

**LINEAR EQUATIONS IN TWO VARIABLES**  
**FREQUENTLY ASKED QUESTIONS WITH SOLUTIONS**

**LEVEL-1( 1 MARK EACH)**

**Q1. Which of the following pairs of linear equations are consistent/inconsistent?**

(i)  $x + y = 5$ ,  $2x + 2y = 10$

**Answer**

(i)  $x + y = 5$ ;  $2x + 2y = 10$

$a_1/a_2 = 1/2$

$b_1/b_2 = 1/2$  and

$c_1/c_2 = 5/10 = 1/2$

Hence,  $a_1/a_2 = b_1/b_2 = c_1/c_2$

Therefore, these linear equations are coincident pair of lines and thus have infinite number of possible solutions. Hence, the pair of linear equations is consistent.

**Q2.** The coach of a cricket team buys 3 bats and 6 balls for Rs 3900. Later, she buys another bat and 3 more balls of the same kind for Rs 1300. Represent this situation algebraically.

**Solution:** Let cost of one bat = Rs  $x$

Cost of one ball = Rs  $y$

3 bats and 6 balls for Rs 3900 So that

$3x + 6y = 3900$

Given that she buys another bat and 2 more balls of the same kind for Rs 1300

So, we get

$x + 2y = 1300$

**Q3.** Find the number of solutions of the following pair of linear equations:

$x + 2y - 8 = 0$

$2x + 4y = 16$

**Solution:**  $a_1/a_2 = 1/2$

$b_1/b_2 = 1/2$

$c_1/c_2 = 1/2$

Here  $a_1/a_2 = b_1/b_2 = c_1/c_2$

Therefore, the equations have infinite number of solutions.

**Q4.** Two lines are given to be parallel. The equation of one of the lines is  $4x + 3y = 14$ . Find the equation of the second line.

**Solution:**  $8x + 6y = 28$

Q1. Solve the following pair of linear equations by the substitution method.

$$x + y = 14 ; x - y = 4$$

**Solution:**  $x + y = 14 \dots (i)$

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

From equation (i), we get

$$x = 14 - y \dots (iii)$$

Putting this value in equation (ii), we get

$$(14 - y) - y = 4$$

$$14 - 2y = 4$$

$$10 = 2y$$

$$y = 5 \dots (iv)$$

Putting this in equation (iii), we get

$$x = 9$$

$$\therefore x = 9 \text{ and } y = 5$$

Q2. For which value of k will the following pair of linear equations have no solution?

$$3x + y = 1$$

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

**Solution:**

$$3x + y - 1 = 0$$

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

$$a_1/a_2 = 3/2k-1$$

$$b_1/b_2 = 1/k-1 \text{ and}$$

$$c_1/c_2 = -1/-2k-1 = 1/2k+1$$

For no solutions,

$$a_1/a_2 = b_1/b_2 \neq c_1/c_2$$

$$3/2k-1 = 1/k-1 \neq 1/2k+1$$

$$3/2k-1 = 1/k-1$$

$$3k - 3 = 2k - 1$$

$$k = 2$$

Hence, for  $k = 2$ , the given equation has no solution.

Q3. Solve the following pair of linear equations by the elimination method .

$$x + y = 5 \text{ and } 2x - 3y = 4$$

**Solution**

$$x + y = 5 \text{ and } 2x - 3y = 4$$

By elimination method

$$x + y = 5 \dots (i)$$

$$2x - 3y = 4 \dots (ii)$$

Multiplying equation (i) by (ii), we get

$$2x + 2y = 10 \dots (iii)$$

$$2x - 3y = 4 \dots (ii)$$

Subtracting equation (ii) from equation (iii), we get

$$5y = 6$$

$$y = 6/5$$

Putting the value in equation (i), we get

$$x = 5 - (6/5) = 19/5$$

Hence,  $x = 19/5$  and  $y = 6/5$

**Q4.** On comparing the ratios  $a_1/a_2$ ,  $b_1/b_2$  and  $c_1/c_2$ , find out whether the lines representing the following pairs of linear equations intersect at a point, are parallel or coincident

$$5x - 4y + 8 = 0$$

$$7x + 6y - 9 = 0$$

**Solution:** Comparing these equation with

$$a_1x + b_1y + c_1 = 0$$

$$a_2x + b_2y + c_2 = 0$$

We get

$$a_1 = 5, b_1 = -4, \text{ and } c_1 = 8$$

$$a_2 = 7, b_2 = 6 \text{ and } c_2 = -9$$

$$a_1/a_2 = 5/7,$$

$$b_1/b_2 = -4/6 \text{ and}$$

$$c_1/c_2 = 8/-9$$

Hence,  $a_1/a_2 \neq b_1/b_2$

Therefore, both are intersecting lines at one point.

### LEVEL-3 ( 3 MARKS EACH)

**Q1.** 10 students of Class X took part in a Mathematics quiz. If the number of girls is 4 more than the number of boys, find the number of boys and girls who took part in the quiz. Find the solutions graphically.

**Solution**

Let number of boys =  $x$

Number of girls =  $y$

Given that total number of student is 10 so that

$$x + y = 10$$

Subtract  $y$  both side we get

$$x = 10 - y$$

Putting  $y = 0, 5, 10$  we get

$$x = 10 - 0 = 10$$

$$x = 10 - 5 = 5$$

$$x = 10 - 10 = 0$$

$x$	10	5
$y$	0	5

Given that if the number of girls is 4 more than the number of boys

So that

$$y = x + 4$$

Putting  $x = -4, 0, 4$ , and we get

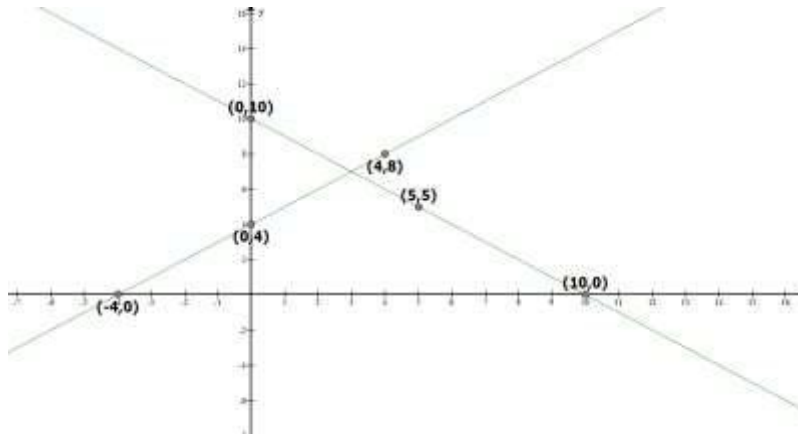
$$y = -4 + 4 = 0$$

$$y = 0 + 4 = 4$$

$$y = 4 + 4 = 8$$

x	-4	0	4
y	0	4	8

Graphical representation



Therefore, number of boys = 3 and number of girls = 7.

**Q2. 5 pencils and 7 pens together cost Rs 50, whereas 7 pencils and 5 pens together cost Rs 46. Find the cost of one pencil and that of one pen.**

**Solution:**

Let cost of pencil = Rs  $x$

Cost of pens = Rs  $y$

5 pencils and 7 pens together cost Rs 50,

So we get

$$5x + 7y = 50$$

Subtracting  $7y$  both sides we get

$$5x = 50 - 7y$$

Dividing by 5 we get

$$x = 10 - 7y/5$$

Putting value of  $y = 5, 10$  and  $15$  we get

$$x = 10 - 7 \times 5/5 = 10 - 7 = 3$$

$$x = 10 - 7 \times 10/5 = 10 - 14 = -4$$

$$x = 10 - 7 \times 15/5 = 10 - 21 = -11$$

x	3	-4	-11
y	5	10	15

Given that 7 pencils and 5 pens together cost Rs 46

$$7x + 5y = 46$$

Subtracting  $7x$  both side we get

$$5y = 46 - 7x$$

Dividing by 5 we get

$$y = 46/5 - 7x/5$$

$$y = 9.2 - 1.4x$$

Putting  $x = 0, 2$  and  $4$  we get

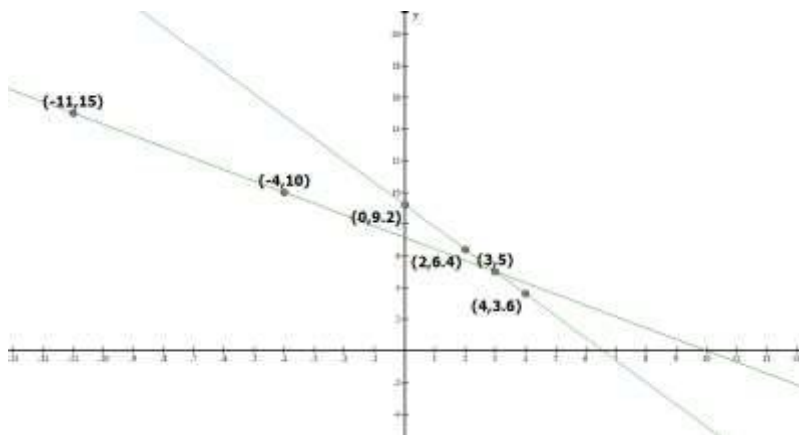
$$y = 9.2 - 1.4 \times 0 = 9.2 - 0 = 9.2$$

$$y = 9.2 - 1.4 (2) = 9.2 - 2.8 = 6.4$$

$$y = 9.2 - 1.4 (4) = 9.2 - 5.6 = 3.6$$

$x$	0	2	4
$y$	9.2	6.4	3.6

Graphical representation



Therefore, cost of one pencil = Rs 3 and cost of one pen = Rs 5.

**Q3. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?**

Let the speed of 1st car and 2nd car be  $u$  km/h and  $v$  km/h.

Respective speed of both cars while they are travelling in same direction =  $(u - v)$  km/h

Respective speed of both cars while they are travelling in opposite directions i.e., travelling towards each other =  $(u + v)$  km/h

According to the question,

$$5(u - v) = 100$$

$$\Rightarrow u - v = 20 \dots \text{(i)}$$

$$1(u + v) = 100 \dots \text{(ii)}$$

Adding both the equations, we get

$$2u = 120$$

$$u = 60 \text{ km/h} \dots \text{(iii)}$$

Putting this value in equation (ii), we obtain

$$v = 40 \text{ km/h}$$

Hence, speed of one car = 60 km/h and speed of other car = 40 km/h

Q4. Yash scored 40 marks in a test, getting 3 marks for each right 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 incorrect answer, then Yash would have scored 50 marks. How many questions were there in the test?

Let the number of right answers and wrong answers be  $x$  and  $y$  respectively.

According to the question,

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

$$4x - 2y = 50$$

$$\Rightarrow 2x - y = 25 \dots \text{(ii)}$$

Subtracting equation (ii) from equation (i), we get

$$x = 15 \dots \text{(iii)}$$

Putting this value in equation (ii), we get

$$30 - y = 25$$

$$y = 5$$

Therefore, number of right answers = 15

And number of wrong answers = 5

Total number of questions = 20

#### LEVEL-4 ( 4 MARKS EACH)

Q1. Draw the graphs of the equations  $x - y + 1 = 0$  and  $3x + 2y - 12 = 0$ . Determine the coordinates of the vertices of the triangle formed by these lines and the  $x$ -axis, and shade the triangular region.

**Solution.**

$$x - y + 1 = 0$$

$$x = y - 1$$

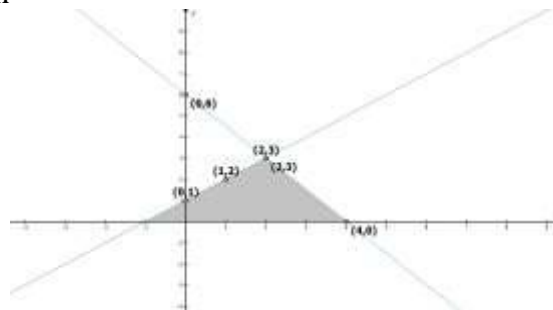
$x$	0	1	2
$y$	1	2	3

$$3x + 2y - 12 = 0$$

$$x = 12 - 2y/3$$

$x$	4	2	0
$y$	0	3	6

Graphical representation



From the figure, it can be observed that these lines are intersecting each other at point (2, 3) and  $x$ -axis at  $(-1, 0)$  and  $(4, 0)$ . Therefore, the vertices of the triangle are (2, 3),  $(-1, 0)$ , and  $(4, 0)$ .

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**Q2. Solve  $2x + 3y = 11$  and  $2x - 4y = -24$  and hence find the value of 'm' for which  $y = mx + 3$ .**

**Solution:**

$$2x + 3y = 11 \dots \text{(i)}$$

Subtracting  $3y$  both side we get

$$2x = 11 - 3y \dots \text{(ii)}$$

Putting this value in equation second we get

$$2x - 4y = -24 \dots \text{(iii)}$$

$$11 - 3y - 4y = -24$$

$$7y = -24 - 11$$

$$-7y = -35$$

$$y = -35/-7$$

$$y = 5$$

Putting this value in equation (iii) we get

$$2x = 11 - 3 \times 5$$

$$2x = 11 - 15$$

$$2x = -4$$

Dividing by 2 we get

$$x = -2$$

Putting the value of  $x$  and  $y$

$$y = mx + 3.$$

$$5 = -2m + 3$$

$$2m = 3 - 5$$

$$m = -2/2$$

$$m = -1$$

**Q3. The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.**

**Solution:** Let the unit digit and tens digits of the number be  $x$  and  $y$  respectively.

$$\text{Then, number} = 10y + x$$

$$\text{Number after reversing the digits} = 10x + y$$

According to the question,

$$x + y = 9 \dots \text{(i)}$$

$$9(10y + x) = 2(10x + y)$$

$$88y - 11x = 0$$

$$-x + 8y = 0 \dots \text{(ii)}$$

Adding equation (i) and (ii), we get

$$9y = 9$$

$$y = 1 \dots \text{(iii)}$$

Putting the value in equation (i), we get

$$x = 8$$

$$\text{Hence, the number is } 10y + x = 10 \times 1 + 8 = 18.$$

**Q4.Solve the following pairs of equations by reducing them to a pair of linear equations:**

$$\frac{10}{x+y} + \frac{2}{x-y} = 4$$

$$\frac{15}{x+y} - \frac{5}{x-y} = -2$$

**Solution.**  $\frac{10}{x+y} + \frac{2}{x-y} = 4$

$$\frac{15}{x+y} - \frac{5}{x-y} = -2$$

Putting  $1/x+y = p$  and  $1/x-y = q$  in the given equations, we get:

$$10p + 2q = 4$$

$$\Rightarrow 10p + 2q - 4 = 0 \dots \text{(i)}$$

$$15p - 5q = -2$$

$$\Rightarrow 15p - 5q + 2 = 0 \dots \text{(ii)}$$

Using cross multiplication, we get

$$p/4 - 20 = q/-60 - (-20) = 1/-50 - 30$$

$$p/-16 = q/-80 = 1/-80$$

$$p/-16 = 1/-80 \text{ and } q/-80 = 1/-80$$

$$p = 1/5 \text{ and } q = 1$$

$$p = 1/x+y = 1/5 \text{ and } q = 1/x-y = 1$$

$$x + y = 5 \dots \text{(iii)}$$

$$\text{and } x - y = 1 \dots \text{(iv)}$$

Adding equation (iii) and (iv), we get

$$2x = 6$$

$$x = 3 \dots \text{(v)}$$

Putting value of  $x$  in equation (iii), we get

$$y = 2$$

Hence,  $x = 3$  and  $y = 2$