Question-8

Which of the following pairs of linear equations are consistent/inconsistent ?
If consistent, obtain the solution graphically:
(i) x + y = 5, 2x + 2y = 10
(ii) x − y = 8, 3x − 3y = 16
(iii) 2x + y − 6 = 0, 4x − 2y − 4 = 0
(iv)2x − 2y − 2 = 0, 4x − 4y − 5 =0

Solution:

$x + y = 5, 2x + 2y = 10$

$\frac{a_1}{a_2} = \frac{1}{2}; \frac{b_1}{b_2} = \frac{1}{2}; \frac{c_1}{c_2} = \frac{1}{2}$

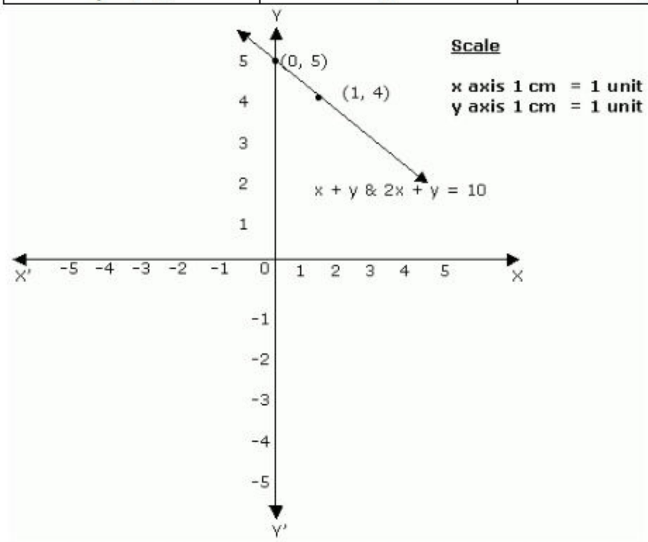
∴ Equations are consistent .

We have to draw the graphs of both the given equations x + y = 5

x	0	1
y = 5 - x	5	4

$2x + 2y = 10 \Rightarrow y = 5 - x$

x	0	1
y = 5 - x	5	4



Hence the lines represented by both the equations are coincident. Thus both the equations have infinitely many solutions.

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

$\frac{a_1}{a_2} = \frac{1}{3}, \frac{b_1}{b_2} = \frac{-1}{-3} = \frac{1}{3}; \frac{c_1}{c_2} = \frac{8}{16} = \frac{1}{2}$

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

$\therefore$The equation are inconsistent.

$2x + y - 6 = 0$

$4x - 2y - 4 = 0$

$\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}, \frac{b_1}{b_2} = -\frac{1}{2}$

Thus as $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, the equations are consistent.

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

when $x = 1$, $y = 6 - 2x = 4$

$x = 0$, $y = 6$

$x = -1$, $y = 8$

x	2	0	-1
y = 6 − 2x	2	6	8

$4x - 2y - 4 = 0$

$4x - 2y = 4$

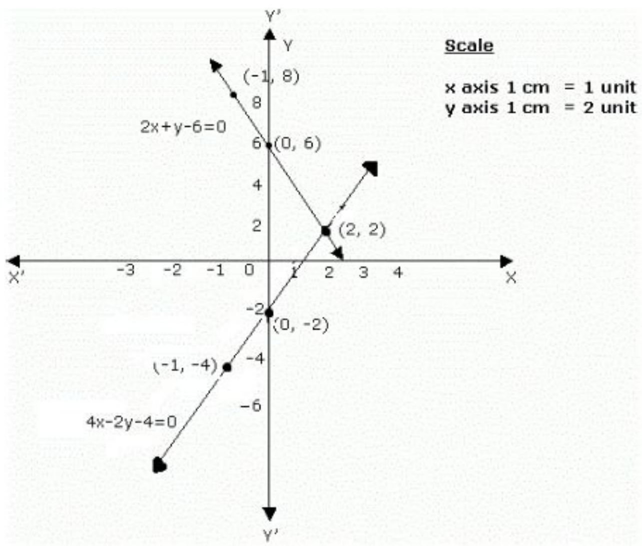
$y = \frac{4x - 4}{2} = 2x - 2$

When $x = 1$, $y = 2 - 2 = 0$

$x = 0$, $y = -2$

$x = -1$, $y = -2 -2 = -4$

x	2	0	-1
y = 2x − 2	2	-2	-4



(iv) $2x - 2y - 2 = 0$

$4x - 4y - 5 = 0$

$\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}$

$\frac{b_1}{b_2} = \frac{-2}{-4} = \frac{1}{2}$

$\frac{c_1}{c_2} = \frac{2}{5}$

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

Equations are inconsistent

Question-9

Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. Find the dimensions of the garden.

Solution:

Let l be the length and b be the breadth

$l = b + 4$

$\Rightarrow l - b = 4$ …………..(1)

Perimeter = $2(l + b)$

$\frac{1}{2} \times 2(l + b) = 36$(given) ………………..(2)

$l - b = 4$ ………… (1)

$l + b = 36$ ………..(2)

(1) + (2) => $2l = 40$

$l = \frac{40}{2} = 20$ m

Substitute $l = 20$ in (1)

$l - b = 4$

$20 - b = 4$

$b = 20 - 4 = 16$ m.

Question-10

Given the linear equation 2x +3y − 8 = 0, write another linear equation in two variables such that the geometrical representation of the pair so formed is:
(i) intersecting lines (ii) parallel lines (iii) coincident lines

Solution:

$2x + 3y - 8 = 0$

$3x + 2y - 7 = 0$ (intersecting lines)

$2x + 3y + 12 = 0$ (parallel lines)

$4x + 6y - 16 = 0$ (coincident lines)

Question-11

Draw the graphs of the equations x − y +1 =0 and 3x +2y −12 =0. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis , and the triangular region.

Solution:

$x - y + 1 = 0$

$y = x + 1$

x	-1	0	1	2
y = x + 1	0	1	2	3

$3x + 2y - 12 = 0$

$2y = 12 - 3x$

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

when x = 0,

$y = \frac{12 - 3(0)}{2} = \frac{12}{2} = 6$

when x = 2,

$y = \frac{12 - 3(2)}{2} = \frac{12 - 6}{2} = \frac{6}{2} = 3$

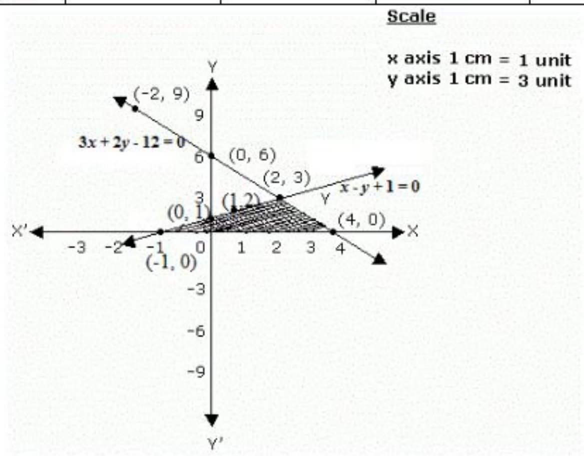
when x = 4,

$y = \frac{12 - 3(4)}{2} = \frac{12 - 12}{2} = \frac{0}{2} = 0$

when x = -2,

$y = \frac{12 - 3(-2)}{2} = \frac{12 + 6}{2} = \frac{18}{2} = 9$

x	-2	0	2	4
$y = \frac{12 - 3x}{2}$	9	6	3	0



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