Mount Abu Public School

H-Block, Sector-18, Rohini, New Delhi-110085

SUBJECT:- MATHEMATICS

CLASS-X

Week : 11 January 2021 to 16 January 2021

Number of blocks: 2

CHAPTER-1 : REAL NUMBERS

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=1-15

Sub-Topics:

- HCF and LCM of two or more numbers using prime factorization and division method
- Fundamental theorem of Arithmetic
- Revisiting irrational numbers - Prove √2 and √5 etc. irrational.
- Decimal expansion of rational and irrational numbers

Learning Outcomes:

Each student will be able to:

- Find HCF of the given numbers
- Find LCM of given numbers
- State the fundamental theorem of arithmetic
- Classify rational and irrational numbers

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

Dear students,

Kindly read the content given below and view the links shared for better understanding.

Solve the given questions in math notebook.

DAY-1

LESSON DEVELOPMENT

STEP 1:

GUIDELINES AND INTRODUCTION

Guidelines:

Dear students, kindly refer to the following notes/video links from the Chapter- "Real Numbers" and thereafter do the questions in your Math register.

INTRODUCTION

Real Numbers- Collection of all rational and irrational numbers form a set of real numbers. All real numbers can be plotted on a number line or real number line. Between any two rational numbers, there are infinitely many rational and irrational numbers.

STEP 2:

Subtopics:

HCF and LCM of two or more numbers using prime factorization and division method Fundamental theorem of Arithmetic

Revisiting irrational numbers - Prove $\sqrt{2}$ and $\sqrt{5}$ etc. irrational.

Decimal expansion of rational and irrational numbers

STEP 3 –

Key Points and Important Links to Remember:

Fundamental Theorem of Arithmetic-

The Fundamental Theorem of Arithmetic states that every composite number can be expressed as a product of its prime factors and this factorization is unique irrespective of the orders of prime factors.

Refer to the following link:

https://www.khanacademy.org/computing/computer-science/cryptography/moderncrypt/v/the-fundamental-theorem-of-arithmetic-1

HCF of two or more numbers using Prime Factorization Method

https://www.youtube.com/watch?v=eOrJw5u5Mq8

HCF using long division method

https://www.youtube.com/watch?v=eljVa2KqOTo&feature=youtu.be

LCM using division method

https://www.youtube.com/watch?v=JzDq34ObMHg&t=14s

Real life application of HCF and LCM

https://www.youtube.com/watch?v=SjG__BRG4IA

https://www.youtube.com/watch?v=y6na-cqGnlk

https://www.youtube.com/watch?v=Gb795SQKx-E

https://www.youtube.com/watch?v=jK7FF56sjHA

https://www.youtube.com/watch?v=iWy38_ux0fM

Note-

Product of Two Numbers = HCF X LCM of the two numbers

• For any two positive integers a and b, a×b=H.C.F×L.C.M.

• Example – For 36 and 56, the H.C.F is 4 and the L.C.M is 504 36×56=2016 4×504=2016 Thus, 36×56=4×504

• The above relationship, however, doesn't hold true for 3 or more numbers

DAY-2

LESSON DEVELOPMENT

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=1-15

1. **Revisiting Irrational Numbers**
   Irrational Numbers
   Any number that cannot be expressed in the form of $\frac{p}{q}$ (where p and q are integers and q≠0.) is an irrational number.
   Examples √2,π and so on.

Interesting Results

• If a number p (a prime number) divides a 2 , then p divides a.

Example:

3 divides 6^2 i.e. 36,

which implies that 3 divides 6.

• We can prove √2, √5 irrational using method of contradiction.

• https://www.youtube.com/watch?v=IzkCVzzHHbg

• https://www.youtube.com/watch?v=m8eH4iAI-2Q

(Refer to these links to prove √2 and √5 irrational and few important questions)

• Prove that √7 is irrational

Assumption: √7 is rational

Since it is rational

√7 can be expressed as $\frac{a}{b}$ where a and b are co-prime Integers, b ≠ 0.

On squaring, $\frac{a^2}{b^2} = 7 \Rightarrow a^2 = 7\,b^2$.

• Thus 7 divides a^2

Hence, 7 divides a.

Then, there exists a number c such that a=7c.

Then, $a^2 = 49c^2$.

Hence, $7b^2 = 49c^2$ or $b^2 = 7c^2$.

Hence 7 divides b. Since 7 is a common factor for both a and b, it contradicts our assumption that a and b are coprime integers.

Hence, our initial assumption that √7 is rational is wrong.

Therefore, √7 is irrational.

2. **Decimal Expansion of Rational and Irrational numbers**
   To Check if a given rational number is terminating or not If a/b is a rational number, then its decimal expansion would terminate if both of the following conditions are satisfied:
   a) The H.C.F of a and b is 1.
   b) b can be expressed as a prime factorisation of 2 and 5 i.e. b=2 m x 5 n where either m or n, or both m and n are 0. If the prime factorisation of b contains any number other than 2 or 5, then the decimal expansion of that number will be non-terminating but recurring.

   Refer to the following link for more practice:
   https://www.youtube.com/watch?v=3_FTJEI-xvs

STEP 4

Points to Remember

1) Numbers whose decimal expansion is non-terminating and non-recurring are irrational numbers.

2) Product of three numbers may not be equal to the product of their HCF and LCM.

3) Every rational number has either terminating or non-terminating decimal expansion.

ASSIGNMENT

Do NCERT Ex 1.1,1.2,1.3 and 1.4 in the CW/HW register.

Do the following questions in practice notebook:

1. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$: x,y are prime numbers, then HCF(a,b)is

a) xy b)xy^2 c)x^3y^3 d) x^2y^2

2. If two positive integers a and b are expressible in the form $a = pq^2$ and $b = p^3q$; p and q being prime numbers, LCM (a, b) =

a) pq b) p^3q^3 c) p^3q^2 d) p^2q^2

3. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =

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

4. If the sum of LCM and HCF of two numbers is 1260 and their LCM is 900 more than their HCF, the product of two numbers is

a) 203400 b) 194400 c) 198400 d) 205400

5. The decimal expansion of the rational number 33 220 will terminate after ________ decimal places.

DAY-3

Number of blocks: 1

CHAPTER-2 : POLYNOMIALS

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=2-15

Sub-Topics:

- HCF and LCM of two or more numbers using prime factorization and division method
- Fundamental theorem of Arithmetic
- Revisiting irrational numbers - Prove √2 and √5 etc. irrational.
- Decimal expansion of rational and irrational numbers

Learning Outcomes:

Each student will be able to:

- Find HCF of the given numbers
- Find LCM of given numbers
- State the fundamental theorem of arithmetic
- Classify rational and irrational numbers

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

Dear students,

Kindly read the content given below and view the links shared for better understanding.

Solve the given questions in math notebook.

LESSON DEVELOPMENT

INTRODUCTION

Let us recall the concepts done in class IX

1) **Polynomial:**
The expression, which contains one or more terms with non-zero coefficient is called a polynomial. A polynomial can have any number of terms.

   For Example: 25, p + q, 7x + y + 5, wx + xy+ y z+ zx etc. are some polynomials.
2) **Degree of polynomial:**
The highest power of the variable in a polynomial is called as the degree of the polynomial. For Example: The degree of $p(x) = x^5 - x^3 + 7$ is 5.
A polynomial of degree 1 is called a linear polynomial, degree 2 is called quadratic polynomial, degree 3 is called a cubic polynomial.
3) **Zeroes of a Polynomial:**
The value of variable for which the polynomial becomes zero is called as the zeroes of the polynomial. i.e. a real number k is said to be zero of a polynomial p(x) if p(k) = 0
For Example: Consider p(x) = x + 2.

Find zeroes of this polynomial. If we put x = -2 in p(x), we get, p(-2) = -2 + 2 = 0. Thus, -2 is a zero of the polynomial p(x).

STEP 2:

Subtopic:

(i) Geometrical Meaning of zeroes of a polynomial

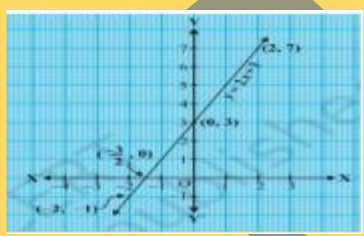
(ii) Relationship between zeroes and coefficients of a polynomial

(iii) Forming a polynomial, given its zeroes

STEP 3:

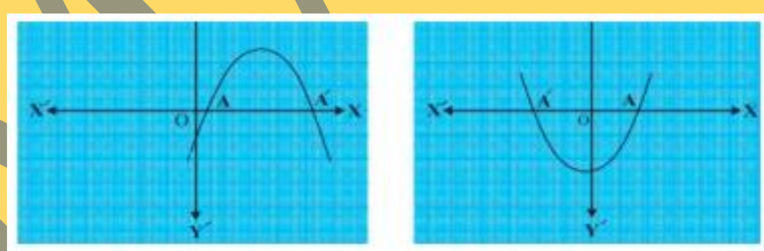
Key Points and important link for references:

(i) Geometrical Meaning of the Zeroes of a Polynomial (i) Graph of a linear polynomial ax + b is a straight line.



Refer to the link for zeroes of linear polynomial
https://www.youtube.com/watch?v=XAuAH64puJU

(ii) Graph of a quadratic polynomial p(x) = ax2 + bx + c is a parabola open upwards if a > 0. Graph of a quadratic polynomial p(x) = ax2 + bx + c is a parabola open downwards, if a < 0.



a < 0   a > 0

Refer to the link for the quadratic polynomial

https://www.youtube.com/watch?v=s-AlezS1ByQ

Refer to the following link for other polynomials
https://www.youtube.com/watch?v=bSzmfUdBp2w

https://www.youtube.com/watch?v=Xz5gXe2Ok-0

Q1 Write the number of zeroes of the polynomial y = f(x) whose graph is given in the following figures:

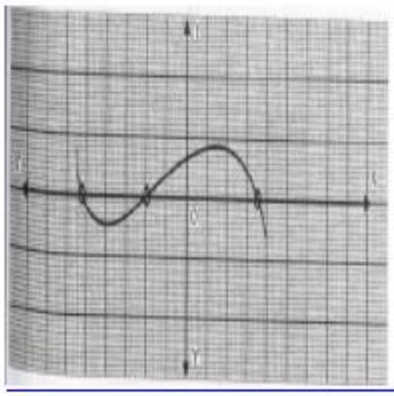


fig (i)

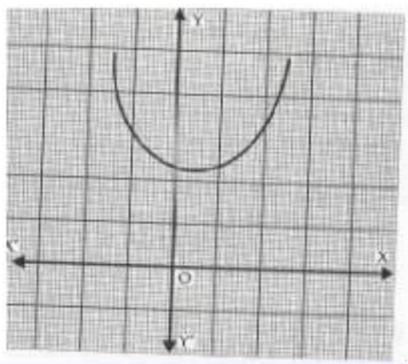


fig (ii)

fig (i) has 3 zeroes

fig (ii) has no zeroes

(ii) Relationship Between Zeroes and Coefficients of a Polynomial

In general, if α* and β* are the zeroes of the quadratic polynomial $p(x) = ax^2 + bx + c$, $a \neq 0$, then you know that $x - \alpha$ and $x - \beta$ are the factors of $p(x)$. Therefore,

$$ax^2 + bx + c = k(x - \alpha)(x - \beta), \text{ where } k \text{ is a constant}$$

$$= k[x^2 - (\alpha + \beta)x + \alpha\beta]$$

$$= kx^2 - k(\alpha + \beta)x + k\alpha\beta$$

Comparing the coefficients of x^2, x and constant terms on both the sides, we get

$$a = k,\ b = -k(\alpha + \beta) \text{ and } c = k\alpha\beta.$$

This gives $$\boldsymbol{\alpha + \beta = \frac{-b}{a}},$$

$$\boldsymbol{\alpha\beta = \frac{c}{a}}$$

i.e., $$\text{sum of zeroes} = \alpha + \beta = -\frac{b}{a} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2},$$

$$\text{product of zeroes} = \alpha\beta = \frac{c}{a} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}.$$

Link:

https://www.youtube.com/watch?v=cmrKOQJ3hTE&feature=emb_logo

Example 2 : Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.

Solution : We have

$$x^2 + 7x + 10 = (x + 2)(x + 5)$$

So, the value of $x^2 + 7x + 10$ is zero when $x + 2 = 0$ or $x + 5 = 0$, i.e., when $x = -2$ or $x = -5$. Therefore, the zeroes of $x^2 + 7x + 10$ are -2 and -5. Now,

$$\text{sum of zeroes} = -2 + (-5) = -(7) = \frac{-(7)}{1} = \frac{-(\text{Coefficient of } x)}{\text{Coefficient of } x^2},$$

$$\text{product of zeroes} = (-2) \times (-5) = 10 = \frac{10}{1} = \frac{\text{Constant term}}{\text{Coefficient of } x^2}.$$

(iii) Forming a polynomial, given its zeroes

(a) A quadratic polynomial whose zeroes are α and β ,is given by :
$\boldsymbol{p(x) = k[\,x^2 - (\alpha + \beta)x + \alpha\,\beta]}$, where k is any real number

(b) A quadratic polynomial whose zeroes are α, β and γ , is given by :
$\boldsymbol{P(x) = k[\,x^3 - (\alpha + \beta + \gamma)x^2 + (\alpha\,\beta + \beta\,\gamma + \alpha\,\gamma)x - \alpha\,\beta\,\gamma]}$, where k is any real number

Example 2: Find the quadratic polynomial with the sum of the zeroes as 2 and the product of the zeroes as – 6.

Solution :

A quadratic polynomial whose zeroes are α and β ,is given by :

$p(x) = k[\,x^2 - (\alpha + \beta)x + \alpha\,\beta]$, where k is any real number

here α + β = 2 and α β= -6

So, the required equation is $k[x^2 - 2x - 6]$, where k is any real number.

STEP 4 :

Points to Remember:

1) For finding the zeroes of the polynomial p(x), we put p(x) = 0.

2) On the graph if the curve is

(a) Intersecting the axis, it gives one zero

(b) Touching the axis, it gives two equal zeroes

(c) No point of intersection implies no zero

3) To find the total number of zeroes of the polynomial y = p(x) geometrically,the number of zeroes is equal to the total number of distinct points where the curve meets the x axis

4) If the zeroes of the polynomial are given, then we will find the sum (α + β) and product (α β) of the zeroes and substitute and find the polynomial

$p(x) = k[\, x^2 - (\alpha + \beta)x + \alpha\,\beta]$, where k is any real number.

ASSIGNMENT

1) Q1 Do NCERT Ex 2.1 and Ex 2.2 (to be done in cw/hw register)
   Q2 to Q5 of the assignment to be done in practice register)

2) If the product of zeroes of the polynomial $ax^2 - 6x - 6$ is 4, find the value of ‘a’.

3) If one zero of the polynomial $(a^2 + 9)\, x^2 + 13x + 6a$ is the reciprocal of the other, find the value of ‘a’. (Hint : take the zeroes as α and $\frac{1}{\alpha}$,then find the product of the zeroes)

4) Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficient of the polynomial.

5) Find the quadratic polynomial, the sum of whose zeroes is 8 and their product is 12. Hence, find the zeroes of the polynomial.

Week : 18 January 2021 to 23 January 2021

Number of blocks: 3

CHAPTER-3 : PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=3-15

Sub-Topics:

- Graphical method to find solution
- Substitution method
- Elimination method
- Consistent and inconsistent solutions

Learning Outcomes:

Each student will be able to:

- Find solution of pair of linear equations in two variables by graphical method
- Find solution of pair of linear equations in two variables by elimination method
- Find solution of pair of linear equations in two variables by substitution method

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

Dear students,

Kindly read the content given below and view the links shared for better understanding.

Solve the given questions in math notebook.

DAY-1

LESSON DEVELOPMENT

A general form of linear equation in two variables is: $ax + by + c = 0$, where a, b and c are real numbers and at least one of a and b is non zero.

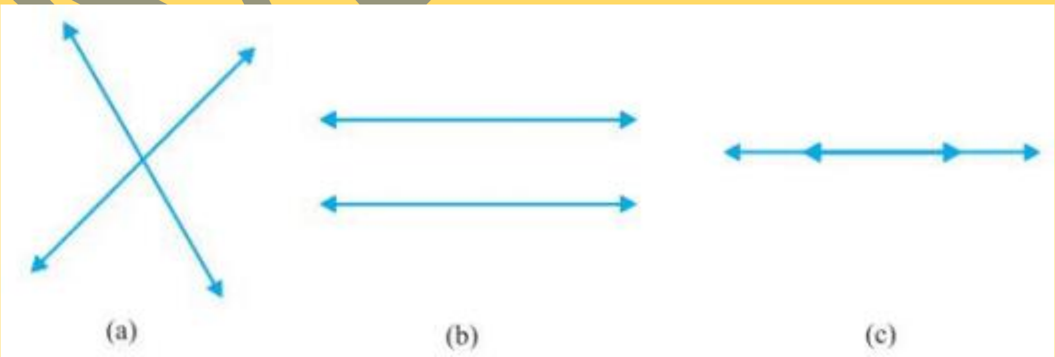
The solution of such an equation is a pair of values for x and y which make both sides of the equation equal.

The geometrical or graphical representation of a linear equation in two variables is always a straight line.

Hence, a pair of linear equations in two variables will be two straight lines which are considered together in the same plane.

If there are two lines in a plane, three cases are possible:

- The two lines will intersect at one point. {Fig.1 (a)}
- They will not intersect, i.e., they are parallel. {Fig.1 (b)}
- The two lines will be coincident. {Fig.1 (c)}



In this chapter we are going to learn about the point of intersection i.e. the common solution of the pair of linear equations, if any.

STEP 2:-

Subtopics:-

i) Graphical method of solving a pair of linear equations in two variables.

ii) Real life application (statement questions) based on a pair of linear equations.

STEP 3:-

Key points and important links for reference:-

1. Recapitulation of linear equation in two variables

Refer to the link

https://www.youtube.com/watch?v=skC8O86qbKY

2. A pair of linear equations in two variables is said to form a system of simultaneous linear equations in two variables.

Example :-

$$x + 2y = 10$$

$$2x + y = 5$$

The most general form of a pair of linear equations in two variables is:

$$a_1x + b_{1y} + c_1 = 0$$

$$a_2x + b_{2y} + c_2 = 0$$

Where $a_1, b_1, c_1, a_2, b_2, c_2$ are real numbers and

$a_1^2 + b_1^2 \neq 0$ and $a_2^2 + b_2^2 \neq 0$

3. A pair of values of x and y satisfying each of the equation of the given pair is the solution of a pair of linear equations in two variables.

Refer to this link to enhance your knowledge.

https://www.youtube.com/watch?v=hZ6-RHL4lB8

5. Framing of a pair of linear equations in two variables:

https://www.youtube.com/watch?v=ldaSoLWenyo&feature=youtu.be

https://www.youtube.com/watch?v=D8gPL18CtYI

6. Graphical solution of system of linear equation:

https://www.youtube.com/watch?v=NPzlCNDEJqA

Without solving , how can we identify whether the system of linear equation /pair of linear equations in two variables represents parallel lines, intersecting lines or coincident lines?

The following link will answer this question:

https://www.youtube.com/watch?v=T7T-z3i49l8

STEP 4:-

Points to Remember Conditions for solubility (or consistency)

If a pair of linear equation is given by

$$a_1x \ + b_{1y} + c_1 = 0$$

$$a_2x \ + b_{2y} + c_2 = 0$$

, the following cases can arise:

(i) If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$the system of a pair of linear equations is consistent. (system has a unique solution -graphical representation is intersecting lines)

(ii) If $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ the pair of linear equations is inconsistent. (system has no solution - graphical representation is parallel lines)

(iii) If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ the pair of linear equations is dependent and consistent. (system has infinitely many solutions- graphical representation is coincident lines)

EXTRA QUESTIONS:

Pair of linear equation in two variables

Q1. Express y in terms of x in the expression 3x – 7y = 10.

Q2. The point of intersection of the lines x=2 and y= 3 is given by ______.

Q3. The area of the triangle formed by the line $x\ a$ + $y\ b$ =1 and the two coordinate axes is

a) ab b)2ab c) ½ ab d) ¼ ab

Q4. The area of the triangle formed by the lines y=x ,x=6 and y=0 is

a) 36 sq.units b) 18 sq.units c) 9 sq.units d) 72 sq.units.

Q5. The area of the triangle formed by the lines x=3, y=4 and x=y is

a) ½ sq.units b) 1 sq.units c) 2 sq.units d)none of these

Q6. If a pair of linear equations is consistent, their graph lines will be

a) parallel b) always coincident c) always intersecting

Q7. Does the point (2,3) lie on the graph of 3x – 2y = 5?

Q8. A pair of linear equations which has a unique solution x = 2 and y = – 3 is

(a) x + y = 1 and 2x – 3y = – 5

(b) 2x + 5y = – 11 and 2x – 3y = – 22

(c) 2x + 5y = – 11 and 4x + 10y = 22

(d) x – 4y – 14 = 0 and 5x – y – 13 = 0

Q9. If a pair of linear equations in two variables is consistent, the lines represented by two equations are:

(a) Intersecting (b) Parallel (c) always coincident

(d)intersecting or coincident

Q10. For 2x + 3y = 4, y can be written in terms of x as ________

Q11. Solve graphically the pair of linear equations 5x – y = 5 and 3x – 2y = – 4 Also find the co-ordinates of the points where these lines intersect y-axis.

Q12. Ram is walking along the line joining (1, 4) and (0, 6) Rahim is walking along the line joining (3, 4) and (1, 0) Represent on the graph and find the point where both of them cross each other.

Q13. Given the linear equation 2x + 3y – 12 = 0, write another linear equation in these variables, such that geometrical representation of the pair so formed is:

(i) Parallel Lines (ii) Coincident Lines

Q14. If we draw lines of x = 2 and y = 3 ,what kind of lines do we get?

DAY-2

LESSON DEVELOPMENT

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=3-15

STEP 1:-

Introduction:

We have already learnt how to solve pair of linear equations graphically. We can solve pair of linear equations without drawing graphs too.

These are termed as algebraic methods (substitution method, elimination method and cross multiplication method) of solving pair of linear equations in two variables.

Today, we are going to learn: 1) Substitution Method 2) Elimination Method by Equating the Coefficients.

STEP 2:-

Subtopics:-

i) Algebraic methods of solving a pair of linear equations in two variables:

a) Substitution Method b) Elimination Method

ii) Real life application (statement questions) based on a pair of linear equations.

STEP 3:-

Key points and important links for reference:-

Solution of pair of linear equations in two variables algebraically:

3. Solution by Substitution method:
   Refer to the following link:- https://www.youtube.com/watch?v=sdR2kdhmBIM

4. Solution by elimination method (by equating the coefficients):
   Refer to the following link: https://www.youtube.com/watch?v=MwU5ylJIEVs

5. Refer to the following links for important word problems:-
   https://www.youtube.com/watch?v=puIoLdl4WY0
   https://www.youtube.com/watch?v=oR4K9IfwO50
   https://www.youtube.com/watch?v=vIf0uR_I8qU
   https://www.youtube.com/watch?v=NsnodnkmJg4

STEP 4:

Points to Remember

1. Any method can be applied to solve the statement questions. Each method is mandatory to be well understood and practiced.

2. Let us consider the following pair of linear equations in two variables:

$x+ y = 4$ - (i)

$2x +2y = 8$ - (ii)

From (i) $y= 4 – x$

When we substitute this value in (ii):

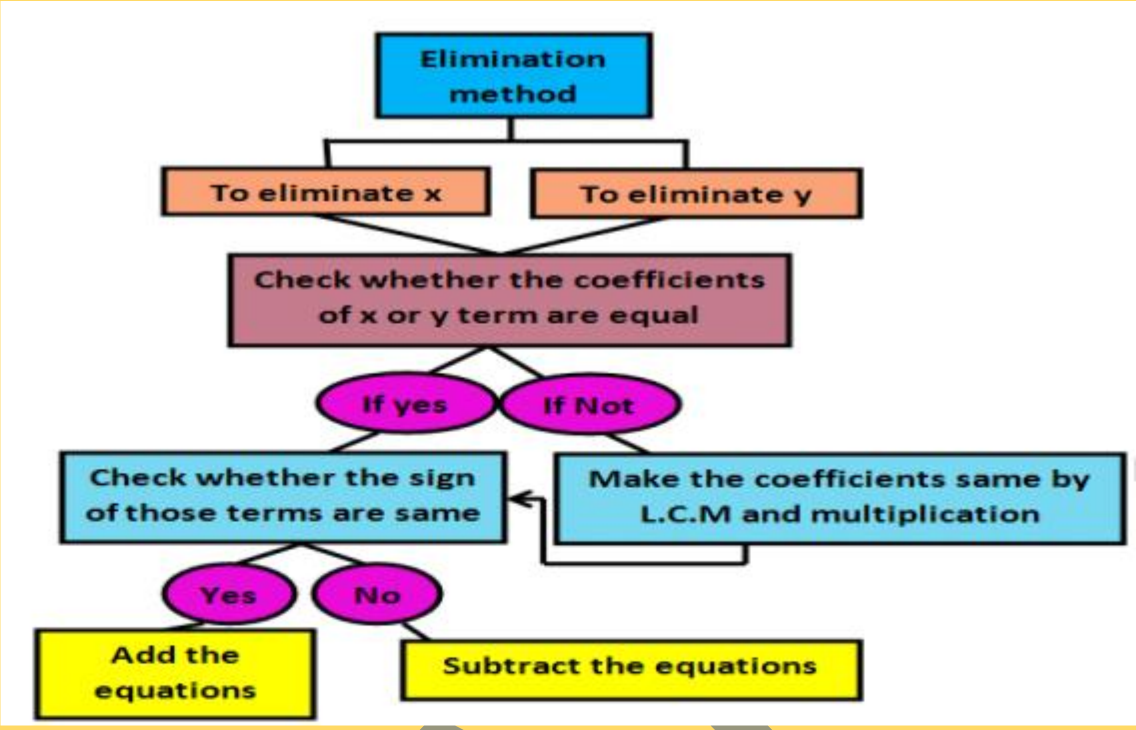
we get $2x +2(4-x) =8$

i.e. $2x +8-2x = 8$ i.e. $8 = 8$ which is always true.

In such a case, the pair is said to have infinitely many solutions.

3. Suppose while solving the equations we reach the condition $0 = 8$, which is never true, then the given pair will have no solution

Elimination Method



<u>ASSIGNMENT</u> (Exercise 3.3 and 3.4 from NCERT including examples)

MORE QUESTIONS FOR PRACTICE

Q1. If x = a and y = b is the solution of the equations x – y = 2 and x + y = 4, then the value of a and b is _______ and _________ respectively.

Q2. One of the common solutions of ax + by = c and y axis is:

(a) (0, c/ b) (b) (0, b/ c) (c) (0,- c/ b) (d) (0, -b/c)

Q3. If ax + by = c and lx + my = n has a unique solution, then the relation between the coefficient will be:

(a) am ≠ lb (b) am = lb (c) ab = lm (d) ab ≠ lm

Q4. If x = 3m –1 and y = 4 is a solution of the equation x + y = 6, then find the value of m

Q5. The sum of the numerator and the denominator of the fraction is 3 less than twice the denominator. If the numerator and denominator both are decreased by 1, the numerator becomes half the denominator. Find the fraction.

Q6. The difference of two numbers is 66. If one number is four times the other, find the numbers.

Q7. Pinky 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 deducted for each wrong answer, then also Pinky would have scored 40 marks. How many questions were there in the test?

Q8. A two digit number is obtained either by multiplying the sum of the digits by 8 and adding 1 or by multiplying the difference of the digits by 13 and adding 2. Find the number.

Q9. Father's age is three times the sum of the ages of his two children. After 5 years, his age will be twice the sum of the ages of his two children. Find the age of the father.

10.Sunita has some Rs.50 and Rs.100 notes amounting to a total of Rs 15,500. If the notes are 200 in number, find out the number of Rs 50 and Rs 100 notes she possesses.

DAY-3

LESSON DEVELOPMENT

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=3-15

STEP 1:

We have already learnt the graphical and algebraic methods of finding the solution of a pair of linear equations in two variables. Today, we are going to learn an important concept of finding unknown (for example k) in the following system of linear equations.

$$kx + 3y + 7 = 0$$

$$3x + 4y + 8 = 0$$

given the system has infinitely many solutions/no solution/ unique solution. (Based on Exercise 3.5, Q2)

STEP 2:

SUBTOPIC:

Finding k if the pair of equation has infinitely many solutions/ no solution/ unique solution.

STEP 3:-

Key points and important links for your reference:-

Look at the following question before attempting the assignment questions in your register.

Q-1.Find the value of k for which the following system of equations has a unique solution:

$$x + 4y = 5$$
$$3x + ky = 1$$

Solution:

The given system of equations is:

$$x + 4y - 5 = 0$$
$$3x + k y - 1 = 0$$

The above equations are of the form:

$$a_1x + b_1y + c_1 = 0$$
$$a_2x + b_2y + c_2 = 0$$

Here, $a_1 = 1, b_1 = 4, c_1 = -5, a_2 = 3, b_2 = k, c_2 = -1$

Now

$$\frac{a_1}{a_2} = \frac{1}{3}, \frac{b_1}{b_2} = \frac{4}{k}$$

Condition for unique solution is:

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{1}{3} \neq 4k \Rightarrow k \neq 12$$

Thus, the system has unique solution when $k \neq 12$

Hence, the given system of equations will have unique solution for all real values of k other than 12. (Answer statement)

Note- Attempt assignment question 1 now.

Q2- Find k if the system has no solution.

$$kx + 3y = 3$$
$$12x + ky = 6$$

Check the link:- https://youtu.be/919CjHLj1s4ck

For system of no solution

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

$$\frac{k}{12} = \frac{3}{k} \neq \frac{3}{6}$$

$$\frac{k}{12} = \frac{3}{k}$$

$$k^2 = 36$$

$$k = \pm 6$$

$$\frac{3}{k} \neq \frac{3}{6}$$

$$3k \neq 18$$

$$k \neq 6$$

The condition k = - 6 satisfies both the equation

Hence k = - 6

Q3) Find the value of k for which the following system of equations has infinitely many solutions.

The given system of equations is:

$(k-1)x + 3y = 7 \quad ......(i)$

$(k+1)x + 6y = 5k - 1 .....(ii)$

Here, for infinitely solutions, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{k-1}{k+1} = \frac{3}{6} = \frac{7}{5k-1}$

now, $\frac{k-1}{k+1} = \frac{3}{6}$

$\Rightarrow 6(k-1) = 3(k+1)$

$\Rightarrow 6k - 6 = 3k + 3$

$\Rightarrow 6k - 3k = 3 + 6$

$\Rightarrow 3k = 9$

$\Rightarrow k = 3$

and $\frac{3}{6} = \frac{7}{5k-1}$

$\Rightarrow 3(5k-1) = 7*6$

$\Rightarrow 15k - 3 = 42$

$\Rightarrow 15k = 45$

$\Rightarrow k = 3$

Thus for k=3, $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

STEP 4:

Points to Remember

i) Refer to the solutions given above to solve the question.
ii) Presentation of questions should be given utmost importance.

ASSIGNMENT:

Q-Find k if the following system has

i) unique solution
ii) no solution
iii) infinitely many solutions.

$$4x + ky + 8 = 0$$
$$2x - y = 12$$

NOTE: Do Exercise 3.5, Q2 (all the parts)

Week : 25 January 2021 to 30 January 2021

Number of blocks: 1

CHAPTER-3 : PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=3-15

Sub-Topics:

- equations reducible to pair of linear equations

Learning Outcomes:

Each student will be able to:

- reduce the given equation to pair of linear equation
- solve the system of equations using appropriate method

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

Dear students,

Kindly read the content given below and view the links shared for better understanding.

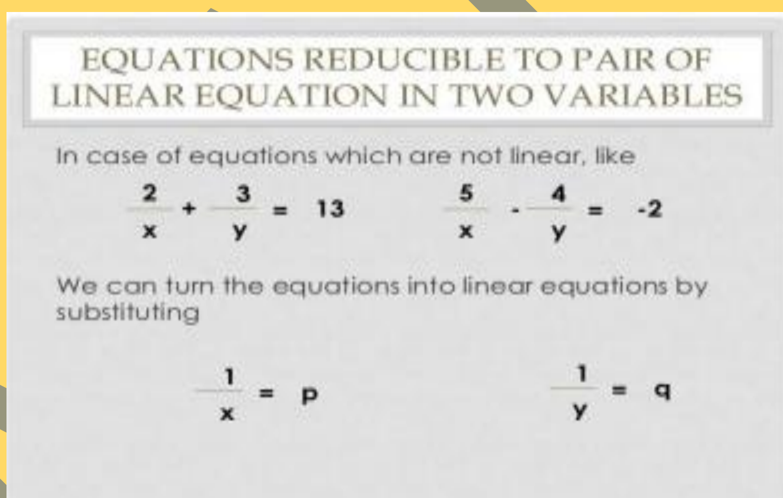
Solve the given questions in math notebook.

DAY-1

LESSON DEVELOPMENT

We have already learnt the graphical and algebraic methods of finding the solution of a pair of linear equations in two variables. Today, we are going to learn solving the pair of equations which are not linear, but can be reduced to linear form.

Look at the following example:



Now, this pair can be written as

$$2p + 3q = 13$$

$$5p - 4q = -2$$

which can be solved by any of the methods (substitution, elimination and cross multiplication)

STEP 2:

SUBTOPIC:

Solving pair of equations which are reducible to a pair of linear equations in two variables.

STEP 3:

Key points and important links for reference:-

Sometimes we come across a pair of equations in two variables, which is not linear but can be reduced to a pair of linear equations in two variables. A few questions have been solved for your reference in the following links:

Refer to the following links to understand how to solve equations which are reducible to a pair of linear equations in two variables.
https://www.youtube.com/watch?v=NvXY75Vrw54

https://youtu.be/6FKrcz410hU Exercise 3.6 Question 1. (ii)
https://www.youtube.com/watch?v=KusMyxme-mw Exercise 3.6 Question 1. (viii)

ASSIGNMENT:

1. Do exercise 3.6, Q-1. i) iii) iv) v) vi) vii) parts

2. Solve for x and y

$$\frac{1}{2x+3y}+\frac{1}{(3x-2y)}=\frac{1}{2}$$

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

Go through the following links to understand word problems based on reducible equations thoroughly:

https://www.youtube.com/watch?v=27v2CLZ-8qo 3.6 Q2 (i)
https://www.youtube.com/watch?v=jv_2xpxmLpE 3.6 Q2 (ii)
https://www.youtube.com/watch?v=kS3oxJQmzb8 3.6 Q2 (iii)

Attempt these questions in your practice register:

Q1) If the lines 3x + 2 k y = 2 and 2x + 5y + 1 = 0 are parallel, then find the value of k.

Q2)The sum of the digits of a two digit number is 12. The number obtained by Interchanging the two digits exceeds the given number by 18. Find the number.

Q3. The sum of the numerator and the denominator of a fraction is 12. If 1 is added to both numerator and denominator, the fraction becomes 1/6. Find the fraction.

Q4. 4 men and 6 boys can finish a piece of work in 5 days while 3 men and 4 boys can finish it in 7 days. Find the time taken by 1 man alone or by 1 boy alone.

Q5. A man travels 600km partly by train and partly by car. It takes 8 hours and 40 minutes if he travels 320 km by train and rest by car. It would take 30 minutes more if he travels 200 km by train and the rest by car. Find the speed of the train and car separately.

Q6. Solve the equations graphically- 2x+y=2 and 2y-x=4. Also find the area of the triangle formed by the two lines and y=0

DAY-2

Number of blocks: 1

CHAPTER-4 : QUADRATIC EQUATIONS

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=4-15

Sub-Topics:

- Quadratic Equation
- Solution of Quadratic equation by factorization
- Forming a quadratic equation in a given situation and solving it
- Nature of the roots

Learning Outcomes:

Each student will be able to:

- Identify quadratic equation
- Find solution of quadratic equation by factorisation method
- Forming a quadratic equation
- Find the nature of the roots

Teaching Aids Used:

Presentation of E-lesson, YouTube videos by screen sharing, white board and marker using laptop/mobile

GUIDELINES:

Dear students,

Kindly read the content given below and view the links shared for better understanding.

Solve the given questions in math notebook.

LESSON DEVELOPMENT

INTRODUCTION

1) A **quadratic equation** in the variable x is an equation of the form: ax2 + bx + c = 0, where a,b,c are real numbers, a ≠ 0.

2) ax2 + bx + c = 0, a ≠ 0, is called the standard form of quadratic equation.

3) The word "quadratic" comes from ***"quadratum",*** the Latin word for square.

Hence, we define a quadratic equation as an equation where the variable is of the second degree. Therefore, a quadratic equation is also called an **"Equation of Degree 2".**

Key Points and Important Link for References

(i) Quadratic Equation $ax^2 + bx + c = 0, a \neq 0$, is called the standard form of quadratic equation
For example (i) 2x2+5x+3=0; Here, a=2, b=3 and c=5 (ii) x 2-3x=0; Here, a=1 , b=-3 and c=0

But sometimes, the quadratic equation does not come in the standard form. These are the hidden quadratic equations which we may have to reduce to the standard form. Here are some examples:

Equation	Standard Form	Coefficients	Explanation
$x^2 - 3x = 1$	$x^2 - 3x - 1 = 0$	a = 1, b = -3, c = -1	Compare it to the general form of the quadratic equation and subtract 1 from both sides.
$2(z^2 - 2z)=5$	$2z^2 - 4z - 5 = 0$	a = 2, b = -4, c = -5	We need to expand (open the brackets) by multiplying 2 with z^2 and -2z and also we need to bring 5 to the left side to equate the equation with 0.
y(y-2)=0	$y^2 - 2y = 0$	a = 1, b = -2, c = 0	We need to expand, multiply y with both y and -2 and the output you get is in the desired standard form.

Refer to the following link for more on the topic:

https://www.youtube.com/watch?v=UZTvYYoOrmI&list=PLmdFyQYShrjc6bN89NAbgJcUYGgM1r2wF&index=1

Q Check whether x3 – 4x2 - x +1 = (x – 2)3 is a quadratic equation.

Here RHS can be expanded as $x^3 - 6x^2 + 12x - 8$

Therefore, we get $x^3 - 4x^2 - x + 1 = x^3 - 6x^2 + 12x - 8$ i.e. $2x^2 - 13x + 9 = 0$

So, the given equation is a quadratic equation.

(ii) Solution of Quadratic Equation by Factorization

Refer to the given link to understand the solution of quadratic equation: https://www.youtube.com/watch?v=5Bs-QhklVg&list=PLmdFyQYShrjc6bN89NAbgJcUYGgM1r2wF&index=11

Q Find the roots of the following Quadratic equations:

(i) $x^2 - 3x - 10 = 0$

$x^2 - 3x - 10$

$= x^2 - 5x + 2x - 10$

$= x(x - 5) + 2(x - 5)$

$= (x - 5)(x + 2)$

Roots of this equation are the values for which $(x - 5)(x + 2) = 0$

$\therefore\ x - 5 = 0$ or $x + 2 = 0$

i.e., $x = 5$ or $x = -2$

(ii) Given equation is $\frac{2}{5}x^2 - x - \frac{3}{5} = 0$.

On multiplying by 5 on both sides, we get

$\Rightarrow \quad 2x^2 - 5x - 3 = 0$

$2x^2 - (6x - x) - 3 = 0$ [by splitting the middle term]

$\Rightarrow \quad 2x^2 - 6x + x - 3 = 0$

$\Rightarrow \quad 2x(x - 3) + 1(x - 3) = 0$

$\Rightarrow \quad (x - 3)(2x + 1) = 0$

Now, $x - 3 = 0 \Rightarrow x = 3$

and $2x + 1 = 0$

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

Hence, the roots of the equation $2x^2 - 5x - 3 = 0$ are $-\frac{1}{2}$ and 3.

(iii) Given equation is $3\sqrt{2}\,x^2 - 5x - \sqrt{2} = 0$.

$3\sqrt{2}\,x^2 - (6x - x) - \sqrt{2} = 0$ [by splitting the middle term]

$3\sqrt{2}x^2 - 6x + x - \sqrt{2} = 0$

$3\sqrt{2}x^2 - 3\sqrt{2}\cdot\sqrt{2}x + x - \sqrt{2} = 0$

$\Rightarrow \quad 3\sqrt{2}\,x(x - \sqrt{2}) + 1(x - \sqrt{2}) = 0$

$\Rightarrow \quad (x - \sqrt{2})(3\sqrt{2}x + 1) = 0$

Now, $x - \sqrt{2} = 0 \Rightarrow x = \sqrt{2}$

and $3\sqrt{2}\,x + 1 = 0$

$\Rightarrow \quad x = -\frac{1}{3\sqrt{2}} = \frac{-\sqrt{2}}{6}$

Hence, the roots of the equation $3\sqrt{2}x^2 - 5x - \sqrt{2} = 0$ are $-\frac{\sqrt{2}}{6}$ and $\sqrt{2}$.

Refer to the following links:

https://www.youtube.com/watch?v=UtReXKgmQ10 https://www.youtube.com/watch?v=qeByhTF8WEw

(iii) Forming a Quadratic Equation in a Given Situation
https://www.youtube.com/watch?v=fHqfCxwGBKE&list=PLmdFyQYShrjc6bN89NAbgJcUYGgM1r2wF&index=2

Q.The altitude of a right triangle is 7cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

Let the base of the right triangle be x cm.
Its altitude = $(x - 7)$ cm
From pythagoras theorem,

$\text{Base}^2 + \text{Altitude}^2 = \text{Hypotenuse}^2$

$\therefore x^2 + (x-7)^2 = 13^2$

$\Rightarrow x^2 + x^2 + 49 - 14x = 169$

$\Rightarrow 2x^2 - 14x - 120 = 0$

$\Rightarrow x^2 - 7x - 60 = 0$

$\Rightarrow x^2 - 12x + 5x - 60 = 0$

$\Rightarrow x(x-12) + 5(x-12) = 0$

$\Rightarrow (x-12)(x+5) = 0$

Either $x - 12 = 0$ or $x + 5 = 0$, i.e., $x = 12$ or $x = -5$
Since sides are positive, x can only be 12.
Therefore, the base of the given triangle is 12 cm and the altitude of this triangle will be $(12 - 7)$ cm $= 5$ cm.

Step 4 :

Points to Remember

1) Always simplify the given equation to check if it is a quadratic equation or not

2) A quadratic equation is factorized into two linear factors and then apply the zero product principle i.e. if the product of two numbers/variables/algebraic expressions a and b is zero, then either a=0 or b=0 or both a and b are zeroes.

ASSIGNMENT

1) Do NCERT EX 4.1 and 4.2 in the CW/HW register.
   Do the following questions in your practice register:

2) Determine if (x – 2)2 -25 = 0 is quadratic or not.

3) Divide 12 into two parts s.t. the sum of their squares is 74.

4) One side of a rectangle exceeds its other side by 2 cm. If its area is 195 cm, determine the sides of the rectangle.

ANSWER KEY Q 2) Yes Q3) 5 and 7 Q4) 13 cm and 15cm

DAY-3

LESSON DEVELOPMENT

Link for the chapter: https://ncert.nic.in/textbook.php?jemh1=4-15

Solution of the quadratic equation:

The value of the variable x that satisfies the given quadratic equation

STEP 2:

Subtopics:

(i) Solution of Quadratic equation using quadratic formula
(ii) Forming a quadratic equation in a given situation and solving it
(iii) Nature of roots of the given quadratic equation

STEP 3:

Key Points and Important Link for References

(i) Quadratic Formula For the Quadratic Equation $ax^2 + bx + c = 0, a \neq 0$,

if $b^2 - 4ac \geq 0$, then the roots are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{when } ax^2+bx+c=0$$

a, b, c = constants, where a ≠ 0

Refer to the following link for more practice:

https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadraticfunctions-equations/x2f8bb11595b61c86:quadratic-formula-a1/v/using-thequadratic-formula

https://www.youtube.com/watch?v=3ayhvAI3IeY

(iii) $4x^2 - 4\sqrt{3}x + 3 = 0$

This is of the form $ax^2 + bx + c = 0$,

where $a = 4, b = 4\sqrt{3}$ and $c = 3$.

Discriminant, $D = b^2 - 4ac$

$= (4\sqrt{3})^2 - 4 \times 4 \times 3 = 48 - 48 = 0$

Since, $D = 0$

Roots are

$$\alpha = \frac{-b+\sqrt{D}}{2a} = \frac{-4\sqrt{3}+0}{8} = \frac{-4\sqrt{3}}{8} = \frac{-\sqrt{3}}{2}$$

$$\beta = \frac{-b-\sqrt{D}}{2a} = \frac{-4\sqrt{3}-0}{8} = \frac{-4\sqrt{3}}{8} = \frac{-\sqrt{3}}{2}$$

Hence, the roots are $\frac{-\sqrt{3}}{2}, \frac{-\sqrt{3}}{2}$.

Equation Reducible to Quadratic Equations

Given: $x - \frac{1}{x} = 3$

Multiplying both sides by x, we get:

$$x^2 - 1 = 3x$$

$$\Rightarrow \quad x^2 - 3x - 1 = 0$$

This is a quadratic equation.

Here, $a = 1$, $b = -3$ and $c = -1$

$$\therefore \quad x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 1 \times (-1)}}{2 \times 1}$$

$$= \frac{3 \pm \sqrt{9+4}}{2} = \frac{3 \pm \sqrt{13}}{2}$$

$$\Rightarrow \text{ Either } x = \frac{3+\sqrt{13}}{2} \text{ or } x = \frac{3-\sqrt{13}}{2}$$

Refer to the links :

https://www.youtube.com/watch?v=BbeRP04pQIM

https://www.youtube.com/watch?v=AAcknrC0QJA

(ii) Forming a Quadratic Equation in a Given Situation:

A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Solution:

Total distance travelled = 360 km

Let uniform speed be x km/h

Then, increased speed = (x + 5) km/h

According to question,

$$\frac{360}{x} - \frac{360}{x+5} = 1 \qquad \left\{\text{Time} = \frac{\text{Distance}}{\text{Speed}}\right\}$$

$$\Rightarrow \frac{360(x+5) - 360x}{x(x+5)} = 1$$

$$\Rightarrow 360x + 1800 - 360x = x(x+5)$$

$$\Rightarrow 1800 = x^2 + 5x$$

$$\Rightarrow x^2 + 5x - 1800 = 0 \qquad \Rightarrow x^2 + 45x - 40x - 1800 = 0$$

$$\Rightarrow x(x+45) - 40(x+45) = 0 \qquad \Rightarrow (x-40)(x+45) = 0$$

$$\Rightarrow x - 40 = 0 \quad \text{or} \quad x + 45 = 0$$

$$\Rightarrow x = 40 \quad \text{or} \quad x = -45 \quad \text{(rejected)}$$

$\therefore$ Speed of the train = 40 km/h

Refer to the following links for more word problems :

https://www.youtube.com/watch?v=yHDqZE7XyHA

https://www.youtube.com/watch?v=f2lxRLycnY8

(iii) Nature of Roots

The Discriminant

The discriminant of a quadratic equation $ax^2 + bx + c = 0$ is given by $b^2 - 4ac$.
The symbol, Δ is sometimes used for the discriminant.

Note that the discriminant is the part of the quadratic formula that is under the square root sign.

By examining the value of the discriminant we can determine the number and nature of the roots.

If the discriminant is zero	$b^2 - 4ac = 0$	there is one (repeated) rational root
If the discriminant is positive	$b^2 - 4ac > 0$	there are two real roots
If the discriminant is negative	$b^2 - 4ac < 0$	there are no real roots

If the discriminant is a perfect square, such as 49 or 100, then the roots will be rational (fractional) numbers.

Examples:

	example 1	example 2	example 3
Equation	$y = (x + 3)^2$ $= x^2 + 6x + 9$	$y = x^2 - 5x + 6$	$y = -x^2 + x - 2$
a, b and c	a = 1, b = 6, c = 9	a = 1, b = -5, c = 6	a = -1, b = 1, c = -2
Discriminant	$b^2 - 4ac = 6^2 - 4x1x9$ $= 0$ Discriminant = 0 (i.e. Zero)	$b^2 - 4ac = (-5)^2 - 4x1x6$ $= 1$ Discriminant = 1 (i.e. Positive)	$b - 4ac = (1)^2 - 4x\text{-}1x\text{-}2$ $= -7$ Discriminant = -7 (i.e. Negative)
Number and nature of the roots	There is one repeated real root	There are two real roots	There are no real roots

Refer to the link :

https://www.youtube.com/watch?v=yHDqZE7XyHA

Q Find the value of k for which the quadratic equation has two equal roots.

$$kx(x-2) + 6 = 0$$

$$\Rightarrow \quad kx^2 - 2kx + 6 = 0$$

This is of the form $ax^2 + bx + c = 0$,

where $a = k, b = -2k$ and $c = 6$

Discriminant, $D = b^2 - 4ac$

$$= (-2k)^2 - 4 \times k \times 6 = 4k^2 - 24k$$

For equal roots, $D = 0$

$$\Rightarrow \quad 4k^2 - 24k = 0 \quad \Rightarrow \quad k(4k - 24) = 0$$

$$\Rightarrow \quad k = 0 \text{ (not possible)} \quad \text{or} \quad 4k - 24 = 0$$

$$\Rightarrow \quad 4k = 24$$

$$\Rightarrow \quad k = \frac{24}{4} = 6$$

Step 4 :

Points to Remember

1) A quadratic equation always has two roots.

2) A given daily life situation will be feasible (Ex 4.4 - Q 3 to 5) if the quadratic equation so formed has real roots.

ASSIGNMENT Do NCERT Ex 4.1 and 4.2 in the CW/HW register.

CASE STUDY QUESTIONS - REVISION ASSIGNMENT

Q1)

A test consists of 'True' or 'False' questions. One mark is awarded for every correct answer while ¼ mark is deducted for every wrong answer. A student knew answers to some of the questions. Rest of the questions he attempted by guessing. He answered 120 questions and got 90 marks.

(i) If answer to all questions he attempted by guessing were wrong, then how many questions did he answer correctly?

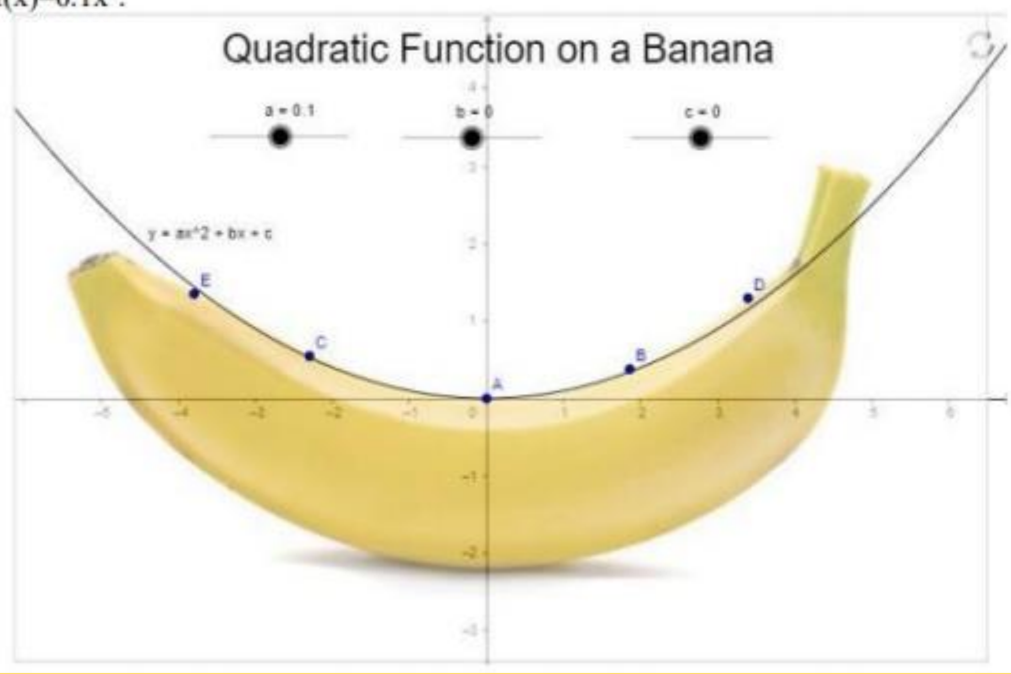
(ii) How many questions did he guess?

(iii) If answer to all questions he attempted by guessing were wrong and answered 80 correctly, then how many marks he got?

(iv) If answer to all questions he attempted by guessing were wrong then how many questions answered correctly to score 95 marks?

Q2)

The below quadratic function can model the natural shape of a banana. Now, we know that a parabolic shape must have a quadratic function, therefore an equation in standard form of $f(x)=ax^2 + bx + c$. To find an equation for the parabolic shape of the banana, we need to find the values of a, b, and c. From the banana picture above, we can see that a quadratic function is able to model the banana quite accurately, with $a=0.1$, $b=0$, and $c=0$. Therefore, the equation is $f(x)=0.1x^2$.



(i) Name the shape of the banana curve from the above figure.
Ans: Parabola
(ii) Find the number of the zeroes of the polynomial for the shape of the banana.
Ans: No. of zeroes = 1
(iii) If the curve of banana represented by $f(x) = x^2 - x - 12$. Find its zeroes.

(iv) If the representation of banana curves whose one zero is 4 and the sum of the zeroes is 0 then find the quadratic polynomial.

Q3)

1) A geodesic dome is a structure built in an almost spherical shape—a structure made from struts set on large circles. Because of its curved walls and ceiling, these domes use approximately a third less surface area to enclose the same volume as a traditional box home.

Figure 1

(a) A hollow model of a similar type of structure is constructed with a hemisphere mounted on a cylinder.

If the height of the cylindrical part is 6 cm, and the total height of the model is 13 cm, then find the radius of the hemisphere .

(i) 5 cm (ii) 3 cm (iii) 7 cm (iv) 4 cm

(b) A square band of side 17 cm is put outside along the edge of the hemisphere as shown in figure 1.

Find the area of the metal sheet required for the band:

(i) 145 cm^2 (ii) 125 cm^2 (iii) 135 cm^2 (iv) 155 cm^2

(c) A test tube is cylindrical in shape with hemispherical base of diameter 2 cm as shown in figure 2. If it is filled with chemical solution up to the height of 7 cm, then find the volume of the chemical solution in the test tube.

(i) $20\ 3\ \pi\ cm^3$ (ii) $8\pi\ cm^3$ (iii) $20\ 5\ \pi\ cm$^3 (iv) $10\ 3\ \pi\ cm^3$

(d)Two hemispheres of the same radius are joined end to end along their base. Find the total surface area of the solid so obtained.

(i) $4\pi r^2$ (ii) πr^2 (iii) $2\pi r^2$ (iv) $6\pi r^2$

Q4. Arithmetic progression is sequence of numbers such that the difference of any two successive members of the sequence is a constant. Reema being a plant lover decides to open a nursery and she bought a few plants with pots. She wants to place the pots in such a way that the number of pots in the first row is 3, in the second row is 5 and in the third row is 7 and so on.

(a) If Reema wants to place 120 pots in total, then the total number of rows formed in this arrangement is:

(i) 12 (ii) 10 (iii) 14 (iv) 8

(b)How many pots are placed in the last row?

(i) 22 (ii) 21 (iii) 24 (iv) 18

(c) Find the difference in the number of pots placed in the 8th row and the 3rd row.

(i) 10 (ii) 11 (iii) 14 (iv) 15

(d) If Reema has sufficient space for 15 rows then how many total number of pots are placed by her with the same arrangement?

(i) 200 (ii) 150 (iii) 255 (iv) 180

(e) If for an AP, an = 4n + 5 find the common difference:

(i) 5 (ii) 4 (iii) 1 (iv) 0

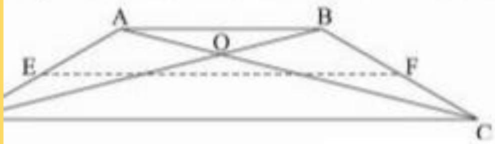
Q5

Kerala

Kerala is a state in Southern India. The state is known as a tropical paradise of waving palms and wide sandy beaches.

This map of the Indian province of Kerala shows its area can be approximated using a simple straight-sided shape. The shape has two parallel sides 561 km and 216 km long. The other sides are 180 km and 211 km long. Its parallel sides are 100 km apart.

Shreya observed the shape formed by four straight lines and explored it on her notebook in different ways shown below.



Shape I

Shape II

Refer to Shape I

(*a*) Let ABCD is a trapezium with AB || DC, E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB. Then $\frac{AE}{ED} =$ **1**

(*i*) $\frac{BF}{CD}$ (*ii*) $\frac{AB}{CD}$ (*iii*) $\frac{BF}{FC}$ (*iv*) None of these.

(*b*) Here, AB || CD. If DO = $3x - 19$, OB = $x - 5$, CO = $x - 3$ and AO = 3, the value of x is **1**

(*i*) 5 or 8 (*ii*) 8 or 9 (*iii*) 10 or 12 (*iv*) None of these.

(*c*) Again AB || CD. If DO = $3x - 1$, OB = $5x - 3$, AO = $6x - 5$ and OC = $2x + 1$, then the value of x is **1**

(*i*) 0 (*ii*) 1 (*iii*) 2 (*iv*) 3

Refer to Shape II

(*d*) In ΔABC, PQ || BC. If AP = 2.4 cm, AQ = 2 cm, QC = 3 cm and BC = 6 cm, AB and PQ are respectively **1**

(*i*) AB = 6 cm, PQ = 2.4 cm (*ii*) AB = 4.8 cm, PQ = 8.2 cm

(*iii*) AB = 4 cm, PQ = 5.3 cm (*iv*) AB = 8.4 cm, PQ = 2.8 cm

(*e*) In ΔDEF, if RS || EF, DR = $4x - 3$, DS = $8x - 7$, ER = $3x - 1$ and FS = $5x - 3$, then the value of x is **1**

(*i*) 1 (*ii*) 2 (*iii*) 8 (*iv*) 10

Q6

Saving Money

Saving money is a good habit for everyone. It helps you in the event of financial emergency. Some children of Class X decided to save their pocket money. The following distribution shows their daily pocket allowance.

Daily Pocket allowance (in ₹)	100-120	120-140	140-160	160-180	180-200
Number of children	12	14	8	6	10

(*a*) The class-mark of class 140-160 is **1**

(*i*) 140 (*ii*) 160 (*iii*) 150 (*iv*) 20

(*b*) The median class is **1**

(*i*) 120-140 (*ii*) 140-160 (*iii*) 160-180 (*iv*) 180-200

(*c*) The mean daily pocket allowance is **1**

(*i*) ₹ 150 (*ii*) ₹ 142.50 (*iii*) ₹ 135.70 (*iv*) ₹ 145.20

(*d*) The upper limit of modal class is **1**

(*i*) 120 (*ii*) 140 (*iii*) 180 (*iv*) 200

(*e*) The modal daily pocket allowance is **1**

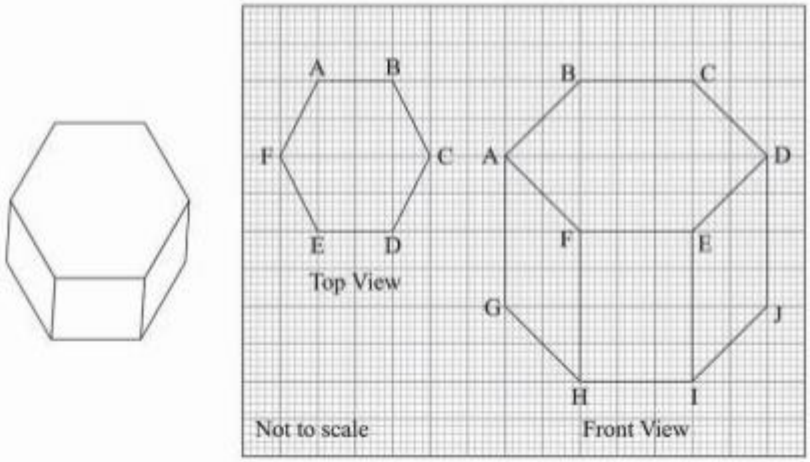
(*i*) ₹ 125 (*ii*) ₹ 140 (*iii*) ₹ 135 (*iv*) ₹ 160

Aquarium

An aquarium is a transparent tank of water in which live fish and other water creatures and plants are kept.

The diagrams below show the plans for an aquarium. It will be built in hexagonal shape. It will be made using

- six rectangular shaped clear glasses.
- one regular hexagon clear glass for roof.



Refer to Top View

(*a*) The value of x for which the distance between the points F(2, –3) and C(x, 5) is 10, is **1**

(*i*) 8 or –4 (*ii*) 4 or 8 (*iii*) 5 or –10 (*iv*) 5 or 10

(*b*) The mid-point of the line segment joining the points E(8, 11) and B(11, 15) is **1**

(*i*) (6, 10) (*ii*) $\left(\frac{11}{5}, \frac{8}{5}\right)$ (*iii*) $\left(17, \frac{15}{4}\right)$ (*iv*) $\left(\frac{19}{2}, 13\right)$

Refer to Front View

(*c*) The distance of a point F(8, 6) from origin is **1**

(*i*) 12 units (*ii*) 16 units (*iii*) 14 units (*iv*) 10 units

(*d*) The perimeter of square EFHI where E(–2, 0), F(3, 0), H(3, 5) and I(–2, 5) is **1**

(*i*) $8\sqrt{5}$ units (*ii*) 40 units (*iii*) 20 units (*iv*) None of these.

(*e*) The coordinates of the point which divides segment joining the point A(–4, 5) and D(6, 3) in the ratios 3 : 2 internally is **1**

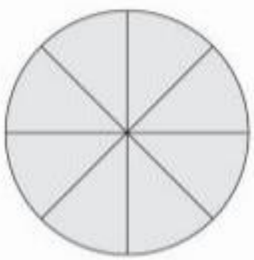
(*i*) (0, 8) (*ii*) $\left(2, \frac{19}{5}\right)$ (*iii*) $\left(8, \frac{13}{2}\right)$ (*iv*) $\left(\frac{7}{5}, 3\right)$

Q7

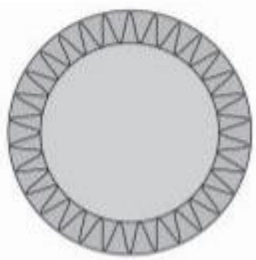
A Brooch

A brooch is a small piece of jewellery which has a pin at the back so it can be fastened on a dress, blouse or coat.

Designs of some brooch are shown below. Observe them carefully.



A



B

Design A: Brooch A is made with silver wire in the form of a circle with diameter 28 mm. The wire used for making 4 diameters which divide the circle into 8 equal sectors.

Design B: Brooch B is made in two colours — Gold and Silver. Outer part is made with gold. The circumference of silver part is 44 mm and the gold part is 3 mm wide everywhere.

Refer to Design A

(*a*) The total length of the silver wire required is **1**

(*i*) 180 mm (*ii*) 200 mm (*iii*) 250 mm (*iv*) 280 mm

(*b*) The area of each sector of the brooch is **1**

(*i*) 44 mm^2 (*ii*) 52 mm^2 (*iii*) 77 mm^2 (*iv*) 68 mm^2

Refer to Design B

(*c*) The circumference of outer part (golden) is **1**

(*i*) 48.49 mm (*ii*) 82.2 mm (*iii*) 72.50 mm (*iv*) 62.86 mm

(*d*) The difference of areas of golden and silver parts is **1**

(*i*) 18π (*ii*) 44π (*iii*) 51π (*iv*) 64π

(*e*) A boy is playing with the brooch B. He makes revolution with it along its edge. How many complete revolutions must it take to cover 80π mm? **1**

(*i*) 2 (*ii*) 3 (*iii*) 4 (*iv*) 5