CHAPTER: Linear Equation in two Variables

Grade: **9**
Board: **CBSE**
Book: **NCERT**

1.

Chapter Summary and Placement

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

This chapter connects to linear equations in one variable of grade 8 which intern connects to simple equations of grade 7
Here we learn to represent linear equation in graphical form and find out solutions
It connects to Pair of linear equations in two variables of grade 10

2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>

1. Recapitulate linear equation and express it in standard form
2. Represents the given statement as linear equation in two variables
3. Find the solutions of linear equation in two variables
4. Represent linear equation in two variables in graphical form
5. Identify the equations of x-axis and y-axis
6. Draw graphs parallel to x-axis and y-axis

3. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently

Subtopic and Learning Objective #1

Subtopic:Linear equation and its standard form

LO:
Recapitulate linear equation and express it in standard form
1.To make the student recollect the definition of linear equation and it’s standard form

Teacher Activity

Do recap of definition of linear equation. Introduce standard form of it. Introduce number of examples to get hold on it

Check for understanding:

a) General form of linear equation in 2 variables is_____
b) Degree of linear equation is _____
c) Give some examples of linear equations with one variable and two variables
d) In ax+by+c=0 a,b and care_____ and x and y are _____

Resources Suggested

Blackboard, pen and paper
Resource 1 can be used for explanation

Subtopic and Learning Objective #2

Sub topic: Statement to linear equation
LO:
Represents the given statement as linear equation in two variables
1. To make student to represent the the given statements in equation form

Teacher Activity

Introduce representation of statement in equation form

Check for understanding:

a) Difference of two numbers 2
b) If twice the age of son is added to age of father, the sum is 56
c) Two pens and one eraser cost Rs. 35
d) One number is three times the other number.

Resources Suggested

Blackboard, pen and paper
Resource 2 can be used for explanation

Subtopic and Learning Objective #3

Sub topic:Solution of linear equation in two variables
LO:
Find the solutions of linear equation in two variables
1. To make student find solutions of linear equation with two variables

Teacher Activity

Introduce the method of finding solution of linear equation in two variables

Check for understanding:

a) Find 3 solutions for each of the following linear equations

i) $x - y = 20$

ii) $3x - 2y = -10$

iii) $2x+5y = 17$

Resources Suggested

Blackboard, pen and paper
Resource 2 can be used for explanation

Subtopic and Learning Objective #4

Sub topic:Graphical representation
LO:
Represent linear equation in two variables in graphical form
1. To make student represent given equation in graphical form

Teacher Activity

Introduce the method of plotting the graph

Check for understanding:

a) Represent the following equations in graph

i) x - y = 20

ii) 3x - 2y = -10

iii) 2x+5y = 17

Resources Suggested

Blackboard, pen and paper
Resource 3 can be used for explanation

Subtopic and Learning Objective #5

Sub topic: Equations of axes
LO:
Identify the equations of x-axis and y-axis
1. To make student to identify the equations of axes
LO:
Draw graphs parallel to x-axis and y-axis
1. To make the student draw the graphs of lines parallel to x-axis and y-axis

Teacher Activity

Introduce equation of x-axis and y-axis

Introduce the graphs of lines parallel to x-axis and y-axis

Check for understanding:

a) Take any equation which gives a parallel line to x-axis and y-axis then represent in graphical form

Resources Suggested

Blackboard, pen and paper
Resource 4 can be used for explanation

Resource 1

Linear equation: An equation whose degree is 1 is called linear equation.

Example: 2x-6=12 --- Linear equation with 1 variable that is x

2x - 5y =13 --- Linear equation with 2 variables x and y

General form of Linear equation in two variables is ax+by+c = 0 where a,b and c are real numbers[constants] and x and y are variables.

Writing linear equations in standard form:

The linear equation x + 2y = 3 can be written in standard form as x + 2y -3 = 0

Resource 2

Representing the given statement/situation as linear equation in two variable:

1. Sum of two numbers is 23

   If two numbers are x and y then the equation is x+y = 23

   In standard form as x + y - 23 = 0

2. In a two digit number sum of digits is 22 less than twice number

   The digits being x and y then the equation is x+y =2(10x+y)-22

   In the standard form as 19x + y - 22 = 0

3. If the perimeter of a rectangle is 60 units

   The length and breadth being x and y , the equation is 2(x + y) = 60, x+y=30

   In the standard form as x + y - 30 = 0

Solutions of linear equation in two variables:

A single linear equation in two variables can have infinite number of real solutions

Example: In x + y =23

For every value of x there exist a value of y which satisfies the equation

As x takes the values 0, 1, 2, 3, ……23

Y takes the values 23, 22, 21, ……0

Give more number of examples for students understanding.

Resource 3

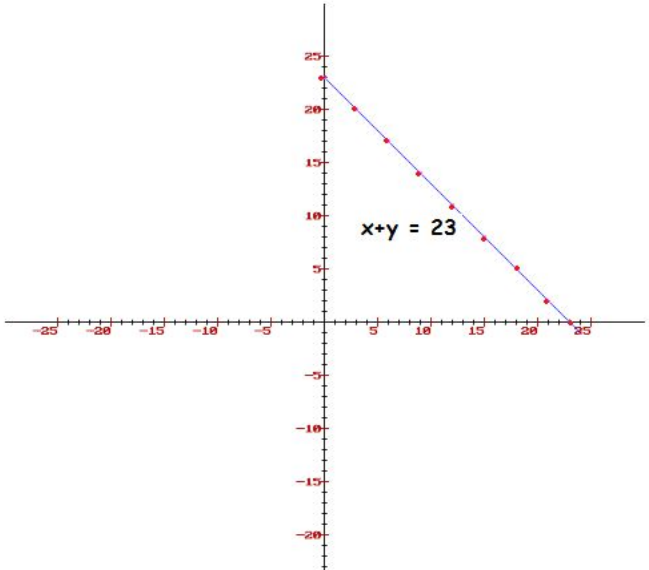
Graphical form of representation:

The solutions of given linear equations can be written as pairs like for x+y = 23

for x = 0, y = 23 can be written as (0,23) similarly other solutions are

(1,22);(2,21);(3,20);(4,19);(5,18);(6,17).....

Plotting the above points in a graph we get a straight line graph as shown below. All the points lying on the straight line are the solutions.



Resource 4

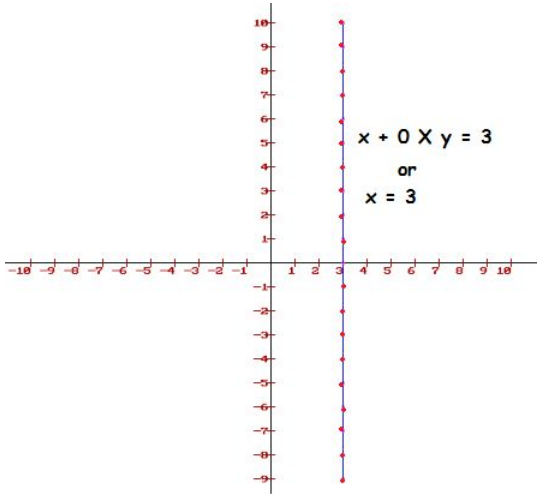
Equations of axes:

Every point on the x-axis is of the form(x,0) so, the equation of x-axis can be given as y=0. Similarly the equation of y-axis is x=0.

It can be guessed that the equation parallel to x-axis is y=k and y-axis is x=k.

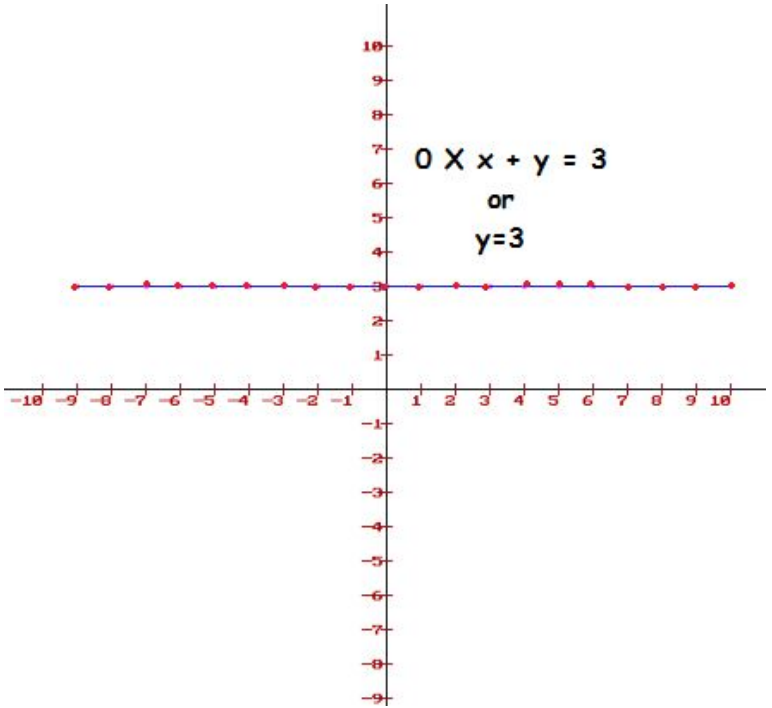
An equation x=3 can be re written as x+ y x 0 =3 where y can take infinite values

Bt plotting the graph for (3, 1); (3,2); (3,3); (3,4);..... We get a line parallel to y-axis



Resource 4

Similarly y=3 graph will be as follows



4. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after the chapter is complete, homework

Answer the following:

1. Write the following equations in standard form

a) $x + 2y = -4$

b) $3x - 5y = -1$

c) $4x + 9y = 5$

d) $-5x + 3y = 8$

e) $9x - 6y = 12$

f) $4x + 6y = 14$

2. Represent the following in equation form:

a) 5 tables and 2 chairs cost Rs. 1900

b) The difference between the two numbers is 7.

c) A number consists of two digits whose sum is 5.

d) Perimeter of an isosceles triangle is 30 cms

Worksheet 2

Use it like: test after the chapter is complete, homework

Answer the following:

1. Find 3 solutions for the equations represented by following statements

a) 5 tables and 2 chairs cost Rs. 1900

b) The difference between the two numbers is 7.

c) A number consists of two digits whose sum is 5

d) Perimeter of an isosceles triangle is 30 cms

Worksheet 3

Use it like: test after the chapter is complete, homework

Answer the following:

1. Find 3 solutions for the equations represented by following statements

a) 5 tables and 2 chairs cost Rs. 1900

b) The difference between the two numbers is 7.

c) A number consists of two digits whose sum is 5

d) Perimeter of an isosceles triangle is 30 cms

Worksheet 4

Use it like: test after the chapter is complete, homework

Answer the following:

1. Draw a graph of a line which is at a distance of 4 units and parallel to x-axis, at a distance of 4 units and parallel to y axis

5. SOLUTIONS

This section gives you sample answers for activities and questions listed above.

Worksheet 1

1.

a) $x + 2y + 4 = 0$

b) $3x - 5y + 1 = 0$

c) $4x + 9y - 5 = 0$

d) $-5x + 3y - 8 = 0$

e) $9x - 6y - 12 = 0$

f) $4x + 6y - 14 = 0$

2.

a) Cost of 1 table and 1 chair be x and y. The equation is $5x+2y=1900$

b) Let the numbers be x and y, the equation is $x-y=7$

c) Let the digits bex and y, equation is $x+y=5$

d) Let the each of equal sides be x and other side be y, equation is $2x+y=30$

Worksheet 2

1. Solutions may vary as per students choice

a) (x,y)=(100,700);(200, 450); (300, 200)

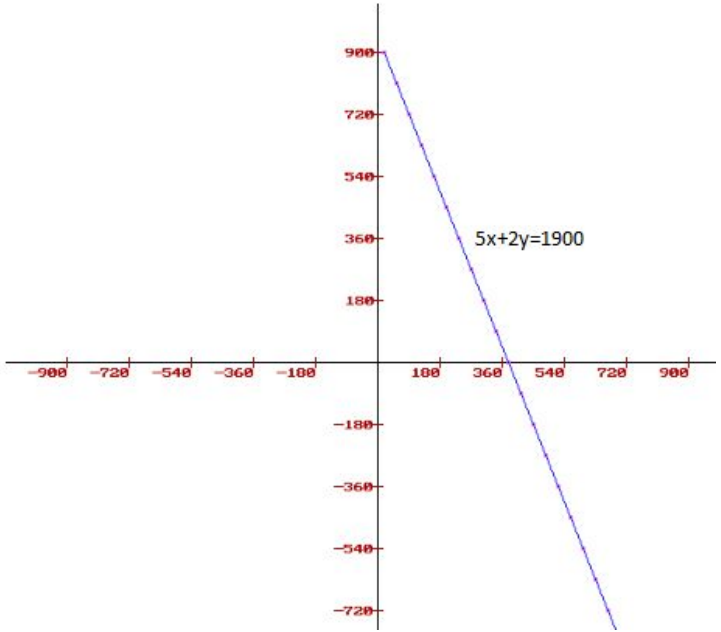
b) (x,y)=(10,3);(9, 2); (7, 0)

c) (x,y)=(1,4);(2, 3); (5,0)

d) (x,y)=(12,6);(13, 4); (8, 14)

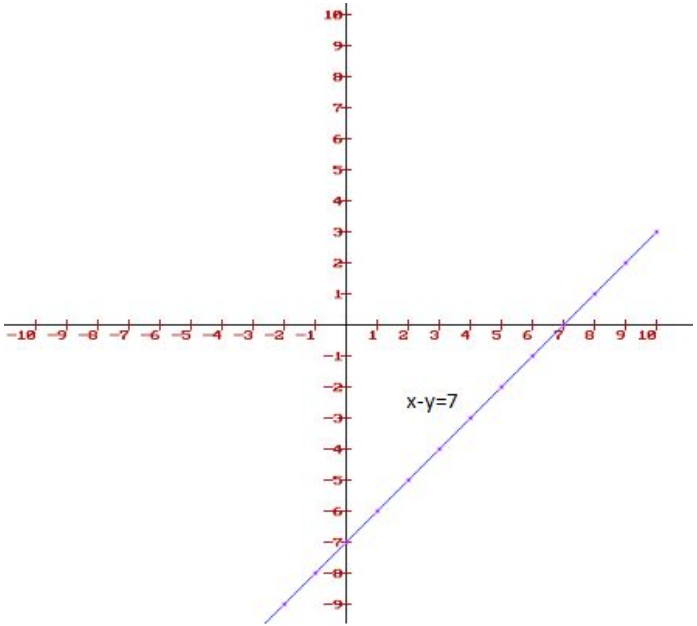
Worksheet 3

a)



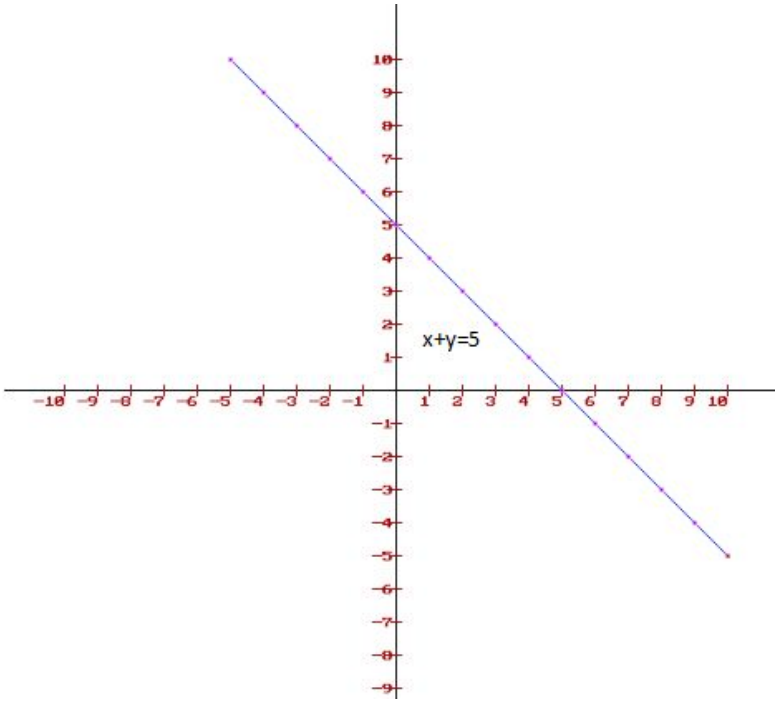
Worksheet 3

b)



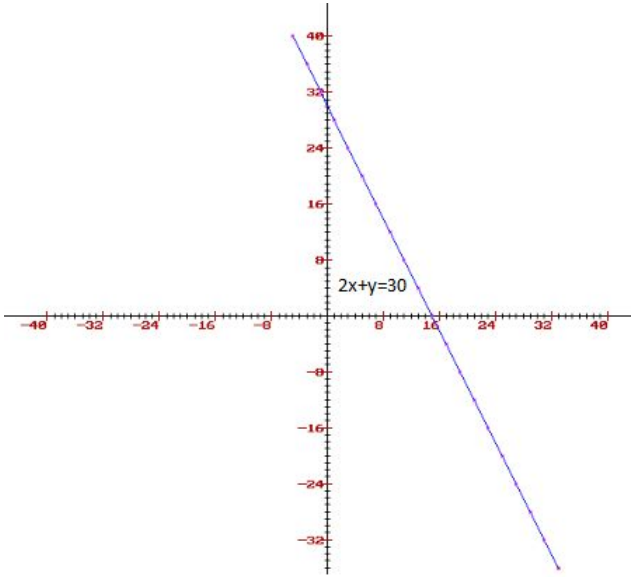
Worksheet 3

c)

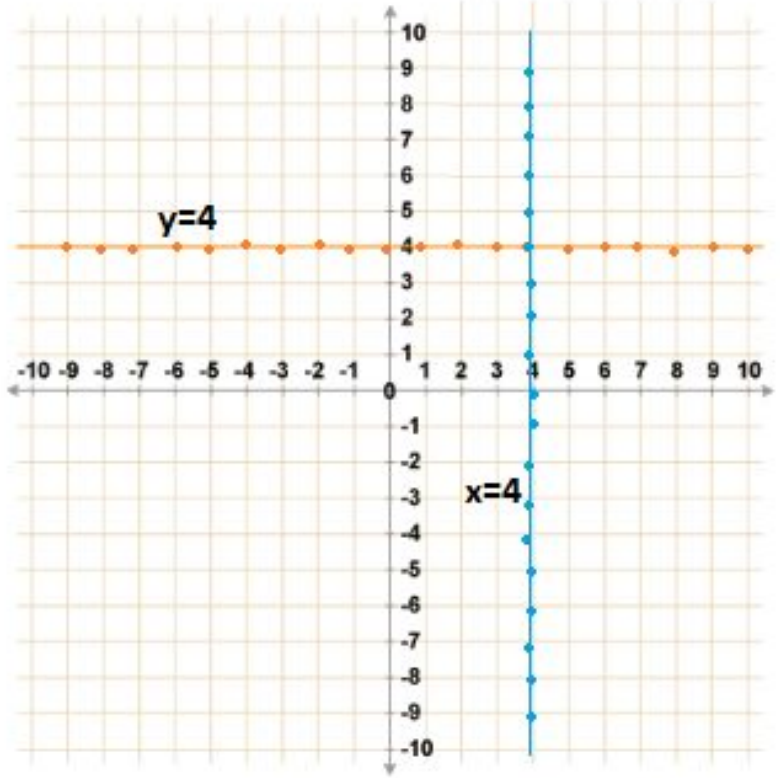


Worksheet 3

d)



Worksheet 4



6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them

Teacher can use these videos if time and facilities permit:

1. https://www.youtube.com/watch?v=hPlYA6RlvAQ