

27/4/23

Chapter - 3

Date _____
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Pair of Linear Equations in Two Variables

⇒ Linear equation in two variables

degree-1 LHS & RHS 2 $a, b, c, d,$

General equation

$$a_1x + b_1y + c_1 = 0$$

$$a_2x + b_2y + c_2 = 0$$

Where $a_1, a_2, b_1, b_2, c_1, c_2$ are integers

$$\text{Ex. } 2x + 3y + 8 = 0$$

$$3x + 2y - 9 = 0$$

Exercise-3.01

10(i) Let the no. of girls = x

Let the no. of boys = y

$$\text{C-1} \rightarrow x + y = 10 \quad \text{--- (1)}$$

$$\text{C-2} \rightarrow x = 4 + y$$

$$x - y = 4 \quad \text{--- (2)}$$

x	4	5	6	7
y	0	1	2	3

$$\text{now, } x + y = 10$$

$$x = 10 - y$$

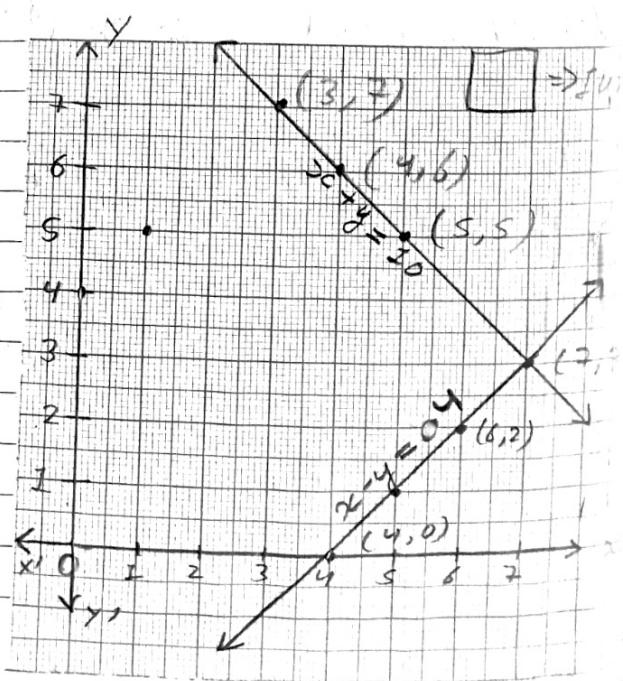
x	5	4	3
y	5	6	7

The lines intersect

at $(7, 3)$ so,

no. of girls is 7 and

no. of boys is 3.



no variables

i-iii) Let cost of 1 pencil $\Rightarrow ₹ x$

and cost of 1 pen $\Rightarrow ₹ y$

now, $5x + 7y = ₹ 50$

$7x + 5y = ₹ 46$

$\Rightarrow x = \frac{50 - 7y}{5}$ ①

$\Rightarrow x = \frac{46 - 5y}{7}$ ②

ers

eq. ①

x	10	3	-4
y	0	2.5	7

eq. ②

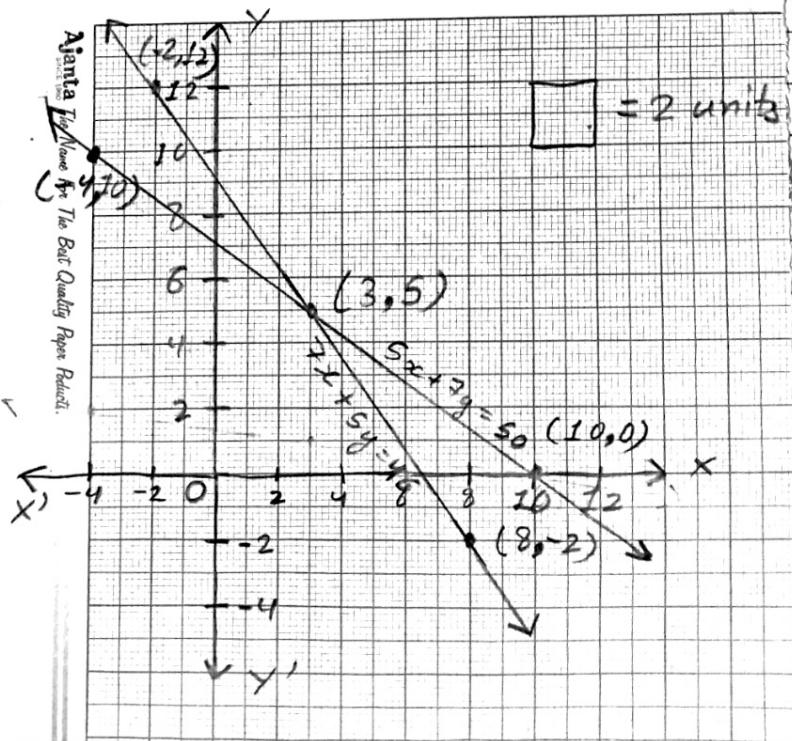
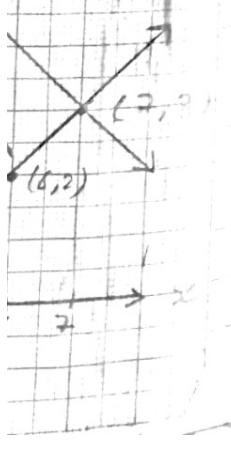
x	3	8	-2
y	5	2	12

The lines intersects at $(3, 5)$.

so, no. of cost of one pencil is 3 and cost of one pen is 5.

$\boxed{} = 14$

$(5, 5)$



$$\text{Q3(vii)} \quad \frac{3}{2}x + \frac{5}{3}y = 7, \quad 9x - 10y = 14$$

solve compare the equations with ~~$a_1x + b_1y + c_1 = 0$~~
 $, \quad a_2x + b_2y + c_2 = 0$

$$\text{we get, } a_1 = \frac{3}{2}, \quad b_1 = \frac{5}{3}, \quad c_1 = -7$$

$$a_2 = 9, \quad b_2 = -10, \quad c_2 = -14$$

now, compare $\frac{a_1}{a_2}$ & $\frac{b_1}{b_2}$

$$\Rightarrow \frac{\frac{3}{2}}{9} \neq \frac{\frac{5}{3}}{-10}$$

$$\Rightarrow \frac{1}{6} \neq -\frac{1}{6}$$

$$\therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2} \quad (\text{intersecting})$$

Hence, These equations are consistant.

$$(ii) \quad 3x + 2y = 5, \quad 2x - 3y = 7$$

~~solve compare the equations with $a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$~~
 \Rightarrow we get, $a_1 = 3, \quad b_1 = 2, \quad c_1 = -5$

$$a_2 = 2, \quad b_2 = -3, \quad c_2 = -7$$

now, compare $\frac{a_1}{a_2}$ & $\frac{b_1}{b_2}$

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

$$\Rightarrow \frac{3}{2} \neq -\frac{2}{3} \quad (\text{intersecting line})$$

Hence, These equations are consistant.

(iv)

~~solve~~

(v)

~~solve~~

(iv) $5x - 3y = 11, -10x + 6y = -22$

\Rightarrow compare the equations with $a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$
 we get, $a_1 = 5, b_1 = -3, c_1 = -11$
 $a_2 = -10, b_2 = 6, c_2 = 22$

now, compare $\frac{a_1}{a_2} \& \frac{b_1}{b_2}$

$$\Rightarrow \frac{5^1}{-10}, \frac{-3^{-1}}{6^2}$$

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

again, compare $\frac{a_1}{a_2} \& \frac{b_1}{b_2} \& \frac{c_1}{c_2}$

$$\Rightarrow \frac{5^1}{-10}, \frac{-3^{-1}}{6^2}, \frac{11^{-1}}{22^2}$$

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

so, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (coincident lines)

Hence, these equations are consistant.

(v) $\frac{4}{3}x + 2y = 8, 2x + 3y = 12$

\Rightarrow compare the equations with $a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$

we get, $a_1 = \frac{4}{3}, b_1 = 2, c_1 = -8$
 $a_2 = 2, b_2 = 3, c_2 = -12$

now compare $\frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$

$$\Rightarrow \frac{4^2}{3 \times 2}, \frac{2}{3}, 0 \frac{-8^2}{+12^3}$$

$$\Rightarrow \frac{2}{3} = \frac{2}{3} = \frac{2}{3}$$

$$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \quad (\text{coincident lines})$$

Hence, these equations are consistent.

$$(iii) 2x - 3y = 8, \quad 4x - 6y = 9$$

Sol → compare the equations with $a_1x + b_1y + c_1 = 0$ & $a_2x + b_2y + c_2 = 0$

$$\text{we get, } a_1 = 2, b_1 = -3, c_1 = -8 \\ a_2 = 4, b_2 = -6, c_2 = -9$$

$$\text{now, compare, } \frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$$

$$\Rightarrow \frac{2}{4}, \frac{-3}{-6}, \frac{-8}{-9}$$

$$\Rightarrow \frac{1}{2} = \frac{1}{2} \neq \frac{8}{9}$$

$$\text{so, } \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \quad (\text{parallel lines})$$

Hence, these equations are inconsistent.

$$2 \rightarrow (i) 5x - 4y + 8 = 0, \quad 7x + 6y - 9 = 0$$

Sol → compare the equations with, $a_1x + b_1y + c_1 = 0$
 $a_2x + b_2y + c_2 = 0$

$$\text{we get, } a_1 = 5, b_1 = -4, c_1 = 8$$

$$a_2 = 7, b_2 = 6, c_2 = -9$$

$$\text{now, compare, } \frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$$

$$\Rightarrow \frac{5}{7}, \frac{-4}{6}, \frac{8}{-9}$$

(iii)
Sol →

$$\Rightarrow \frac{5}{7} \neq -\frac{2}{3} \neq -\frac{8}{9}$$

$$\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \text{ (intersecting lines)}$$

∴ these equations form intersecting lines.

$$(iii) 9x + 3y + 12 = 0, 18x + 6y + 24 = 0$$

~~or~~ compare the equations with $a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$

$$\text{we get, } a_1 = 9, b_1 = 3, c_1 = 12$$

$$a_2 = 18, b_2 = 6, c_2 = 24$$

$$\text{now, compare, } \frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$$

$$\Rightarrow \frac{9}{18}, \frac{3}{6}, \frac{12}{24}$$

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

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

Hence, these equations form coincident lines.

$$(iii) 6x - 3y + 10 = 0, 2x - y + 9 = 0$$

~~or~~ compare the equations with $a_1x + b_1y + c_1 = 0$
 $a_2x + b_2y + c_2 = 0$

$$\text{we get } a_1 = 6, b_1 = -3, c_1 = 10$$

$$a_2 = 2, b_2 = -1, c_2 = 9$$

$$\text{now, compare, } \frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$$

$$\Rightarrow \frac{6}{2}, \frac{-3}{-1}, \frac{10}{9}$$

$$\Rightarrow \frac{3}{1} = \frac{3}{1} \neq \frac{10}{9}$$

$$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \quad \text{[not consistent]}$$

Hence, these equations ~~are~~ & ~~constant~~ form parallel lines

$$4 \rightarrow (i) x+y=5, 2x+2y=10$$

solv compare these equations with $a_1x+b_1y+c_1=0$
 $a_2x+b_2y+c_2=0$

$$\text{we get, } a_1=1, b_1=1, c_1=-5$$

$$a_2=2, b_2=2, c_2=-10$$

now, compare $\frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$

$$\Rightarrow \frac{1}{2} = \frac{1}{2} = \frac{-5}{-10}$$

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

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

Hence, these equations form coincident lines. so
these equations are consistent

$$(i) x+y=5$$

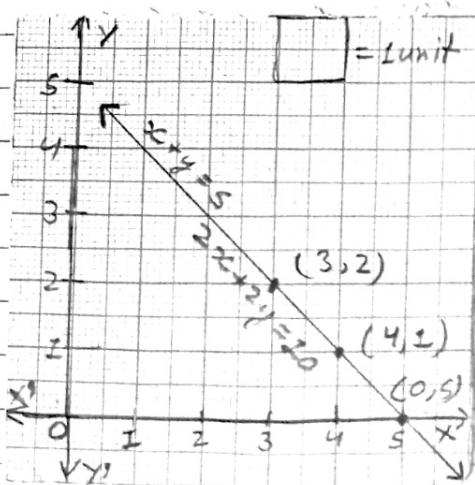
$$x=5-y$$

x	5	4	3
y	0	1	2

$$(ii) 2x+2y=10$$

$$x=\frac{10-2y}{2}$$

x	5	4	3
y	0	1	2



(ii) $x-$

solv a_1

a_2

new

so

The

so

(iii) 2

solv a

a

no

H.

(i) $2x$

a_2

(ii) 3

$[$

(ii) $x - y = 8, 3x - 3y = 16$

Sol $\Rightarrow a_1 = 1, b_1 = -1, c_1 = -8$

$a_2 = 3, b_2 = -3, c_2 = -16$

now, $\frac{a_1}{a_2} = \frac{1}{3}, \frac{b_1}{b_2} = \frac{-1}{-3}, \frac{c_1}{c_2} = \frac{-8}{-16}$

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

Hence, these equations form parallel lines.

so, these equations are inconsistent.

(iii) $2x + y - 6 = 0, 4x - 2y - 4 = 0$

Sol $\Rightarrow a_1 = 2, b_1 = 1, c_1 = -6$

$a_2 = 4, b_2 = -2, c_2 = -4$

now, $\frac{a_1}{a_2} = \frac{2}{4} \Rightarrow \frac{1}{2}, \frac{b_1}{b_2} = \frac{1}{-2}, \frac{c_1}{c_2} = \frac{-6}{-4} \Rightarrow \frac{3}{2}$

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

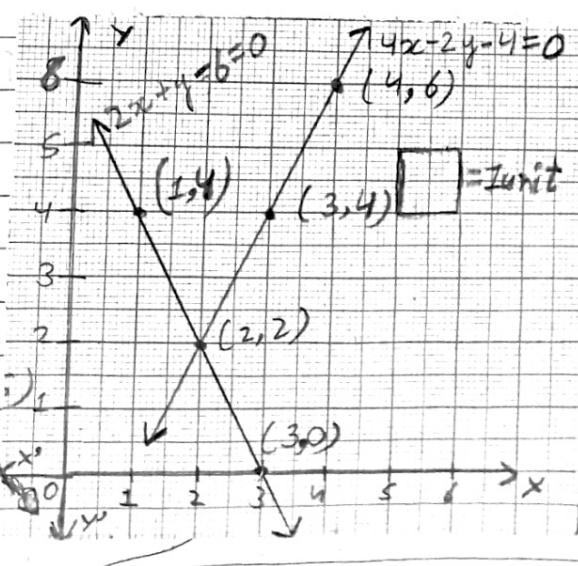
Hence, these equations form intersecting lines

so, these equations are consistent

(i) $2x + y - 6 = 0$

$2x = 6 - y$

x	3	2	1
y	0	2	4



(ii) ~~$2x + y - 6 = 0$~~ $4x - 2y - 4 = 0$

~~$2x = 6 - y$~~ $4x = 4 + 2y$

x	2	3	4
y	2	4	6

(iv) $2x - 2y - 2 = 0, 4x - 4y - 5 = 0$

Soln: $a_1 = 2, b_1 = -2, c_1 = -2$

$a_2 = 4, b_2 = -4, c_2 = 5$

Now, $\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}, \frac{b_1}{b_2} = \frac{-2}{-4} = \frac{1}{2}, \frac{c_1}{c_2} = \frac{-2}{5}$

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

Hence, these equations form parallel lines
so, these equations are inconsistent.

5) $2x + 3y - 8 = 0$

(i) ~~Intersecting lines~~ $\left[\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \right]$

Required equation is

$$4x + 6y - 16 = 0$$

(ii) Parallel lines $\left[\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \right]$

Required equa. is

$$4x + 6y - 9 = 0$$

(iii) Coincident lines

Required equ. is

$$4x + 6y - 16 = 0 \quad \left[\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \right]$$

5) Let the length of garden be x

Let the breadth of garden be y

Sol. $\rightarrow C-1, x = y + 4$

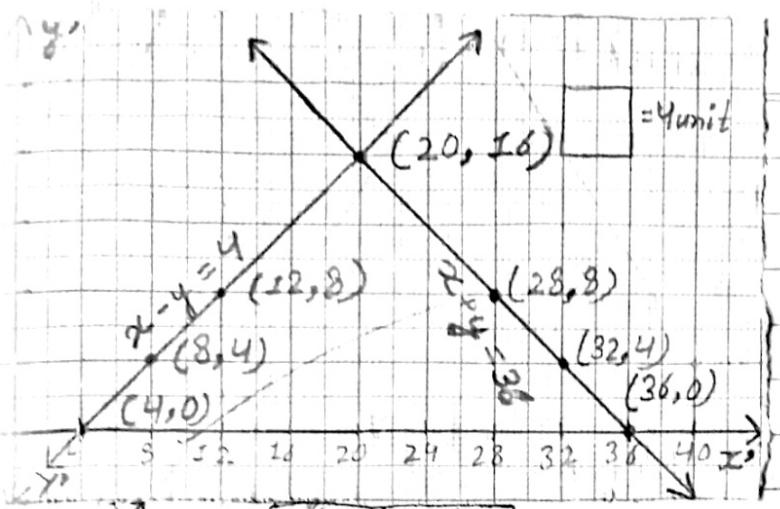
$$x - y = 4 \quad \text{--- (1)}$$

C-2, $\frac{1}{2} \times P = 36$

$$\frac{1}{2} \times x(x+y) = 36 \quad \text{--- (2)}$$

~~∴~~ ~~therefore~~ $x+y = 36$

(2)



from eq. ①

x	4	8	12
y	0	4	8

from eq. ②

x	36	32	28
y	0	4	8

$$\begin{aligned} \text{7} \rightarrow x - y + 1 &= 0 \\ x - y &= -1 \quad \text{--- ①} \end{aligned}$$

$$3x + 2y - 12 = 0$$

$$3x + 2y = 12 \quad \text{--- ②}$$

from eq. ②

$$3x = 12 - 2y$$

$$x = \frac{12 - 2y}{3}$$

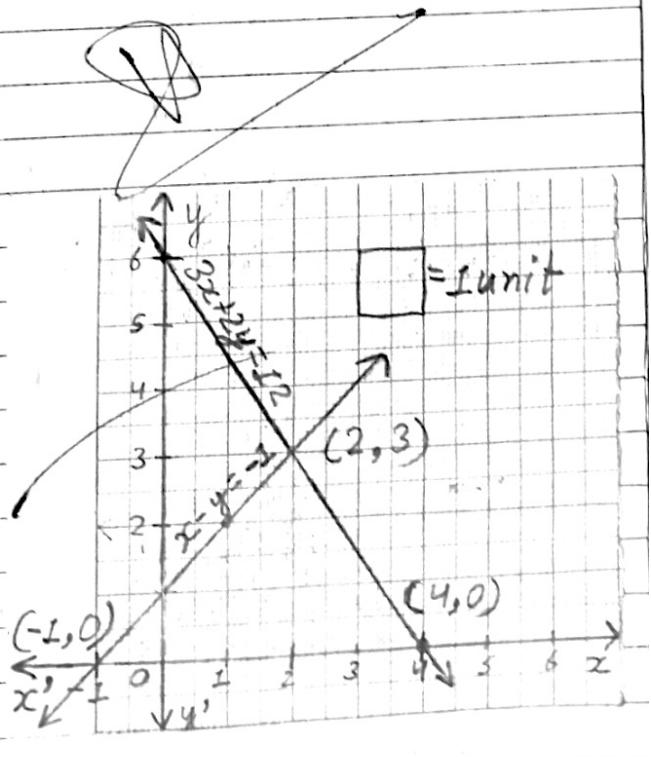
x	4	2	0
y	0	3	6

from eq. ① →

$$x - y = -1$$

$$x + 1 = y$$

x	0	1	2
y	1	2	3



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Exercise → 3.2

$$0 \rightarrow (i) \quad x + y = 14 \quad \text{--- } ①$$

$$x - y = 4 \quad \text{--- } ②$$

$$\Rightarrow x = y + 4$$

Put $x = y + 4$ in eq. ①

$$\Rightarrow 4 + y + y = 14$$

$$\Rightarrow 2y = 10$$

$$\Rightarrow y = 5$$

Put $y = 5$ in $x = 4 + y$

$$\Rightarrow x = 4 + 5$$

$$\Rightarrow x = 9$$

$$(v) \quad \sqrt{2}x + \sqrt{3}y = 0 \quad \text{--- } ①$$

$$\sqrt{3}x - \sqrt{8}y = 0 \quad \text{--- } ②$$

solv $\Rightarrow \sqrt{3}x = \sqrt{8}y$

$$\Rightarrow x = \frac{\sqrt{8}y}{\sqrt{3}}$$

Put $x = \frac{\sqrt{8}y}{\sqrt{3}}$ in eq. ①

$$\Rightarrow \sqrt{2} \cdot \frac{\sqrt{8}y}{\sqrt{3}} + \sqrt{3}y = 0$$

$$\Rightarrow \frac{4y}{\sqrt{3}} + \frac{\sqrt{3}}{1}y$$

$$\Rightarrow \frac{4y + 3y}{\sqrt{3}} = 0$$

$$\Rightarrow 7y = 0$$

$$\Rightarrow y = 0$$

put $y = 0$ in $x = \frac{\sqrt{8}}{\sqrt{3}}y \Rightarrow x = 0$

$$-2 \rightarrow 2x + 3y = 11 \quad \textcircled{1}$$

$$2x - 4y = -24 \quad \textcircled{2}$$

$$\text{sol} \Rightarrow 2x = -24 + 4y$$

$$\Rightarrow x = \frac{-24 + 4y}{2}$$

$$\Rightarrow x = \cancel{x}(-12 + 2y)$$

$$\Rightarrow x = -12 + 2y$$

\Rightarrow Put $x = -12 + 2y$ in eq. $\textcircled{1}$

$$\Rightarrow 2(-12 + 2y) + 3y = 11$$

$$\Rightarrow -24 + 4y + 3y = 11$$

$$\Rightarrow 7y = 11 + 24$$

$$\Rightarrow y = \frac{35}{7}$$

$$\Rightarrow \boxed{y = 5}$$

Put $y = 5$ in $-12 + 2y = x$

~~$\Rightarrow \boxed{0} = x = -12 + 2y$~~

~~$\Rightarrow 0 = 0$~~

$$\Rightarrow x = -12 + 2 \times 5$$

$$\Rightarrow x = -12 + 10$$

$$\Rightarrow \boxed{x = -2}$$

Put $x = 2$, & $y = 5$ in $y = mx + 3$

$$\Rightarrow 5 = m(-2) + 3$$

$$\Rightarrow 5 = -2m + 3$$

$$\Rightarrow 5 - 3 = -2m$$

$$\Rightarrow 2 = -2m$$

$$\Rightarrow \frac{x}{x} = m$$

$$\Rightarrow \boxed{m = -1}$$

$$a) i-iii) \quad s - t = 3 \quad \text{---} \quad ①$$

$$\frac{1}{3} + \frac{t}{2} = 6 \quad \text{---} \quad ②$$

$$\text{sol} \Rightarrow \text{from eq. } ① \Rightarrow s = 3 + t$$

$$\text{put } s = 3 + t \text{ in eq. } ②$$

$$\Rightarrow \frac{3+t}{3} + \frac{t}{2} = 6$$

$$\Rightarrow \frac{6+2t+3t}{6} = 6$$

$$\Rightarrow \frac{6+5t}{6} = 6$$

$$\Rightarrow 6 + 5t = 36$$

$$\Rightarrow 5t = 30$$

$$\Rightarrow \boxed{t = 6}$$

$$\text{put } t = 6 \text{ in } s = 3 + t$$

$$\Rightarrow s = 3 + 6$$

$$\Rightarrow \boxed{s = 9}$$

1-iv)

$$1- (iii) \quad 3x - y = 3 \quad \text{---} \quad ①$$

$$9x - 3y = 9 \quad \text{---} \quad ②$$

$$\text{sol} \Rightarrow 9x = 9 + 3y$$

$$x = \frac{9+3y}{9}$$

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

$$\boxed{x = \frac{3+y}{3}}$$

$$\text{put } x = \frac{3+y}{3} \text{ in eq. } ①$$



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

$$\Rightarrow 3 + 3y - y = 3$$

$$\Rightarrow 3 = 3$$

Hence, There is no non-zero polynomial remains so,
this equation are ~~or~~ inconsistent

$$\begin{array}{r} \cancel{1} \\ \cancel{1} \end{array} \times 10 \quad \begin{array}{r} 2x + 0.3 \\ \cancel{10} \quad \cancel{10} \end{array} y = \cancel{1} \cancel{3}$$

$$\Rightarrow \cancel{\frac{1}{10}} (2x + 3y) = \cancel{\frac{1}{10}} (13)$$

$$\Rightarrow 2x + 3y = 13 \quad \text{--- (1)}$$

$$\Rightarrow \cancel{0.4} x + \cancel{0.5} y = \cancel{2.3}$$

$$\Rightarrow \cancel{\frac{1}{10}} (4x + 5y) = \cancel{\frac{1}{10}} (2.3)$$

$$\Rightarrow 4x + 5y = 23 \quad \text{--- (2)}$$

$$\Rightarrow x = \frac{23 - 5y}{4}$$

put $x = \frac{23 - 5y}{4}$ in eq. (1)

$$\Rightarrow 2x \cancel{\frac{23 - 5y}{4}} + 3y = 13$$

$$\Rightarrow \cancel{23} - \cancel{5y} + 3y = 13$$

$$\Rightarrow \cancel{23} - \cancel{5y} + 6y = 13$$

$$\Rightarrow 23 + y = 13 \times 2$$

$$23 + y = 26$$

$$\Rightarrow y = 26 - 23$$

$$\Rightarrow \boxed{y = 3}$$

$$\Rightarrow \text{put } y = 3 \text{ in } x = \frac{23 - 5y}{4}$$

$$\Rightarrow x = \frac{23 - 5 \times 3}{4}$$

$$\Rightarrow x = \frac{23 - 15}{4}$$

$$\Rightarrow x = \frac{8}{4}$$

$$\Rightarrow \boxed{x = 2} \quad A.$$

$$I-(vi) \quad \frac{3x}{2} - \frac{5y}{3} = -2 \quad ①$$

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

~~so~~ ~~20~~ ~~5~~

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

$$\Rightarrow 2x + 3y = 13 \times 2$$

$$\Rightarrow \boxed{x = \frac{13 - 3y}{2}}$$

3(i)-

put $x = \frac{13 - 3y}{2}$ in eq. ①

$$\Rightarrow \frac{3}{2} \times \frac{13 - 3y}{2} - \frac{5y}{3} = -2$$

C-1

C-2:

$$\Rightarrow \frac{39 - 9y}{4} - \frac{5y}{3} = -2$$

$$\Rightarrow 117 - 27y - 20y = -2$$

$$\Rightarrow 117 - 47y = -2$$

$$\Rightarrow 117 = -2 + 47y$$

$$\Rightarrow 117 + 2 = 47y$$

$$\Rightarrow 119 = 47y$$

$$\Rightarrow y = \frac{119}{47}$$

$$\Rightarrow y = 3$$

$$\text{put } y = 3 \text{ in } x = \frac{13 - 3y}{2}$$

$$\Rightarrow x = \frac{13 - 3 \times 3}{2}$$

$$\Rightarrow x = \frac{13 - 9}{2}$$

$$\Rightarrow x = \frac{4}{2}$$

$$\Rightarrow x = 2$$

3(i) \Rightarrow Let the first no. be x

also, Let the second no. be y

Let x is greater than y

$$C-1 \Rightarrow x - y = 26 \quad (x > y) \quad \textcircled{1}$$

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

$$x - 3y = 0 \quad \textcircled{2}$$

put $x = 3y$ in eq. ①

$$\Rightarrow 3y - y = 26$$

$$\Rightarrow 2y = 26$$

$$\Rightarrow \boxed{y = 13}$$

put $y = 13$ in $x = 3y$

$$\Rightarrow x = 3 \times 13$$

$$\boxed{x = 39}$$

(ii) Let the larger angle be x

Let the smaller angle be y

$$C.-1 \Rightarrow x + y = 180 \quad \textcircled{1}$$

$$C.-2 \Rightarrow x = y + 180$$

$$\Rightarrow x - y = 180 \quad \textcircled{2}$$

put $x = y + 180$ in eq. $\textcircled{1}$

$$\Rightarrow y + 180 + y = 180$$

$$\Rightarrow 180 + 2y = 180$$

$$\Rightarrow 2y = 180 - 180$$

$$\Rightarrow 2y = 0$$

$$\Rightarrow \boxed{y = 0} \quad \boxed{y = 81}$$

put $y = 81$ in $x = y + 180$

$$\Rightarrow \boxed{x = 81 + 180}$$

$$\Rightarrow \boxed{x = 99}$$

(iv)

C.-1

C.-2

sol.

(iii) Let the cost of 1 bat be x

Let the cost of 1 ball be y

$$C.-1 \Rightarrow 7x + 6y = 3800 \quad \textcircled{1}$$

$$C.-2 \Rightarrow 3x + 5y = 1750 \quad \textcircled{2}$$

sol. $x = \frac{1750 - 5y}{3}$ (3)

put $x = \frac{1750 - 5y}{3}$ in eq. (1)

$$\Rightarrow 7\left(\frac{1750 - 5y}{3}\right) + 6y = 3800$$

$$\Rightarrow \frac{12250 - 35y}{3} + 6y = 3800$$

$$\Rightarrow 12250 - 35y + 18y = 3800 \times 3$$

$$\Rightarrow 12250 = 11400 + 17y$$

$$\Rightarrow 12250 - 11400 = 17y$$

$$\Rightarrow 17y = 850$$

$$\Rightarrow y = \frac{850}{17}$$

$$\Rightarrow y = 50$$

put $y = 50$ in eq. (3)

$$\Rightarrow x = \frac{1750 - 5(50)}{3}$$

$$\Rightarrow x = \frac{1750 - 250}{3}$$

$$\Rightarrow x = \frac{1500}{3}$$

$$\Rightarrow x = 500$$

(iv) Let the fixed charge be x

let the additional charge be y

C. - 1 $x + 10y = 105$ (1)

C. - 2 $x + 15y = 155$ (2)

sol. from eq. (2), $x = 155 - 15y$ (3)

\Rightarrow put eq. (3) in eq. (1)

$$\Rightarrow 155 - 15y + 10y = 105$$

$$\Rightarrow 155 - 5y = 105$$

$$\Rightarrow 155 = 105 + 5y$$

$$\Rightarrow 155 - 105 = 5y$$

$$\Rightarrow 5y = 50$$

$$\Rightarrow y = 10$$

put $y = 10$ in eq. (3)

$$\Rightarrow x = 155 - 15(10)$$

$$\Rightarrow x = 155 - 150$$

$$\Rightarrow x = 5$$

A person have to pay for travelling a distance
25 km is $x + 25y$

$$\Rightarrow 5 + 25(10)$$

$\Rightarrow 5 + 250$ Ans:

(V) Let the numerator be $2x$

Let the denominator be y

$$\Rightarrow \text{fraction} = \frac{2x}{y}$$

$$C.-1 \Rightarrow \frac{2x+2}{y+2} = \frac{9}{11}$$

$$\Rightarrow 11(2x+2) = 9(y+2)$$

$$\Rightarrow 22x + 22 = 9y + 18$$

$$\Rightarrow 22x - 9y = 18 - 22$$

$$\Rightarrow 22x - 9y = -4 \quad \textcircled{1}$$

$$C.-2 \Rightarrow \frac{x+3}{y+3} = \frac{5}{6}$$

$$\Rightarrow 6(x+3) = 5(y+3)$$

$$\Rightarrow 6x + 18 = 5y + 15$$

$$\Rightarrow 6x - 5y = 15 - 18$$

$$\Rightarrow 6x - 5y = -3 \quad \textcircled{2}$$

from eq. $\textcircled{2}$, $x = \frac{-3 + 5y}{6}$ \textcircled{3}

put eq. $\textcircled{3}$ in eq. $\textcircled{1}$

$$\Rightarrow 11\left(\frac{-3 + 5y}{6}\right) - 9y = -4$$

$$\Rightarrow -33 + 55y - 54y = -4 \times 6$$

$$\Rightarrow -33 + 55y - 54y = -24$$

$$\Rightarrow y = 0.9$$

distance of

put $y = 9$ in eq. ③

$$\Rightarrow x = -3 + \frac{5(9)}{6}$$

$$\Rightarrow x = -3 + \frac{45}{6}$$

$$\Rightarrow x = \frac{42}{6}$$

$$\Rightarrow \boxed{x = 7}$$

Hence, the fraction is $\boxed{\frac{7}{9}}$

(vi) Let Jacob's present age be x

Let Jacob's son age be y

After 5 years

Jacob's age $\Rightarrow (x+5)$,

Jacob's son age $\Rightarrow (y+5)$

$$\Rightarrow (x+5) = 3(y+5)$$

$$\Rightarrow x+5 = 3y+15$$

$$\Rightarrow x-3y = 15-5$$

$$\Rightarrow x-3y = 10 \quad \textcircled{1}$$

before 5y

Jacob's age $= (x-5)$

Jacob's son age $= (y-5)$

$$\Rightarrow (x-5) = 7(y-5)$$

$$\Rightarrow x-5 = 7y-35$$

$$\Rightarrow x-7y = -35+5$$

$$\Rightarrow x-7y = -30 \quad \textcircled{2}$$

from eq. ②, $\boxed{x = -30 + 7y}$

put eq. ③ in eq. ①

③

$$\Rightarrow -30 + 7y - 3y = 10$$

$$\Rightarrow 4y = 10 + 30$$

$$\Rightarrow y = \frac{40}{4}$$

$$\Rightarrow \boxed{y = 10}$$

put $y = 10$ in eq. ③

$$\Rightarrow x = -30 + 7(10) \quad (10)$$

$$\Rightarrow x = -30 + 70$$

$$\Rightarrow \boxed{x = 40}$$

Hence, The present age of Jacob is 40 years and the present age of his son is 10 years

Exercise → 3.3

$$P-1 \rightarrow (i) \quad x + y = 5 \quad \textcircled{1}$$

$$2x - 3y = 4 \quad \textcircled{2}$$

$$3x + 3y = 15 \quad \textcircled{3} \quad (\text{multiply by 3 in eq. } \textcircled{1})$$

on adding

$$\Rightarrow 5x = 19$$

$$\Rightarrow \boxed{x = \frac{19}{5}}$$

put $x = \frac{19}{5}$ in eq. ②

$$\Rightarrow \frac{19}{5} + y = 5$$

$$\Rightarrow y = 5 - \frac{19}{5}$$

$$\Rightarrow y = \frac{25 - 19}{5} \Rightarrow \boxed{y = \frac{6}{5}}$$

(ii)

Sols.

$$\text{Q. } \frac{x}{2} + \frac{2y}{3} = -1 \quad \textcircled{1}$$

$$\begin{array}{r} \cancel{x} \quad \cancel{y} \\ \hline \cancel{2} \end{array} \quad \textcircled{2}$$

$$\Rightarrow \frac{3x + 4y}{6} \Rightarrow -1$$

$$\Rightarrow 3x + 4y \Rightarrow -6 \quad \textcircled{1}$$

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

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

the

$$\Rightarrow 3x - y = 9 \quad \textcircled{2}$$

$$\Rightarrow -3x + 4y = 6 \quad (\text{on subtracting})$$

$$\Rightarrow -5y = 15$$

$$\Rightarrow y = \frac{15}{-5}$$

$$\Rightarrow \boxed{y = -3}$$

put $y = -3$ in eq. $\textcircled{2}$

$$\checkmark \Rightarrow 3x - (-3) = 9$$

$$\Rightarrow 3x + 3 = 9$$

$$\Rightarrow x = 9 - 3$$

$$\Rightarrow x = 6^{\frac{3}{2}}$$

$$\Rightarrow \boxed{x = 2}$$

$$\text{Q. } 3x + 4y = 10 \quad \textcircled{1}$$

$$2x - 2y = 2 \quad \textcircled{2}$$

$$\text{Ans. } \cancel{2x} \cancel{-2y} \quad 4x - 4y = 4 \quad \textcircled{3} \quad (\text{multiply by 2 in eq. 1})$$

$$\Rightarrow 3x + 4y = 10 \quad (\text{on adding})$$

$$\Rightarrow 7x = 14$$

$$\Rightarrow x = \frac{14}{7} \Rightarrow \boxed{x = 2}$$

put $x = 2$ in eq. ②

$$\Rightarrow 2(2) - 2y = 2$$

$$\Rightarrow 4 - 2y = 2$$

$$\Rightarrow 4 = 2 + 2y$$

$$\Rightarrow 4 - 2 = 2y$$

$$\Rightarrow 2 = 2y$$

$$\Rightarrow y = 1$$

$$\Rightarrow \boxed{y = 1}$$

$$(iii) 3x - 5y = 4 = 0 \quad \textcircled{1} \Rightarrow 3x - 5y = 4$$

$$9x = 2y + 7$$

$$\Rightarrow 9x - 2y = 7 \quad \textcircled{2}$$

$$\Rightarrow 9x - 5y = -12$$

~~(on sub)~~ (multiply by 3 in eq 1)

$$\Rightarrow -9x + 2y = -7 \quad (\text{on sub})$$

$$\Rightarrow -13y = 5$$

$$\Rightarrow \boxed{y = \frac{-5}{13}}$$

\Rightarrow put $y = -\frac{5}{13}$ in eq. ②

$$\Rightarrow 9x - 2\left(-\frac{5}{13}\right) = 7$$

$$\Rightarrow 9x + \frac{10}{13} = 7$$

$$\Rightarrow 9x = \frac{7 - 10}{13}$$

$$\Rightarrow 9x = \frac{91 - 10}{13}$$

$$\Rightarrow 9x = \frac{81}{13}$$

$$\Rightarrow x = \frac{87^9}{13 \times 9}$$

$$\Rightarrow \boxed{x = \frac{9}{18}}$$

2-(i) Let the numerator be x

Let the denominator be y

$$\text{Fraction} \Rightarrow \frac{x}{y}$$

$$C-1 \Rightarrow \frac{x+1}{y-1} = 1$$

$$\Rightarrow x+1 = 1 \times y - 1$$

$$\Rightarrow x-y = -1 - 1$$

$$\Rightarrow \boxed{x-y = -2} \quad \textcircled{1}$$

$$C-2 \Rightarrow \frac{x}{y+1} \times 2 = \frac{1}{2}$$

$$\Rightarrow 2x = y + 1$$

$$\Rightarrow \boxed{2x-y = 1} \quad \textcircled{2}$$

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

$$-2x+y = -1$$

(on subtracting)

$$\Rightarrow -x = -3$$

$$\Rightarrow x = -(-3)$$

$$\Rightarrow \boxed{x = 3}$$

put $x=3$ in eq. $\textcircled{2}$

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

$$\Rightarrow 6 = 1+y$$

$$\Rightarrow y = 6-1$$

$$\Rightarrow \boxed{y = 5}$$

Hence the fraction is $\boxed{\frac{3}{5}}$

(ii) Let the present age of Nuri be x
 also, let the present age of Sonu be y
Five years ago

$$\text{Nuri's age} = (x - 5)$$

$$\text{Sonu's age} = (y - 5)$$

$$\Rightarrow (x - 5) = 3(y - 5)$$

$$\Rightarrow x - 5 = 3y - 15$$

$$\Rightarrow x - 3y = -15 + 5$$

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

At Ten year later

$$\text{Nuri's age} = (x + 10)$$

$$\text{Sonu's age} = (y + 10)$$

$$\Rightarrow (x + 10) = 2(y + 10)$$

$$\Rightarrow x + 10 = 2y + 20$$

$$\Rightarrow x - 2y = 20 - 10$$

$$\Rightarrow \boxed{x - 2y = 10} \quad \text{--- (2)}$$

$$\Rightarrow x - 3y = -10$$

$$\Rightarrow \boxed{-y = -20}$$

$$\Rightarrow y = -(-20)$$

$$\Rightarrow \boxed{y = 20}$$

(on subtracting)

Put $y = 20$ in eq. (2)

$$\Rightarrow x - 2(20) = 10$$

$$\Rightarrow x - 40 = 10$$

(iii)

at

C.1

C.2

new,

$$\Rightarrow x = 10 + 40$$

$$\Rightarrow \boxed{x = 50}$$

Hence, Nuri is 50 years old and Sonu is 20 years old.

(ii) Let ten's place digit be x

~~also~~ let one's place digit by y

$$\text{number} \Rightarrow 10x + y$$

$$\Rightarrow (10x + y)$$

$$\text{C.1} \Rightarrow x + y = 9 \quad \textcircled{1}$$

$$\text{C.2} \Rightarrow 9(10x + y) = 2(10y + x)$$

$$\Rightarrow 90x + 9y = 20y + 2x$$

$$\Rightarrow 90x - 2x + 9y - 20y = 0$$

$$\Rightarrow 88x - 11y = 0$$

$$\Rightarrow 11(8x - y) = 0$$

$$\Rightarrow 8x - y = 0 \quad \textcircled{2}$$

$$\text{now, } x + y = 9 \quad \textcircled{1}$$

$$8x - y = 0 \quad \textcircled{2} \quad (\text{on adding})$$

$$9x = 9$$

$$x = 1$$

put $x = 1$ in eq. $\textcircled{1}$

$$\Rightarrow 1 + y = 9$$

$$y = 8$$

put, $x = 1$ and $y = 8$ in $(10x + y)$

$$\Rightarrow 10(1) + (8)$$

$$\Rightarrow 10 + 8$$

$$\Rightarrow 18 \text{ or } 81 \quad \underline{\text{Ans}}$$

(iv) Let the number of ₹50 notes be x
also, let the number of ₹100 notes be y

$$C.1 \Rightarrow x + y = 25 \quad \text{--- (1)}$$

$$C.2 \Rightarrow 50x + 100y = ₹2000$$

$$\Rightarrow 50(x + 2y) = ₹2000$$

$$\Rightarrow x + 2y = 40 \quad \text{--- (2)}$$

now, $50x + y = 25 \quad \text{--- (1)}$

$$-x + 2y = 40 \quad \text{--- (2)} \quad (\text{on sub})$$

$$\Rightarrow -y = -15$$

$$\Rightarrow y = -(-15)$$

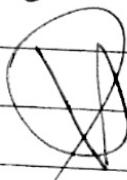
$$\Rightarrow \boxed{y = 15}$$

put $y = 15$ in eq. (1)

$$\Rightarrow x + 15 = 25$$

$$\Rightarrow x = 25 - 15$$

$$\Rightarrow \boxed{x = 10}$$



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(v) Let the fixed charged be x
Let the additional charge be y

$$C.1 \Rightarrow x + 4y = ₹27 \quad \text{--- (1)}$$

$$C.2 \Rightarrow -x + 2y = ₹-21$$

$$\Rightarrow 2y = 6$$

$$\Rightarrow \boxed{y = 3}$$

put $y = 3$ in eq. (2)

$$\Rightarrow x + 2(3) = 21$$

$$\Rightarrow x + 6 = 21$$

$$\Rightarrow \boxed{x = 15}$$

Hence, the fixed charge is ₹15 and addition charge