

Pair of Linear Equations in Two Variables

MULTIPLE CHOICE QUESTIONS

Q1. The pair of linear equations $3x + 5y = 3$ and $6x + ky = 8$ do not have a solution if k

a) $= 5$

b) $= 10$

c) $\neq 10$

d) $\neq 5$

Q2. The solution of the equation $x + y = 5$ and $x - y = 5$ is

a) (0,5)

b) (5,5)

c) (5,0)

d) (10 ,5)

Q3. The pair of linear equations $x = 0$, $x = -5$ has

a) One solution

b) two solution

c) infinite no: of solution

d) no solution

Q4. For what value of 'k' do the equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ represent coincident lines

a) $1/2$

b) $-1/2$

c) 2

d) -2

Q5. The value of 'k' for which the system of equations $4x + ky + 8 = 0$ and $2x + 2y + 2 = 0$ has a unique solution is 35

a) $k=3$

b) $k \neq 4$

c) $k \neq 0$

d) $k=0$

OBJECTIVE TYPE QUESTIONS

Q1. In how many points do the lines represented by the equations $x - y = 0$ and $x + y = 0$

intersect?

Q2. Find the value of $(x + y)$ if, $3x - 2y = 5$ and $3y - 2x = 3$

Q3. Sum of two numbers is 35 and their difference is 13, find the numbers

Q4. Find the value of 'p' for which the pair of linear equations $2px + 3y = 7$: $2x + y = 6$ has exactly one solution

Q5. Do the equations $y = x$ and $y = x + 3$ represent parallel lines?

CASE STUDY BASED QUESTIONS

1. Represent algebraically the situation in hall "Rose".

a) $50x + y = 10000$

b) $50x - y = 10000$

c) $x + 50y = 10000$

d) $x - 50y = 10000$

2. Represent algebraically the situation in hall "Jasmine"

a) $x + 25y = 7500$

b) $x - 25y = 7500$

c) $25x + y = 7500$

d) $25x - y = 7500$

3. What is the fixed rent of the halls?

- a) ₹2500
- b) ₹3300
- c) ₹ 4000
- d) ₹5000

4. Find the amount the hotel charged per person.

- a) ₹ 150
- b) ₹ 190
- c) ₹130
- d) ₹ 100

SHORT ANSWER TYPE QUESTIONS (2 MARKS)

Q 1. Find the solutions of the pair of linear equations $5x + 10y - 50 = 0$ and $x + 8y = 10$. Hence find the value of m if $y = mx + 5$.

Q 2. Are the following pair of linear equations consistent? Justify your answer.

$$2ax + by = a; 4ax + 2by - 2a = 0 ; a, b \neq 0$$

Q 3. There are 20 vehicles – cars and motorcycles in a parking area. If there are 56 wheels together, how many cars and motorcycles are there?

Q 4. Write a pair of linear equations which has a unique solution $x = 2$ and $y = -1$. How many such pairs are possible?

Q 5. If the sum of two positive numbers is 108 and the difference of these numbers is 8, then find the numbers.

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

Q1. Find the two-digit numbers whose sum is 75 and difference is 15

Q2. The monthly incomes of A and B are in the ratio 5:4 and their expenditure are in the ratio 7:5. If each saves 3000/- per month, find the monthly income of each.

Q3. A and B each have a certain number of oranges. A says to B, "if you give me 10 of your oranges, I will have twice the number of oranges left with you." B replies, "if you give me 10 of your oranges, I will have the same number of oranges as left with you. Find the number of oranges with A and B separately.

Q4. Yash scored 40 marks in a test, receiving 3 marks for each correct answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks been deducted for each wrong answer, then Yash would have scored 50 marks. How many questions were there in the test?

Q5. A man has only 20 paise coins and 25 paise coins in his purse. If he has 50 coins in all totalling 11.25/-, how many coins of each kind does he have?

LONG ANSWER TYPE QUESTIONS (4 Marks)

Q1. Two numbers are in the ratio 5:6. If 8 is subtracted from each of the numbers, the ratio becomes 4:5. Find the numbers.

Q2. The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.

Q3. A number consists of two digits. When the number is divided by the sum of its digits, the quotient is 7. If 27 is subtracted from the number, the digits interchange their places. Find the number.

Q4. Draw the graphs of $2x - 3y + 6 = 0$ and $2x + 3y - 18 = 0$. Find the ratio of areas of triangles formed by the given lines with X-axis and Y-axis.

Q5. Determine graphically the vertices of the triangle, the equations of whose sides are given below

$$2y - x = 8; 5y - x = 14; y - 2x = 1$$

ANSWER KEY

Q no	MULTIPLE CHOICE QUESTIONS
1	b
2	c
3	d

4	c
5	b
Q no	OBJECTIVE TYPE QUESTIONS
1	one
2	$X + Y = 8$
3	24, 11
4	$P \neq 3$
5	Yes

CASE STUDY BASED QUESTIONS

Let us denote the fixed rent by ₹ x and proportional expense per person by ₹ y.

1. Algebraic representation of the situation in "Rose" hall $x + 50y = 10000$

Answer- Option C

2. Algebraic representation of the situation in "Jasmine" hall

$$x + 25y = 7500$$

Answer- Option A

Subtracting the equations represented by (i) and (ii)

$$x + 50y - x + 25y = 10000 - 7500$$

$$25y = 2500$$

$$y = 100$$

Substituting $y = 100$ in $x + 50y = 10000$, we get

$$x + 50 \times 100 = 10000$$

$$x + 5000 = 10000$$

$$x = 5000$$

3. Answer : Option D

4. Answer : Option D

SHORT ANSWER TYPE QUESTIONS (2 MARKS)

1 Solving $5x + 10y - 50 = 0$

$$10 \left(\frac{x}{2} + y - 5 \right) = 0$$

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

Substituting $y = 5 - \frac{x}{2}$ in $x + 8y = 10$ we get

$$x + 8 \left(5 - \frac{x}{2} \right) = 10$$

$$x = 10$$

$$\text{Thus } y = 0$$

Substituting the values of x and y in $y = mx + 5$, we get

$$0 = m10 + 5$$

$$\text{Therefore } m = -\frac{1}{2}$$

2 The given pair of linear equation can be written as

$$2ax + by - a = 0 \text{ and } 4ax + 2by - 2a$$

Here,

$$a_1 = 2a,$$

$$b_1 = b,$$

$$c_1 = -a$$

$$\text{And } a_2 = 4a,$$

$$b_2 = 2b,$$

$$c_2 = -2a$$

$$\therefore \frac{a_1}{a_2} = \frac{2a}{4a} = \frac{1}{2} \text{ and } \frac{b_1}{b_2} = \frac{b}{2b} = \frac{1}{2} \text{ and } \frac{c_1}{c_2} = \frac{-a}{-2a} = \frac{1}{2}$$

$$\text{Since, } \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} = \frac{1}{2}$$

$\therefore$ The given pair of linear equation is consistent.

3 Let no of cars = x and no of motorcycles = y

According to our condition

$$x + y = 20$$

$$X = 20 - y \text{ (i)}$$

$$4x + 2y = 56 \text{ (ii)}$$

Replacing (i) in (ii) we get

$$4(20 - y) + 2y = 56$$

$$80 - 4y + 2y = 56$$

$$-2y = -24$$

$$\text{Thus } y = 12$$

Now replacing $y = 12$ in $x + y = 20$ we get

$$x = 8$$

4 Condition for any pair of systems to have a unique solution is $a_1/a_2 \neq b_1/b_2$

Let us consider the following equations_

$$a_1x + b_1y + c_1 = 0 \text{ and}$$

$$a_2x + b_2y + c_2 = 0$$

We have $x = 2$ and $y = -1$ as the unique solution of these two equations.

Hence, it must satisfy the above equations

$$a_1(2) + b_1(-1) + c_1 = 0$$

$$2a_1 - b_1 + c_1 = 0 \text{ ----- (1)}$$

$$a_2(2) + b_2(-1) + c_2 = 0$$

$$2a_2 - b_2 + c_2 = 0 \text{ ----- (2)}$$

the restricted values of a_1, a_2 and b_1, b_2 are only

$$a_2a_1 = b_2b_1 \dots (3)$$

So all the real values a_1, a_2, b_1, b_2 except condition (3) can form so many linear equations which will satisfy equation (1) and (2)

Therefore, infinitely many pairs of linear equations are possible.

Infinite number of solution.

5 According to the question

$$x + y = 108$$

$$\text{So } x = 108 - y$$

$$\text{And } x - y = 8$$

$$\text{So } 108 - y - y = 8$$

$$-2y = -100$$

$$y = 50$$

$$\text{Thus } x = 108 - 50 = 58$$

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

1 Let the numbers be x and y .

$$x + y = 75$$

$$\text{Thus } x = 75 - y \dots\dots\dots(1)$$

$$x - y = 15 \dots\dots\dots(2)$$

$$\text{Substituting (1) in (2) } 2y = 90$$

$$\text{So } y = 45.$$

$$\text{Putting } y = 45 \text{ in (1) , } x = 30.$$

Hence the numbers are $x = 30$ and $y = 45$

2 By the given conditions

The monthly income would be $5x:4x$ and monthly expenditure would be $7y:5y$

Since saving = income - expenditure

$$5x - 7y = 3000 \dots\dots\dots(1)$$

$$4x-5y= 3000 \dots\dots\dots(2)$$

Solving, we get $x= 2000/-$

Monthly income of A = $5x= 5 \times 2000= 10000/-$

Monthly income of B = $4x = 4 \times 2000 = 8000/-$

3 Suppose A has x number of oranges and B has y oranges. Then

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

$$\Rightarrow x - 2y + 30 = 0$$

$$y + 10 = x - 10$$

$$\Rightarrow x - y - 20 = 0$$

Equating both the equations we get $y=50$ and $x=70$

Hence A has 70 oranges and B has 50 oranges

4 Let right answer questions attempt by Yash be x and wrong answer questions be y

$$\text{Then, } 3x - y = 40 \dots\dots\dots(i)$$

$$4x - 2y = 50 \dots\dots\dots(ii)$$

Solving we get $x = 15, y = 5$

Total number of questions in the test = $x + y = 15 + 5 = 20$.

5 Let no. of 20 paisa coins be x and that of 25 paisa coins be y , then

$$x + y = 50 \dots\dots\dots(i)$$

$$20x + 25y = 1125 \Rightarrow 4x + 5y = 225 \dots\dots\dots(ii)$$

Solving, we get $x=25$ and $y=25$

Hence there are 24 points of each kind.

LONG ANSWER TYPE QUESTIONS (4 Marks)

1 Let the two numbers be $5x$ and $6x$

Then according to the question

$$5x-8 : 6x-8 = 4:5$$

Cross multiplying, we get

$$5(5x-8) = 4(6x-8)$$

Solving this equation we get

$$x = 8$$

Replacing the value of x we get that the numbers are 40 and 48.

2 Let the present age of his two children be "x" years and "y" years.

$$\text{Present age of father} = 2(x+y) \text{---(1)}$$

Then, according to the question

$$2x+y+20=x+20+y+20$$

$$2x+2y+20=x+y+40$$

$$2x+2y-x-y=40-20$$

$$x+y=20 \text{---(2)}$$

Substituting eqn (2) in eqn (1), we get

$$\text{Present age of father} = 2 \times 20$$

$$= 40 \text{ years}$$

3 Let the digit in ones place be y and the digit in tens place be x.

Then the two digit number = $10x+y$

$$\text{Given } 10x+yx+y=7$$

$$\Rightarrow 10x + y = 7(x + y)$$

$$\therefore 10x+y-7x-7y=0$$

$$3x-6y=0$$

$$x-2y=0 \text{---(1)}$$

According to the second condition.

$$10x + y - 27 = 10y + x$$

$$10x + y - 10y - x = 27$$

$$9x - 9y = 27$$

$$x - y = 3 \text{-----}(2)$$

Equation (1)- equation (2)

$$x - 2y - x - y = 0 - 3$$

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

$$-y = -3$$

$$\text{Thus } y = 3$$

Substituting $y = 3$ in equation (2), we get

$$x - 3 = 3$$

$$x = 6$$

Since two-digit number $= 10x + y$

$$\text{So } 10 \times 6 + 3$$

$$= 60 + 3 = 63$$

$$\text{Then } 20y + y - 27 = 10y + 2y$$

$$\Rightarrow 9y = 27$$

$$\Rightarrow y = 3$$

Substitute y value in eqn(1)

$$\text{we get, } x = 2 \times 3$$

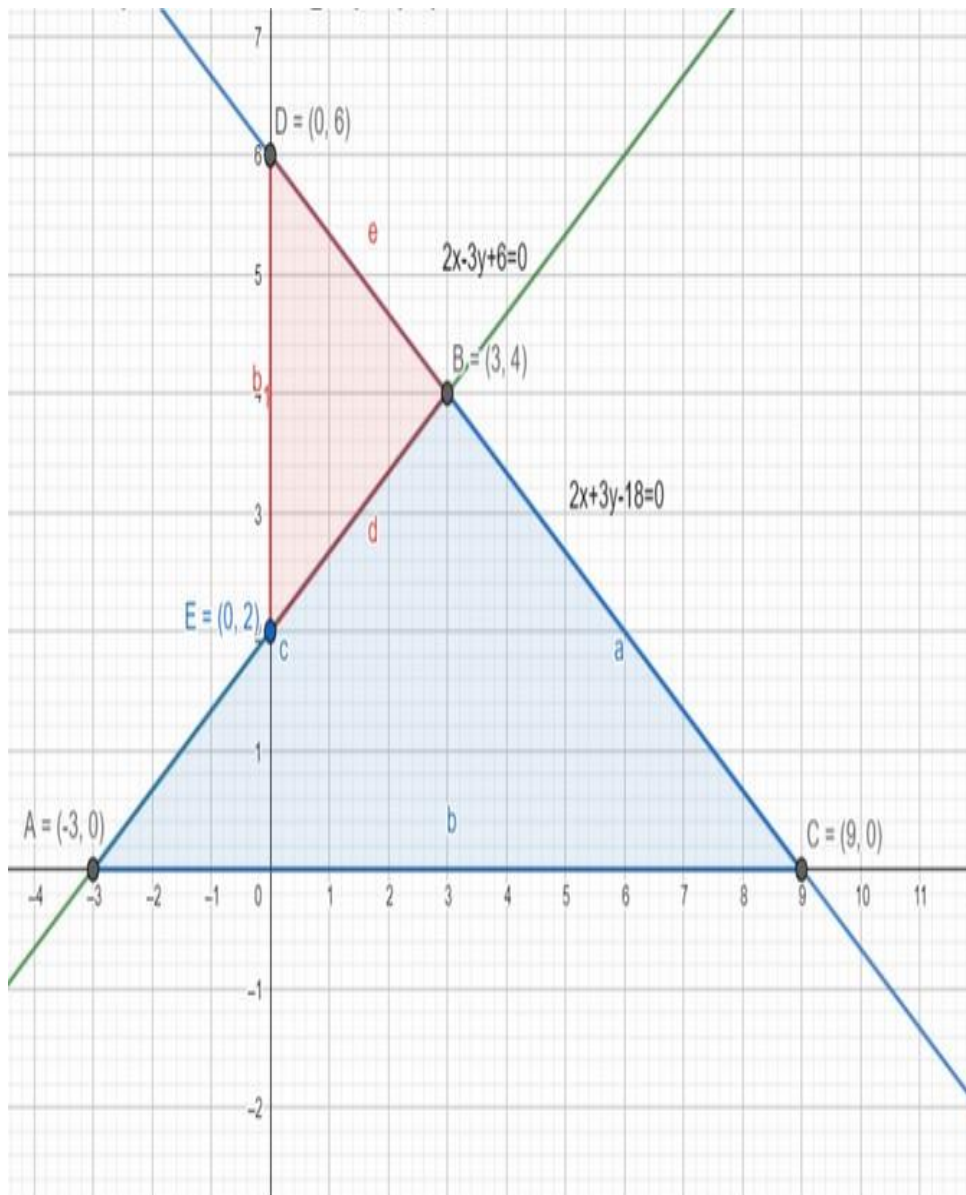
$$\Rightarrow x = 6$$

Hence the required number is 63.

4 Find three solutions of $2x - 3y + 6 = 0$

Find three solutions of $2x + 3y - 18 = 0$

Plot the points on the graph paper.



Area of triangle ABC formed by the lines and the X-axis

$$= \frac{1}{2} \times 12 \times 4 = 24 \text{ sq. units}$$

Area of triangle DEB formed by the lines and the Y-axis

$$= \frac{1}{2} \times 4 \times 3 = 6 \text{ sq. units}$$

Ratio of areas of triangles formed by the given lines with X-axis and Y-axis =

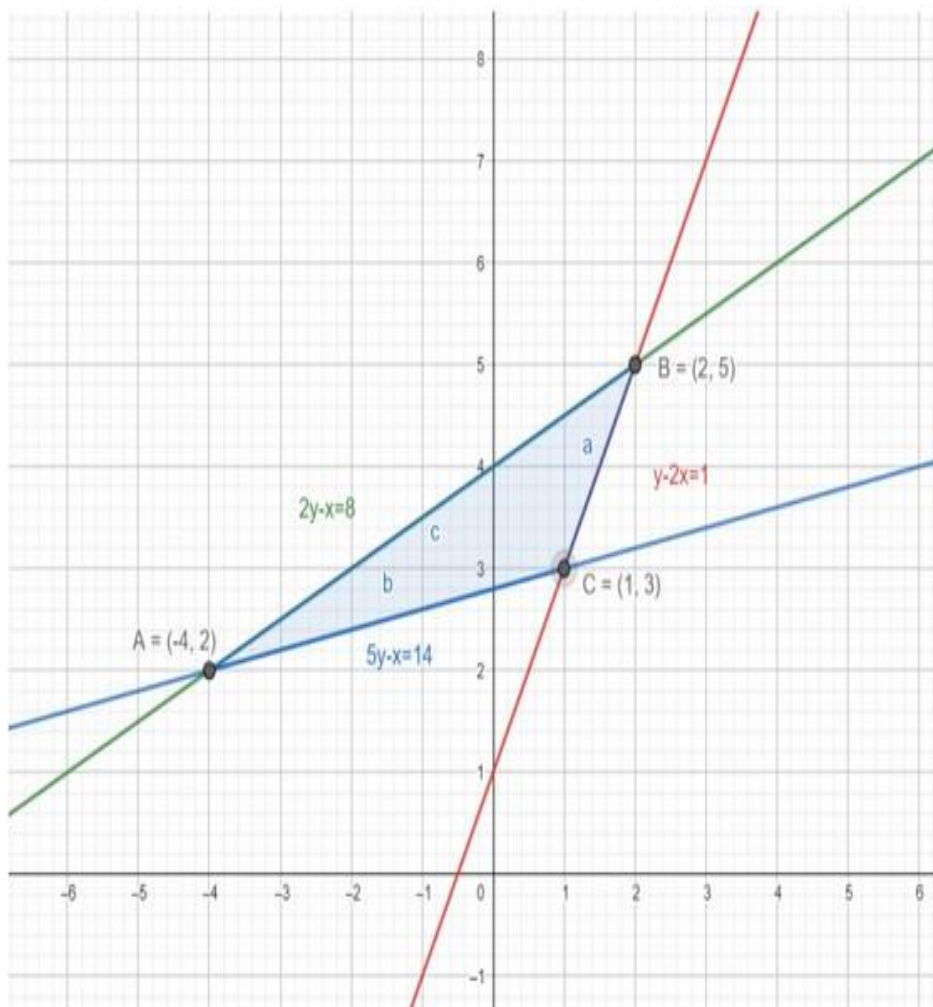
$$24 : 6 = 4 : 1$$

5 Find three solutions of $2y-x=8$

Find three solutions of $5y-x=14$

Find three solutions of $y-2x=1$

Plot the points on the graph paper.



Coordinates of triangle ABC formed between the given lines A(-4,2), B (2,5),
C(1,3)