Objective

To obtain a linear equation and draw a graph that represents the linear equation.

Material Required

Graph paper, pens, pencil, eraser, ruler.

Theory

1. Concept of linear equation.
2. To represent the coordinates on the cartesian plane.

Procedure

Let us consider a situation. Suppose you have 60 rupees to spend. You went to a stationery shop to buy some pencils and some pens. The cost of 1 pencil is Rs. 2 and the cost of 1 pen is Rs. 4. Find the number of pencils and pens bought by you from the shop.

Construct a linear equation in two variables.

1. Let the number of pencils be x and the number of pens is y.
2. According to the given situation, $60 = 2x + 4y$.
3. Now we have to represent this situation on the graph paper.
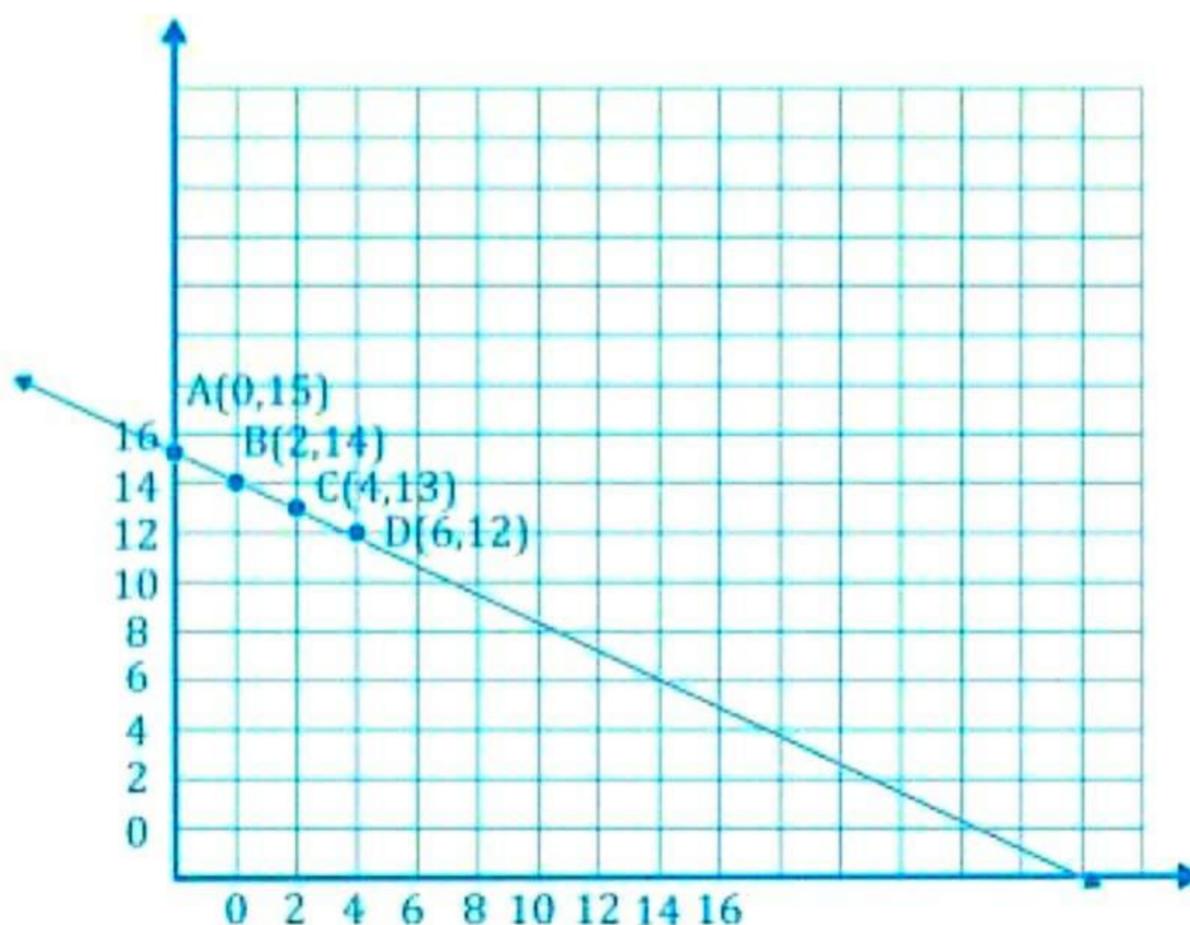
4. By taking different values of x, we get different values of y. Put different values of x given in the table to get corresponding values y as shown.
5. Take a graph paper and a cartesian system is drawn, i.e., x–axis and y–axis are drawn.

x- axis	0	2	4	6
y- axis	15	14	13	12

6. Plot the coordinates from the above table on the graph and name them as A (0,15), B (2,14), C (4,13), D (6,12). On joining the points A, B, C and D we get a straight line.

Observation

1. We get a straight line, which represents the linear equation.
2. On the line, there are infinitely many coordinates. But, according to the situation we have taken those points or coordinates which are natural numbers.

Result

We observed that for the given equation, we get a straight line on the graphpaper which cuts the x–axis and y–axis.

Learning Outcome

We learnt that for any one-degree equation whether, in one variable or two variables, we will get a straight line on the graph papers. For $x = $ a line is parallel to y–axis at a distance of a unit from origin. For $y = b$, the line will be parallel to x–axis at a distance of b unit from origin.

Activity Time

For the other daily life situations, students can draw linear equations on the graph.
For example:

1. $x = 2y$ (cost of one apple is equal to the cost of two oranges).
2. $x + y = 7$ (the sum of some pencils and erasers is 7).

Viva Voce

Q1. How many solutions will you obtain for $a + b = 3$?
Ans: Infinitely many solutions.

Q2. How many solutions will you obtain for $3x + 5 = 8$?
Ans: One solution.

Q3. Write solution of $8x + 4 = 20$.
Ans: 2

Q4. If $x = 6$, does the equation $x + 6 = 12$ verify?
Ans: Yes.

Q5. Write the solution for $x = 2$ in $2x + y = 4$.
Ans: (2, 0).

Q6. The cost of a ribbon is thrice the cost of a hair pin. Write this statement in two variables in a linear equation.
Ans: $x = 3y$, where x is the cost of a ribbon and y is the cost of a hair pin.

Q7. Write any two solutions of $x = 6y$.
Ans: (0,0) and (6,1).

Q8. Check whether the point $(-5, -1)$ lies on the line $-3x + y = 12$.

Ans: No, $(-5, -1)$ does not lie on the given line.

Q9. The solution of equation $x - 2y = 4$ is?

Ans: $(4, 0)$

Multiple Choice Questions

Q 1. The value of y at $x = -1$ in the equation $5y = 2$ is:

(a) $\frac{5}{2}$ (b) $\frac{2}{5}$ (c) 10   (d) 0

Q 2. The equation of a line which is 5 units distance above the x-axis is:

(a) $x = 5$ (b) $x + 5 = y$ (c) $y - 5$ (d) $x - y = 0$

Q 3. $x = 3$ and $y = -2$ is a solution of the equation $4px - 3y = 12$, then the value of p is:

(a) 0   (b) $\frac{1}{2}$ (c) 2   (d) 3

Q 4. Which of the following is the equation of a line parallel to y-axis?

(a) $y = 0$ (b) $x + y = z$ (c) $y = x$ (d) $x = a$

Q 5. Any point on the line $y = 3x$ is of the form

(a) $(a, 3a)$ (b) $(3a, a)$ (c) $\left(a, \frac{a}{3}\right)$ (d) $\left(\frac{a}{3}, -a\right)$

Q 6. How many linear equations in x and y can be satisfied by $x = 1$ and $y = 2$?

(a) Only one   (b) Two   (c) Infinitely many   (d) Three

Q 7. Any point of the form $(a, -a)$ always lie on the graph of the equation.

(a) $x = -a$ (b) $y = a$ (c) $y = x$ (d) $x + y = 0$

Q 8. The graph of the equation $2x + 3y = 6$ cuts the x-axis at the point

(a) $(0, 3)$ (b) $(3, 0)$ (c) $(2, 0)$ (d) $(0, 2)$

Q 9. Graph of linear equation $ax + by + c = 0, a \neq 0, b \neq 0$ cuts x-axis and y-axis respectively at the points.

(a) $\left(\frac{-c}{a}, 0\right), \left(0, \frac{-c}{b}\right)$ (b) $\left(\frac{-c}{b}, 0\right), \left(\frac{-c}{a}, 0\right)$

(c) $(-c, 0)(0, -c)$ (d) $(x, 0)(y, 0)$

Q 10. Which of the following ordered pairs is a solution of the equation $x - 2y - 6$?

(a) $(2, 4)$ (b) $(0, 3)$ (c) $(-4, 1)$ (d) $(4, -1)$

ANSWER KEY

1.(b)	2.(c)	3.(b)	4.(d)	5.(a)	6.(a)	7.(d)	8.(b)	9.(a)	10.(c)