② Check whether the following equations are consistent or inconsistent. Solve them graphically.

a) $3x + 2y = 5$

$2x - 3y = 7$

Sol: Given equations, $3x + 2y = 5 \Rightarrow 3x + 2y - 5 = 0$

$2x - 3y = 7 \Rightarrow 2x - 3y - 7 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 3$; $b_1 = 2$; $c_1 = -5$

$a_2x + b_2y + c_2 = 0$ $a_2 = 2$; $b_2 = -3$; $c_2 = -7$

$$\Rightarrow \frac{a_1}{a_2} = \frac{3}{2} \quad ; \quad \frac{b_1}{b_2} = \frac{2}{-3} \quad \Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$\therefore$ Given equations are consistent and they are intersecting

Now, to represent given equations on graph,

$\Rightarrow$ For $3x + 2y = 5 \Rightarrow 2y = 5 - 3x \Rightarrow y = \frac{5-3x}{2}$

x	-1	1	3
$y = \frac{5-3x}{2}$	4	1	-2
(x, y)	(-1 , 4)	(1 , 1)	(3 , -2)

$x = -1 \Rightarrow y = \frac{5-3(-1)}{2}$

$\Rightarrow y = \frac{5+3}{2} = \frac{8}{2} = 4$

$x = 1 \Rightarrow y = \frac{5-3(1)}{2}$

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

$x = 3 \Rightarrow y = \frac{5-3(3)}{2}$

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

$\Rightarrow$ For $2x - 3y = 7 \Rightarrow 3y = 2x - 7 \Rightarrow y = \frac{2x-7}{3}$

x	-1	2	5
$y = \frac{2x-7}{3}$	-3	-1	1
(x, y)	(-1,-3)	(2 , -1)	(5 , 1)

$x = -1 \Rightarrow y = \frac{2(-1)-7}{3}$

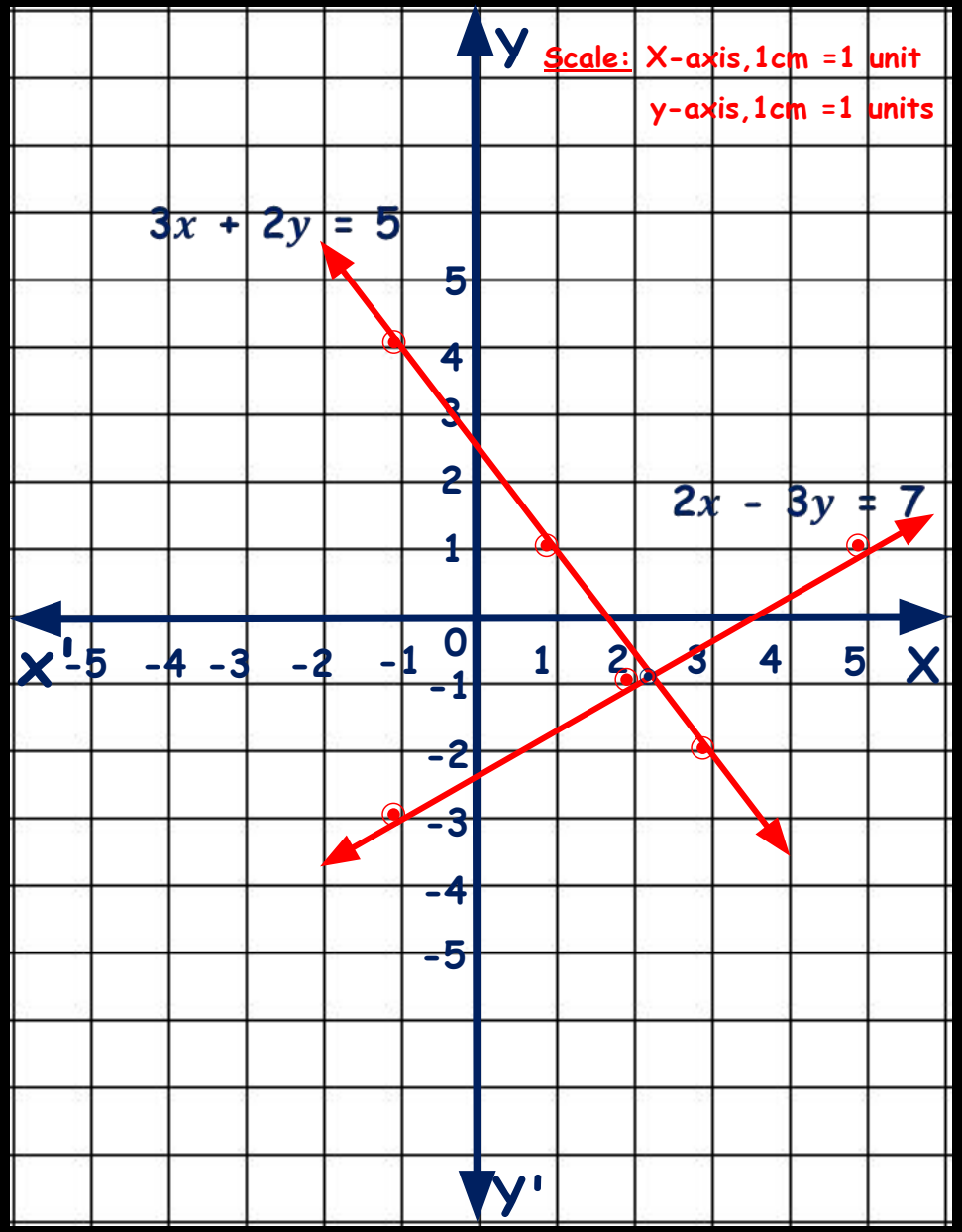
$\Rightarrow y = \frac{-2-7}{3} = \frac{-9}{3} = -3$

$x = 2 \Rightarrow y = \frac{2(2)-7}{3}$

$\Rightarrow y = \frac{4-7}{3} = \frac{-3}{3} = -1$

$x = 5 \Rightarrow y = \frac{2(5)-7}{3}$

$\Rightarrow y = \frac{10-7}{3} = \frac{3}{3} = 1$



$3x + 2y = 5$

x	-1	1	3
$y = \frac{5-3x}{2}$	4	1	-2
(x, y)	(-1 , 4)	(1 , 1)	(3 , -2)

$2x - 3y = 7$

x	-1	2	5
$y = \frac{2x-7}{3}$	-3	-1	1
(x, y)	(-1,-3)	(2 , -1)	(5 , 1)

$\therefore$ Intersecting point / solution is $(\frac{29}{13}, \frac{-11}{13})$

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

~~b)~~ $2x - 3y = 8$

$4x - 6y = 9$

Sol: Given equations, $2x - 3y = 8 \Rightarrow 2x - 3y - 8 = 0$

$4x - 6y = 9 \Rightarrow 4x - 6y - 9 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 2$; $b_1 = -3$; $c_1 = -8$

$a_2x + b_2y + c_2 = 0$ $a_2 = 4$; $b_2 = -6$; $c_2 = -9$

$$\Rightarrow \frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2} \; ; \; \frac{b_1}{b_2} = \frac{-3}{-6} = \frac{1}{2} \; ; \; \frac{c_1}{c_2} = \frac{-8}{-9} = \frac{8}{9}$$

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

$\therefore$ Given equations are inconsistent and they are parallel

Now, to represent given equations on graph,

⇒ For $2x - 3y = 8 \Rightarrow 3y = 2x - 8 \Rightarrow y = \frac{2x-8}{3}$

x	1	4
$y = \frac{2x-8}{3}$	-2	0
(x, y)	(1 , -2)	(4 , 0)

$x = 1 \Rightarrow y = \frac{2(1)-8}{3} = \frac{-6}{3} = -2$

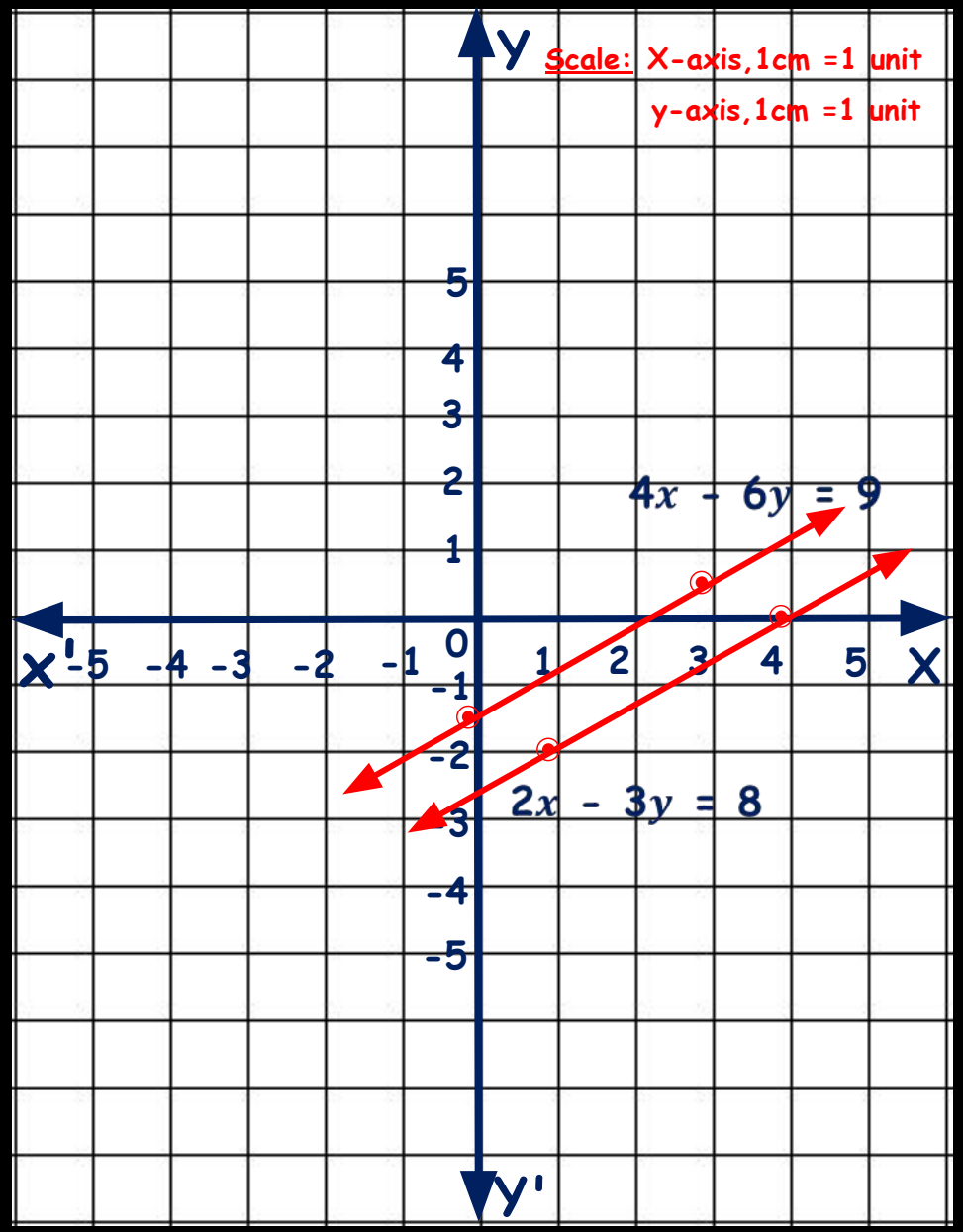
$x = 4 \Rightarrow y = \frac{2(4)-8}{3} = \frac{0}{3} = 0$

⇒ For $4x - 6y = 9 \Rightarrow 6y = 4x - 9 \Rightarrow y = \frac{4x-9}{6}$

x	0	3
$y = \frac{4x-9}{6}$	$\frac{-3}{2}$ = -1.5	$\frac{1}{2}$ = 0.5
(x, y)	(0,-1.5)	(3, 0.5)

$x = 0 \Rightarrow y = \frac{4(0)-9}{6} = \frac{-9}{6} = \frac{-3}{2}$

$x = 3 \Rightarrow y = \frac{4(3)-9}{6} = \frac{3}{6} = \frac{1}{2}$



$2x - 3y = 8$

x	1	4
$y = \frac{2x-8}{3}$	-2	0
(x, y)	(1 , -2)	(4 , 0)

$4x - 6y = 9$

x	0	3
$y = \frac{4x-9}{6}$	$\frac{-3}{2}$ = -1.5	$\frac{1}{2}$ = 0.5
(x, y)	(0,-1.5)	(3, 0.5)

∴ Lines are parallel and have no solutions

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

c) $\frac{3}{2}x + \frac{5}{3}y = 7$

$9x - 10y = 12$

Sol: Given equations, $\frac{3}{2}x + \frac{5}{3}y = 7 \Rightarrow 9x + 10y - 42 = 0$ ($\because$ by LCM)

$9x - 10y = 12 \Rightarrow 9x - 10y - 12 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 9$; $b_1 = 10$; $c_1 = -42$

$a_2x + b_2y + c_2 = 0$ $a_2 = 9$; $b_2 = -10$; $c_2 = -12$

$\Rightarrow \frac{a_1}{a_2} = \frac{9}{9} = 1$; $\frac{b_1}{b_2} = \frac{10}{-10} = -1$ $\boxed{\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}}$

$\therefore$ Given equations are consistent and they are intersecting

Now, to represent given equations on graph,

⇒ For $9x + 10y - 42 = 0 \Rightarrow 10y = 42 - 9x \Rightarrow y = \frac{42-9x}{10}$

x	3	8
$y = \frac{42-9x}{10}$	1.5	-3
(x, y)	(3, 1.5)	(8 , -3)

$x = 3 \Rightarrow y = \frac{42-9(3)}{10} = \frac{15}{10} = 1.5$

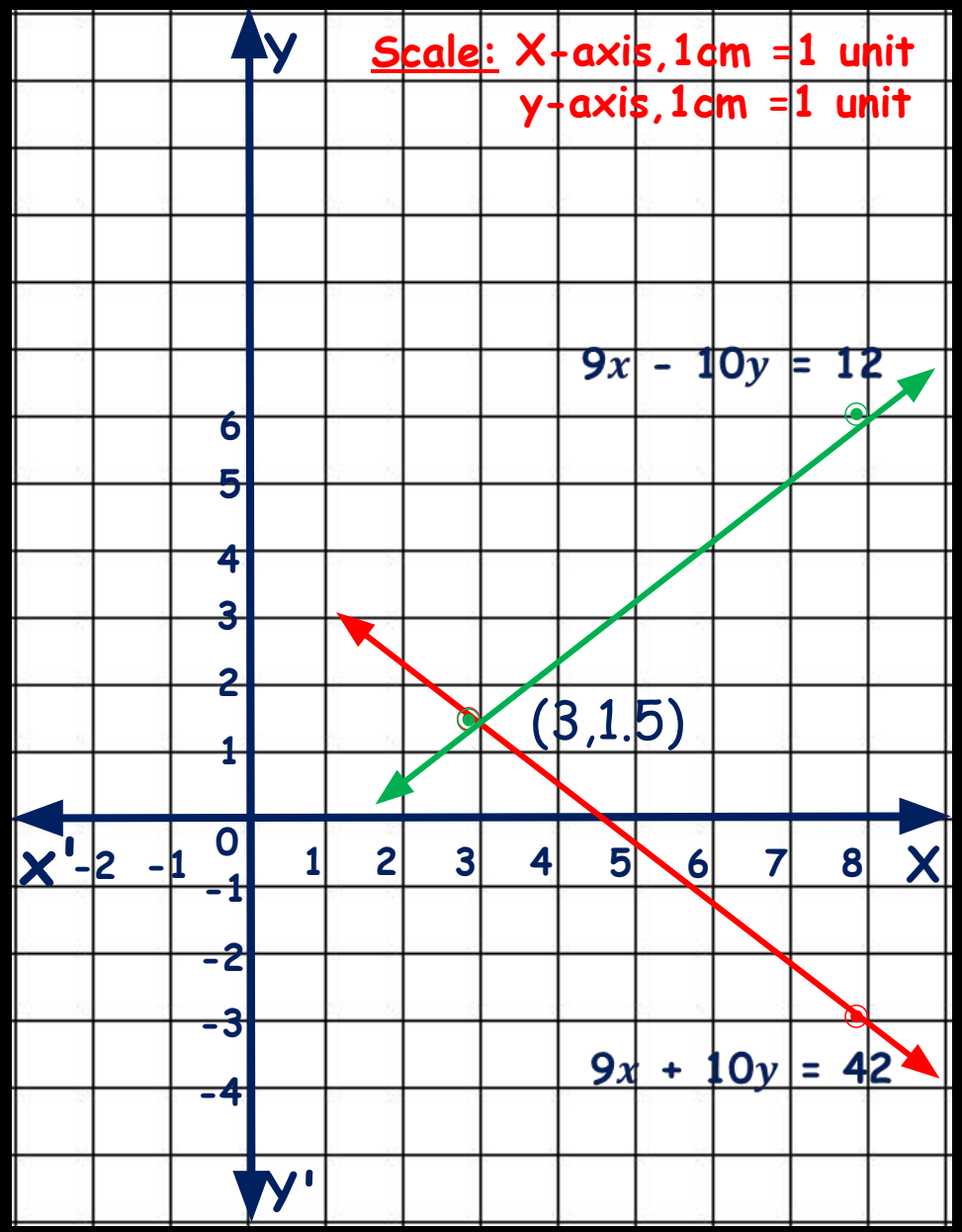
$x = 8 \Rightarrow y = \frac{42-9(8)}{10} = \frac{-30}{10} = -3$

⇒ For $9x - 10y = 12 \Rightarrow 10y = 9x - 12 \Rightarrow y = \frac{9x-12}{10}$

x	3	8
$y = \frac{9x-12}{10}$	1.5	6
(x, y)	(3, 1.5)	(8, 6)

$x = 3 \Rightarrow y = \frac{9(3)-12}{10} = \frac{15}{10} = 1.5$

$x = 8 \Rightarrow y = \frac{9(8)-12}{10} = \frac{60}{10} = 6$



$9x + 10y = 42$

x	3	8
$y = \frac{42-9x}{10}$	1.5	-3
(x, y)	(3, 1.5)	(8, -3)

$9x - 10y = 12$

x	3	8
$y = \frac{9x-12}{10}$	1.5	6
(x, y)	(3, 1.5)	(8, 6)

∴ Intersecting point / solution = (3,1.5)

$= (3, \frac{3}{2})$

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

d) $5x - 3y = 11$

$-10x + 6y = -22$

Sol: Given equations, $5x - 3y = 11 \Rightarrow 5x - 3y - 11 = 0$

$-10x + 6y = -22 \Rightarrow -10x + 6y + 22 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 5$; $b_1 = -3$; $c_1 = -11$

$a_2x + b_2y + c_2 = 0$ $a_2 = -10$; $b_2 = 6$; $c_2 = 22$

$$\Rightarrow \frac{a_1}{a_2} = \frac{5}{-10} = -\frac{1}{2} \; ; \; \frac{b_1}{b_2} = \frac{-3}{6} = -\frac{1}{2} \; ; \; \frac{c_1}{c_2} = \frac{-11}{22} = -\frac{1}{2} \Rightarrow \boxed{\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}}$$

∴ Given equations are consistent and they are coincident

Now, to represent given equations on graph,

⇒ For $5x - 3y = 11$ $\Rightarrow 3y = 5x - 11$ $\Rightarrow y = \frac{5x-11}{3}$

x	1	4
$y = \frac{5x-11}{3}$	-2	3
(x, y)	(1, -2)	(4, 3)

$x = 1 \Rightarrow y = \frac{5(1)-11}{3} = \frac{-6}{3} = -2$

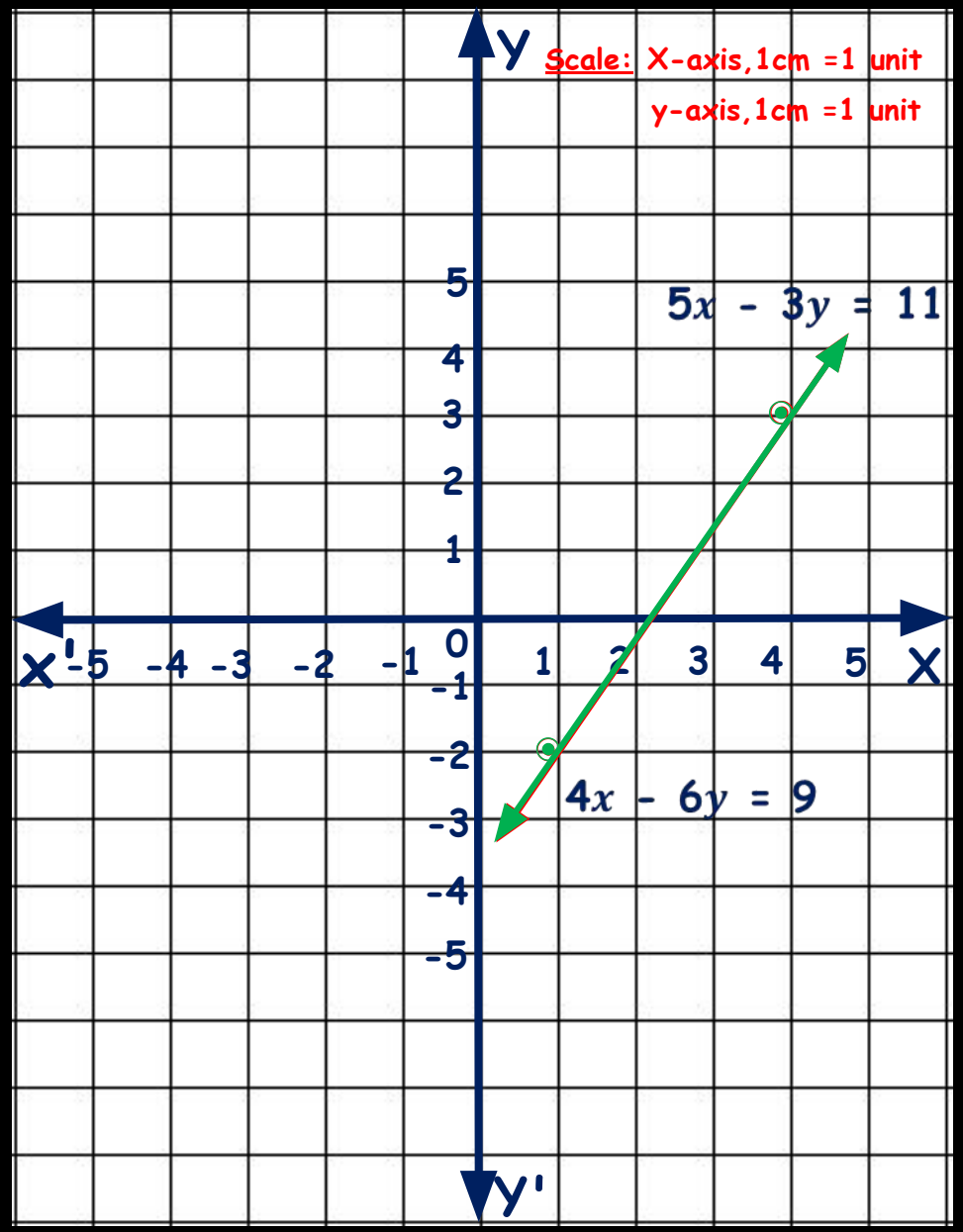
$x = 4 \Rightarrow y = \frac{5(4)-11}{3} = \frac{9}{3} = 3$

⇒ For $-10x + 6y = -22$ $\Rightarrow 6y = 10x - 22$ $\Rightarrow y = \frac{10x-22}{6}$

x	1	4
$y = \frac{10x-22}{6}$	-2	3
(x, y)	(1, -2)	(4, 3)

$x = 1 \Rightarrow y = \frac{10(1)-22}{6} = \frac{-12}{6} = -2$

$x = 4 \Rightarrow y = \frac{10(4)-22}{6} = \frac{18}{6} = 3$



$5x - 3y = 11$

x	1	4
$y = \frac{5x-11}{3}$	-2	3
(x, y)	(1 , -2)	(4 , 3)

$-10x + 6y = -22$

x	1	4
$y = \frac{10x-22}{6}$	-2	3
(x, y)	(1,-2)	(4, 3)

$\therefore$ Lines are coincident and have infinite solutions

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

~~f)~~ $x + y = 5$

$2x + 2y = 10$

Sol: Given equations, $x + y = 5 \Rightarrow x + y - 5 = 0$

$2x + 2y = 10 \Rightarrow 2x + 2y - 10 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 1$; $b_1 = 1$; $c_1 = -5$

$a_2x + b_2y + c_2 = 0$ $a_2 = 2$; $b_2 = 2$; $c_2 = -10$

$$\Rightarrow \frac{a_1}{a_2} = \frac{1}{2} \; ; \; \frac{b_1}{b_2} = \frac{1}{2} \; ; \; \frac{c_1}{c_2} = \frac{-5}{-10} = \frac{1}{2} \Rightarrow \boxed{\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}}$$

∴ Given equations are consistent and they are coincident

Now, to represent given equations on graph,

⇒ For $4x + 6y - 24 = 0 \Rightarrow 6y = 24 - 4x \Rightarrow y = \frac{24-4x}{6}$

x	0	3
$y = \frac{24-4x}{6}$	4	2
(x, y)	(0 , 4)	(3 , 2)

$x = 0 \Rightarrow y = \frac{24-4(0)}{6} = \frac{24}{6} = 4$

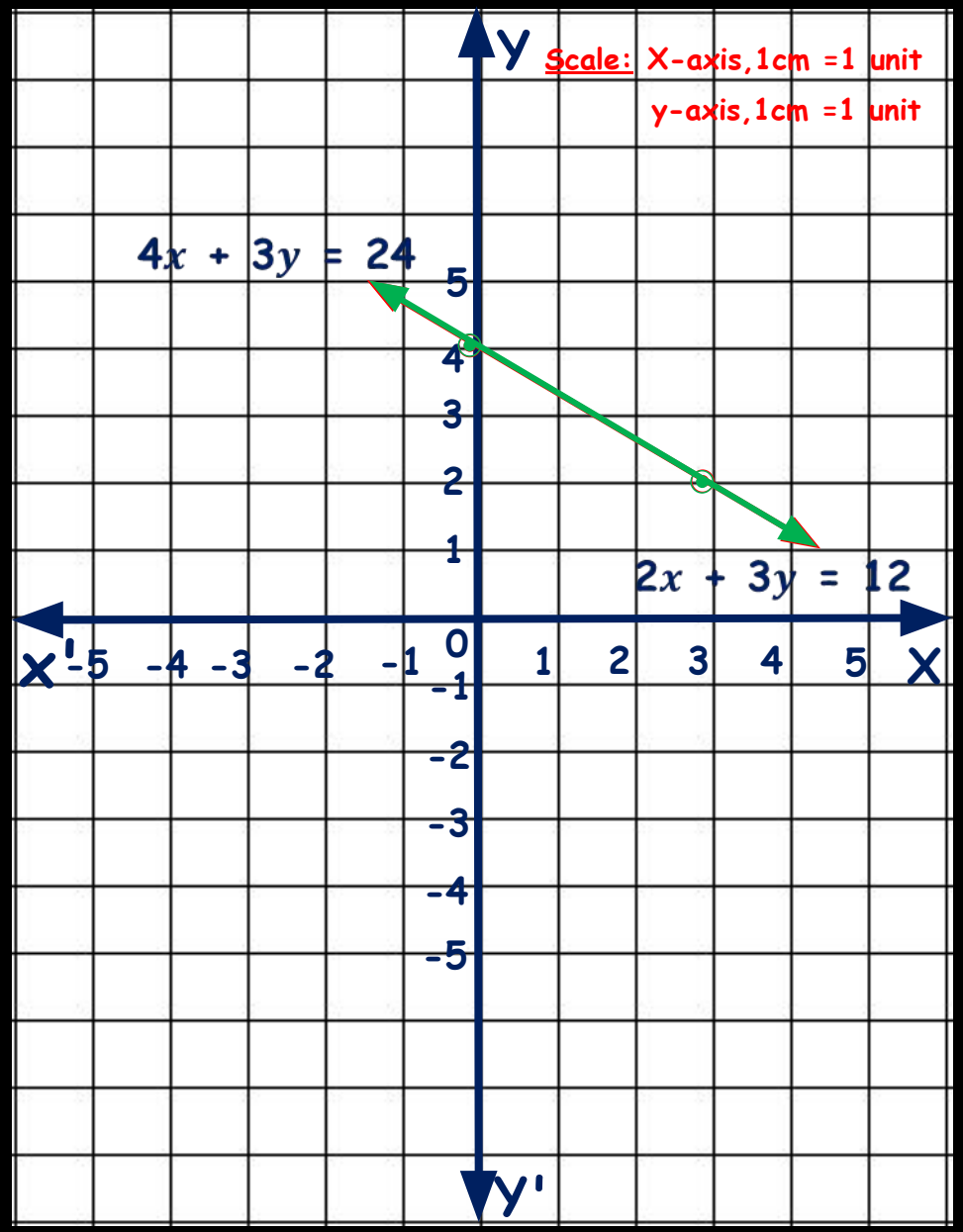
$x = 3 \Rightarrow y = \frac{24-4(3)}{6} = \frac{12}{6} = 2$

⇒ For $2x + 3y - 12 = 0 \Rightarrow 3y = 12 - 2x \Rightarrow y = \frac{12-2x}{3}$

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

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

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



$4x + 3y = 24$

x	0	3
$y = \frac{24-4x}{6}$	4	2
(x, y)	(0, 4)	(3, 2)

$2x + 3y = 12$

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

$\therefore$ Lines are coincident and have infinite solutions

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

~~f)~~ $x + y = 5$

$2x + 2y = 10$

Sol: Given equations, $x + y = 5 \Rightarrow x + y - 5 = 0$

$2x + 2y = 10 \Rightarrow 2x + 2y - 10 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 1$; $b_1 = 1$; $c_1 = -5$

$a_2x + b_2y + c_2 = 0$ $a_2 = 2$; $b_2 = 2$; $c_2 = -10$

$$\Rightarrow \frac{a_1}{a_2} = \frac{1}{2} \; ; \; \frac{b_1}{b_2} = \frac{1}{2} \; ; \; \frac{c_1}{c_2} = \frac{-5}{-10} = \frac{1}{2} \Rightarrow \boxed{\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}}$$

∴ Given equations are consistent and they are coincident

Now, to represent given equations on graph,

⇒ For $x + y = 5$ $\Rightarrow y = 5 - x$

x	1	2
$y = 5 - x$	4	3
(x, y)	(1 , 4)	(2 , 3)

$x = 1 \Rightarrow y = 5 - 1 = 4$

$x = 2 \Rightarrow y = 5 - 2 = 3$

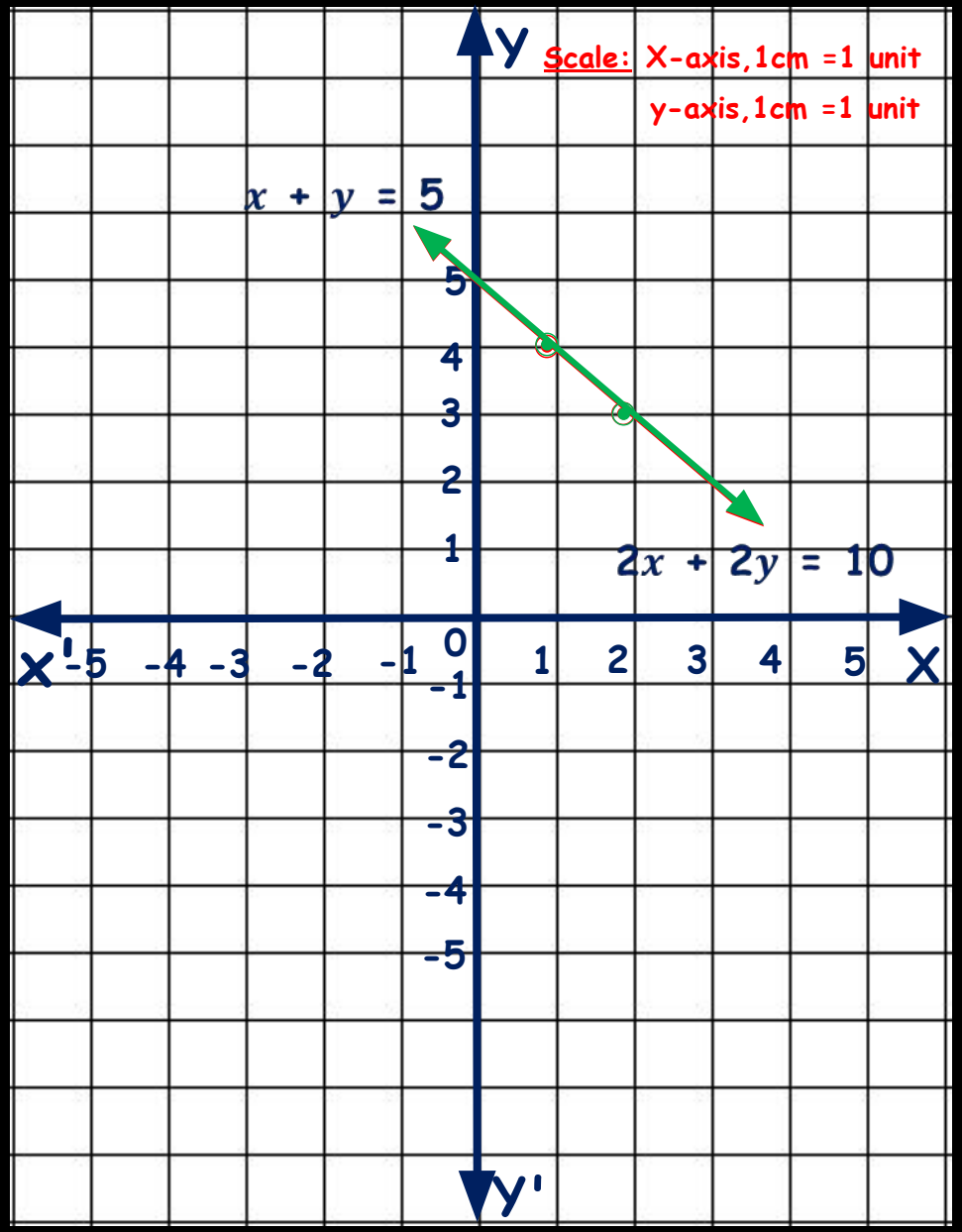
⇒ For $2x + 2y = 10 \Rightarrow 2(x + y) = 10 \Rightarrow x + y = 5$

$\Rightarrow y = 5 - x$

x	1	2
$y = 5 - x$	4	3
(x, y)	(1, 4)	(2, 3)

$x = 1 \Rightarrow y = 5 - 1 = 4$

$x = 2 \Rightarrow y = 5 - 2 = 3$



$x + y = 5$

x	1	2
$y = 5 - x$	4	3
(x, y)	(1 , 4)	(2 , 3)

$2x + 2y = 10$

x	1	2
$y = 5 - x$	4	3
(x, y)	(1, 4)	(2, 3)

$\therefore$ Lines are coincident and have infinite solutions

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

g) $x - y = 8$

$3x - 3y = 16$

Sol: Given equations, $x - y = 8 \Rightarrow x - y - 8 = 0$

$3x - 3y = 16 \Rightarrow 3x - 3y - 16 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 1$; $b_1 = -1$; $c_1 = -8$

$a_2x + b_2y + c_2 = 0$ $a_2 = 3$; $b_2 = -3$; $c_2 = -16$

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

∴ Given equations are inconsistent and they are parallel

Now, to represent given equations on graph,

⇒ For $x - y = 8$ $\Rightarrow y = x - 8$

x	3	5
$y = x - 8$	-5	-3
(x, y)	(3 , -5)	(5 , -3)

$x = 3 \Rightarrow y = 3 - 8 = -5$

$x = 5 \Rightarrow y = 5 - 8 = -3$

⇒ For $3x - 3y = 16$ $\Rightarrow 3y = 3x - 16$ $\Rightarrow y = \frac{3x-16}{3}$

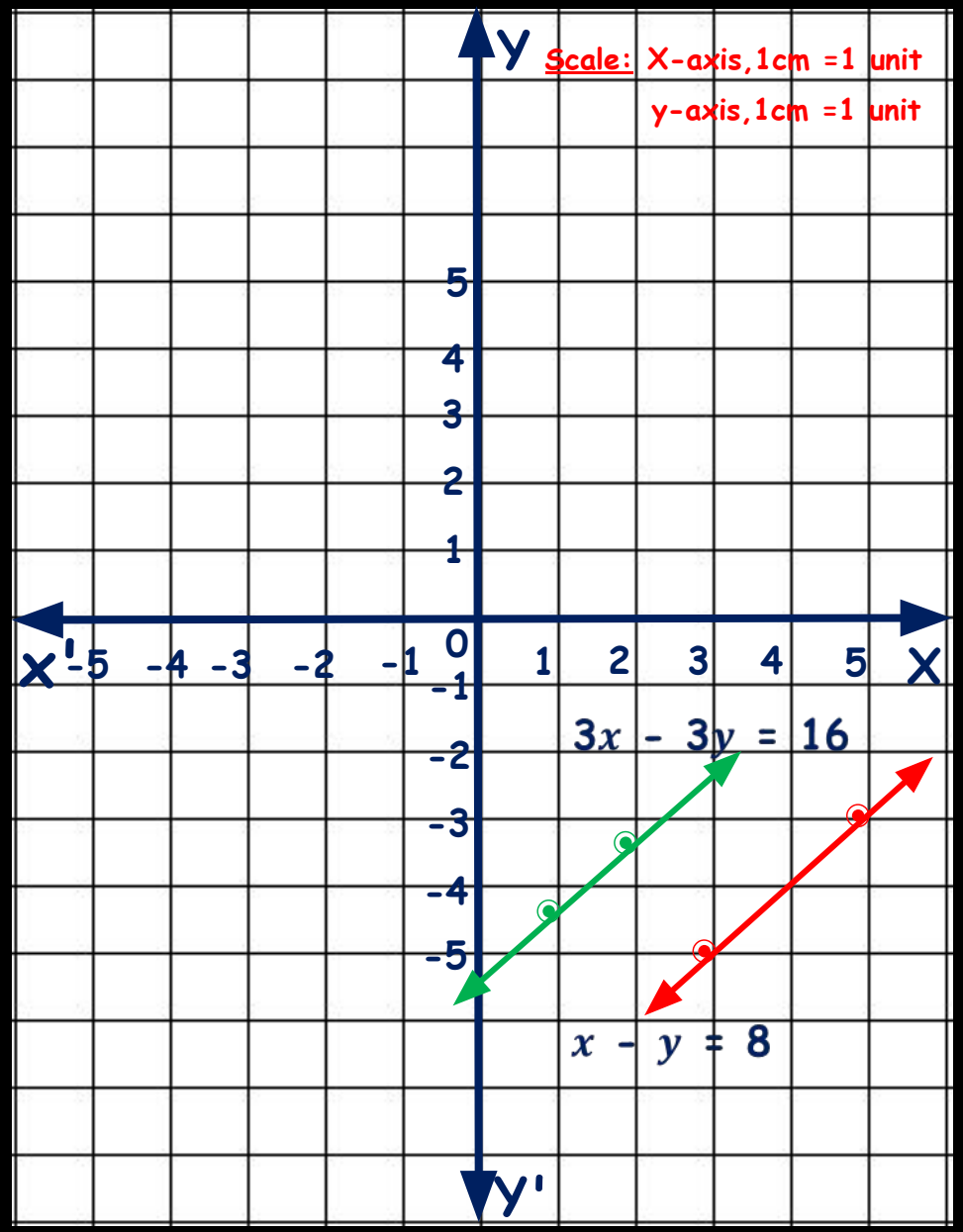
x	1	2
$y = \frac{3x-16}{3}$	-4.33	-3.33
(x, y)	(1, -4.33)	(2, -3.33)

$x = 1 \Rightarrow y = \frac{3(1)-16}{3} = \frac{-13}{3}$

$= -4.33$

$x = 2 \Rightarrow y = \frac{3(2)-16}{3} = \frac{-10}{3}$

$= -3.33$



$x - y = 8$

x	3	5
$y = x - 8$	-5	-3
(x, y)	(3 , -5)	(5 , -3)

$3x - 3y = 16$

x	1	2
$y = \frac{3x - 16}{3}$	-4.33	-3.33
(x, y)	(1, -4.33)	(2, -3.33)

∴ Lines are parallel and have no solutions

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

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

$4x - 2y - 4 = 0$

Sol: Given equations, $2x + y - 6 = 0$

$4x - 2y - 4 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 2$; $b_1 = 1$; $c_1 = -6$

$a_2x + b_2y + c_2 = 0$ $a_2 = 4$; $b_2 = -2$; $c_2 = -4$

$$\Rightarrow \frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2} \quad ; \quad \frac{b_1}{b_2} = \frac{1}{-2} = -\frac{1}{2} \quad \Rightarrow \boxed{\frac{a_1}{a_2} \neq \frac{b_1}{b_2}}$$

∴ Given equations are consistent and they are intersecting

Now, to represent given equations on graph,

⇒ For $2x + y - 6 = 0 \Rightarrow y = 6 - 2x$

x	1	2
$y = 6 - 2x$	4	2
(x, y)	(1 , 4)	(2 , 2)

$x = 1 \Rightarrow y = 6 - 2(1) = 4$

$x = 2 \Rightarrow y = 6 - 2(2) = 2$

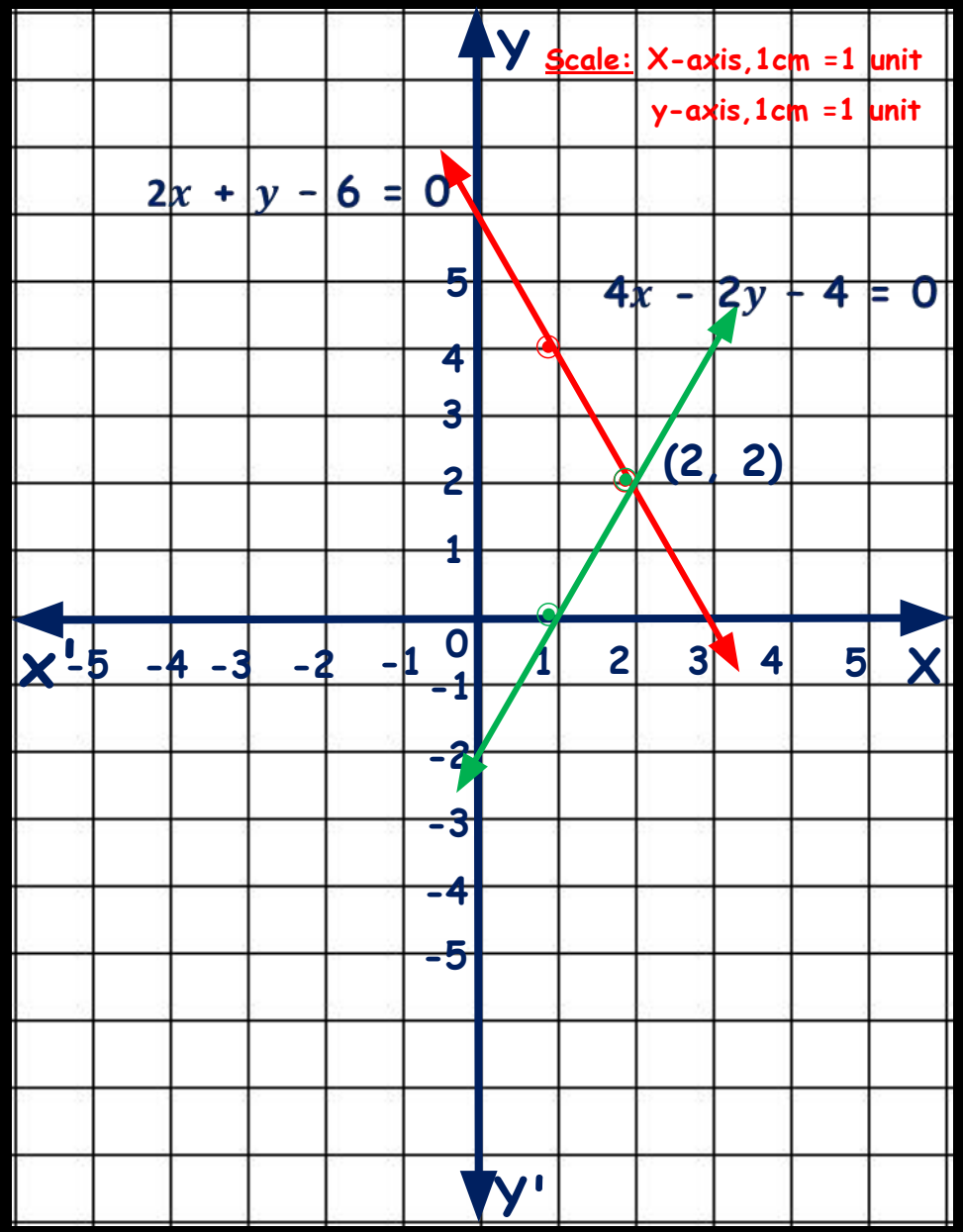
⇒ For $4x - 2y - 4 = 0 \Rightarrow 2(2x - y - 2) = 0 \Rightarrow 2x - y - 2 = 0$

$\Rightarrow y = 2x - 2$

x	1	2
$y = 2x - 2$	0	2
(x, y)	(1, 0)	(2, 2)

$x = 1 \Rightarrow y = 2(1) - 2 = 0$

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



$2x + y - 6 = 0$

x	1	2
$y = 6 - 2x$	4	2
(x, y)	(1, 4)	(2, 2)

$4x - 2y - 4 = 0$

x	1	2
$y = 2x - 2$	0	2
(x, y)	(1, 0)	(2, 2)

∴ Intersecting point / solution = (2, 2)

② Check whether the following equations are consistent or inconsistent. Solve them graphically.

i) $2x - 2y - 2 = 0$

$4x - 4y - 5 = 0$

Sol: Given equations, $2x - 2y - 2 = 0$

$4x - 4y - 5 = 0$

On comparing with $a_1x + b_1y + c_1 = 0$; we get, $a_1 = 2$; $b_1 = -2$; $c_1 = -2$

$a_2x + b_2y + c_2 = 0$ $a_2 = 4$; $b_2 = -4$; $c_2 = -5$

$$\Rightarrow \frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2} \quad ; \quad \frac{b_1}{b_2} = \frac{-2}{-4} = \frac{1}{2} \quad ; \quad \frac{c_1}{c_2} = \frac{-2}{-5} = \frac{2}{5} \Rightarrow \boxed{\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}}$$

$\therefore$ Given equations are inconsistent and they are parallel

Now, to represent given equations on graph,

⇒ For $2x - 2y - 2 = 0 \Rightarrow 2(x - y - 1) = 0 \Rightarrow x - y - 1 = 0$

$\Rightarrow y = x - 1$

x	2	4
$y = x - 1$	1	3
(x, y)	(2 , 1)	(4 , 3)

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

$x = 4 \Rightarrow y = 4 - 1 = 3$

⇒ For $4x - 4y - 5 = 0 \Rightarrow 4y = 4x - 5 \Rightarrow y = \frac{4x - 5}{4}$

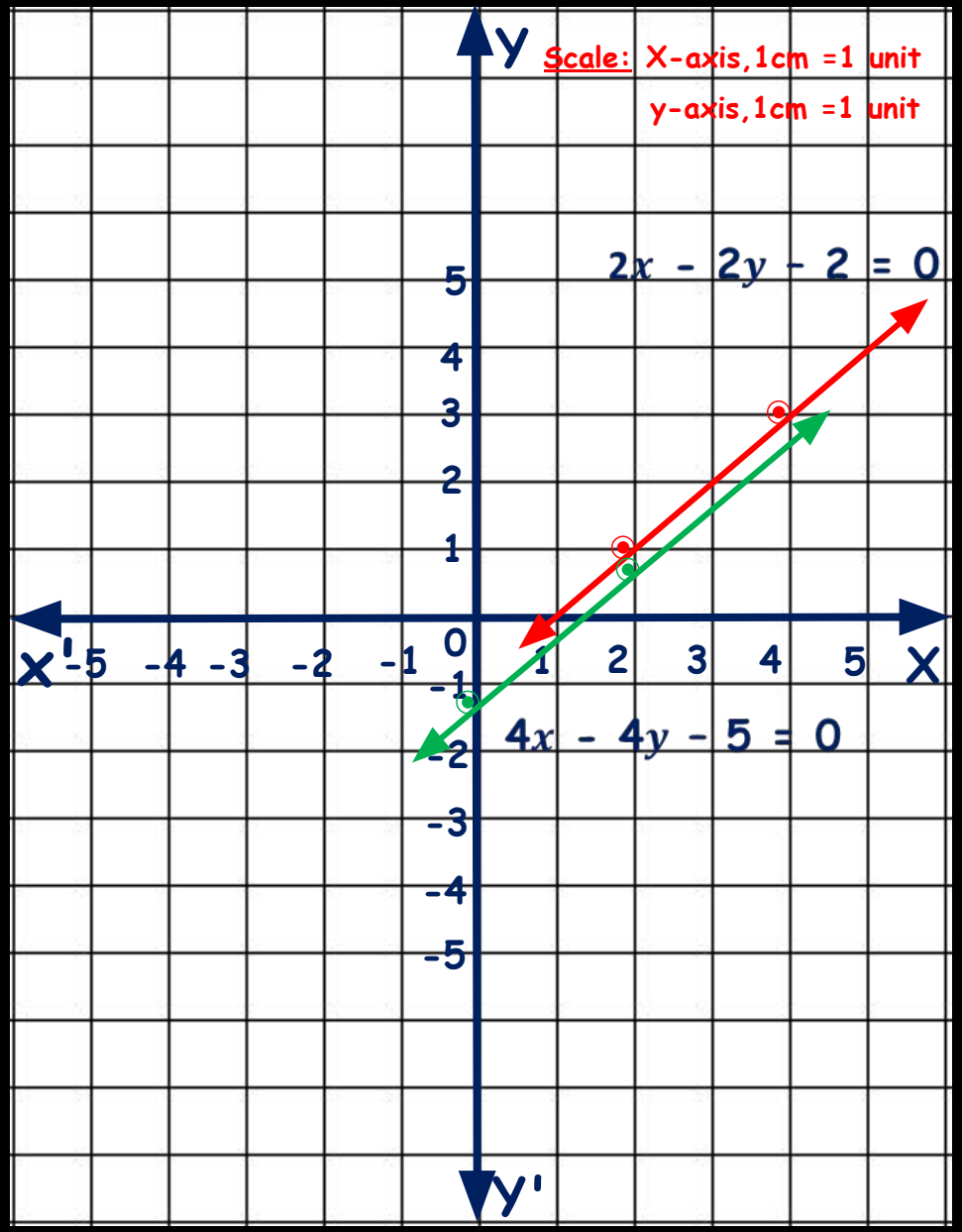
x	0	2
$y = \frac{4x - 5}{4}$	-1.25	0.75
(x, y)	(0, -1.25)	(2, 0.75)

$x = 0 \Rightarrow y = \frac{4(0)-5}{4} = \frac{-5}{4}$

$= -1.25$

$x = 2 \Rightarrow y = \frac{4(2)-5}{4} = \frac{3}{4}$

$= 0.75$



$2x - 2y - 2 = 0$

x	2	4
$y = x - 1$	1	3
(x, y)	(2 , 1)	(4 , 3)

$4x - 4y - 5 = 0$

x	0	2
$y = \frac{4x - 5}{4}$	-1.25	0.75
(x, y)	(0, -1.25)	(2, 0.75)

∴ Lines are parallel and have no solutions