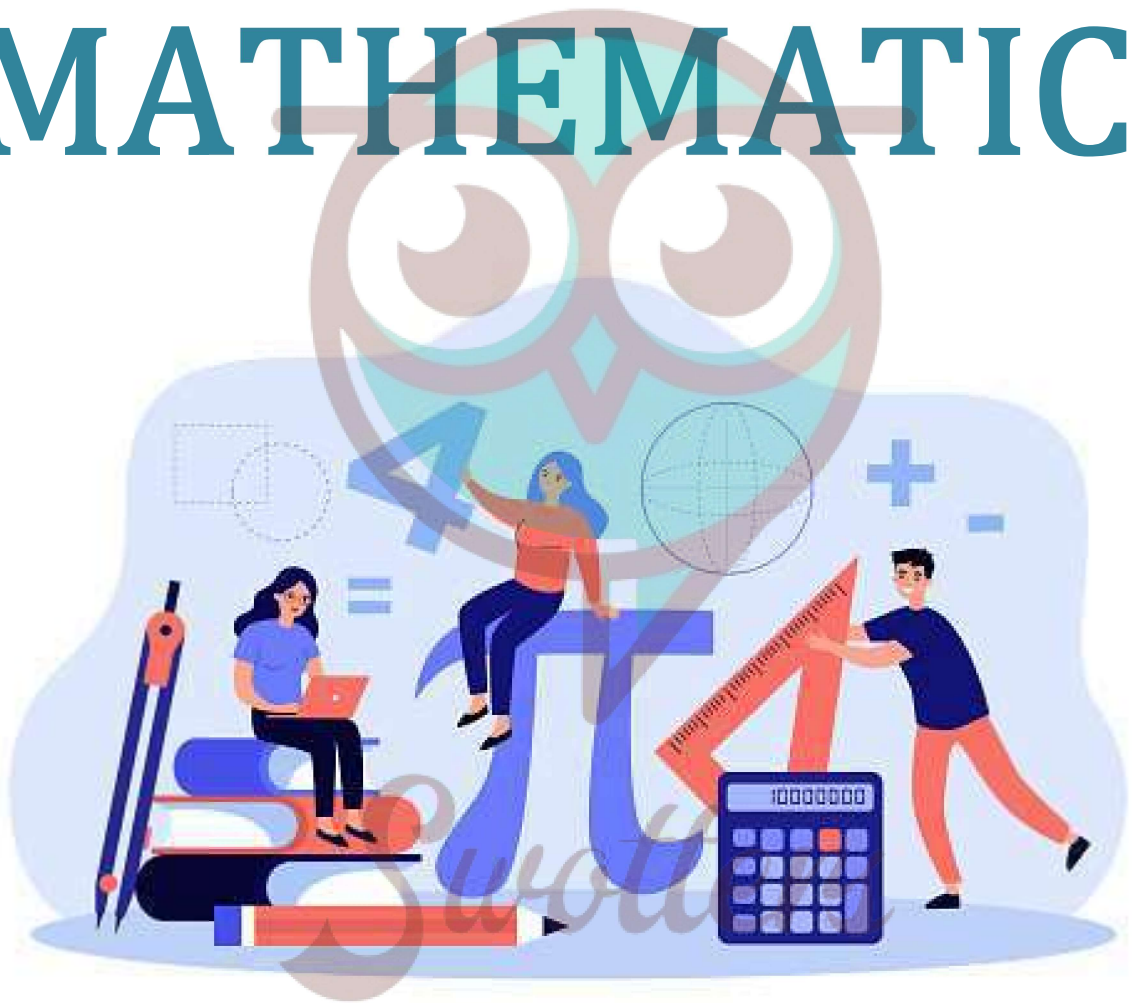# MATHEMATICS

Important Questions

Multiple Choice questions-

Question 1. The linear equation $3x - 11y = 10$ has:

a) Unique solution

b) Two solutions

c) Infinitely many solutions

d) No solutions

Question 2. $3x + 10 = 0$ will has:

a) Unique solution

b) Two solutions

c) Infinitely many solutions

d) No solutions

Question 3. The solution of equation $x - 2y = 4$ is:

a) (0,2)

b) (2,0)

c) (4,0)

d) (1,1)

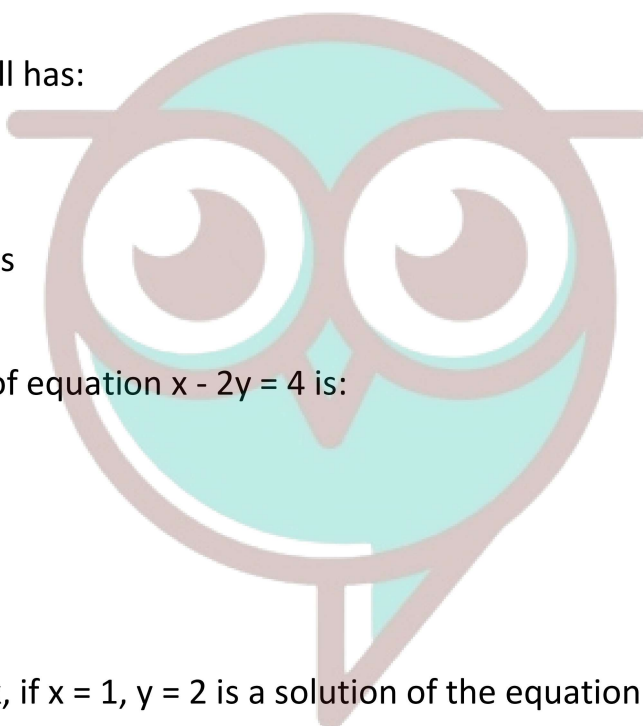Question 4. The value of k, if $x = 1$, $y = 2$ is a solution of the equation $2x + 3y = k$.

a) 5

b) 6

c) 7

d) 8

Question 5. Point (3, 4) lies on the graph of the equation $3y = kx + 7$. The value of k is:

a) 4/3

b) 5/3

c) 3

d) 7/3

Question 6. The graph of linear equation $x + 2y = 2$, cuts the y-axis at:

a) (2,0)

b) (0,2)

c) (0,1)

d) (1,1)

Question 7. Any point on the line x = y is of the form:

a) (k, -k)

b) (0, k)

c) (k, 0)

d) (k, k)

Question 8. The graph of x = 3 is a line:

a) Parallel to x-axis at a distance of 3 units from the origin

b) Parallel to y-axis at a distance of 3 units from the origin

c) Makes an intercept 3 on x-axis

d) Makes an intercept 3 on y-axis

Question 9. In equation, y = mx + c, m is:

a) Intercept

b) Slope of the line

c) Solution of the equation

d) None of the above

Question 10. If x and y are both positive solutions of equation ax + by + c = 0, always lie in:

a) First quadrant

b) Second quadrant

c) Third quadrant

d) Fourth quadrant

Very Short:

1. Linear equation x – 2 = 0 is parallel to which axis?

2. Express x in term of y : $\frac{x}{7} + 2y = 6$

3. If we multiply or divide both sides of a linear equation with a non-zero number, then what will happen to the solution of the linear equation?

4. Find the value of k for which x = 0, y = 8 is a solution of 3x – 6y = k.

5. Write the equation of a line which is parallel to x-axis and is at a distance of 2 units from the origin.

6. Find 'a', if linear equation 3x - ay = 6 has one solution as (4, 3).

7. Cost of a pen is two and half times the cost of a pencil. Express this situation as a linear equation in two variables.

8. In an one day international cricket match, Raina and Dhoni together scored 198 runs. Express the statement as a linear equation in two variables.

9. The cost of a table is 100 more than half the cost of a chair. Write this statement as a linear equation in two variables.

Short Questions:

1. Write linear equation representing a line which is parallel to y-axis and is at a distance of 2 units on the left side of y-axis.

2. In some countries temperature is measured in Fahrenheit, whereas in countries like India it is measured in Celsius. Here is a linear equation that converts Fahrenheit to Celsius :

$$F = \left(\frac{9}{5}\right)C + 32°$$

If the temperature is – 40°C, then what is the temperature in Fahrenheit?

3. If the temperature is – 40°C, then what is the temperature in Fahrenheit?

4. If ax + 3y = 25, write y in terms of x and also, find the two solutions of this equation.

5. Find the value of k, if (1, -1) is a solution of the equation 3x - ky = 8. Also, find the coordinates of another point lying on its graph.

6. Let y varies directly as x. If y = 12 when x = 4, then write a linear equation. What is the value of y, when x = 5?

Long Questions:

1. Write the equations of the lines drawn in following graph:
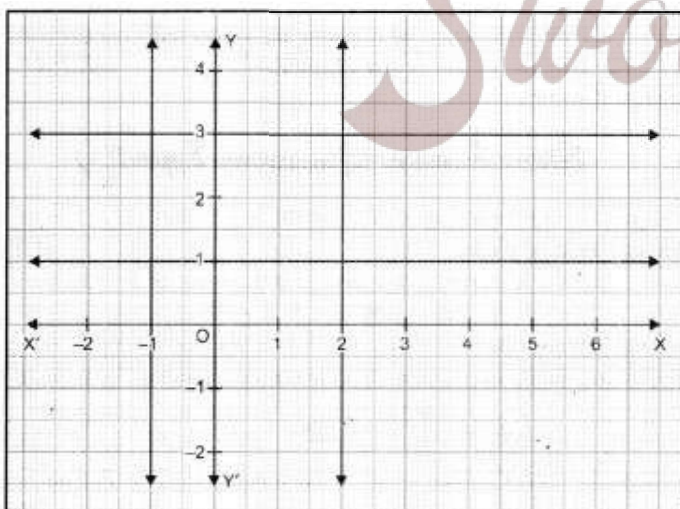
Also, find the area enclosed between these lines.

2. If (2, 3) and (4, 0) lie on the graph of equation ax + by = 1. Find the value of a and b. Plot the graph of equation obtained.

3. Draw the graphs of the following equations on the same graph sheet:

   x = 4, x = 2, y = 1 and y - 3 = 0.

4. Cost of 1 pen is ₹ x and that of 1 pencil is ₹ y. Cost of 2 pens and 3 pencils together is ₹ 18. Write a linear equation which satisfies this data. Draw the graph for the same.

5. Sum of two numbers is 8. Write this in the form of a linear equation in two variables. Also, draw the line given by this equation. Find graphically the numbers, if difference between them is 2.

Assertion and Reason Questions-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

   a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

   b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

   c) Assertion is correct statement but reason is wrong statement.

   d) Assertion is wrong statement but reason is correct statement.

Assertion: There are infinite number of lines which passes through (2, 14).

Reason: A linear equation in two variables has infinitely many solutions.

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

   a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

   b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

   c) Assertion is correct statement but reason is wrong statement.

   d) Assertion is wrong statement but reason is correct statement.

Assertion: All the points (1, 0), (,) - 1 0 , (2, 0) and (5, 0) lie on the x -axis.

Reason: Equation of the x -axis is y = 0.

Case Study Questions-

1. In the below given layout, the design and measurements has been made such that

area of two bedrooms and Kitchen together is 95 sq. m.
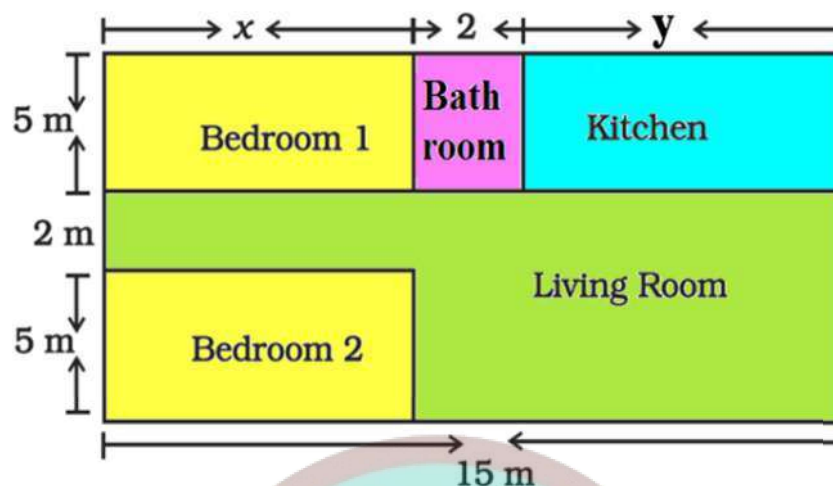
(i) The area of two bedrooms and kitchen are respectively equal to:

   (a) 5x, 5y

   (b) 10x, 5y

   (c) 5x, 10y

   (c) x, y

(ii) Find the length of the outer boundary of the layout.

   (a) 27m

   (b) 15m

   (c) 50m

   (d) 54m

(iii) The pair of linear equation in two variables formed from the statements are

   (a) x + y = 13, x + y = 9

   (b) 2x + y = 13, x + y = 9

   (c) x + y = 13, 2x + y = 9

   (d) None of the above

(iv) Which is the solution satisfying both the equations formed in (iii)?

   (a) x = 7, y = 6

   (b) x = 8, y = 5

   (c) x = 6, y = 7

   (d) x = 5, y = 8

(v) Find the area of each bedroom.

   (a) 30 sq. m

(b) 35 sq. m

(c) 65 sq. m

(d) 42 sq. m

Case Study Answers-

(i) (b) 10x, 5y

Explaination:

Area of one bedroom = 5x sq.m

Area of two bedrooms = 10x sq.m

Area of kitchen = 5y sq. m

(ii) (d) 54m

Explanation:

Length of outer boundary = 12 + 15 + 12 + 15 = 54 m

(iii) (d) None of the above

Explanation:

Area of two bedrooms = 10x sq.m

Area of kitchen = 5y sq. m

So, 10x + 5y = 95, 2x + y = 19
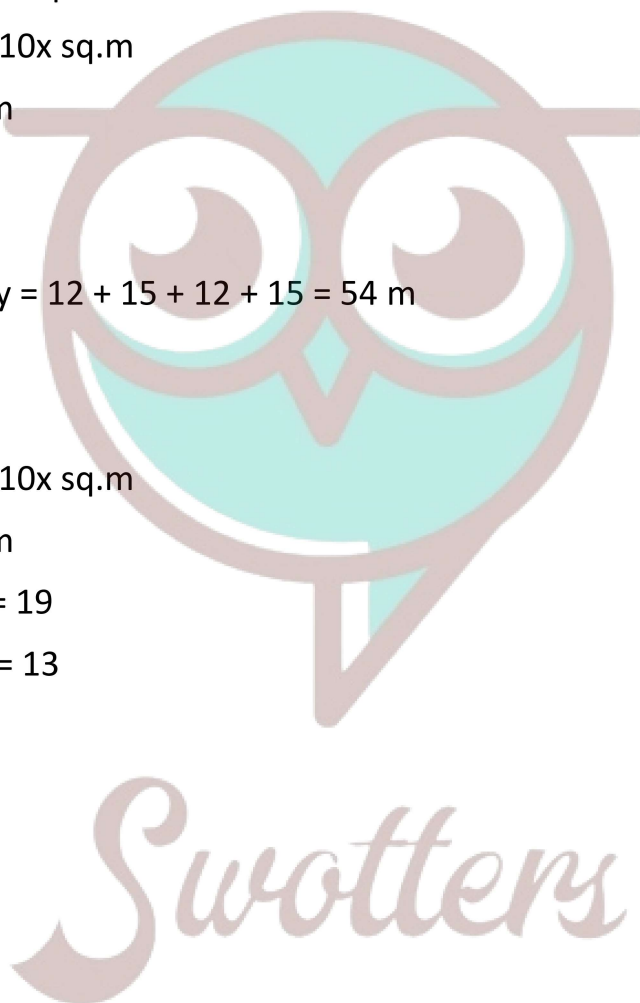
Also, x + 2 + y = 15, x + y = 13

(iv) x = 6, y = 7

Explanation:

x + y = 6 + 7 = 13

2x + y = 2(6) + 7 = 19

x = 6, y = 7

(v) (a) 30 sq. m

Answer Key:

MCQ:

1. (c) Infinitely many solutions

2. (a) Unique solution

3. (c) (4,0)

4. (d) 8

5. (b) 5/3

6. (c) (0,1)

7. (d) (k, k)

8. (b) Parallel to y-axis at a distance of 3 units from the origin

9. (b) Slope of the line

10. (a) First quadrant

Very Short Answer:

1. Here, linear equation is $x - 2 \Rightarrow 0$ $x = 2$

   Thus, it is parallel to the y-axis.

2. Given equation is

   $\frac{x}{7} + 2y = 6$

   $\Rightarrow \frac{x}{7} = 6 - 2y$

   Thus, $x = 7(6 - 2y)$.

3. Solution remains the same.

4. Since x = 0 and y = 8 is a solution of given equation

   $3x - 6y = k$

   $3(0) - 6(8) = k$

   $\Rightarrow k = -48$

5. Here, required line is parallel to x-axis and at a distance of 2 units from the origin.

   $\therefore$ Its equation is

   $y + 2 = 0$

   or $y - 2 = 0$

6. Since (4, 3) is a solution of given equation.
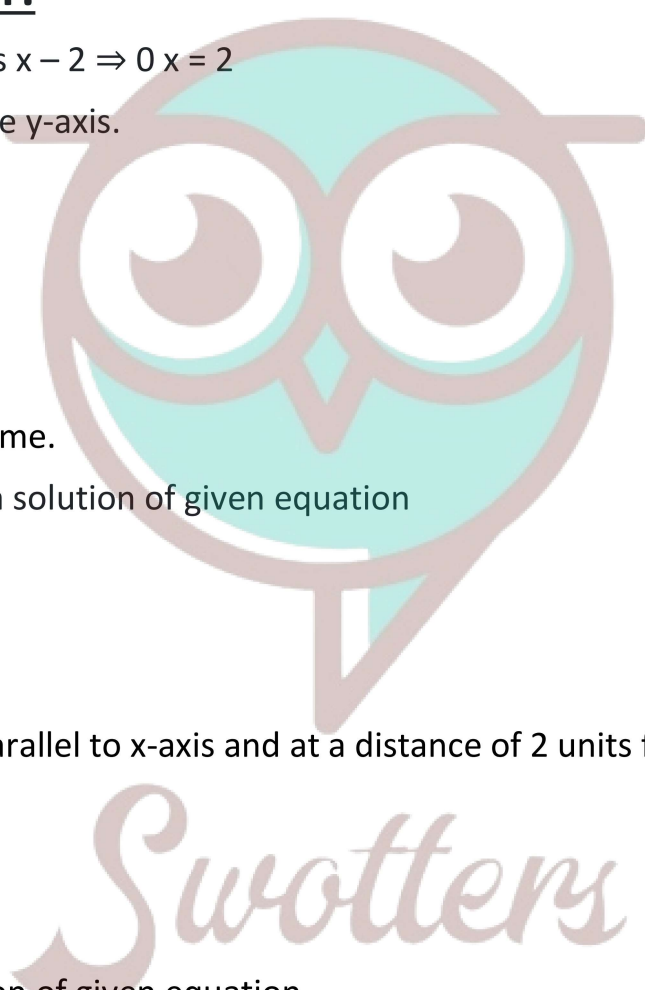
   $\therefore 3(4) - a(3) = 6$

   $\Rightarrow 12 - 3a = 6$

   $\Rightarrow a = \frac{-6}{-3}$

   Hence, a = 2

7. Let cost of a pen be ₹ x and cost of a pencil be ₹ y.

   According to statement of the question, we have

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

$\Rightarrow 2x = 5y$ or $2x - 5y = 0$

8. Let runs scored by Raina be x and runs scored by Dhoni be y.

   According to statement of the question, we have

   $x + y = 198$

   $x + y - 198 = 0$

9. Let the cost price of a table be ₹ x and that of a chair be ₹ y.

   Since the cost price of a table is 100 more than half the cost price of a chair.

   $\therefore x = \frac{1}{2}y + 100$

   $\Rightarrow 2x = y + 200$ or $2x - y - 200 = 0$.

Short Answer:

Ans: 1. Here, required equation is parallel to y-axis at a distance of 2 units on the left side of y-axis

   $x = -2$ or $x + 2 = 0$

Ans: 2. Given linear equation is

   $F = \left(\frac{9}{5}\right)C + 32°$

   Put C = -40°, we have

   $F = \frac{9}{5}(-40°) + 32°$

   $F = -72° + 32°$

   $F = -40°$

Ans: 3. Since there are infinite lines passing through the point (2, 3).

   Let, first equation is $x + y = 5$ and second equation is $2x + 3y = 13$.

   Clearly, the lines represented by both equations intersect at the point (2, 3).

Ans: 4.

   Given equation is

   $$\pi x + 3y = 25$$

   $\therefore$ $$y = \frac{25 - \pi x}{3}$$

   When $x = 0$, then $y = \frac{25}{3}$.

   When $x = 1$, then $y = \frac{25 - \pi}{3}$.

   Hence, the two solutions are $x = 0, y = \frac{25}{3}$ and $x = 1, y = \frac{25 - \pi}{3}$.

Ans: 5. Since (1, -1) is a solution of the equation $3x - ky = 8$

$\therefore 3(1) - k(-1) = 8$

$\Rightarrow k = 8 - 3 = 5$

Thus, the given equation is

$3x - 5y = 8$

Put $x = 6$, then $y = \dfrac{3 \times 6 - 8}{5} = \dfrac{18 - 8}{5} = \dfrac{10}{5} = 2$

Hence, the coordinates of another point lying on the graph of $3x - 5y = 8$ is (6, 2).

Ans: 6. Given y varies directly as x implies $y = kx$

But $y = 12$ for $x = 4$

$\Rightarrow 4k = 12 = k = 3$

Put $k = 3$ in $y = kx$, we have

$y = 3x$

Now, when $x = 5$, $y = 3 \times 5 = y = 15$ ...(i)

Ans: 7. Let numerator and denominator of the given fraction be respectively x and y. According to the statement, we obtain

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

$\Rightarrow 4x - 8 = y + 3$

$\Rightarrow 4x - y - 11 = 0$

Which is the required linear equation. When $y = 1$, then $x = 3$. When $y = 5$, then $x = 4$. Hence, the two solutions are (3, 1) and (4, 5).

Long Answer:

Ans: 1. Equations of the lines drawn in the graph are as :

$x = -1$ or $x + 1 = 0$,

$x = 2$ or $x - 2 = 0$,

$y = 1$ or $y - 1 = 0$ and

$y = 3$ or $y - 3 = 0$

Figure formed by these lines is a rectangle of dimensions 3 units by 2 units.

Hence, the area enclosed between given lines = 6 sq. units.

Ans: 2. (2, 3) and (4, 0) lie on the graph of equation

$ax + by = 1$ ...(i)

$\therefore$ We have $2a + 3b = 1$ ... (ii)

and $4a + 0 = 1$

$\Rightarrow \qquad\qquad\qquad\qquad a = \dfrac{1}{4}$

Putting the value of a in eq. (ii), we have

$$2 \times \dfrac{1}{4} + 3b = 1$$

$$\dfrac{1}{2} + 3b = 1$$

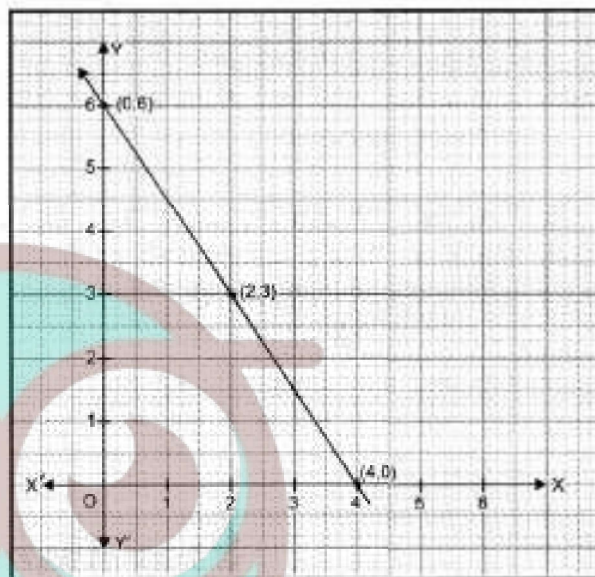$\Rightarrow \qquad\qquad\qquad 3b = \dfrac{1}{2}$

$\Rightarrow \qquad\qquad\qquad b = \dfrac{1}{6}$

Putting the values of a and b in eq. (i), we have

$$\dfrac{1}{4}x + \dfrac{1}{6}y = 1$$

$\Rightarrow \qquad\qquad \dfrac{3x+2y}{12} = 1 \Rightarrow \qquad 3x + 2y = 12 \qquad\qquad$ ...(iii)

Which is required linear equation.

Put x= 0 in eq. (iii), we have

$\Rightarrow 3(0) + 2y = 12$

$\Rightarrow 2y = 12$

$\Rightarrow y = 6$

Put x = 2 in eq. (iii), we have

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

$\Rightarrow 2y = 6$

$\Rightarrow y = 3$

Put x = 4 in eq. (iii), we have

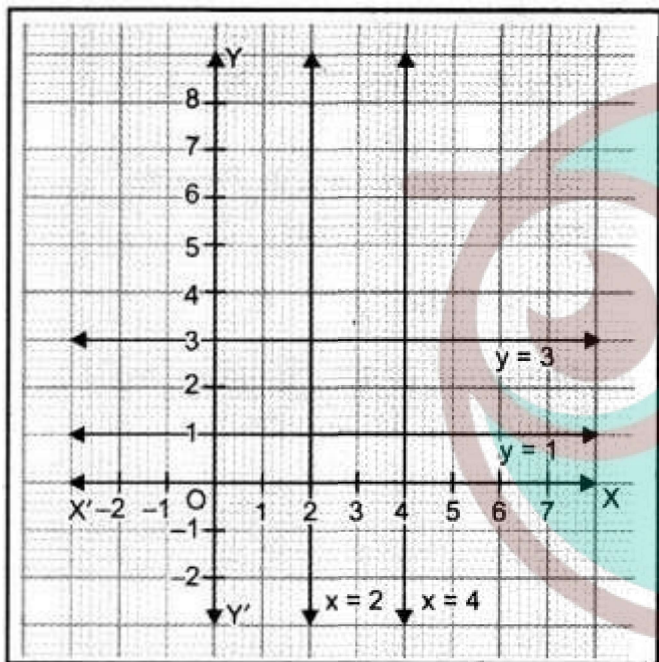$\Rightarrow 3(4) + 2y = 12$

$\Rightarrow 2y = 0$

$\Rightarrow y = 0$

We have the following table:

x	0	2	4
y	6	3	0

By plotting the points (0, 6), (2, 3) and (4, 0). Joining them, we obtained the graph of 3x + 2y = 12.

Ans: 3. By plotting the points (0, 6), (2, 3) and (4, 0). Joining them, we obtained the graph of 3x + 2y = 12.

Ans: 4. Here, cost of 1 pen is ₹x and that

of 1 pencil is ₹ y According to the statement of the question, we have

2x + 3y = 18

$\Rightarrow X = \frac{18-3y}{2}$

When y = 0, x = 9

When y = 4, x= 3.

When y = 6, x = 0

Table of solutions is

x	0	3	9
y	6	4	0

Plot the points (0, 6), (3, 4) and (9, 0). Join them in pairs to get the required line.

Ans: 5. Let the two numbers be x and y.

It is given that sum of two numbers is 8.

∴ x + y = 8

y = 8 – x

When x = 0,

When x = 4, y = 4

When x = 8, y = 0

Table of solutions is:
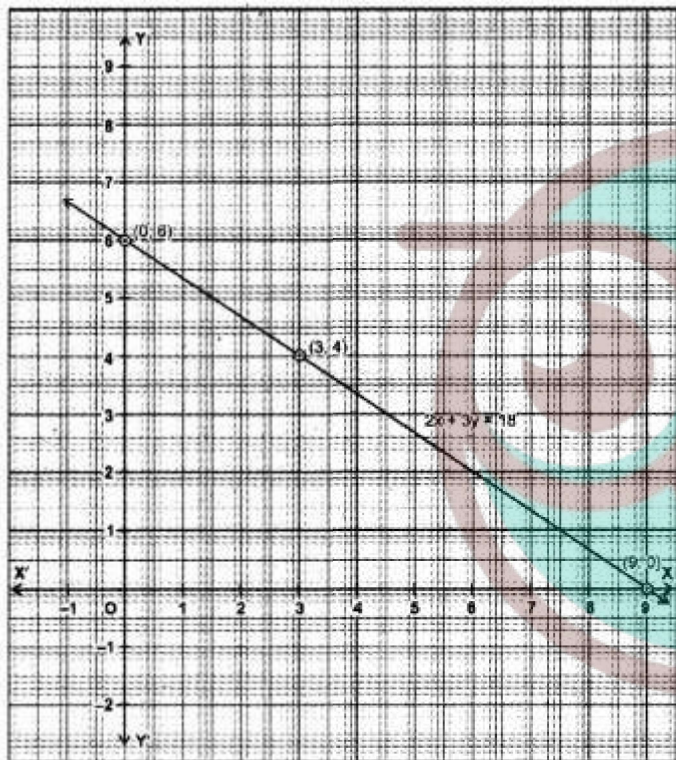
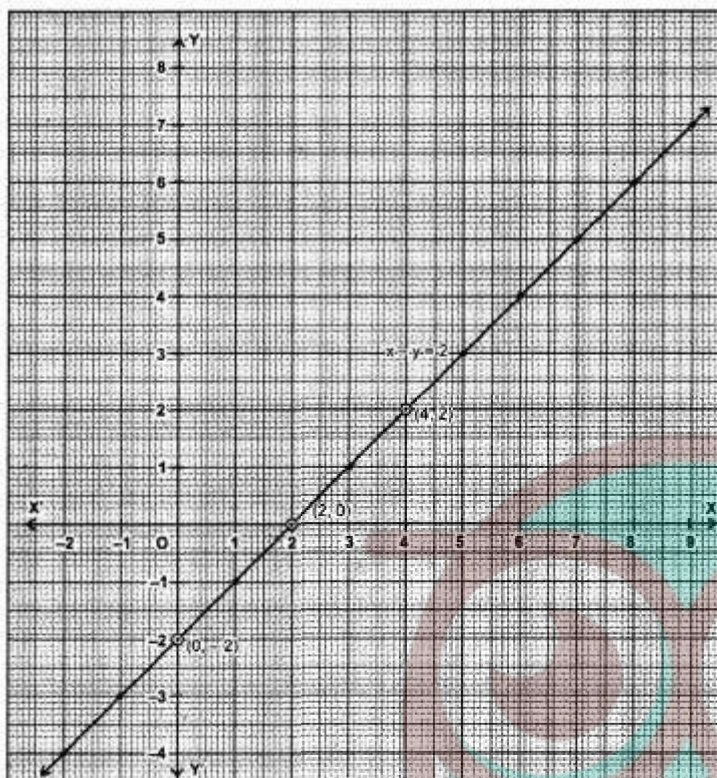| x	0	4	8
y	8	4	0

Plot the points (0, 8), (4, 4), (8, 0) and join them in pairs, we get the required graph.

When difference between two number is 2, then

x – y = 2, x > y

⇒ x = y + 2

When x = 0, y = -2

When x = 2, y = 0

When x = 4, y = 2

Table of solutions is:

x	0	2	4
y	-2	0	2

Plot these points (0, -2), (2, 0), (4, 2) and join them to get the required line.

Graphically, the numbers are: (-2; 4), (-1, -3), (0, -2), (1, -1), (2, 0), (3, 1), (4, 2), (5, 3), (6, 4), (7,5) etc.

Assertion and Reason Answers-

1. b)   Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Explanation:

Assertion : There are infinite number of lines which passes through (2 , 14) .

For a given point there can be infinite number of line passing through

Hence Assertion is true

to Define one line , there should be atleast 2 distinct points

Reason : A linear equation in two variables has infinitely many solutions.

ax + by = c

Has infinitely many solutions as infinite point lies on a line

Hence Reason is True

But Reason is not the the correct explanation of assertion as reason is about infinite points on a given line

while assertion is about infinite lines passing through a point.

Hence,

Both assertion and reason are true but reason is not the correct explanation of assertion.

2. a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
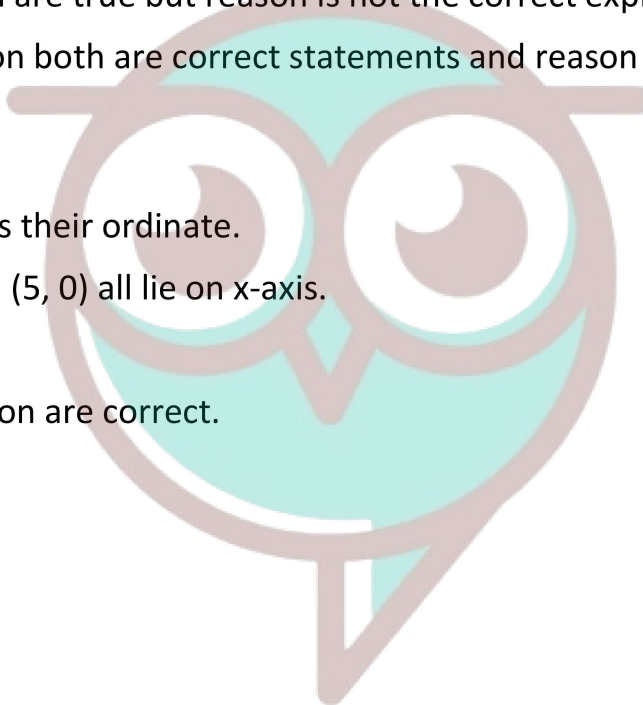
Explanation:

Points on x-axis have '0' as their ordinate.

So, (1,0), (-1, 0), (2, 0) and (5, 0) all lie on x-axis.

Equation of x-axis is y = 0

∴ Both assertion and reason are correct.