

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

Chapter 08

LINEAR EQUATIONS

Exercise 8.1

1. Solve the following equations.

(i) $2x + 5 = 19$

Ans. $2x + 5 = 19$

$2x = 19 - 5$

$x = \frac{14}{2}$

$x = 7$

(ii) $5x - 7 = 2x + 3$

Ans. $5x - 7 = 2x + 3$

$5x - 2x = 3 + 7$

$3x = 10$

$x = \frac{10}{3}$

(iii) $19x - 13 = 11x + 27$

Ans. $19x - 13 = 11x + 27$

$8x = 40$

$x = \frac{40}{8}$

$x = 5$

(iv) $9y + 17 = 6y + 23$

Ans. $9y + 17 = 6y + 23$

$9y - 6y = 23 - 17$

$3y = 6$

$y = \frac{6}{3}$

$y = 2$

(v) $2x + 3 = 16 - (2x - 3)$

Ans. $2x + 3 = 16 - (2x - 3)$

$2x + 3 = 16 - 2x + 3$

$2x + 2x = 16 + 3 - 3$

$4x = 16$

$x = \frac{16}{4}$

$x = 4$

(vi) $\frac{x}{2} + x = \frac{1}{2}$

Ans. $\frac{x}{2} + x = \frac{1}{2}$

$\frac{x}{2} = \frac{1}{2} - 3$

$\frac{x}{2} = \frac{2 - 6}{2}$

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

$x = \frac{-4}{2} \times \frac{2}{1}$

$x = -4$

(vii) $8\left(\frac{y}{2} - 3\right) = 7x + 2$

Ans. $8\left(\frac{y}{2} - 3\right) = 7x + 2$

$4 \times \frac{x}{1} - (8 \times 3) = 7x + 2$

$4x - 24 = 7x + 2$

$4x - 7x = 2 + 24$

$-3x = 26$

$x = \frac{26}{-3}$

$x = -\frac{26}{3}$

(viii) $x + \frac{4}{5} = 2x - \frac{1}{3}$

Ans. $x + \frac{4}{5} = 2x - \frac{1}{3}$

$\frac{4}{5} + \frac{1}{3} = 2x - x$

$\frac{4 \times 3 + 1 \times 5}{15} = x$

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$$\frac{12+5}{15} = x$$

$$\frac{17}{15} = x$$

$$(ix) \quad \frac{x}{2} - 3 = 4 - \frac{2x}{3}$$

$$Ans. \quad \frac{x}{2} - 3 = 4 - \frac{2x}{3}$$

$$\frac{x}{2} + \frac{2x}{3} = 4 + 3$$

$$\frac{x \times 3 + 2x \times 2}{6} = 7$$

$$\frac{3x + 4x}{6} = 7$$

$$\frac{7x}{6} = 7$$

$$x = \cancel{1} \times \frac{6}{\cancel{1}}$$

$$x = 6$$

$$(x) \quad \frac{2x+5}{x} = \frac{7}{3}$$

$$Ans. \quad \frac{2x+5}{x} = \frac{7}{3}$$

$$3(2x+5) = 7x$$

$$6x + 15 = 7x$$

$$15 = 7x - 6x$$

$$15 = x$$

$$x = 15$$

$$(xi) \quad \frac{y}{9y-2} = \frac{1}{8}$$

$$Ans. \quad \frac{y}{9y-2} = \frac{1}{8}$$

$$8y = 9y - 2$$

$$2 = 9y - 8y$$

$$2 = y$$

$$y = 2$$

$$(xii) \quad \frac{x}{x-12} = \frac{9}{5}$$

$$Ans. \quad \frac{x}{x-12} = \frac{9}{5}$$

$$5x = 9(x-12)$$

$$5x = 9x - 108$$

$$108 = 9x - 5x$$

$$108 = 4x$$

$$\frac{108}{4} = x$$

$$27 = x$$

$$x = 27$$

$$(xiii) \quad \frac{24}{5z+4} = \frac{4}{z-1}$$

$$Ans. \quad \frac{24}{5z+4} = \frac{4}{z-1}$$

$$24(z-1) = 4(5z+4)$$

$$24z - 24 = 20z + 16$$

$$24z - 20z = 26 + 16$$

$$4z = 40$$

$$z = \frac{40}{4}$$

$$z = 10$$

$$(xiv) \quad \frac{2}{-3} = \frac{4x+4}{2x+14}$$

$$Ans. \quad \frac{2}{-3} = \frac{4x+4}{2x+14}$$

$$2(2x+14) = -3(4x+4)$$

$$4x + 28 = -12x - 12$$

$$4x + 12x = -28 - 12$$

$$16x = -40$$

$$x = -\frac{40}{16}$$

$$x = -\frac{10}{4}$$

$$x = -\frac{5}{2}$$

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2. $\left(\frac{x}{2} + 7\right)$ is three times of $3\left(\frac{x}{5} + 2\right)$. Find the value of x .

Ans. $\left(\frac{x}{2} + 7\right) = 3\left(\frac{x}{5} + 2\right)$

$$\frac{x}{2} + 7 = \frac{3x}{5} + 6$$

$$7 - 6 = \frac{3x}{5} - \frac{x}{2}$$

$$1 = \frac{3x \times 2 - x \times 5}{10}$$

$$1 = \frac{6x - 5x}{10}$$

$$1 \times 10 = x$$

$$10 = x$$

3. When a number is added to two-thirds of itself, the result is 45. Find the number.

Ans. Let the number be x

$$x + \frac{2x}{3} = 45$$

$$\frac{x \times 3 + 2x}{3} = 45$$

$$\frac{3x + 2x}{3} = 45$$

$$5x = 45 \times 3$$

$$x = \frac{45 \times 3}{5}$$

$$x = 27$$

4. The numerator of a fraction is 5 less than the denominator. If 1 is added to both the numerator and the denominator, the fraction would become $\frac{2}{3}$. Find the fraction.

Ans. $\frac{x-5}{x} + \frac{1}{1} = \frac{2}{3}$

$$\frac{x-5+1}{x+1} = \frac{2}{3}$$

$$\frac{x-4}{x+1} = \frac{2}{3}$$

$$3(x-4) = 2(x+1)$$

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

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

$$x = 14$$

5. Given the equation $5x + 4y = 20$, write the equation in terms of

(i) y (ii) x

Ans. (i) $5x + 4y = 20$

$$4y = 20 - 5x$$

$$y = \frac{20 - 5x}{4}$$

(ii) $5x + 4y = 20$

$$5x = 20 - 4y$$

$$x = \frac{20 - 4y}{5}$$

6. The perimeter P of a rectangle is given by the formula $P = 2l + 2w$, where l is the length and w is the width.

(i) Solve the formula for the width w .

(ii) Use the rewritten formula to find the width of the rectangle when $P = 100$, $l = 25$.

Ans. (i) $P = 2l + 2w$

$$P - 2l = 2w$$

$$\frac{P - 2l}{2} = w$$

(ii) $P = 100$

$$l = 25$$

$$w = \frac{P - 2l}{2}$$

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$$w = \frac{100 - 2(25)}{2}$$

$$w = \frac{100 - 50}{2}$$

$$w = \frac{50}{2}$$

$$w = 25$$

7. Given $C = \frac{5}{9}(F - 32)$ is a relation between C and F , where C is Celsius and F is Fahrenheit.

- (i) Find value of F in terms of C .
 (ii) Calculate F by substituting, $C = 15$ and $C = 10$ in rewritten formula.

Ans. (i) $C = \frac{5}{9}(F - 32)$

$$\frac{9C}{5} = F - 32$$

$$\frac{9C}{5} + 32 = F$$

(ii) $F = \frac{9C}{5} + 32$

When $C = 15$

$$F = \frac{9}{5}(15) + 32$$

$$F = 27 + 32$$

$$F = 59$$

When $C = 10$

$$F = \frac{9}{5}(10) + 32$$

$$F = 18 + 32$$

$$F = 50$$

8. Volume of cuboid is $V = lwh$, write w in terms of v , l , and h .

Ans. $V = lwh$

$$W = \frac{V}{l \times h}$$

9. Surface area of prism

$$S = 2B + Ph, \text{ solve the relation for } h.$$

Ans. $S = 2B + Ph$

$$S - 2B = Ph$$

$$\frac{S - 2B}{P} = h$$

10. Solve $x = \frac{a + b + c}{ab}$ for a .

Ans. $x = \frac{a + b + c}{ab}$

$$abx = a + b + c$$

$$abx - a = b + c$$

$$a(bx - 1) = b + c$$

$$a = \frac{b + c}{bx - 1}$$

Exercise 8.2

1. Select the ordered pairs which are solution points to the corresponding equations.

(i) $3x - y = -8$

$$(-1, 10), (3, 10), (-2, 2), (-1, 5)$$

Ans. $(-1, 10)$ $(3, 10)$

$$3(-1) - 10 = -8 \quad 3(3) - 10 = -8$$

$$-3 - 10 = -8 \quad 9 - 10 = -8$$

$$-13 \neq -8 \quad -1 \neq -8$$

$$(-2, 2) \quad (-1, 5)$$

$$3(-2) - 2 = -8 \quad 3(-1) - 5 = -8$$

$$-6 - 2 = -8 \quad -3 - 5 = -8$$

$$-8 = -8 \quad -8 = -8$$

$(-2, 2)$ and $(-1, 5)$ are solutions to the equation $3x - y = -8$.

(ii) $5x - 3y = 11$

$$(1, -2), (3, 1), (-2, -7), (7, 8)$$

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Ans. (1, -2) (3, 1)
 $5(1) - 3(-2) = 11$ $5(3) - 3(1) = 11$
 $5 + 6 = 11$ $15 - 3 = 11$
 $11 = 11$ $12 \neq 11$
 (-2, 7) (7, 8)
 $5(-2) - 3(7) = 11$ $5(7) - 3(8) = 11$
 $-10 - 21 = 11$ $35 - 24 = 11$
 $-31 \neq 11$ $11 = 11$

(1, -2) and (7, 8) are correct solution.

(iii) $2x - y = -1$

(0, 1), (2, 5), (0, 0), (-2, -3)

Ans. (0, 0) (2, 5)
 $2(0) - 1 = -1$ $2(2) - 5 = -1$
 $-1 = -1$ $4 - 5 = -1$
 $-1 = -1$
 (0, 0) (-2, -3)
 $2(0) - 0 = -1$ $2(-2) - (-3) = -1$
 $0 = -1$ $-4 + 3 = -1$
 $-1 = -1$

(0, 1), (2, 5), (-2, -3) are the correct solutions.

(iv) $3x - 2y = 6$

(4, 0), (2, 0), (3, -2), (3, -1)

Ans. (4, 0) (2, 0)
 $3(4) - 2(0) = 6$ $3(2) - 2(0) = 6$
 $12 - 0 = 6$ $6 - 0 = 6$
 $12 \neq 6$ $6 = 6$
 (3, -2) (3, -1)
 $3(3) - 2(-2) = 6$ $3(3) - 2(-1) = 6$
 $9 + 4 = 6$ $9 + 3 = 6$
 $13 \neq 6$ $12 \neq 6$

(2, 0) is the correct solution.

(v) $2x + y = 4$

(2, 3), $(1, \frac{1}{2})$, (0, 4), (-2, 2)

Ans. (2, 3) $(1, \frac{1}{2})$

$2(2) + 3 = 4$ $2(1) + \frac{1}{2} = 4$

$4 + 3 = 4$ $2 + \frac{1}{2} = 4$

$7 \neq 4$ $2 + \frac{1}{2} \neq 4$

(0, 4) (-2, 2)

$2(0) + 4 = 4$ $2(-2) + 2 = 4$

$0 + 4 = 4$ $-4 + 2 = 4$

$4 = 4$ $-2 \neq 4$

(0, 4) is the correct equation.

(vi) $5x - 2y = -50$

(-10, 0), (-5, 5), (0, 25), (20, -2)

Ans. (-10, 0) (-5, 5)
 $5(-10) - 2(0) = -50$ $5(-5) - 2(5) = -50$
 $-50 - 0 = -50$ $-25 - 10 = -50$
 $-50 = -50$ $-35 \neq -50$

(0, 25) (20, -2)
 $5(0) - 2(25) = -50$ $5(20) - 2(-2) = 50$
 $0 - 50 = -50$ $40 + 4 = 50$
 $-50 = -50$ $44 \neq 50$

(-10, 0) and (0, 25) are the correct solution.

2. Find any three ordered pairs that are possible solutions for each of the following linear equations.

(i) $y - x = 3$

Ans. If we let $y = 4$

$4 - x = 3$

$4 - 3 = x$

$1 = x$

If we let $y = 5$

$5 - x = 3$

$5 - 3 = x$

$2 = x$

If we let $y = 6$

$6 - x = 3$

$6 - 3 = x$

$3 = x$

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(1, 4), (2, 5), (3, 6) are possible solution to the equation.

(ii) $3x + 2y = -6$

Ans.

If we let $x = 10$

$$3(10) + 2y = -6$$

$$2y = -6 - 30$$

$$2y = -36$$

$$2y = \frac{-36}{2}$$

$$y = -18$$

If we let $x = 20$

$$3(20) + 2y = -6$$

$$60 + 2y = -6$$

$$2y = -6 - 60$$

$$y = \frac{-66}{2}$$

$$y = -33$$

(10, -18), $(5, \frac{-21}{4})$, (20, -33) are the possible solutions to the equation.

(iii) $2x + y = 8$

Ans. If we let $x = 10$

$$2(10) + y = 8$$

$$20 + y = 8$$

$$y = 8 - 20$$

$$y = -12$$

If we let $x = 6$

$$2(6) + y = 8$$

$$12 + y = 8$$

$$y = 8 - 12$$

$$y = -4$$

(10, -12), (4, 0), (6, -4) are possible solutions to the equation.

(iv) $x - 2y = 3$

Ans.

If we let $x = 3$

If we let $x = 5$

$$3 - 2y = 3$$

$$3 - 3 = 2y$$

$$\frac{0}{2} = y$$

$$y = 0$$

$$y = 0$$

If we let $x = 10$

$$10 - 2y = 3$$

$$13 = 2y$$

$$\frac{13}{2} = y$$

$$y = \frac{13}{2}$$

$$5 - 2y = 3$$

$$5 - 3 = 2y$$

$$2 = 2y$$

$$\frac{2}{2} = y$$

$$y = 1$$

(3, 0), (5, 1), $(10, \frac{13}{2})$ are the possible solutions to the equation.

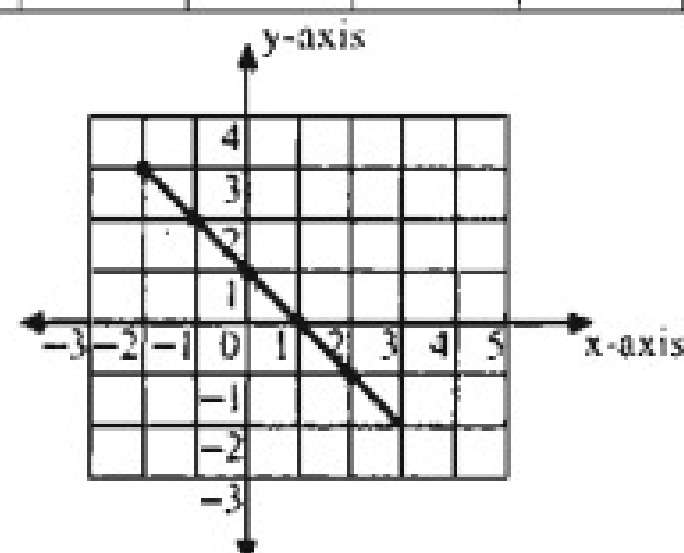
Exercise 8.3

1. Graph the equation with the given values of x .

(i) $y = -x + 1$ with $x = -2, -1, 0, 1, 2$

Ans. $y = 2x - 5$

x	-2	-1	0	1	2
$y = -x + 1$	3	2	1	0	-1
Ordered pair(x,y)	(-2,3)	(-1,2)	(0,1)	(1,0)	(2,-1)

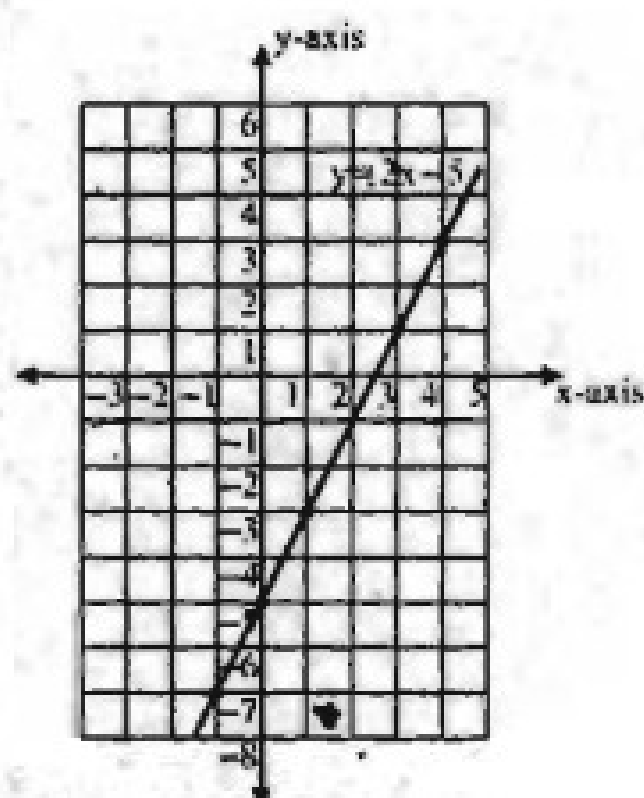


(ii) $y = 2x - 5$ with $x = -1, 0, 1, 2, 3, 4$

Ans. $y = 2x - 5$

x	-1	0	1	3	4
y	-7	-5	-3	1	3

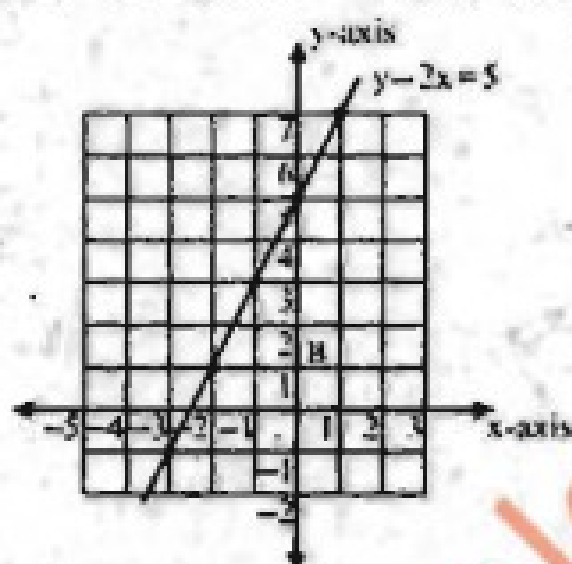
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(iii) $y - 2x = 5$ with $x = -3, -2, -1, 0, 1$

Ans. $y - 2x = 5$

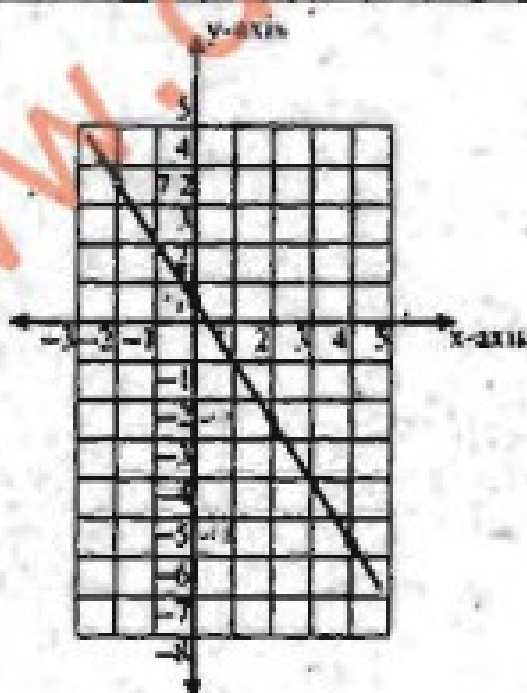
x	-3	-2	-1	0	1
y	-1	1	3	5	7



(iv) $3x + 2y = 1$ with $x = -2, 0, 2, 4$

Ans. $3x + 2y = 1$

x	-2	0	2	4
y	7/2	1/2	-5/2	-11/2

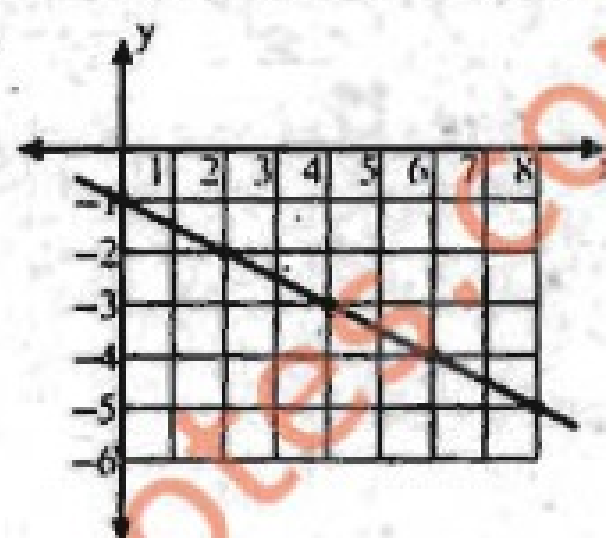


2. Graph the equations by setting five values of x .

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

Ans. $x + 2y = -2$

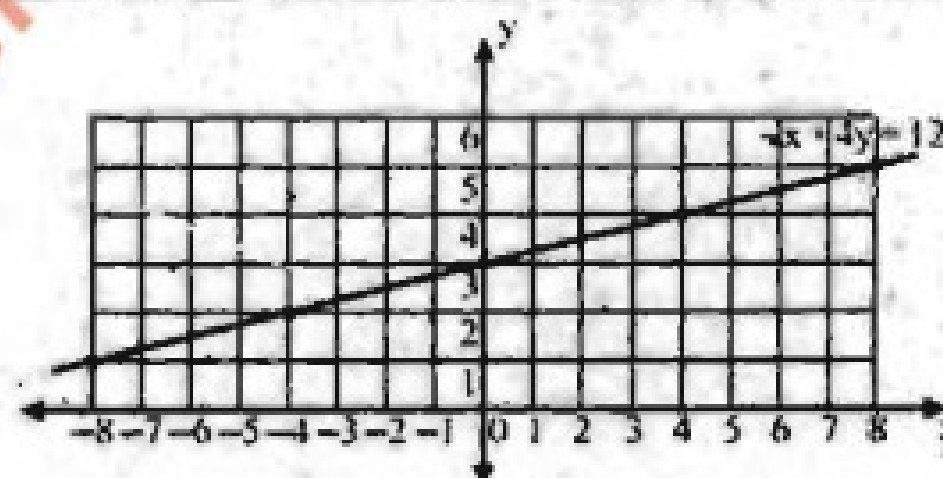
x	0	2	4	6	8
y	-1	-2	-3	-4	-5



(ii) $-x + 4y = 12$

Ans. $-x + 4y = 12$

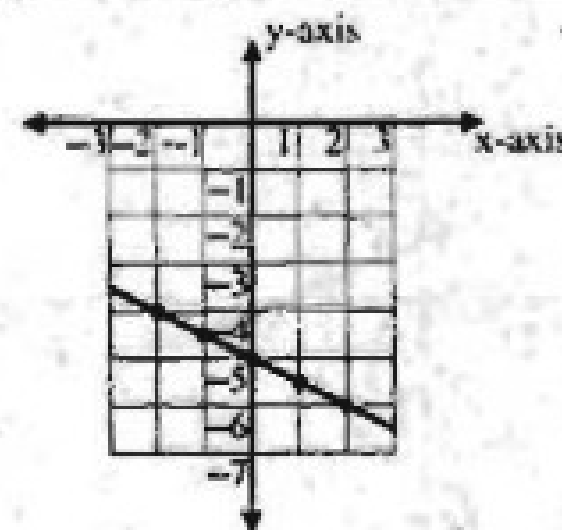
x	-8	-4	0	4	8
y	1	2	3	4	5



(iii) $x + 2y = -10$

Ans. $x + 2y = -10$

x	-2	-1	0	1	2
y	-4	-4/2	-5	-11/2	-6

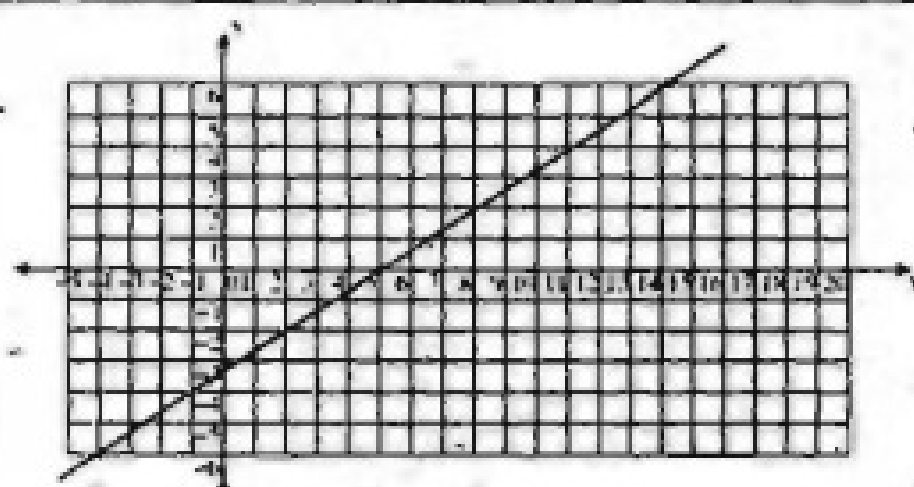


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(iv) $3x - 5y = 15$

Ans. $3x - 5y = 15$

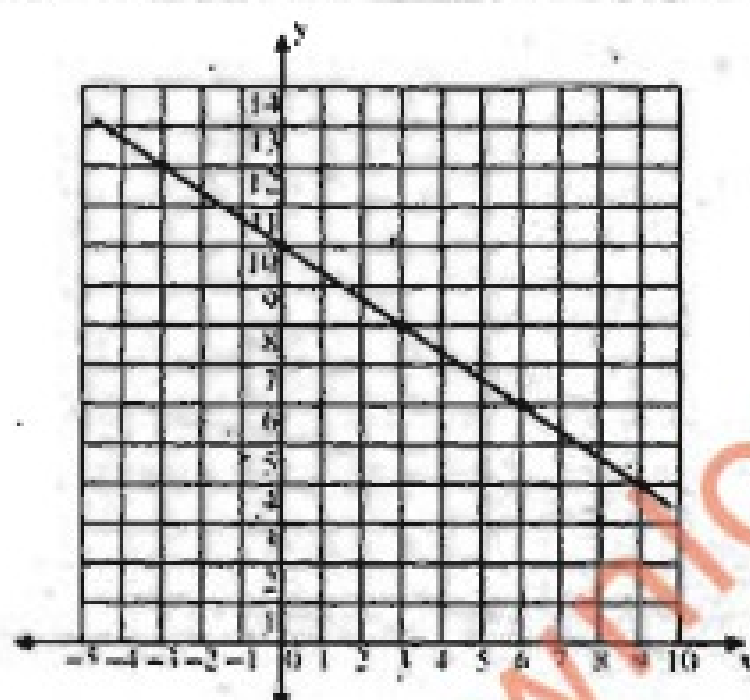
x	-3	-2	-1	0	1
y	-1	1	3	5	7



(v) $2x + 3y = 30$

Ans. $2x + 3y = 30$

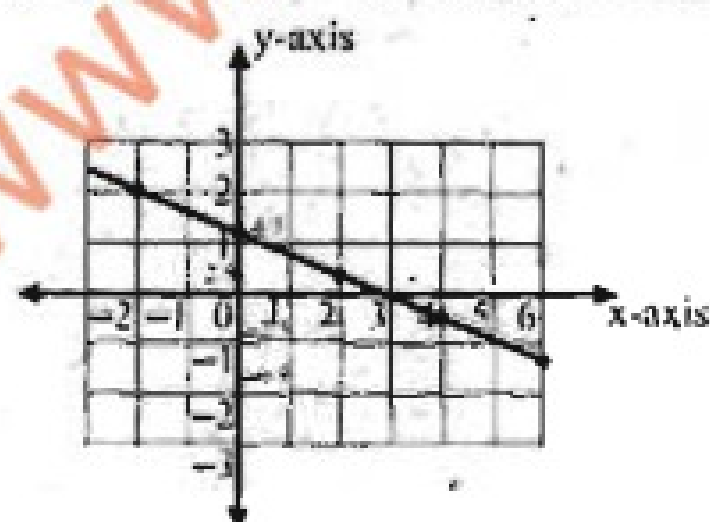
x	-3	-2	-1	0	1
y	-1	1	3	5	7



(vi) $2x + 5y = 6$

Ans. $2x + 5y = 6$

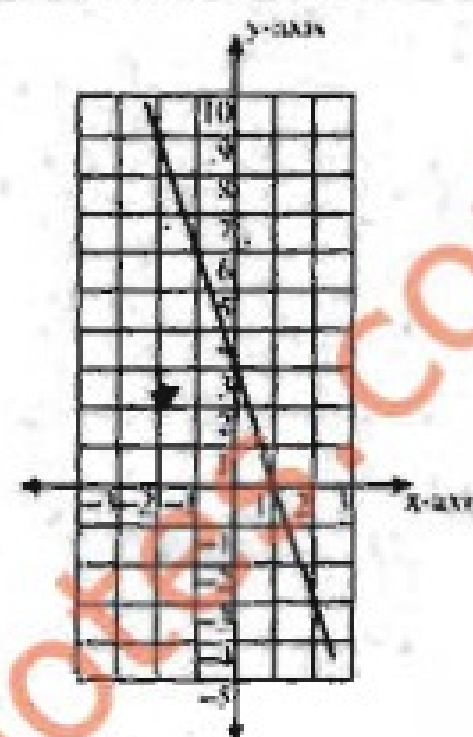
x	-2	0	2	4	6
y	2	6/5	2/5	-2/5	-6/5



(vii) $6x + 2y = 6$

Ans. $6x + 2y = 6$

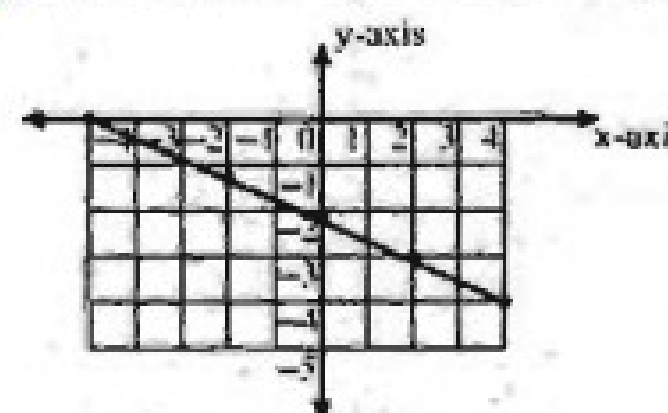
x	-2	-1	0	1	2
y	9	6	3	0	-3



(viii) $2x + 4y = -8$

Ans. $2x + 4y = -8$

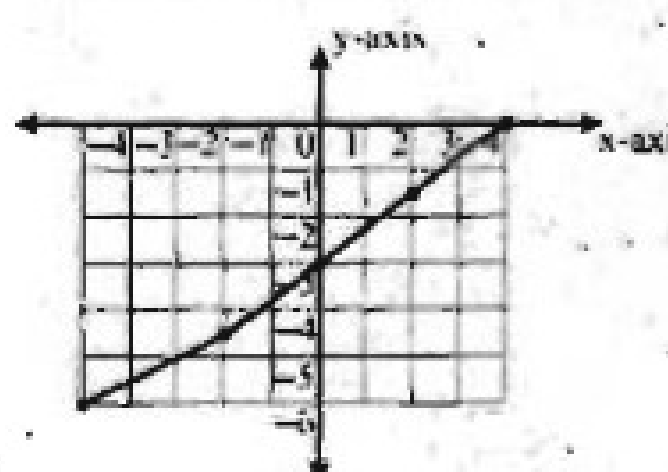
x	-4	-2	0	2	4
y	0	-1	-2	-3	-4



(ix) $-3x + 4y = -12$

Ans. $-3x + 4y = -12$

x	-4	-2	0	2	4
y	-6	-4.5	-3	-1.5	0

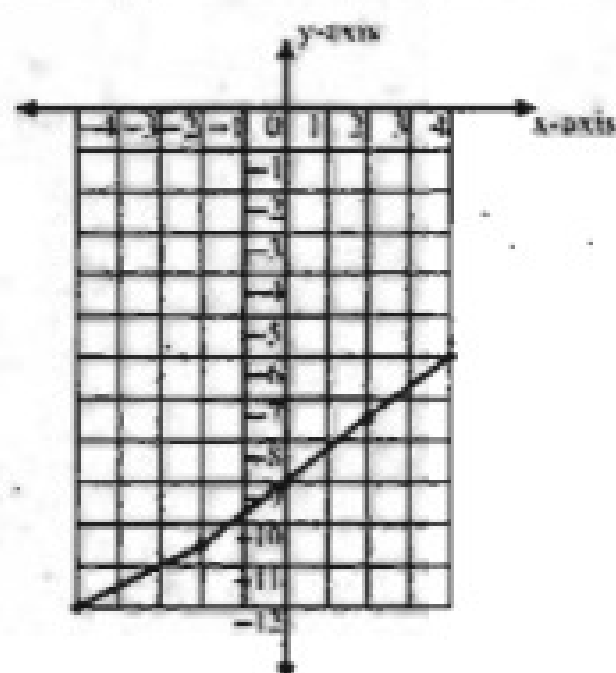


(x) $3x - 4y = 36$

Ans. $3x - 4y = 36$

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x	-4	-2	0	2	4
y	-12	-10.5	-9	-7.5	-6



3. Determine whether the graph of the given equation is horizontal, vertical or neither.

(i) $x = 4$

Ans. Vertical

(ii) $y = -5$

Ans. Horizontal

(iii) $4x = -12$

Ans. Vertical

(iv) $x - y = 0$

Ans. Neither

(v) $-3y = -15$

Ans. Horizontal

(vi) $y = 2x - 3$

Ans. Neither

(vii) $x = 0y$

Ans. Vertical

(viii) $x = 3y$

Ans. Neither

Exercise 8.4

1. Solve the following system of equations by elimination method.

(i) $2x + y = 3$

$$3x - 2y = -6$$

Ans. $2x + y = 3$ (1)

$$3x - 2y = -6$$
 (2)

Multiply equation (1) with (2)

$$4x + 2y = 6$$

$$3x - 2y = -6$$

$$x = 0$$

Put $x = 0$ in equation (1)

$$2(0) + y = 3$$

$$y = 3$$

(0, 3) is the solution to equations.

(ii) $7x - 2y = 1$

$$3x + 4y = 15$$

Ans. $7x - 2y = 1$ (1)

$$3x + 4y = 15$$
 (2)

Multiply equation (1) by (2)

$$14x - 4y = 2$$

$$3x + 4y = 15$$

$$17x = 17$$

$$x = 1$$

Put $x = 1$ in equation (1)

$$7(1) - 2y = 1$$

$$7 - 2y = 1$$

$$7 - 1 = 2y$$

$$6 = 2y$$

$$3 = y$$

(1, 3) is the solution to the equations.

(iii) $9x + 4y = 5$

$$3x - 5y = 8$$

Ans. $9x + 4y = 5$ (1)

$$3x - 5y = 8$$
 (2)

Multiply equation (2) with (3)

$$9x - 15y = 24$$
 (3)

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$$\begin{array}{r} 9x + 4y = 5 \\ -(\pm 9x \mp 15y = \pm 24) \\ \hline \end{array}$$

$$19y = -19$$

$$y = 1$$

Put $y = 1$ in equation (1)

$$9x + 4(1) = 5$$

$$9x = 5 - 4$$

$$x = \frac{1}{9}$$

$\left(\frac{1}{9}, 1\right)$ is the solution to the equations.

$$(iv) \quad 2x + 3y = 5$$

$$3x + 2y = 10$$

$$Ans. \quad 2x + 3y = 5 \quad (1)$$

$$3x + 2y = 10 \quad (2)$$

Multiply equation (1) with 3 and equation (2)

$$3(2x + 3y) = 3(5)$$

$$6x + 9y = 15 \quad (3)$$

$$2(3x + 2y) = 2(10)$$

$$6x + 4y = 20 \quad (4)$$

$$\begin{array}{r} 6x + 9y = 15 \\ -(\pm 6x \pm 4y = \pm 20) \\ \hline \end{array}$$

$$5y = -5$$

$$y = -1$$

$$y = -1$$

Put $y = -1$ in equation (1)

$$2x + 3(-1) = 5$$

$$2x + 3 = 5$$

$$2x = 5 - 3$$

$$2x = 2$$

$$x = 1$$

$(1, -1)$ is solution to the system of equation.

2. Solve the following system of equation by substitution method.

$$(i) \quad x + 4y = 2$$

$$5x - 4y = 10$$

$$Ans. \quad x + 4y = 2 \quad (1)$$

$$5x - 4y = 10 \quad (2)$$

Using equation (1)

$$x = 2 - 4y$$

Putting $x = 2 - 4y$ in equation (2)

$$5(2 - 4y) - 4y = 10$$

$$10 - 20y - 4y = 10$$

$$10 - 24y = 10$$

$$10 - 10 = 24y$$

$$0 = 24y$$

$$y = 0$$

Putting $y = 0$ in $x = 2 - 4y$

$$x = 2 - 4(0)$$

$$x = 2$$

$(2, 0)$ is the solution to the equation.

$$(ii) \quad x - y = 5$$

$$x + y = 19$$

$$Ans. \quad x - y = 5 \quad (1)$$

$$x + y = 19 \quad (2)$$

Using equation (1)

$$x - y = 5$$

$$x = 5 + y$$

Using $x = 5 + y$ in equation (2)

$$x + y = 19$$

$$5 + y + y = 19$$

$$5 + 2y = 19 - 5$$

$$y = \frac{14}{2}$$

$$y = 7$$

Putting $y = 7$ in $x = 5 + y$

$$x = 5 + y$$

$$x = 5 + 7$$

$$x = 12$$

$(12, 7)$ is the solution to the equation.

$$(iii) \quad 3x - 5y = -1$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$x - y = -1$$

Ans. $3x - 5y = -1$ (1)

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

Using equation (2)

$$x - y = -1$$

$$x = y - 1$$

Using $x = y - 1$ in equation (1)

$$3x - 5y = -1$$

$$3(y - 1) - 5y = -1$$

$$3y - 3 - 5y = -1$$

$$-2y - 3 = -1$$

$$-3 + 1 = 2y$$

$$-2 = 2y$$

$$-1 = y$$

Putting $y = -1$ in $x = y - 1$

$$x = y - 1$$

$$x = -1 - 1$$

$$x = -2$$

$(-2, -1)$ is the solution to the system of equations.

(iv) $3x - 7y = -10$

$$y - 2x = 3$$

Ans. $3x - 7y = -10$ (1)

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

Using equation (2)

$$y = 3 + 2x$$

Put $y = 3 + 2x$ in equation (1)

$$3x - 7y = -10$$

$$3x - 7(3 + 2x) = -10$$

$$3x - 21 - 14x = -10$$

$$3x - 14x = -10 + 21$$

$$-11x = 1$$

$$x = \frac{11}{-1}$$

$$x = -1$$

Putting $x = -1$ in $y = 3 + 2x$

$$y = 3 + 2x$$

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

$$y = 3 + 2$$

$$y = 5$$

$(1, 5)$ is the solution to the system of equations.

3. Solve the following simultaneous equations.

(i) $3x - y = 12$

$$2x + y = 13$$

Ans. $3x - y = 12$ (1)

$$2x + y = 13$$
 (2)

$$5x = 25$$

$$x = \frac{25}{5}$$

$$x = 5$$

Putting $x = 5$ in equation (1)

$$3x - y = 12$$

$$3(5) - y = 12$$

$$15 - y = 12$$

$$15 - 12 = y$$

$$3 = y$$

$(5, 3)$ is the solution to the systems of equations.

(ii) $2x + y = 3$

$$3x - 2y = 1$$

Ans. $2x + y = 3$ (1)

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

Multiply equation (1) with 2

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

$$4x + 2y = 6$$
 (3)

Adding equation (2) and (3)

$$3x - 2y = 1$$

$$4x + 2y = 6$$

$$7x = 7$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$x = \frac{7}{7}$$

$$x = 1$$

Using $x = 1$ in equation (1)

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

$$2 + y = 3$$

$$y = 3 - 2$$

$$y = 1$$

(1, 1) is the solution to the system of equation.

$$(iii) \quad 13x - 6y = 20$$

$$7x + 4y = 18$$

$$\text{Ans. } 13x - 6y = 20 \quad (1)$$

$$7x + 4y = 18 \quad (2)$$

From equation (2)

$$7x + 4y = 18$$

$$7x = 18 - 4y$$

$$x = \frac{18 - 4y}{7}$$

Use $x = \frac{18 - 4y}{7}$ in equation (1)

$$13\left(\frac{18 - 4y}{7}\right) - 6y = 20$$

$$\frac{234 - 52y}{7} - 6y = 20$$

$$\frac{234 - 52y - 42y}{7} = 20$$

$$\frac{234 - 94y}{7} = 20$$

$$234 - 94y = 140$$

$$234 - 140 = 94y$$

$$94 = 94y$$

$$\frac{94}{94} = y$$

$$1 = y$$

Putting $y = 1$ in $x = \frac{18 - 4y}{7}$

$$x = \frac{18 - 4(1)}{7}$$

$$x = \frac{18 - 4}{7}$$

$$x = \frac{14}{7}$$

$$x = 2$$

(2, 1) is the solution.

$$(iv) \quad x + y = 3$$

$$x - y = 7$$

$$\text{Ans. } x + y = 3 \quad (1)$$

$$x - y = 7 \quad (2)$$

Adding equation (1) and equation (2)

$$x + y = 3$$

$$x - y = 7$$

$$2x = 10$$

$$x = 5$$

Putting $x = 5$ in equation (1)

$$x + y = 3$$

$$5 + y = 3$$

$$y = 3 - 5$$

$$y = -2$$

(5, -2) is the solution to the system of equation.

$$(v) \quad x + \frac{y}{2} = 4$$

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

$$\text{Ans. } x + \frac{y}{2} = 4 \quad (1)$$

$$\frac{x}{3} + 2y = 5 \quad (2)$$

Multiply equation (1) with 4

$$4\left(x + \frac{y}{2}\right) = 4 \times 4$$

$$4x + 2y = 16 \quad (3)$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

Subtracting equation (2) from equation (3)

$$4x + 2y = 16$$

$$-\left(\pm \frac{x}{3} \pm 2y = \pm 5\right)$$

$$\frac{10}{3}x = 11$$

$$x = 11 \times \frac{3}{10}$$

$$x = 3$$

Putting $x = 3$ in equation (1)

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

$$3 + \frac{y}{2} = 4$$

$$\frac{y}{2} = 4 - 3$$

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

$$y = 2$$

(2, 3) is the solution to the system of equation.

$$(vi) \quad 3x - 2y - 9 = 0$$

$$2x - 2y - 7 = 0$$

$$Ans. \quad 3x - 2y = 9 \quad (1)$$

$$2x - 2y = 7 \quad (2)$$

Subtracting equation (2) from equation (1)

$$3x - 2y = 9$$

$$-(2x - 2y = 7)$$

$$\hline x = 2$$

Put $x = 2$ in equation (1)

$$3(2) - 2y = 9$$

$$6 - 2y = 9$$

$$-2y = 9 - 6$$

$$-2y = 3$$

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

$\left(2, \frac{-3}{2}\right)$ is the solution to the system of equation.

$$(vii) \quad (x + y) = \frac{2}{5}(x - y)$$

$$3x + 11y = 4$$

$$Ans. \quad x + y = \frac{2}{5}(x - y)$$

$$5(x + y) = 2(x - y)$$

$$5x + 5y = 2x - 2y$$

$$5x - 2x = -2y - 5y$$

$$3x = -7y$$

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

$$3x + 11y = 4 \quad (2)$$

Putting $x = \frac{-7y}{3}$ in equation (2)

$$3\left(\frac{-7y}{3}\right) + 11y = 4$$

$$-7y + 11y = 4$$

$$4y = 4$$

$$y = 1$$

Putting $y = 1$ in $x = \frac{-7}{3}y$

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

$$x = \frac{-7}{3}$$

$\left(-\frac{7}{3}, 1\right)$ is the solution.

$$(viii) \quad \frac{x+1}{y+2} = \frac{2}{3}$$

$$\frac{x-2}{y-1} = \frac{1}{3}$$

$$Ans. \quad \frac{x+1}{y+2} = \frac{2}{3}$$

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

$$3x+3 = 2y+4$$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

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

$$3x = 2y + 1$$

$$3x - 2y = 1 \quad (1)$$

$$\frac{x-2}{y-1} = \frac{1}{3}$$

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

$$3x - 6 = y - 1$$

$$3x - y = 6 - 1$$

$$3x - y = 5 \quad (2)$$

Subtracting equation (1) from (2)

$$3x - y = 5$$

$$-(\pm 3x \mp 2y = \pm 1)$$

$$y = 4$$

Put $y = 4$ in equation (2)

$$3x - y = 5$$

$$3x - 4 = 5$$

$$3x = 5 + 4$$

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

(3, 4) is the solution to the system of equation.

Review Exercise 8

1. Encircle the correct option in the following statements.

(i) Which is an algebraic equation?

✓(a) $3x = 8$ (b) $2 + 5 = 7$

(c) $x < 5$ (d) $6y > 10$

(ii) Product of y and 6 is 60. What is y ?

(a) 60 (b) 360

✓(c) 10 (d) 6

(iii) In a linear equation the degree of the polynomial is:

(a) 3 (b) 2

✓(c) 1 (d) 0

(iv) $4x + 7$ is:

(a) an equation

✓(b) an expression

(c) a true sentence

(d) a false sentence

(v) Solution of a linear equation means to find the value of the:

(a) constant

(b) coefficient

(c) known quantity

✓(d) unknown quantity

(vi) In the equation $4y - 1 = 15$, the value of y is:

(a) 1 (b) 2

(c) 3 ✓(d) 4

(vii) The statement "3 added to 6 times a number gives 9" can be written as:

✓(a) $6x + 3 = 9$ (b) $3x + 6 = 9$

(c) $3x + 9 = 6$ (d) $9x + 3 = 6$

(viii) The solution of the equation

$$2x + 3 = 9x + 4$$
 is:

(a) -7

✓(b) $-\frac{1}{7}$

(c) -1

(d) $-\frac{1}{11}$

(ix) Which of the following is a simple linear equation in one variable?

✓(a) $7x + 2 = 20$ (b) $2x + y = 7$

(c) $x^2 + 2x = 2$ (d) $\frac{x^2}{7} + 7 = 5$

(x) One of the solutions of $\frac{1}{2}x + y = 7$ is:

(a) (6, 2) ✓(b) (2, 6)

(c) (0, -7) (d) $\left(x, \frac{14-x}{2}\right)$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

(xi) A linear equation in two variables always represents a:

- ✓(a) straight line (b) triangle
(c) quadrilateral (d) line segment

(xii) $\left(-2, \frac{-1}{2}\right)$ is the solution of:

- (a) $-x - 2y = 0$ ✓(b) $-x + 4y = 0$
(c) $x + 4y = 0$ (d) $-2x \frac{y}{2} = 0$

(xiii) The point of intersecting of $x = 3$ and $y = 4$ is:

- ✓(a) (3, 4) (b) (3, 0)
(c) (0, 4) (d) (-3, -4)

2. Solve:

$$\frac{x-8}{3} = \frac{x-3}{5}$$

Ans. $\frac{x-8}{3} = \frac{x-3}{5}$

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

$$5x - 40 = 3x - 9$$

$$5x - 3x = 40 - 9$$

$$2x = 31$$

$$x = \frac{31}{2}$$

3. When 4 is subtracted from 5 times a number, the result becomes 41. Find the number.

Ans. $5x - 4 = 41$

$$5x = 41 + 4$$

$$x = \frac{45}{5}$$

$$x = 9$$

4. Length of a rectangle exceeds its breadth by 4m. If the perimeter of the rectangle is 84m, find the length and breadth of the rectangle.

Ans. Length = $x + 4$

Breadth = x

Perimeter = $2(L + W)$

$$84 = 2(x + 4 + x)$$

$$84 = 2(2x + 4)$$

$$84 = 4x + 8$$

$$84 - 8 = 4x$$

$$76 = 4x$$

$$\frac{76}{4} = x$$

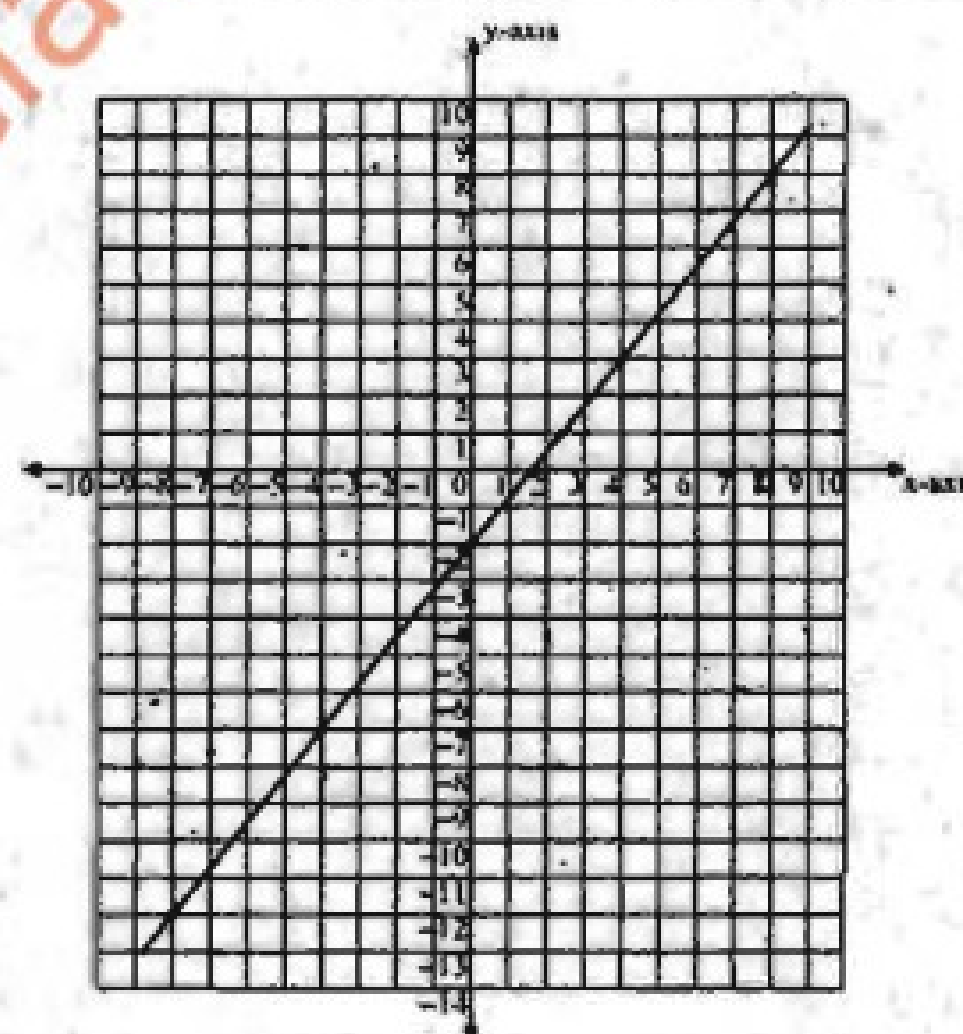
$$19 = x$$

5. Graph the solution of the following equations.

(i) $5x - 4y = 8$

Ans. $5x - 4y = 8$

x	-8	-4	0	4	8
y	-12	-7	-2	3	8

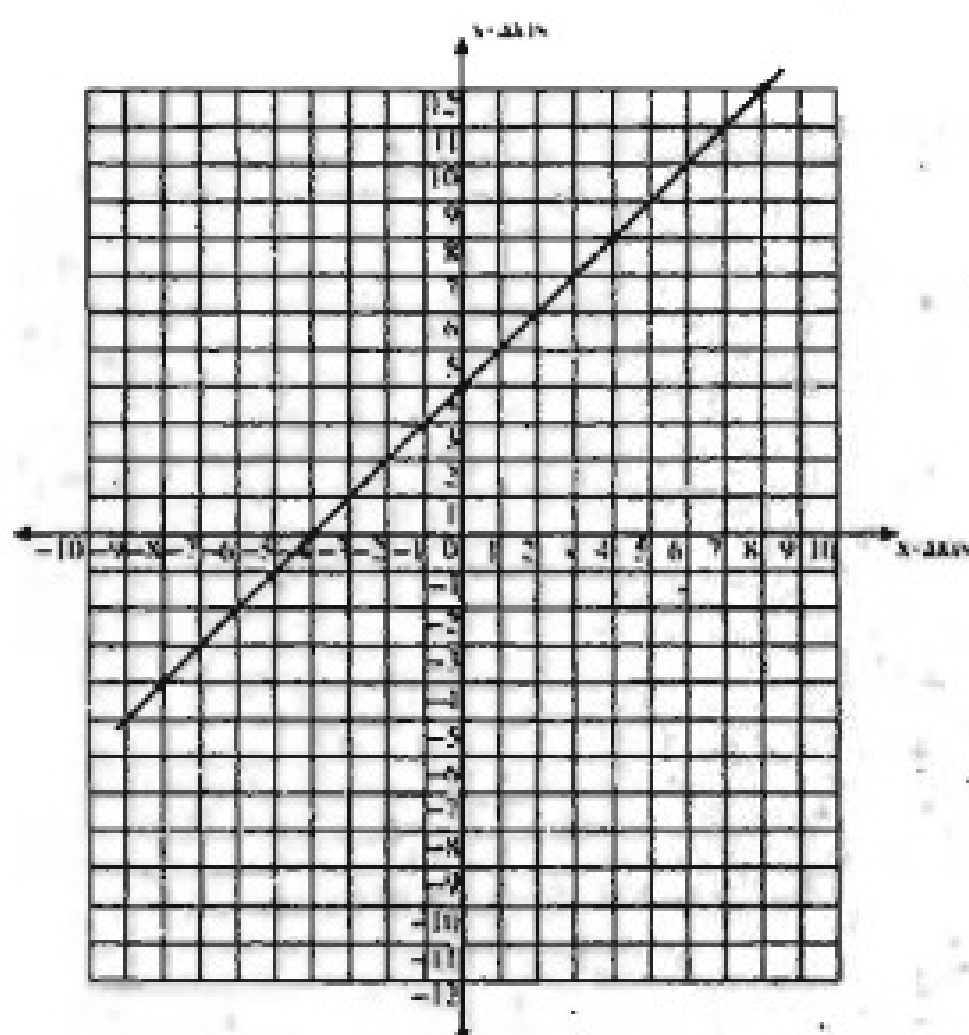


(ii) $x = y - 4$

Ans. $x = y - 4$

x	-8	-4	0	4	8
y	-4	0	4	8	12

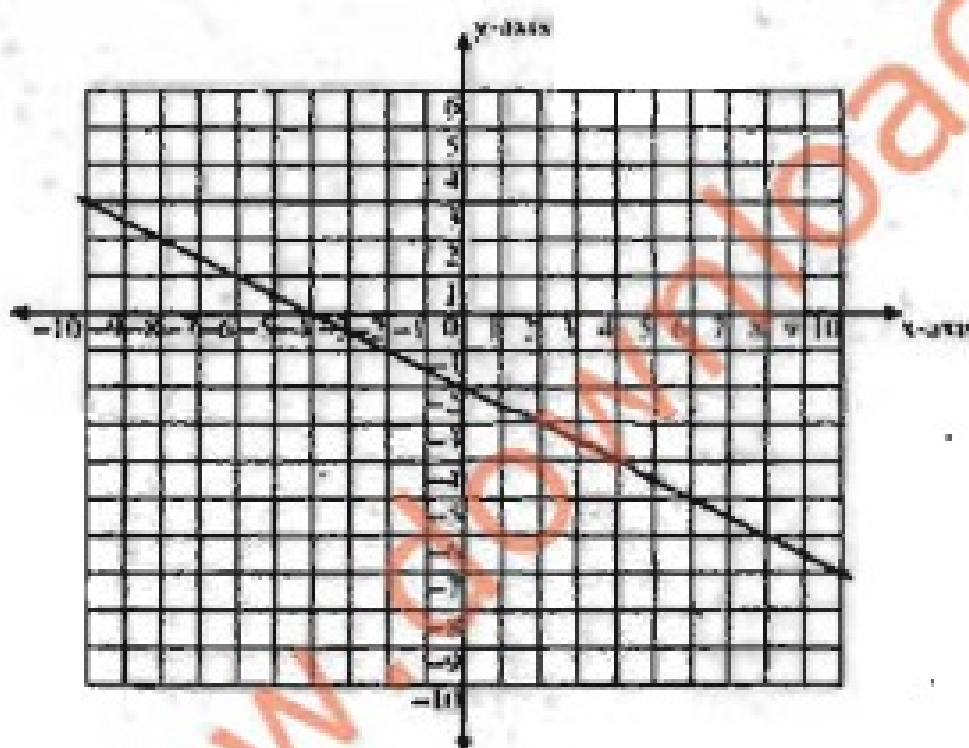
MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)



(iii) $x + y = 2$

Ans. $x + y = 2$

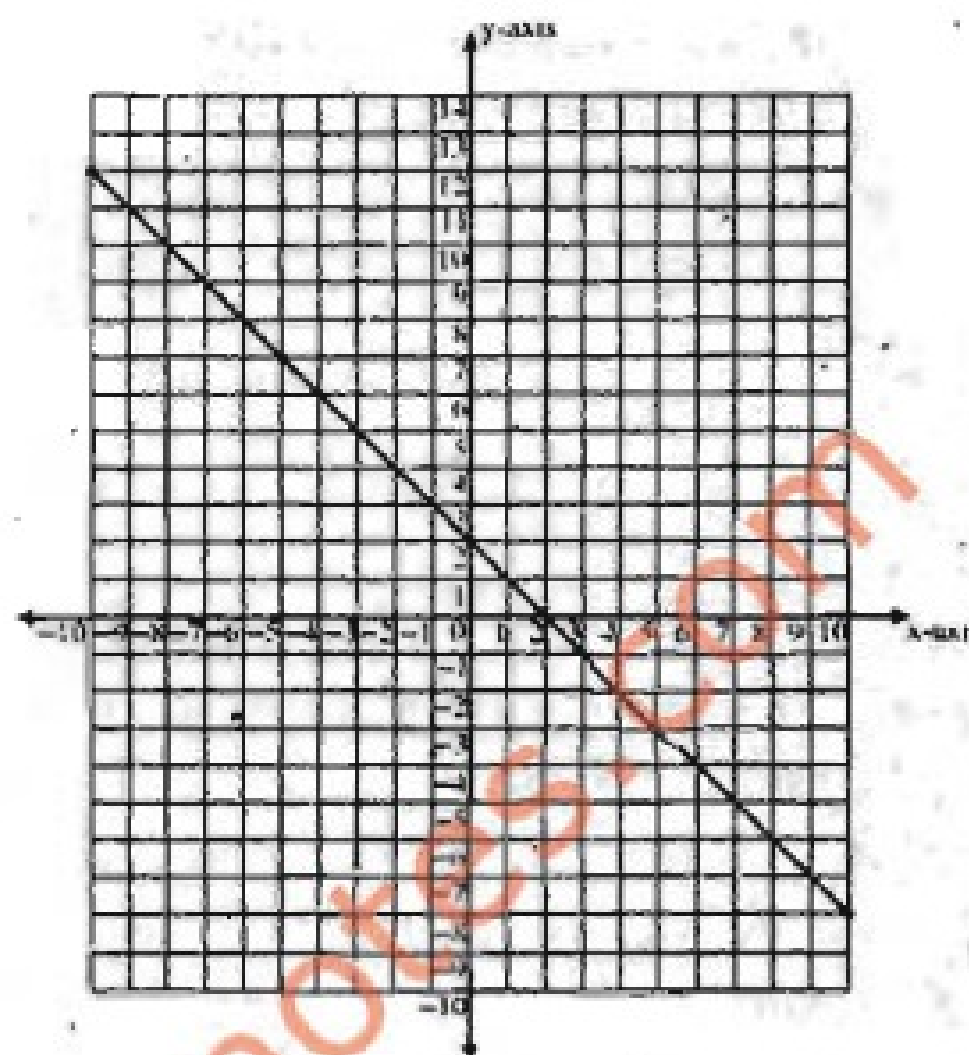
x	-10	-5	0	5	10
y	12	7	2	-3	-8



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

Ans. $2y + x = -4$

x	-10	-5	0	5	10
y	3	-1/2	-2	-9/2	-7



6. Find the solution of the system of equations. (both by elimination & substitution method).

(i) $6x + 2y = 11$

$3x - 8y = 1$

Ans. $6x + 2y = 11$ (1)

$3x - 8y = 1$ (2)

Multiply equation (2) with 4

$4(3x - 8y) = 4(1)$

$12x - 32y = 4$ (3)

Adding equation (1) and equation (3)

$6x + 2y = 11$

$12x - 32y = 4$

$27x = 45$

$x = \frac{45}{27}$

$x = \frac{5}{3}$

Using $x = \frac{5}{3}$ in equation (1)

$6x + 2y = 11$

MATHEMATICS NOTES FOR 7TH CLASS (FOR ISLAMABAD)

$$6\left(\frac{5}{3}\right) + 2y = 11$$

$$10 + 2y = 11$$

$$2y = 11 - 10$$

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

$$\left[\frac{5}{3}, \frac{1}{2}\right] \text{ is the solution.}$$

(ii) $4x + 3y = 5$

$$6x - 9y = 0$$

Ans. $4x + 3y = 5$ (1)

$$6x - 9y = 0$$
 (2)

Multiply equation (1) with 3

$$3(4x + 3y) = (5) \times 3$$

$$12x + 9y = 15$$
 (3)

Adding equation (2) and equation (3)

$$6x - 9y = 0$$

$$12x + 9y = 15$$

$$18x = 15$$

$$x = \frac{15}{18}$$

$$x = \frac{5}{6}$$

Put $x = \frac{5}{6}$ in equation (1)

$$4x + 3y = 5$$

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

$$\frac{10}{3} + 3y = 5$$

$$3y = 5 - \frac{10}{3}$$

$$3y = \frac{15 - 10}{3}$$

$$y = \frac{5}{3} \times \frac{1}{3}$$

$$y = \frac{5}{9}$$

$$\left[\frac{5}{6}, \frac{5}{9}\right] \text{ is the solution.}$$

7. Determine whether the graph of the given equation is horizontal, vertical or neither.

(i) $x = -6$

Ans. $x = -6$

Vertical

(ii) $y = 5$

Ans. $y = 5$

Horizontal

(iii) $4x = 12y$

Ans. $4x = 12y$

Neither

(iv) $x = 0, y = 0$

Ans. $x = 0, y = 0$

Horizontal, Vertical