Grade X

Lesson : 3 Pair of Linear Equations in Two Variables

Objective Type Questions

I. Multiple choice questions

1. The pair of linear equations $2x + 3y = 5$ and $4x = 6y = 10$ is

a) inconsistent b) consistent

c) dependent consistent d) none of these

2. The system of equations $-3x - 4y = 5$ and $\frac{9}{2}x - 6y = \frac{15}{2} = 0$ has

a) Unique solution b) no solution

c) Infinite solution d) None of these

3. A pair of linear equations which have a unique solution $x = 2$ $y = -3$ is

a) $2x - 3y = -5$, $x - y = -1$

b) $2x + 5y + 11 = 0$, $4x + 10y + 22 = 0$

c) $x - 4y - 14 = 0$, $5x - y - 13 = 0$

d) $2x - y = 1$, $3x + 2y = 0$

4. A pair of system of equations $x = 2$, $y = -2$, $x = 3$, $y = -3$ when represented graphically enclose

a) Square b) Trapezium

c) rectangle d) Triangle

5. If two lines are parallel to each other then the system of equations is.

a) consistent **b) inconsistent**

c) consistent dependent d) a and c both

6. If $lq \neq mp$ then the system of equations $lx + my = c$, $px + qy = k$

a) has a unique solution b) has no solution

c) has infinitely may solutions d) may or may not have a solution

7. The pair of equations x = a and y = b has graphically represents lines which are

a) parallel
b) intersecting at (b, a)
c) coincident
d) intersecting at (a, b)

8. Match the columns.

1.	$2x + 5y = -10$ $3x + 4y = -7$	(A)	Unique solution
2.	$2x + 5y = 10$ $6x + 15y = 20$	(B)	Infinitely many solution
3.	$5x + 2y = 10$ $10x + 4y = 20$	(C)	No common solution

a. 1 - A, 2 - B, 3 - C
b. 1 - B, 2 - C, 3 - A
c. 1 - C, 2 - B, 3 - A
d. 1- A, 2 - C, 3 - B

9. The value of k for which the system of equations $x + y - 4 = 0$ and $2x + ky = 3$, has no solution, is

a. -2
b. $\neq 2$
c. 3
d. 2

10. A pair of linear equations which has a unique solution x = 2, y = -3 is

a. $x + y = -1$ $2x - 3y = -5$
b. $2x + 5y = -11$ $4x - 10y = -22$
c. $2x - y = 1$ $3x + 2y = 0$
d. $x - 4y - 14 = 0$ $5x - y - 13 = 0$

11. If x = a, y = b is the solution of the pair of equations $x - y = 2$ and $x + y = 4$, then the respective values of a and b are

a. 3, 5
b. 5, 3
c. 3, 1
d. -1, -3

12. Graphically the two systems of equations $x + 7 = 0$ $y - 2 = 0$ enclose a

a. Square region
b. Rectangular region
c. triangular region
d. Trapezium shaped region

13. If graph of two lines pass through the same points then the system of equations representing these lines is.

a. Consistent
b. Inconsistent
c. Consistent dependent
d. Inconsistent and dependent

14. If x = a, y = b is the solution of the equation x - y = 2 and x + y = 4 then the values of a and b are respectively.

a. 3 and 5 b. 5 and 3 **c. 3 and 1** d. -1 and -3

15. If the pair of equations 2 x + 3y = 7 and k x + $\frac{9}{2}$y = 12 have no solution, then the value of k is :

a. $\frac{2}{3}$ b. $\frac{3}{2}$ **c. 3** d. -3

16. Rs. 2450 were divided among 65 children. If each girl gets Rs. 50 and each boy gets Rs.50 and each boy gets Rs.30 then the number of girls are

a. 30 b. 40 **c. 25** d. 27

17. If 51 x + 23y = 116 and 23 x + 51y = 106, then value of (x - y) is

a. $\frac{14}{15}$ **b. $\frac{5}{14}$** c. -5 d. -14

18. If 3 x + 2y = 13 and 3 x - 2y = 5, then the value of x is.

a. 5 **b. 3** c. 7 d. 11

19. If $\frac{x}{2}$ + y = 0.8 and $\frac{7}{\left(x+\frac{y}{2}\right)}$ = 10 then the value of x + y is

a. 1 b. 0. 6 c. -0.8 d. 0.5

II. Multiple choice questions

1. If a system of pair of linear equations in two unknowns is consistent, then the lines representing the system will be

a) parallel b) always coincident

c) always intersecting **d) intersecting or coincident**

2. The pair of equations x=0 and y=0 has

a) one solution b) two solutions

c) infinitely many solutions **d) no solution**

3. Akhila went to a fair in her village. She wanted to enjoy rides on the giant wheel and play hoopla. If each ride costs Rs. 3 and a game of hoopla costs Rs. 4 then she spent Rs. 20. The linear equation to represent this condition is these.

a) $3x + 4y = 27$ b) $4x + 3y = 5$

c) $3x + 4y = 20$ d) None of these

4. A fraction becomes $\frac{4}{5}$, if 2 is added to both numerator and denominator, if however 4 is subtracted from both numerator and denominator, then the fraction becomes $\frac{1}{2}$. The algebraical representation of situation is.

a. $5x - 4y + 2 = 0$, $x - y = 0$

b. $5x - 4y + 2 = 0$, $2x - y - 4 = 0$

c. $x + 4y = 0$, $y + 2x = 0$

d. None of the above

5. Romila went to a stationary stall and purchased 2 pencils and 3 erasers for Rs.9, Her friend Sonali saw the new variety of pencils and erasers with Romila, and she also bought 4 pencils and 6 erasers of the same kind for Rs.18. The algebraic representation of situation is.

a. $2x - 3y + 2 = 0$, $x - y = 0$ b. $5x - 4y + 2 = 0$, $2x - y - 4 = 0$

c. $2x + 3y = 9$, $4x + 6y = 18$ d. None of the above

6. $3x - y = 3$, $9x - 3y = 9$ has infinite solution.

a. True b. false

c. Cannot say d. Partially true/ false

7. The number of common solutions for the system of linear equations $5x + 4y + 6 = 0$ and $10x + 8y = 12$ is …………..

a. 0 b. 1 c. 2 d. none of these

8. On comparing the ratios a_1 / a_2, b_1 / b_2 and c_1 / c_2 and without drawing them, the pair of linear equation is $3x - 5y + 8 = 0$, $7x + 6y - 9 = 0$

a. parallel

b. intersecting

c. coincident

d. None of the above

9. If a pair of linear equations is consistent, then the lines will be

a. parallel

b. always coincident

c. always intersecting

d) intersecting or coincident

10. If a pair of linear equations is given by $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ and $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$. In this case, the pair of linear equations is consistent.

a. True

b. False

c. Cannot say

d. Partially true / false

11. If the lines intersect at a point, then that point gives the unique solution of the two equations. In this case, the pair of equations is ________.

a. Consistent

b. cannot say

c. Inconsistent

d. None of these

12. If the lines are parallel, then the pair of equations has no solution. In this case the pair of equations is.

a. Consistent

b. Inconsistent

c. Cannot say

d. None of these

13. Which of the following pair of equations are inconsistent?

a. $3x - y = 9$, $x - \frac{y}{3} = 3$

b. $4x + 3y = 24$, $-2x + 3y = 6$

c. $5x - y = 10$, $10x - 2y = 20$

d. None of these

14. The pair of linear equations which has a unique solution $4x - 5y - 12 = 0$, $10y + 20 = 8x$

a. Consistent

b. Inconsistent

c. Cannot say

d. None of these

15. The pair of linear equations which has a unique solution x = 2 and y = -3 is

a. x + y = 1 and 2 x -3 y =-5

b.2 x+ 5y = -11and 4 x+10y =-22

c. 2 x – y = 1 and 3 x + 2y=0

d. x - 4y -14 = 0 and 5 x – y -13 = 0

16. The pair of equations x + 2y + 5 = 0 and -3 x - 6y + 1 = 0 has

a) a unique solution
b) exactly two solutions
c) infinitely many solutions
d) no solution

17. One equation of a pair of dependent linear equations is -5x + 7y – 2 = 0.

The second equation can be

a. 10 x + 14y + 4=0
b. -10 x -14y + 4 = 0
c. -10 x +14y + 4=0
d. 10 x -14y + 4= 0

18. If the lines given by 2 x + ky = 1 and 3 x -5y = 7 has unique solution, then the value of k is

a. $\frac{-10}{3}$
b. $\frac{-5}{3}$
c. $\frac{2}{3}$
d. for all real value except

19. The value of k for which the system of linear equation x + 2y =3

5 x + ky +7 = 0 is inconsistent is

a. $\frac{-14}{3}$
b. $\frac{2}{5}$
c. 5
d. 10

20. The value of 'k' for which the system of equations k x -5y = 26 x +2y = 7 has no solution is .

a. -15
b. $\frac{-5}{2}$
c. $\frac{2}{7}$
d. None of the above

21. For what value of k, will the following pair of linear equations have infinitely many solutions?

2 x + 3y = 4 and (k + 2) x + 6y = 3k + 2

a. 1
b. 2
c. 3
d. 4

22. If the lines given $3x + 2ky = 2$ and $2x + 5y = 1$ are parallel, then the value of k is

a. $-\frac{5}{4}$ b. $\frac{2}{5}$ c. $\frac{15}{4}$ d. $\frac{3}{2}$

23. For what value of p, will the following system of linear equations represent parallel lines?

$-x + py = 1$ and $px - y = 1$

a. 2 b. 3

c. 1 d. None of these

24. The value of x and y for the following system of equations $x + 8y = 19$ and $2x + 11y = 28$ (by substitution method) is

a. 3, 2 b. 2,3 c. 8, 3 d. 3, 4

25. Solve the following system of linear equations

$ax + by - a + b = 0$ and $bx - ay - a - b = 0$ The value of x and y are

a. 1, -1 b. -1, 1 c. 1, 0 d. 0, 2

26. The difference between two numbers is 26 and one number is three times the other number. The numbers are

a. 39 and 26 b. 39 and 41

c. 39 and 13 d. None of these

27. Two numbers are in the ratio 5 : 6. If 8 is subtracted from each of the numbers, the ratio becomes 4: 5, then the numbers are _____ and ____

a. 48, 20 b. 40, 28 **c. 40, 48** d. 20, 24

28. Using elimination method, all the possible solutions of the following pair of linear equations is $2x + 3y = 8$ and $4x + 6y = 7$

a. Consistent b. $x = 2$ $y = 3$

c. No solution d. All real values

29. Find the values of z and y in the following equations

$x - 3y = 8$ and $5x + 3y = 10$

a. $x = 3$, $y = \frac{5}{3}$ b. $x = -3$ $y = \frac{5}{3}$

c. x = -3 y = $\frac{-5}{3}$ d. none of these

30. The values of x and y for the following pair of linear. 41 x + 53y = 135 and 53 x + 41y = 147

a. x = 2 y = 3 b. x = 1 y = 2

c. x = 3 y = 2 **d. x = 2 y = 1**

31. If 2 x + 3y =5 and 3 x + 2y = 10, then x - y = ______

a. 3 b. 4 **c. 5** d. 6

32. If x = a and y = b is the solution of the equations x - y = 2 and x + y = 4, then the values of a and b are 3 and 2 respectively

a. True **b. False**

c. Cannot say d. Partially true / false

33. The pair of equations 3^{x+y} = 81, 81^{x-y} = 3 has

a. no solution b. unique solution

c. infinitely many solutions **d. x = 2 $\frac{1}{8}$ y = 1 $\frac{7}{8}$**

34. If the angels of a triangle are x, y and $40°$ and the difference between the two angles x an y is $30°$. Then, the value of x an y is $85°$ and $55°$

a. True b. False

c. Cannot say d. Partially true / false

35. The sum of a two-digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the first number, the new number is 4 more than 5 times the sum of the digits in the first number. Then, the first number is 64.

. **a. True** b. False

c. Cannot say d. Partially true / false

36. The area of a rectangle increases by 76 sq. units, if the length and breadth is increased by 2 units. However, if the length is increased by3 units and

breadth is decreased by 3 units, the area of sets reduced by 21sq units. Find the breadth of the rectangle.

a. 9 units **b. 16 units** c. 18 units d. 21 units

37. A fraction becomes 4/5 when 1 is added to each of the numerator and denominator. However, if we subtract 5 from each of them, it becomes $\frac{1}{2}$ Then numerator of the fraction is

a. 6 **b. 7** c.8 d. 9

38. Six years hence, a man's age will be three times the age of his son and three years ago he was nine times as old as his son. The present age of the man is

a. 28 b. 30 c. 32 d. 34

39. Aruna has only Rs 1 and Rs 2 coins with her. I the total number of coins that she has is 50 and the amount of money with her is Rs. 75, then the number of Rs. 1 and Rs. 2 coins is

A .24, 24 **b. 25, 25**

c. 26, 26 d. None of these

40. From a bus stand in Delhi, if we buy 2 tickets to Pitampura and 3 tickets to Dilshad Garden, the total cost is Rs.46 but if we buy 3 tickets to Pitampura and 5 tickets to Dilshad Garden, the total cost is Rs.74. Then the fares from the bus stand to Pitampura and to Dilhead Garden is

a. Rs. 8, Rs.100 b. Rs.10 Rs.8

c. Rs.8 Rs.10 d. Rs. 20 Rs.5

41. The value of x and y of the following pair of equation is $\frac{2}{x}+\frac{3}{y}=13; \frac{5}{x}+\frac{4}{y}=-2$

a. x = 2 , y = 3 b. $x = \frac{1}{3}$ $y = \frac{1}{2}$ **c.** $\boldsymbol{x = \frac{1}{2}}$ $\boldsymbol{y = \frac{1}{3}}$ d. x = 3 , y = 2

42. The value of x and y of the following pairs of equations by reducing them to a pair of linear equations is $\frac{2}{\sqrt{x}} + \frac{2}{\sqrt{y}} = 2$ $\frac{4}{\sqrt{x}} + \frac{9}{\sqrt{y}} = -1$

a. $\boldsymbol{x}$ **= 4, y = 9** b. x = 2, y = 3

c. x = 8, y = 18 d. None of the above

43. The values of x and y in the pair of equation x + 4y = 27 x y, x + 2y - 21 x y is

a. x = 3 , y = 15 b. x = 15 , y = 3 c. $x = \frac{1}{15}$ $y = \frac{1}{3}$ **d.** $x = \frac{1}{3}$ $y = \frac{1}{15}$

44. The value of x and y in $\frac{5}{x+1} - \frac{2}{y-1} = \frac{1}{2}$, $\frac{10}{x+1} - \frac{2}{y-1} = \frac{5}{2}$ where $x \neq -1$ and $y \neq -1$ is

a. x **= 4 , y = 5** b. x = 15 , y = 3 c. $x = \frac{1}{15}$ $y = \frac{1}{3}$ d. $x = \frac{1}{3}$ $y = \frac{1}{15}$

45. The train covered a certain distance at a uniform speed. If the train would have been 10 km/h faster, it would have taken 2 h less than the scheduled time and if the train was slower by 10 km/h, it would have taken 3 h more than the scheduled time. Then, the distance covered by the train is

a. 50 km b. 300 km **c. 600 km** d) 12 km

46. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4:3. If each of them manages to save Rs.2000 per month, then find their monthly incomes. From a pair of linear equations from the above data and by elimination method, the value of monthly incomes are.

a. 18000, 14000 b. 20000, 12000

c. 22000, 10000 d. None of the above

47. A boatman rows his boat 35 km upstream and 55 km upstream in 12h. He can row 30 km upstream and 44km downstream in 10 h, then the speed of the boat in still water is.

a. 8 km/h b. 3 km/h c. 5km/h d) 11 km /h

48. Match the Column

	Column I		**Column II**
A.	2 x + 3y = 40 6 x + 5y = 10	1.	Coincident lines
B.	2 x + 3y = 40 6 x + 9y = 50	2.	Intersecting lines
C.	2 x +3y = 10 4 x +6y = 20	3.	Parallel lines

Codes

	A	B	C
a.	1	2	3
b.	3	2	1
c.	**2**	**3**	**1**
d.	1	3	2

50. Column- II give value of x and y for pair of equation given in Column II

	Column I		**Column II**
A.	$2x + y = 8$ $x + 6y = 15$	p.	(3, 4)
B.	$5x + 3y = 35$ $2x + 4y = 28$	q.	(4, 5)
C.	$15x + 4y = 61$ $4x + 15y = 72$	r.	(3, 2)

Codes

	A	B	C
a.	r	p	q
b.	p	r	q
c.	**r**	**q**	**p**
d.	None of these		

Fill in the blanks

1. If in a system of equation corresponding coefficients of member equations are proportional then the system has __________solution (s)

Infinite

2. If in a system of equation $a_1 x + b_1 y + c_1 = 0$, $a_2 x + b_2 y + c_2 = 0$ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ then the line representing the equation must _______at _______ point(s)

Intersect, one

3. If in a system of equations $a_1 x + b_1 y + c_1 = 0$, $a_2 x + b_2 y + c_2 = 0$ $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ then the system is equation is ___________.

Inconsistent

4. A pair of linear equations is said to be inconsistent if its graph lines are

__________.

Parallel

5. A pair of linear equations is said to be_______ if its graph lines intersect or coincide.

Consistent

6. A consistent system of equations where straight lines fall on each other is also called ________system of equations.

Dependent

7.The pair of linear equations ax + by + c = 0 and lx + my + n = 0 represents two parallel lines if __________, ____________.

$\frac{a}{l} = \frac{b}{m} = \frac{c}{a}$

8. Solution of linear equations representing 2x - y = 0, 8x + y = 25 is _______.

x = 2.5 y = 5

9. System of linear equations representing two numbers whose ratio is 2 : 3 and on adding 5 to each number the ratio becomes 5 : 7 is _________

7x – 5 y + 10 = 0 , 3x + 2y = 0

10. The solution of $\sqrt{2}\,x$ - $\sqrt{5}$ y = 0 and $\sqrt{7}\,x$ - $\sqrt{7}$ y = 0 is _________.

x = 0, y = 0

I. Very short answer question

1. **For what value of *k*, the pair of linear equations 3x + *y* = 3 and 6x + *ky* = 8 does not have a solution.**

System has no solution if system has no solution if

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

$$\frac{3}{6} = \frac{1}{k} \neq \frac{3}{8}$$

$$\frac{3}{6} = \frac{1}{k}$$

K = 2

2. For what value of k, the pair of linear equations $x + y - 4 = 0$ and $2x + ky = 3$ does not have a solution

$x + y - 4 = 0$

and $2x + ky - 3 = 0$

Here $\frac{a_1}{a_2} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{1}{k}$ $\frac{c_1}{c_2} = \frac{-4}{-3} = \frac{4}{3}$

$\because$ System has no solution

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

$\Rightarrow$ $\frac{1}{2} = \frac{1}{k} \neq \frac{4}{3}$

$\Rightarrow$ k = 2 or k $\neq \frac{3}{4}$

Hence, the value of k is 2

3. Find the value of k for which system of linear equations $x + 2y = 3$, $5x + ky + 7 = 0$ is inconsistent

We have,

$x + 2y - 3 = 0$ .....(i)

and $5x + ky + 7 = 0$ .....(ii)

Comparing eq.(1) with $a_1x + b_1y + c_1 = 0$ and eq.(ii) with $a_2x + b_2y + c_2 = 0$ we get

$a_1 = 1$ $a_2 = 5$ $b_1 = 2$ and $b_2 = k$, $c_1 = -3$ and $c_2 = 7$

Since, system is inconsistent, then

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

$\Rightarrow \frac{1}{5} = \frac{2}{k} \neq \frac{-3}{7}$

either $\frac{1}{5} = \frac{2}{k}$ **or** $\frac{2}{k} \neq \frac{-3}{7}$

$\Rightarrow$ **10 = k or k** $\neq \frac{-14}{3}$

Since the value of k = 10

4. For which value (s) of p, will the lines represented by the following pair of linear equations be parallel

$3x - y - 5 = 0$

$6x - 2y - p = 0$

All real values except 10

Given, $3x - y - 5 = 0$ .....(i)

$6x - 2y - p = 0$ .....(ii)

Comparing eq.(1) with $a_1 x + b_1 y + c_1 = 0$ and eq.(ii) with $a_2 x + b_2 y + c_2 = 0$ we get

$a_1 = 3$ $a_2 = 6$ $b_1 = -1$ and $b_2 = -2$, $c_1 = -5$ and $c_2 = -p$

We know that, for parallel lines

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

$\frac{3}{6} = \frac{1}{2} \neq \frac{5}{p}$

From (i) and (ii),

$p \neq 10$

So, p can have any number other than 10

5. Find the number of solutions of the following pair of linear equations:

$x + 2y - 8 = 0$, $2x + 4y = 16$

$x + 2y - 8 = 0$ _______(1)

$2x + 4y = 16$ _______(2)

Here $a_1 = 2$ $b_1 = 2$, $c_1 = -8$

and a_2 = 2 b_2 = 4, c_2 = -16

Now $\frac{a_1}{a_2} = \frac{1}{2}$, $\frac{b_1}{a_2} = \frac{2}{4}$ $\frac{c_1}{a_2} = \frac{-8}{-16}$ = $\frac{1}{2}$

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

∴ Given pair of linear equations has infinite many solutions

6. Given the linear equation 3 x + 4y - 8 = 0 write another linear equation in two variables such that the geometrical representation of the pair so formed is parallel lines.

   Lines are parallel when $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

∴ One of the linear equation in two variables can be 6 x + 8y + k = 0 where is constant not equal to -16

7. Find the value of k for which the given pair of linear equations has no common solutions

   4 x + ky = 5

   8 x + 12y = 10

Given equations are 4 x + ky = 5, 8 x +12y = 10

a_1 = 4 b_1 = k c_1 = 5

and a_2 = 8 d b_2 = 12, c_2 = 10

For no common solution

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

$\Longrightarrow$ $\frac{4}{8} = \frac{k}{12} \neq \frac{5}{10}$

$\Longrightarrow$ $\frac{1}{2} = \frac{k}{12}$ *and* $\frac{k}{12} \neq \frac{1}{2}$

$\Longrightarrow$ k = 6 and k $\neq$ 6

There is no value of k for which given pair of liner equations has no common solution

8. On solving the following pair of linear equations: $2x - y = 2$; $5x + 2y = 14$ by substitution values of x and y are ________ and ________ respectively.

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

$5x + 2y = 14$ .....(ii)

Substituting $y = 2x - 2$ in (ii) we get

$5x + 2(2x - 2) = 14 \Rightarrow x = \frac{18}{9} = 2$

$\Rightarrow$ $x = 2$ $y = 2$

9. Solve the following pair of linear equations by substitution method

$2x - 3y + 15 = 0$ $3x - 5 = 0$

Given equations are

$2x - 3y + 15 = 0$ ......(1)

$3x - 5 = 0$ .....(2)

From equation (ii) we get

$3x - 5 = 0 \Rightarrow x = \frac{5}{3}$

Substituting $x = \frac{5}{3}$ in eq (i) we get

$2\left(\frac{5}{3}\right) - 3y + 15 = 0$

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

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

$\Rightarrow$ $-3y = \frac{-45-10}{3}$

$\Rightarrow$ $y = \frac{55}{9}$

$\therefore$ $\boldsymbol{x = \frac{5}{3}, \quad y = \frac{55}{9}}$

10. Find the value of k for which the following pair of linear equations have infinitely many solutions. $2x + 3y = 7$ $(k + 1)x + (2k - 1)y = 4k + 1$

Given equations $2x + 3y - 7 = 0$

$(k + 1)x + (2k - 1)y - (4k + 1) = 0$

Here, a_1 = 2 b_1 = 3 c_1 = -7

and a_2 = (k + 1) d b_2 = 2k - 1, c_2 = -(4k + 1)

For infinitely many solutions

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

$$\Rightarrow \quad \frac{2}{(k+1)} = \frac{3}{(2k-1)} = \frac{-7}{-(4k+1)}$$

$$\therefore \quad \frac{2}{(k+1)} = \frac{3}{(2k-1)} \text{ and } \frac{3}{(2k-1)} = \frac{7}{(4k+1)}$$

∴   4k - 2 = 3k + 3

and   12k + 3 = 14k -7

⇒   k = 5   ......(1)

2k = 10

⇒   k = 5   ......(2)

Using (1) and (2) ⇒ k = 5

11. Find the relation between p and q if x =3 and y = 1 is the solution of the pair of equations.

x - 4y + p = 0 and 2 x + y – q - 2 = 0

Since x = 3 y = 1 is the solution of

x - 4y + p = 0   ....(i)

2 x + y – q – 2 = 0   ....(ii)

So, x = 3 y =1 must satisfy both (i) and (ii)

⇒   3 - 4 (1) + p = 0 ⇒ p = 1

and   2(3) + (1)– q -2 = 0 ⇒ q = 5

Since   1 = - 4 + 5

∴   p = 1 = - 4 + 5

= q - 4

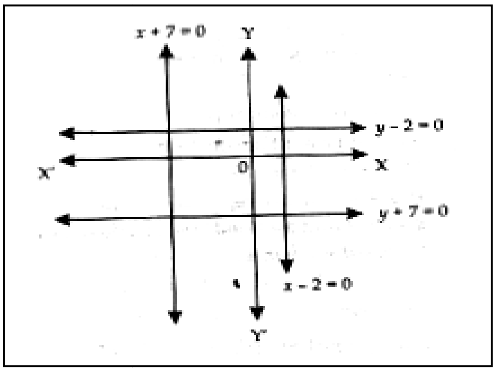
⇒   P = q - 4

Thus, p is lesser than q by 4.

12. Name the geometrical figure enclosed by graph of the equations $x + 7 = 0$

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

Clearly a square of side 9 units is enclosed by lines.



7. Determine whether the following system of linear equations is inconsistent or not

$3x - 5y = 20$

$6x - 10y = -40$

Given

$3x - 5y = 20$ .....(i)

$6x - 10y = -40$ .....(ii)

Here, $\frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}$

$$\frac{b_1}{b_2} = \frac{-5}{-10} = \frac{1}{2}$$

$$\frac{c_1}{c_2} = \frac{20}{-40} = \frac{-1}{2}$$

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

Hence give pair of linear equation are parallel

$\therefore$ It is inconsistent

8. If 51 x + 23y = 116 and 23 x +51y = 106, then find the value of (x - y)

51 x + 23y = 116 ....(i)

23 x + 51y = 106 ....(ii)

Subtracting (ii) from (i)

28 x - 28y = 10

28 (x - y) = $\frac{10}{20} = \frac{5}{14}$

$\Rightarrow$ (x - y) = $\frac{10}{20} = \frac{5}{14}$

9. For what value of 'a' the point (3, a) lies on the line represented by 2 x -3y = 5?

Since (3, a) lies on the equation 2 x -3y = 5?

∴ (3, a) must satisfy this equation

$\Rightarrow$ 2(3) - 3(a) = 5

$\Rightarrow$ 6 – 3a = 5

$\Rightarrow$ -3a = 5 - 6 = -1

a = $\frac{1}{3}$

Short answer type questions I

1. Find the value(s) of k so that the pair of equations x + 2y = 5 and 3 x + ky + 15 = 0 has a unique solution.

x + 2y = 5 ....(i)

3 x + ky + 15 = 0 ....(ii)

a_1 = 1 b_1 = 2 c_1 = -5

a_2 = 3 b_2 = k c_2 = 15

For unique solution,

$\Rightarrow \qquad \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\Rightarrow \qquad \frac{1}{3} \neq \frac{2}{k}$

$\Rightarrow \qquad k \neq 6$

So given system of equations is consistent with unique solution for all values of k other than 6

2. Find c if the system of equations cx +3y + (3 - c) = 0; 12x + cy – c = 0 has infinitely many solutions?

The system of equations are

$cx + 3y + (3 - c) = 0$ ......(i)

$12x + cy - c = 0$ ......(ii)

For infinitely many solutions, we have

$\frac{c}{12} = \frac{3}{c} = \frac{3-c}{-c}$

$\Rightarrow \quad c^2 = 36$ and $-3c - c^2$

$\Rightarrow \quad c^2 = 6c \Rightarrow c^2 - 6c = 0$

$\Rightarrow \quad c(c - 6) = 0 \Rightarrow c = 0$ or $c = 6$

Hence, possible value is c =6

3. Solve for x and y using substitution method.

$x + 2y - 3 = 0$; $3x - 2y + 7 = 0$;

Given equations are

$x + 2y - 3 = 0$ ......(i)

$3x - 2y + 7 = 0$ ......(ii)

From equation (i) , we get

$x + 2y - 3 = 0$

$\Rightarrow \quad x = 3 - 2y$ ......(iii)

Substituting $x = 3 - 2y$ in equation (ii) we get

$3(3 - 2y) - 2y + 7 = 0$

$\Rightarrow \quad 9 - 6y - 2y + 7 = 0$

$\Rightarrow$ $-8y = -16$

$\Rightarrow$ $y = 2$

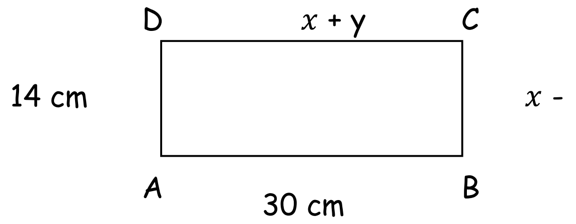
When y = 2 equation (iii) becomes

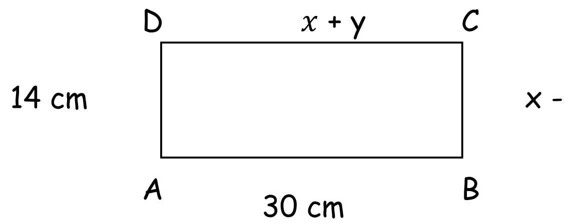
$x = 3 - 2 \times 2$

$\Rightarrow$ $x = -1$

$\therefore$ $x = -1, y = 2$

4. In Fig, ABCD is a rectangle. Find the values of x and y





We know that opposite sides of a rectangular are equal So.

$x + y = 30$ ....(i)

$x - y = 14$ ....(ii)

On adding $2x = 44$

$\therefore$ $x = \frac{44}{2} = 22$

Putting $x = 22$ in eq. (i) we have

$22 + y = 30$

$\Rightarrow$ $y = 30-22 = 8$

$x = 22$ cm and $y = 8$ cm

5. Solve for x and y by the method of elimination : $4x - 3y = 1$: $5x - 7y = -2$

Given equations are

$4x - 3y = 1$ ....(i)

$5x - 7y = -2$ ....(ii)

For making coefficient of y equal in both the equations multiplying equation (i) with 7, we get

$$7 \times (4x - 3y) = 7 \times 1$$

$\Rightarrow$ $28x - 21y = 7$ ....(iii)

Multiplying equation (ii) with 3, we get

$$3 x (5x - 7y) = 3 x - 2$$

$\Rightarrow$ $15x - 21y = -6$ ....(iv)

Subtracting equation (iv) from (iii) we get

$$28x - 21y = 7$$

$$15x - 21y = -6$$

$$- \quad + \quad +$$

$$13x = 13$$

$\Rightarrow$ $x = 1$

When $x = 1$, equation (i) becomes

$$4 \times 1 - 3y = 1$$

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

$\therefore$ $x = 1, y = 1$

6. Solve the following pair of linear equations using elimination method.

$x - y + 1 = 0$; $4x + 3y - 10 = 0$

$x - y + 1 = 0$ ......(i)

$4x + 3y - 10 = 0$ ....(ii)

Eq. (i) is multiplied by 4, then we get

$$4x - 4y + 4 = 0$$

$$4x + 3y - 10 = 0$$

$$- \quad - \quad + \quad -$$

$$-7y + 14 = 0$$

$7y = 14$

$\therefore$ $Y = 2$

Putting $y = 2$ in (ii), we get

$x = 1$

Hence $x = 1, y = 2$

7. Find the values of k for which the pair of linear equations $kx + y = k^2$ and $x + ky = 1$ have infinitely many solutions.

We have

$$\frac{a_1}{a_2} = \frac{k}{1}, \frac{b_1}{b_2} = \frac{1}{k}, \frac{c_1}{c_2} = \frac{k^2}{1}$$

For Infinitely Many solutions

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

$$\frac{k}{1} = \frac{1}{k} = \frac{k^2}{1}$$

1st and 2nd Ratio $\Rightarrow$ $k^2 = 1$

$\Rightarrow$ $k = \pm 1$

2nd and 3rd Ratio $k^2 = 1$

$\Rightarrow$ $k = 1$

(i) and (ii) $\Rightarrow$ $k = 1$

8. Find out whether the following pair of equation is consistent or inconsistent $3x + 2y = 5$ $2x - 3y = 7$

Here $a_1 = 3$ $a_2 = 2$ $b_1 = 2$ $b_2 = -3$ $c_1 = 5$ $c_2 = 7$

$$\frac{a_1}{a_2} = \frac{3}{2}, \frac{b_1}{b_2} = \frac{2}{-3} = \frac{-2}{3}$$

i.e. $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Hence the equation will have a unique solution

9. For what value of k

$2x$ + 2y + 2 = 0

$4x$ + ky + 8 = 0

Will have a unique solution

Here a_1 = 2 b_1 = 2 c_1 = 2

a_2 = 4 b_2 = k c_2 = 8

For the given system of linear equations to have a unique solution

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$$\frac{2}{k} \neq \frac{2}{k}$$

∴ 2k ≠ 2 x 4, or k ≠ 4

Short answer type questions II

1. Determine by drawing graphs, whether the following pair of linear equations has a, unique solution or not : $3x$ + 4y = 12 ; y = 2

Given equations are $3x$ + 4y = 12

and y = 2

Table for $3x$ + 4y = 12 is

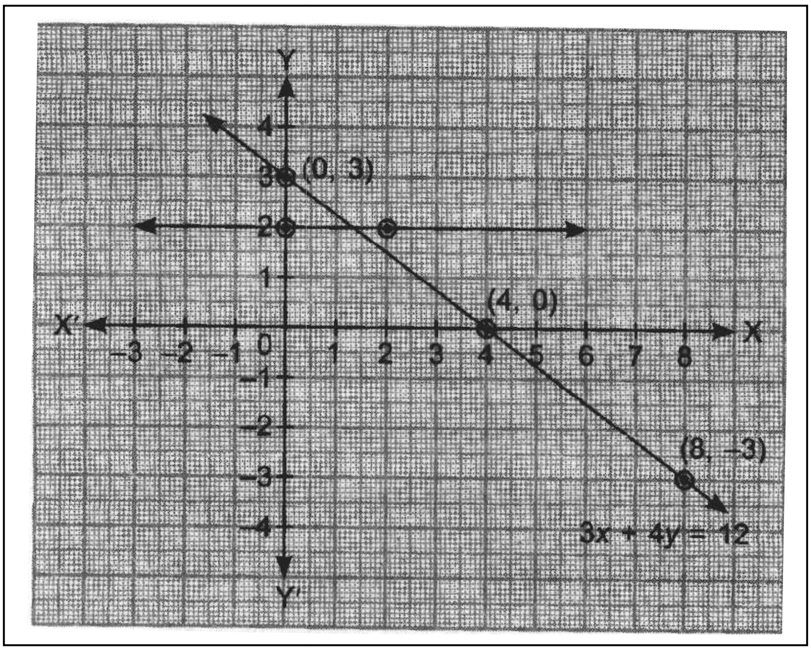
x	0	4	8
y	3	0	-3

Table for y = 2 is

x	0	1	2
y	2	2	2

∵ Lines intersect at one point

∴ Pair of linear equations has a unique solution



2. From a stationery shop, Archana bought two pencils and three pens for Rs 40 and India bought one pencil and two pens for Rs.25. Find the price of one pencil and one pen graphically

Let price of one pencil = Rs. x

and price of one pen = Rs. Y

A.T.Q. 2 x + 3y = 40 and x + 2y = 25

Table for 2 x + 3y = 40

x	20	14	5
y	0	4	10

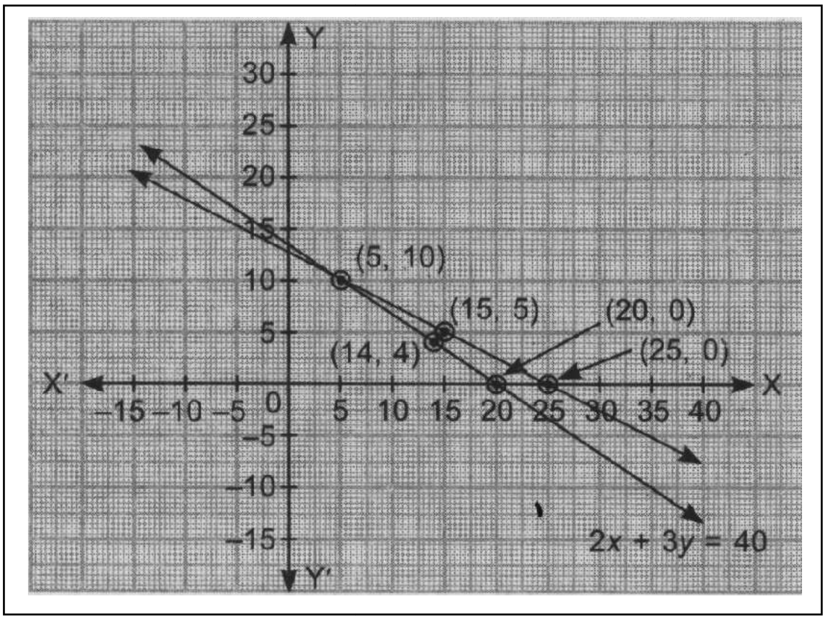
Table for x + 2y = 25 is

x	25	5	15
y	0	10	5

From graph, we get x = 5, y = 10

∴ Cost of one pencil = Rs.5

And one pen = Rs.10



3. Two digit number is divisible by 9. Number when multiplied by sum of its digits is equal to 486. Find the number.

Let digit at unit's place $= x$

and digit at ten's place $= y$

$\therefore$ Number $= 10y + x$

$\because$ Number is divisible by 9

$\therefore$ $10y + x = 9m$

Where m is any positive integer . Also sum of digits, should be divisible by 9

$\Rightarrow$ $x + y = 9q$, where q is any positive integer

A.T.Q

$$(10x + y)(x + y) = 486 \quad \text{.........(i)}$$

$\Rightarrow$ $(10x + y) \times 9q = 486$

$\Rightarrow$ $10x + y = \frac{54}{q}$

$\because$ $10x + y$ is multiplied 9

$\therefore$ $q = 1, 2$ or 3

when $q = 1$, $10x + y = 54$

when $q = 2$, $10x + y = 27$

when q = 3, 10 x + y = 18

Only 10 x + y = 54 satisfies the eq.(i)

∴ Number = 54

4. Solve for x and y using substitution method

$$\frac{ax}{b} - \frac{by}{a} = a + b \; ; \; ax - by = 2ab$$

Given equations are

$$\frac{ax}{b} - \frac{by}{a} = a + b \qquad \text{..... (i)}$$

$$ax - by = 2ab \qquad \text{..... (ii)}$$

From equation (ii) we get

$$ax - by = 2ab \implies ax = 2ab + by$$

$$\implies \quad x = \frac{2ab + by}{a} \qquad \text{.....(iii)}$$

Substituting $x = \frac{2ab + by}{a}$ in equation (i) we get

$$\implies \left(\frac{2ab + by}{a}\right) - \frac{by}{a} = a + b$$

$$\implies \quad \frac{2ab + by}{b} - \frac{by}{a} = a + b$$

$$\implies \quad \frac{2ab}{b} + \frac{by}{b} - \frac{by}{a} = a + b$$

$$2a + y - \frac{by}{a} = a + b$$

$$\frac{ay - by}{a} = a + b - 2a$$

$$\frac{(a - b)y}{a} = b - a$$

$$\implies \quad y = (b - a) \times \frac{a}{a - b}$$

$$\implies \quad y = -a$$

When y = -a, equation (iii) becomes

$$x = \frac{2ab + b(-a)}{a}$$

$$\implies \quad x = \frac{ab}{a} \implies x = b$$

∴ x =b, y = -a is the solution of given pair of linear

5. Solve the following pair of linear equations for x and y

2(ax - by) + (a + 4b) = 0   2 (bx + ay) + (b - 4a) = 0

Consider equations

2(ax - by) + (a + 4b)= 0

and 2(bx + ay) + (b - 4a) = 0

$\Rightarrow$ 2ax – 2by = -a -4b ……(i)

and 2bx +2 ay = 4a –b ……(ii)

Multiply (i) by a and (ii) by b and adding , we get

2(a^2 + a^2) x = (-a - 4b) a + b (4a - b)

= -a^2- 4ab + 4ab - b^2

= - $(a^2 + b^2)$

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

Substituting in (i), we get

-a - 2by = -a -4b

-2by = -4b $\Rightarrow$ y = 2

$\therefore$ x x = $-\frac{1}{2}$ and y = 2.

6. A number consists of two digits. Where 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.

Let digit at unit place be x, and at tenth place be y

$\therefore$ Number = 10y + x

According to the question

$\frac{\mathbf{10y + x}}{\mathbf{y + x}} = 7 \Rightarrow 6x - 3y = 0$

$\Rightarrow$ 2x -y = 0 ……..(i)

Again according to the question

(10y + x) – 27 = 10x + y

9x - 9y = - 27

$\Rightarrow$ $x - y = -3$ ....(ii)

Solving for x and y, we get

$x = 3$ and $y = 6$

$\therefore$ Number is 63.

7. Solve $2x + 3y = 11$ and $x - 2y = -12$ algebraically and hence find the value of m for which $y = x$ $x = 3$

$2x + 3y = 11$ ....(i)

$x - 2y = -12$ ......(ii)

(ii) $\Rightarrow$ $x = 2y - 12$ ......(iii)

Substitute value of x from (iii) in (i), we get

$2(2y - 12) + 3y = 11$

$\Rightarrow$ $4y - 24 + 3y = 11$

$\Rightarrow$ $7y = 35$

$\Rightarrow$ $y = 5$

Substituting value of $y = 5$ in equation (iii) we get

$4 = 2(5) - 12 = 10 - 12 = -2$

Hence, $x = -2$ $y = 5$ is the required solution

Now, $5 = -2m + 3$

$\Rightarrow$ $2m = 3 - 5$

$\Rightarrow$ $2m = -2$

$\Rightarrow$ $m = -1$

8. Represent the system of linear equations $3x + y = 5$ graphically. From the graph, find the points where the lines intersect y- axis.

$3x + y - 5 = 0$, $2x + y - 5 = 0$

$3x + y - 5 = 0$ ......(i)

$2x + y - 5 = 0$ ......(ii)

(i) $\Rightarrow$ $y = 5 - 2x$ ......(iii)

Table of solutions for (iii)

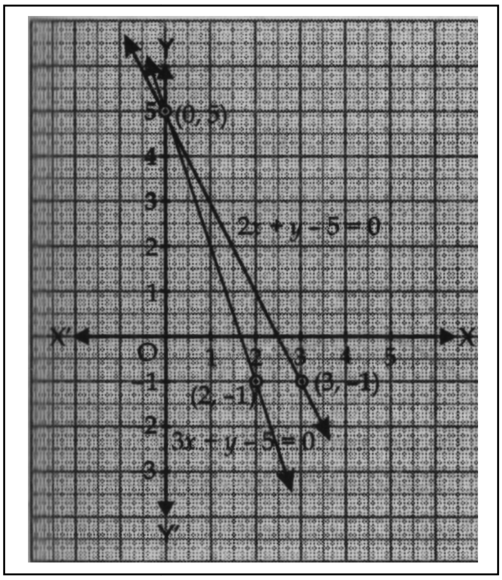
x	0	2
y	5	-1

(ii) $\Rightarrow$ y = 5 -2 x ……(iv)

Table of solutions for (iv)

x	0	3
y	5	-1

Plot the points and draw the lines passing through them. We observe the two lines intersect at the point (0, 5) which lies on y- axis. So from graph, we conclude that (0, 5) is the required point where the lines intersect y- axis



9. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$

when 8 is added to its denominator. Find the fraction

Let the fraction be $\frac{x}{y}$

According to given conditions

$$\frac{x-1}{y} = \frac{1}{3} \text{ and } \frac{x}{y+8} = \frac{1}{4}$$

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

$\Rightarrow$ $3x - y - 3 = 0$ ....(i)

and $4x - y - 8 = 0$ ....(ii)

Subtracting (ii) from (i)

$\Rightarrow$ $-x + 5 = 0$

$\Rightarrow$ $x = 5$

Put $x = 5$ in (i), we get

$3(5) - y - 3 = 0 \Rightarrow y = 15 - 3$

$\Rightarrow$ $y = 12$

$\therefore$ Fraction is $\frac{5}{12}$

10. Find the two numbers whose sum is 75 and difference is 15.

Let x is the first number and y be the second number

A.T.Q.

$x + y = 75$ ....(i)

$x - y = 15$ ....(ii)

By elimination method from (i) and (ii)

$$\begin{array}{r} x + y = 75 \\ x - y = 15 \\ - \quad + \quad - \\ \hline 2y = 60 \end{array}$$

$y = \frac{60}{2}$ $y = 30$

Putting the value of y in eq.(i) we get,

$x + 30 = 75$

$x = 75 - 30$

$x = 45$

$\therefore$ $x = 45$

Hence the first number = 45 and Second number = 30

11. When the son will be as old as what his father is today their ages will add upto 126 years. When the father was as old as what his son is today, their ages added upto 38 years. Find their present ages

Let son's present age be x years and father's present age be y years. Difference in father's and son's age, then the son would turn as old as his father is now and at the time the father's age will be [y + (y- x)] years. Also if we subtract this difference from father's present age , then father would be as old as his son is today and at that time son's age will be [x -(y + x)] years.

Thus, Condition I :

$\Rightarrow$ $[x + (y - x)] + [y + (y - x)] = 126$

$\Rightarrow$ $3y - x = 126$

$\Rightarrow$ $x - 3y = -126$ ......(i)

Condition II.

$\Rightarrow$ $[y - (y - x)] + [x - (y - x)] = 38$

$\Rightarrow$ $3x - y = 38$ ....(ii)

(i) + (ii) $\Rightarrow$ $4(x - y) = -88$

$\Rightarrow$ $x - y = -22$ ....(iii)

(ii) – (i) $\Rightarrow$ $2(x + y) = 164$

$\Rightarrow$ $x + y = 82$ ....(iv)

(iii) + (iv) $\Rightarrow$ $2x = 60$

$\Rightarrow$ $x = 30$

(iv) – (iii) $\Rightarrow$ $2y = 104$

$\Rightarrow$ $y = 52$

Hence present age of father is 52 years and that of son is 30 years.

12. Seven items a two digit number is equal to four times the number obtained by reversing the order of the digits. If the difference of the digits is 3, determine the number.

Let's ten's and Units digits be y and x respectively

$\therefore$ Value of Number is $10y + x$

Value of Number on reversal = $10x + y$

According to as given

$7(10y + x) = 4(10x + y)$

$\Rightarrow$ $70y + 7x - 40x + 4y$

$\Rightarrow$ $66y = 33x$ or $2y = x$

Also $x - y = 3$ ......(ii)

Put the value of x in (ii) from (i)

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

Put for y in (i)

$x = 2(3) = 6$

Hence the number is 36.

Long answer type questions

1. Solve the equations graphically :

$2x + y = 2 \quad 2y - x = 4$

What is the area of the triangle formed by the two lines and the line y = 0 ?

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

$2y - x = 4$ ......(ii)

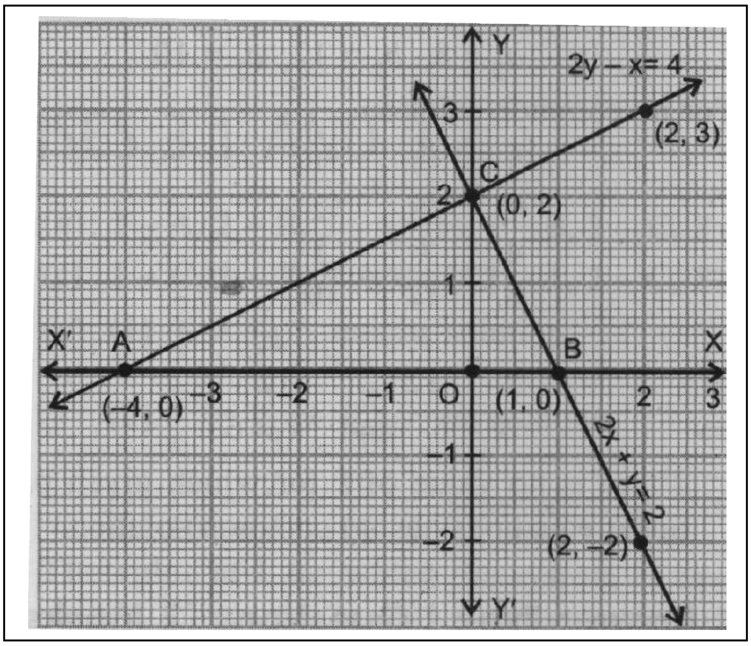
From (i) , $2x + y = 2$

x	1	0	2
y	0	3	-2

From (ii) , 2y - x = 4

x	0	-4	2
y	2	0	3

Area A = $\frac{1}{2}$ AB $\times$ CO= $\frac{1}{2}$ $\times$ 5$\times$ 2 = 5 square units



2. It can take 12 hours to fill a swimming pool using two pipes. If the pipe with larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half the pool can be filled. How long would it take for each pipe to fill the pool separately?

Let pipe with larger diameter fills x part of the pool in one hour and pipe with smaller diameter fills y part of the pool in one hour.

A.T.Q.

$$x + y = \frac{1}{12} \quad \text{........(i)}$$

Also when larger pipe is used for 4 hours and smaller pipe is used for 9 hours.

Then, half the pool is filled

$\Rightarrow$ $4x + 9y = \frac{1}{2}$ ....(ii)

From eq.(i), we get $x = \frac{1}{12} - y$

.........(iii)

Substituting in eq. (ii), we get

$$4\left(\frac{1}{12} - y\right) + 9y = \frac{1}{2}$$

$\Rightarrow$ $\frac{1}{3} - 4y + 9y = \frac{1}{2}$

$\Rightarrow$ $5y = \frac{1}{2} - \frac{1}{3} = \frac{1}{6}$

$\Rightarrow$ $y = \frac{1}{30}$

When $y = \frac{1}{30}$. eq. (iii), becomes $x = \frac{1}{12} - \frac{1}{30} = \frac{3}{60}$

$\Rightarrow$ $x = \frac{1}{20}$

$\Rightarrow$ larger pipe fills $\frac{1}{20}$ part of the tank in one hour.

$\therefore$ Time taken by larger pipe to fill the tank = 20 hours.

Smaller pipe fills $\frac{1}{30}$ part of the tank in one hour

$\therefore$ Time taken by smaller pipe to fill the tank = 30 hours.

3. Two vessels A and B contain mixtures of Boric acid and water. A mixture of 3 parts from A and 2 parts from B is found to contain 29% of boric acid and a mixture of 1 part from A and 9 parts from B is found to contain 34% of boric acid. Fid the percentage of boric acid in a and B.

Let percentage of boric acid in A = x %

and percentage of boric acid in B = y %

A.T.Q. $\frac{x}{100} \times 3 + \frac{y}{100} \times 2 = \frac{29}{100} \times 5$

$\Rightarrow$ $3x + 2y = 145$ ....(i)

and $\frac{x}{100} \times 1 + \frac{y}{100} \times 9 = \frac{34}{100} \times 10$

⇒ $x + 9y = 340$

⇒ $x = 340 - 9y$ ....(ii)

Substituting in eq. (i), we get

$$3(340 - 9y) + 2y = 145$$

⇒ $25y = 875$

⇒ $y = 35$

When y = 35, eq.(ii) becomes

$$x = 340 - 9 \times 35 = 25$$

∴ A contains 25% of boric acid and B contains 35% of boric acid.

4. Two trains each 80m long passes each other on parallel lines. If they are going in same direction the faster train takes one minute to pass the other completely. If they are going in opposite directions they over take each other in three seconds. Find the speed of each train in km/hr.

Let speed of faster train $= x$ km /h

and speed of faster train = y km/h

(i) When they are going in same direction, then speed of overtaking = $(x - y)$ km hr

Distance = (80 + 80)

= 160 m = .16 km

Time taken $= \frac{0.16}{x-y}$ hr.

A.T.Q Time taken = 1 minute

$$= \frac{1}{60} \text{ hr}$$

⇒ $\frac{0.16}{x-y} = \frac{1}{60}$

⇒ $x - y = 9.6$ ....(i)

When trains are moving in opposite direction, then their

speed of crossing $= (x + y)$ km/hr

Time taken $= \frac{0.16}{x+y}$ hr

A.T.Q Time taken = 3 second

$= \frac{3}{3600}$ hr

$\Rightarrow$ $\frac{0.16}{x-y} = \frac{1}{1200}$

$\Rightarrow$ $x + y = 192$ ……(ii)

From (i) and (ii) , we get

$x - y = 9.6$

$x + y = 192$

$2x = 201.6$

$\Rightarrow$ $x = 100.8$

When $x = 100.8$ eq.(ii) becomes

$100.8 + y = 192$

$\Rightarrow$ $y = 192 - 100.8 = 91.2$

$\therefore$ Speed of faster train = 100.8 km/h

Speed of other train = 91.2 km/h

5. **Draw the graph of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and x -axis. Find the areas of the shaded region.**

The given system of equation is

$2x + y - 6 = 0$ …….(i)

$2x - y + 2 = 0$ …….(ii)

Let us write three solutions for each equation of the system in a table.

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

Table of solutions for $2x + y - 6 = 0$

x	0	2	3
y	6	2	0
(x, y)	(0, 6)	(2, 2)	(3,0)

Similarly (ii) ⇒ y = 2 x + 2

Table of solutions for 2 x - y +2 = 0

x	0	-1	2
y	2	0	6
(x, y)	(0, 2)	(-1, 0)	(2,6)

Plotting these points of each table of solutions on the same graph paper and joining them by a ruler, we obtain graph of two lines represented by equation (i) and (ii) respectively as shown in the graph below. Since the two lines intersect at point P (1, 4). Thus x = 1, y = 4 is the solution of the given system of equations.

In graph area bounded by the lines and x -axis is ΔPAB which is shaded.

Draw PM ⊥ x - axis

Clearly PM = y – coordinate of P (1, 4)

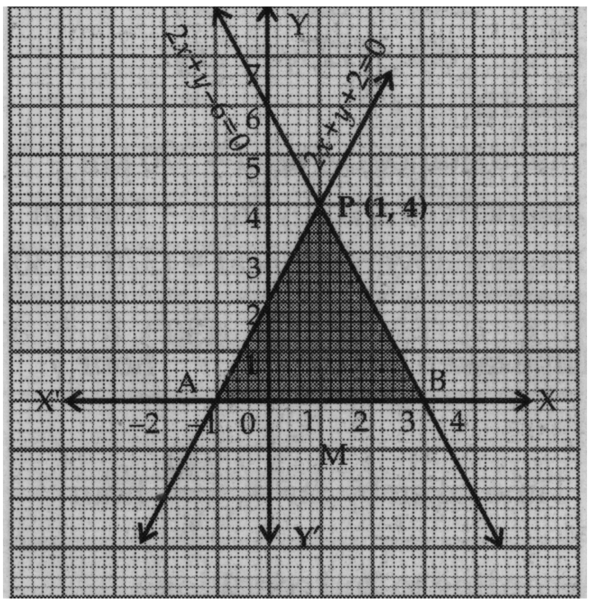
= 4 units.

Also AB = 1 + 3 = 4 units

∴ Area of shaded region

= Area of ΔPAB = $\frac{1}{2}$ x AB x PM

= $\frac{1}{2}$ x 4 x 4 = 8 sq. units



6. Draw the graphs of the following equations:

$2x - y = 1$, $x + 2y = 13$

i) Find the solution of the equations from the graph

ii) Shade the triangular regions formed by lines and the y axis

$2x - y = 1$

$x + 2y = 13$

Let as draw table of values for (i) and (ii)

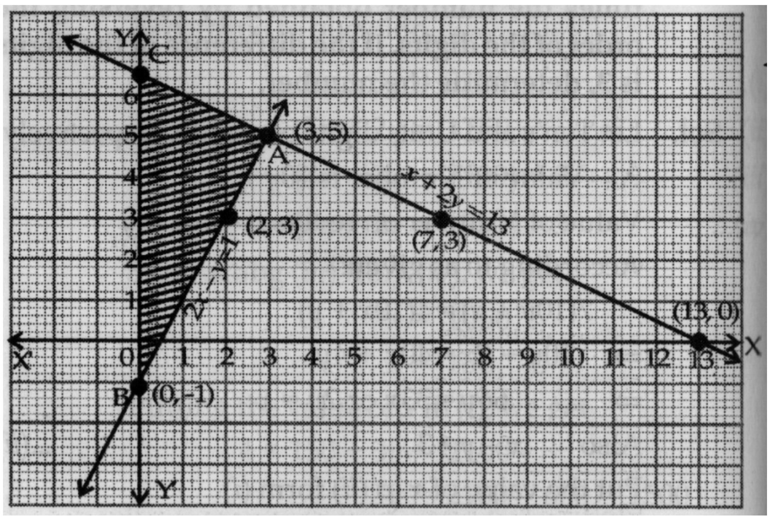
x	0	2	3
y	-1	3	5

x	7	13	3
y	3	0	5

Plotting these points on the graph paper, we see that the two lines representing equations (i) and (ii) intersect at point (3, 5)

(i) Therefore (3, 5) is solution of given system

(ii) Also that two lines enclose a triangular region ΔABC with y- axis which is shaded in graph



7. Solve the following system by drawing their graph.

$\frac{3}{2}x - \frac{5}{4}y = 6,\ 6x - 6y = 20$

Determine whether these are consistent inconsistent or dependent.

$\frac{3}{2}x - \frac{5}{4}y = 6 \qquad \Rightarrow\ y = \frac{6x - 3y}{4} = 6$

$\Rightarrow\ 6x - 5y = 24$

Table of values

x	4	-1	9
y	0	-6	6

Again $6x - 5y = 20$

Or $\qquad 5y = 6x - 20 \quad \therefore \quad y = \frac{6x - 20}{5}$

Table of values

x	0	5	-5
y	-4	2	-10

Plotting the points and joining by a ruler in each case. Here we see that the graph of given equations are parallel lines. The two lines have no point in common. The given system of equations has no solution and is, therefore inconsistent.