frac{a_1}{a_2} = \frac{1}{3}, \frac{b_1}{b_1} = \frac{1}{3} \text{ and } \frac{c_1}{c_2} = \frac{-3}{-3} = \frac{1}{3}$$

$$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_1} = \frac{c_1}{c_2}$$

So, the given pair of lines is coincident. Therefore, these lines have. Hence, the given pair of linear equations has infinitely many solutions, i.e., consistent.

Now, $x + y = 3$ ....(i)
Or $y = 3 - x$
If $x = 0$, $y = 3$
$x = 3$, $y = 0$

x	0	3
y	3	0
Points	*A*	*B*

Also $3x + 3y = 9$ ....(ii)
Or $3y = 9 - 3x$

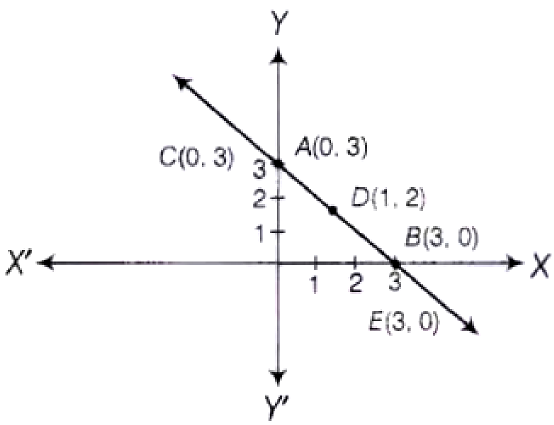
$$\Rightarrow \quad y = \frac{9-3x}{3}$$

If $x = 0$, $y = 3$;

$x = 1$, $y = 2$

$x = 3$, $y = 0$

x	0	1	3
y	3	2	0
Points	C	D	*E*



Plotting (i) and (ii) for respective set of values for x and y, we get two lines AB and CD respectively, that are coincident.