Real Numbers

Learning Objectives

- To revisit Number Systems from Naturals to Real Numbers.

- To learn Euclid's Division Lemma.

- To understand & apply Euclid's Division algorithm for finding HCF of two numbers.

- To understand Fundamental theorem of Arithmetic.

- To find HCF & LCM using prime factorization.

- To prove $\sqrt{2}$, $\sqrt{3}$ etc as irrational numbers.

- To revisit decimal expansion of real numbers.

- To find the condition on rational numbers to have terminating decimal expansion.

Suggested Formative Assessment tasks

Task-1: Crossword Puzzle Worksheet

Topic	Real Numbers
Content Coverage	Whole Chapter
Learning Objectives	To test the basic concepts related to the chapter.
Task	Crossword Puzzle
Execution of task	This task may be performed in the classroom. Students can be given the photocopy of the worksheet.
Duration	10 - 15 minutes.
Criteria for assessment	• Time involved in solving the worksheet. • Rating scale for the worksheet.
Follow up	Practice worksheets

Crossword Puzzle Sheet
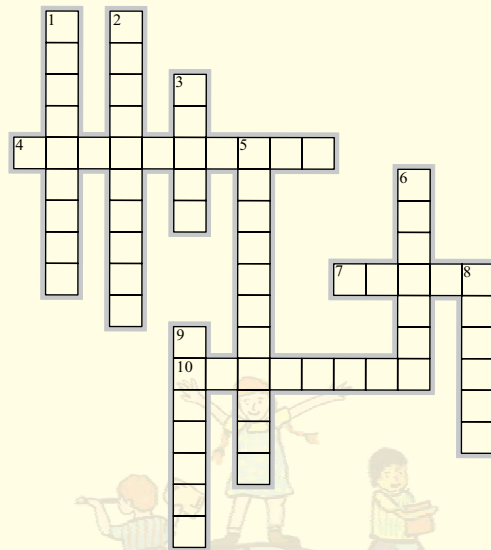
Across

4.   Fundamental theorem of _____ states that every composite number can be uniquely expressed as a product of primes, apart from the order of factors.

7.   The _____ factorization of composite numbers is unique.

10.   _____ numbers have either terminating or non-terminating repeating decimal expansion.

Down

1.   _____ is a sequence of well defined steps to solve any problem.

2.   Numbers having non-terminating, non-repeating decimal expansion are known as

3.   A proven statement used as a stepping stone towards the proof of another statement is known as

5.   Decimal expansion of 3/35 is

6.   The _____ expansion of rational numbers is terminating if the denominator has 2 & 5 as its only factors.

8.   _____ division algorithm is used to find the HCF of two positive numbers.

9.   For any two numbers, HCF × LCM = _____ of numbers.

Rating Scale	Student Knows	Yes	No
	1. Euclid's division lemma		
	2. Fundamental theorem of airthmetic		
	3. Decimal expansion of rational nos.		
	4. Decimal expansion of irrational nos.		
	5. Relation between LCM, HCM & two numbers		

Task-2: Quiz/Oral Assessment

Topic	Real Numbers
Nature of task	Post Content
Content Coverage	Whole Chapter
Learning Objectives	• To check basic Number system concept. • To test understanding & application of Euclid's Division algorithm for finding HCF of two numbers. • To test understanding of Fundamental theorem of Arithmetic & its application in finding HCF/LCM. • To check conceptual understanding of decimal expansion of real numbers.
Task	Quiz/Oral assessment
Execution of task	This task may be performed in 2 periods after the completion of the chapter. The class may be divided in 4 teams(Ramanujan, Aryabhat, Thales, Euclid).The teacher can keep writing the scores on board after each round.
Duration	2 periods

Assessment : Make Score Board

Rounds	Euclid	Thales	Ramanujan	Aryabhatt
1. Rapid Fire				
2. Buzzer Round				
3. Question Framing				
Total				

Suggested Rounds & questions for the quiz

Rapid Fire Round : Each team would be given 2 minutes to answer as many questions. Each correct answer would be awarded one point.

Please Note : (In this round mental math should be encouraged, use of paper-pen should not be allowed)

1.   The sequence of well defined steps to solve any problem is known as_____.

2.   Numbers having non-terminating, non-repeating decimal expansion are known as _____.

3.   A proven statement used as a stepping stone towards the proof of another statement is known as _____.

4.   Fundamental theorem of Arithmetic states _____.

5.   Decimal expansion of 1/35 is _____.

6.   What are the probable factors of the denominator of rational number having terminating decimal expansion ?

7.   The prime factorization of composite numbers is _____.

8.   Name the algorithm which is used to find the HCF of two positive numbers.

9.   For any two numbers, HCF × LCM = _____ of numbers.

(*Note :* Teacher may frame more questions according to the need).

Buzzer Round : The team which finishes the question will press the buzzer. For each correct answer 10 marks will be awarded.

1.   There is a circular path around a sports field. Preeti takes 18 minutes to drive one round of the field, while Suman takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?

2.   Two tankers contain 616 litres and 32 litres of petrol respectively. Find the maximum capacity of container which can measure the petrol of either tanker in exact number of times.

3.   Find the HCF of 12576 & 4052.

4.   Find LCM of 867 & 255.

Framing Question Round :

Each team would be asked to frame a question based on the Chapter. They would be given 5 minutes to prepare a presentation on explaining the question and solution.

Marks for this round would be on the basis of	(1) Originality	(3)
	(2) Question framing	(3)
	(3) Explanation	(4)

Task-3: MCQ

Topic	Real Numbers
Nature of task	Post Content
Content Coverage	Complete Chapter
Task	MCQ
Execution of task	Printed assignment may be given after completing the chapter. After completion of worksheet, teacher can ask children to interchange their sheets & a quick evaluation can be done by class discussion.
Duration	10-15 minutes.
Criteria for assessment	Teacher may prepare a rating scale according to the marks assigned to this task.

Multiple Choice Questions

Choose the correct option.

1. $\sqrt{5} - 3 - 2$ is:

    A.   a rational number   B.   a natural number

    C.   equal to zero   D.   an irrational number

2. Let $x = \dfrac{7}{22 \times 53}$ be a rational number. Then x has decimal expansion which terminates:

    A.   after four places of decimal   B.   after three places of decimal

    C.   after two places of decimal   D.   after five places of decimal

3. The decimal expansion of $\dfrac{63}{72 \times 175}$ is:

    A.   Terminating   B.   Non-terminating

    C.   Non terminating and repeating   D.   None of these

4. If HCF and LCM of two numbers are 4 and 9696, then the product of the two numbers is:

    A.   9696   B.   24242   C.   38784   D.   4848

5. $(2 + \sqrt{3} + \sqrt{5})$ is a:

    A. natural number   B. Integer number

    C. Rational number   D. Irrational number

6. If $\left(\dfrac{9}{7}\right)^3 \times \left(\dfrac{49}{81}\right)^{2x-6} = \left(\dfrac{7}{9}\right)^9$, the value of x is:

    A. 12   B. 9   C. 8   D. 6

7. The number .211 2111 21111 211111....... is a:

    A. terminating decimal

    B. non-terminating repeating decimal

    C. non-terminating decimal which is non-repeating

    D. None of the above

8. If $(m)^n = 32$, where m and and n are positive integers, then the value of $(n)^{mn}$ is:

    A. 32   B. 25   C. (5)10   D. (5)25

9. The number 0.57 in the $\dfrac{p}{q}$ form $(q \neq 0)$ is:

    A. $\dfrac{19}{35}$ B. $\dfrac{57}{99}$ C. $\dfrac{57}{95}$ D. $\dfrac{19}{30}$

10. 0.57 can be written as $\dfrac{p}{q}$, $q \neq 0$ as:

    A. $\dfrac{26}{45}$ B. $\dfrac{13}{27}$ C. $\dfrac{13}{29}$ D. $\dfrac{57}{99}$

11. Any one of the numbers a, $(a + 2)$ and $(a + 4)$ is a multiple of:

    A. 2   B. 3   C. 5   D. 7

12. If p is a prime number and p divides k^2, then p divides:

    A. $2k^2$ B. k C. $3k$ D. None of these

Task-4: Home Assignment

Topic	Real Numbers
Nature of task	Post Content
Content Coverage	Complete Chapter
Task	Home Assignment (Short/Long questions)
Execution of task	Printed assignment may be given after completing the Chapter or the teacher may dictate the questions.
Duration	2 days.
Criteria for assessment	Follow Rubric for H.W/Assignments
Follow up	Reference material in the form of important points to remember can be given as a support material.

Home Assignment : Short & Long Questions

1. Show that only one out of a, $a + 2$ and $a + 4$ is divisible by 3.

2. Without actual division find whether the rational number $\dfrac{1323}{(6^3 \times 35^2)}$ has a terminating or a non-terminating decimal.

3. If LCM (480, 672) = 3360, find HCF (480, 672).

4. Prove that $7 - \sqrt{5}$ is an irrational number.

5. Show that the product of three consecutive natural numbers is divisible by 6.

6. Express 0.69 as a rational number in $\dfrac{p}{q}$ form.

7. Show that the number of the form 7^n, $n \in N$ can not have unit digit zero.

8. Using Euclid's Division Algorithm find the HCF of 9828 and 14742.

Task-5: Remedial Worksheet

Topic	Real Numbers
Nature of task	Delivery of content/Post Content
Content Coverage	Whole chapter.
Learning Objectives	To provide remedial measures on specific topics based on individual needs.
Task	Need based worksheets.
Execution of task	After diagnostic test & before taking remedial test, teacher should take all possible cures and remedies in the teaching process which could be-
	a) Category wise remedial classes-not more than 5 to 10 students in each class. (With the large class size ,this could better be achieved with group work. Teacher can divide the class in small groups of 4-5 students, in each group there should be one good performer who can help out other members of his/her group who are comparatively under achievers (based on the result of diagnostic test, class observation). b) Personal and individual attention by teacher. c) No humiliation. d) Special carefully devised UAA (under achiever's assignment) - Simpler-Simple-Complex. e) Read-Re-read-Write-Re-Write-Reproduce-Drill. f) Group studies; group learning. g) Micro-notes. h) Teaching selected portion of syllabus only. For taking remedial tests teacher may group up children facing same problems & should prepare each group's need based worksheets.
Duration	Need based
Criteria for assessment	• Observation of group based remedial teaching. • Rubric for remedial worksheets.
Follow up	Remedial practice sheets of subtopics & frequent retests.

Remedial Worksheet

1. Learn statement of Euclid's Division. Lemma Euclid Division Lemma states that
    _____.

2. Given positive integers a and b, there exist unique integers q and r satistfying $a = bq + r$,
    _____. (write other condition).

3. Complete the missing steps.

    Use Euclid's algorithm to find the HCF of 324 and 12084.

    Since 12084 > 324, by Eudid's division lemma 12084 = 324 × 37 + 96.

    Since remainder ≠ 0, again by division lemma. 324 = 96 × 3 + 36.

    Remainder = 36, 96 = _____ × _____ + _____

    _____, 36 = _____ × _____ + _____

    _____, 24 = <u>12</u> × <u>2</u> + <u>0</u>.

    _____, HCF=_____ × _____ + _____

4. The fundamental theorem of arithmetic states that every composite number can be expressed
    as _____ and this factorization is _____ apart from _____.

5. For any two positive integers a and b, HCF (a, b) × LCM (a, b) = a × b.
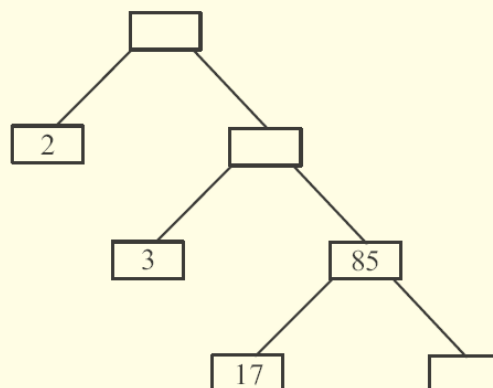   Find HCF of 96 and 404 by division lemma and hence find LCM.

Step 1: HCF of 96 and 404

_____

_____

HCF = _____

Step 2: Use the above formula to find LCM.

_____

_____

LCM = _____

6. Complete the following factor tree.

7. The decimal representation of $\dfrac{23}{2^3 5^2}$ will (*i*) terminate (*ii*) terminate after 3 decimal places.

Reason

(*i*)_____

_____

_____

(*ii*)_____

_____

_____

8. Application of fundamental theorem of Arithmetic

(*i*) $7 \times 11 \times 13 + 13$

= 13 (_____+_____)

= $132 \times 2 \times 3$ = _____

Is this factorisation unique. (Y/N)
So, the given expression is a _____ number

(*ii*) $5 \times 7 \times 13 + 5$

=_____

=_____

Is this factorisation unique. (Y/N)
So, the given expression is a _____ number

(*iii*) $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 6 \times 4 \times 3$

= _____ _____ (take $6 \times 4 \times 3$ common)

= _____ _____ (factorise 561)

= _____ _____ (observe the product)

Is this factorisation unique? (Y/N)
So, the given expression is a _____ number.

9. Proof of $\sqrt{2}$ is irrational.

Step 1. Let $\sqrt{2}$ be a rational number

Let $\sqrt{2} = \dfrac{a}{b}$, a & b are integers $b \neq 0$ a & b are coprime

* Applying definition of rational number
(Focus on definition of co-prime numbers
they do not have common factor other than 1.)

Step 2.   Squaring both sides

$$2 = \frac{a^2}{b^2}$$

=> $a^2 = 2.b^2$ ...(1)   Observe, a^2 has factor 2

∴ a^2 is divisible by 2   When a^2 is even then a is also even

∴ a is divisible by 2   ...(2)   Think: 4 is even

Step 3. a is divisible by 2 we can write   ∴   2 is even

       $a = 2m,\ m \in N$ ...(3)

Step 4.   Put (3) in (1)

       $4\ m^2 = 2b^2$

       $b^2 = 2m^2$

=> b^2 is divisible by 2

       b is divisible by 2   ...(4)

Step 5.   from (2) & (4), a and b have a common factor 2

       This is a contradiction

∴   Our assumption is false ∴ $\sqrt{2}$ is irrational

10.   Proof of $\sqrt{3}$ is irrational

     Step 1.   Let $\sqrt{3}$ be rational

     Let $\sqrt{3} = \frac{a}{b}$, a & b are   _____

         $b \neq 0$

         a & b are   _____

     Step 2.   Squaring both sides

     $3 = \frac{a^2}{b^2}$

     $a^2 = 3b^2$ ...(1)

     => a^2 is divisible by   _____

     a is divisible by_____   ...(2)

Step 3. $a = 3m$, $m \in N$ ...(3)

Step 4.   Put (3) is (1)

$(\_\_\_)^2 = 3b^2$

$=>$ b^2 is divisible by $\_\_\_\_\_$

$\therefore$ b is divisible by $\_\_\_\_\_$...(4)

Step 5.   from (2) and (4), we get

a and b have a common factor $_____$

11.   **Develop the proof of $\sqrt{5}$ is irrational**

(i) _____

_____

_____

Step1.

Step2.

Step3.

Step4.

Step5.

12.   **Remember :** Let $x = \dfrac{p}{q}$ be a rational number, such that the prime factorisation of q is of the form $2^n 5^m$, where n, m are non-negative integers. Then x has a decimal expansion which terminates.

Consider : $x = \dfrac{3}{8} = \dfrac{3}{2^3}$

$$= \frac{3 \times 5^3}{2^3 \times 5^3} = \frac{375}{10^3} = 0.375$$

Since the denominator can be expressed in the form of $2^n 5^m$, where n, m are non negative integers, therefore the decimal expansion of x terminates.

Check whether the following rational numbers will have a terminating decimal expansion or a non-terminating repeating decimal expansion.

(i) $\dfrac{64}{455} =$ (Hint : First simplify then find factors of denominator)

$= \dfrac{64}{\boxed{}}$ Can you express denominator in the form $2^n 5^m$?

Now Try :

(ii) $\dfrac{29}{343} =$

(iii) $\dfrac{35}{50} =$

(iv) $\dfrac{77}{210} =$

(v) $\dfrac{6}{15} =$

Consider : $x = \dfrac{3}{80}$

$= \dfrac{3}{2^4 \times 5} = 0.0375$

Observe the decimal expansion of x terminates after 4 decimals and the highest value of n or m is also 4 in the denominator.

Consider : $x = \dfrac{14588}{625}$

$= \dfrac{14588}{5^4} = 23.3408$

The decimal expansion terminates after 4 decimals.

Rational Number $\left(x=\dfrac{a}{b}, b\neq 0\right.$, a & b are integers a & b are coprime)	Decimal expansion will terminate (Put ✔ or ✘) (If it terminates then after how many decimal places it will terminate ?	Decimal expansion will not terminate (Put ✔ or ✘)
(1) $\dfrac{13}{3125}$		
(2) $\dfrac{29}{343}$		
(3) $\dfrac{177}{210}$		
(4) $\dfrac{23}{2^3 5^2}$		
(5) $\dfrac{49}{2^7 5^2}$		
(6) $\dfrac{7}{80}$		
(7) $\dfrac{13}{125}$		
(8) $\dfrac{120}{400}$		

Task-6: Project Work

Topic	Real Numbers
Nature of task	Post Content
Content Coverage	Whole chapter
Learning Objectives	To provide children with an opportunity to see the interconnection of subjects.
Task	Project work
Execution of task	The class may be divided into groups of 6 to 8 students (Students living in the same neighborhood may be assigned in one group). Each group is supposed to work as a team for the completion of project. Few members can take responsibility of gathering required information for the project, others can work for making a rough draft from the gathered information. All members should discuss the draft & give their inputs. After finalizing, members can writes the report. The project work completes with the submission of report. A small seminar could be conducted where the team leader should present their work to the complete class.
Duration	10 to 15 days
Criteria for assessment	The project work could be assessed according to the following parameters:
	• Team Spirit • Identification of project • Procedure adopted • Preparation of Report • Class presentation of the work

Suggestive Projects:

• **Math Vs Computers**

Algorithms are the base of all computer programs. Make a flow chart to elaborate & explain Euclid's Algorithm. Take help of computer science seniors/friends/teacher to convert your flowchart into a computer program to ease your calculation work.

•   **Using Art with Math - The Math Journal**

Journals are important elements in education system. When completed, the Math Journal looks like an ancient book that is full of mysterious and amazing secrets and discoveries! It's an exciting and fun project that appeals to all students.

The journal should contain the following articles:

•　　　　Evolution of Number System-Journey from Counting numbers to Real numbers.

Use your imagination & art skills to draw pictures to support your write up of this journey.

Will this journey continue further after real number system? What do you think?

- Properties of Real number system (Support with explanation & examples).

- Real number game/activity

- Real life problems

Teacher can organize an art show in the school for journal exhibition !!

Polynomials

Learning Objectives

- Recall and review polynomial, degree, coefficients, constant, zeroes, factors

- To learn geometrical meaning of zeroes of a polynomial

- Review and recall splitting the middle term of a quadratic polynomial

- To learn to verify relationship between zeroes and coefficients of a polynomial

- To learn to find remaining zeroes of a bi quadratic polynomial if two of its zeroes are given

Suggested Formative Assessment Tasks

Task-1: Think and tell

Topic	Polynomials
Nature of task	Warm up
Content Coverage	polynomial, degree, coefficients, constant, zeroes, factors, types of polynomials
Learning Objectives	Recall and review of earlier learnt basic concepts
Task	Think and tell
Execution of task	Teacher will make two boxes on the black board containing variables and constants. Students would be then asked questions on making a polynomial (different types), degree, coefficients etc.
Duration	1 period
Criteria for assessment	It is not necessary to give marks for this assessment. It may be used as a starting exercise of chapter.
Follow up	Students may be suggested to refer their previous year NCERT text book for details.

Warm up task :

1. Use the given constants and variables and make 3 polynomials

    Constants
    1   -7 $\sqrt{5}$
    15   $5\sqrt{2}$

    Variables
    x   y   z   t
    p
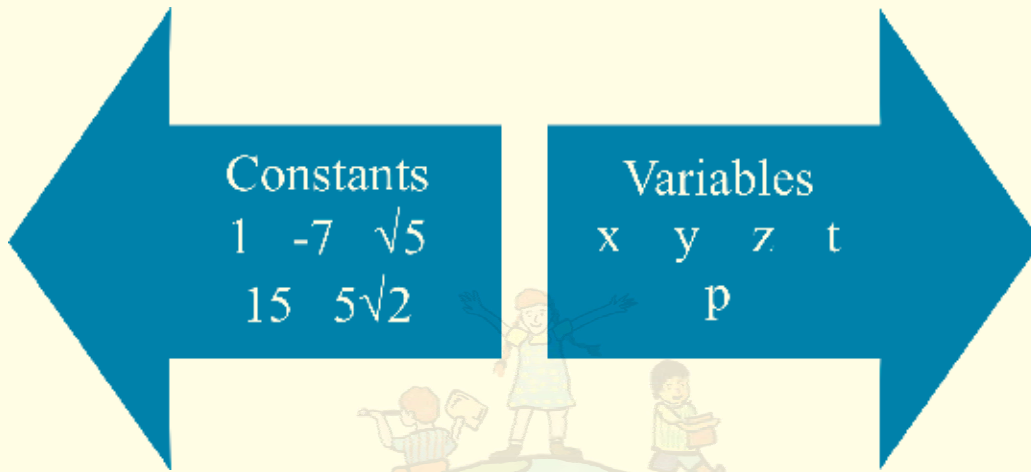
2. Complete the entries

$P(x)= 5x^7 - 6x^5 + 7x - 6$	Coefficient of x^5 = Degree of $p(x)$ = Constant term = Number of terms =
$T(x) = 17z^2 + 7x - 6$	Constant term = Number of terms = Coefficient of x = Degree of $t(x)$ =

3. Justify the following statements with examples:
    a)   We can have a trinomial having degree 7.
    b)   The degree of a binomial cannot be more than two.
    c)   There is only one term of degree one in a monomial.
    d)   A cubic polynomial always has degree three.

4. Sieve polynomials from the given box into a new box. Justify why the left ones are not polynomials?

2	$\dfrac{4}{x}$	$4x^2 + 5x - 6$
$5 \times 3 - 4x + 6$	$\dfrac{6}{x-2}$	$5x^{-1}$	$\sqrt{x} - 5$
$14y$	$17z^2 + 7$	$9x^7 + \sqrt{x} \times$
$9x^3 - 19x^{-3}$	$8c - 5$	$3x^2$
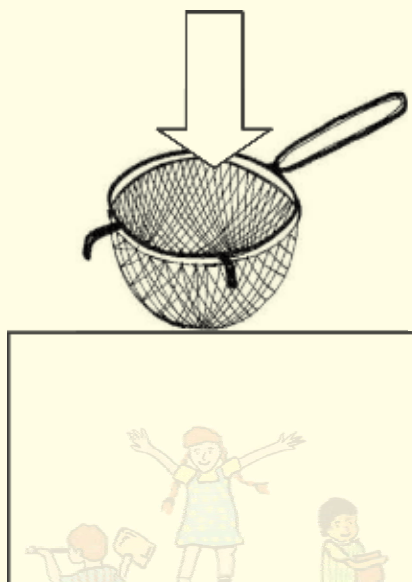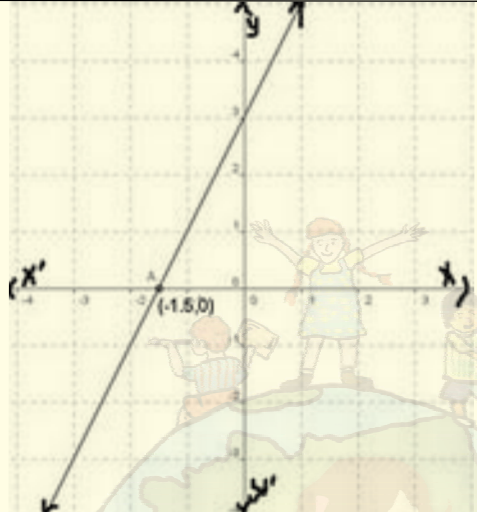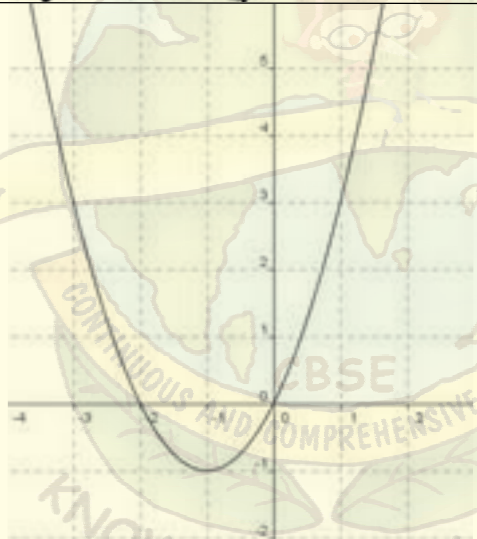
Task-2: Explore the graphs

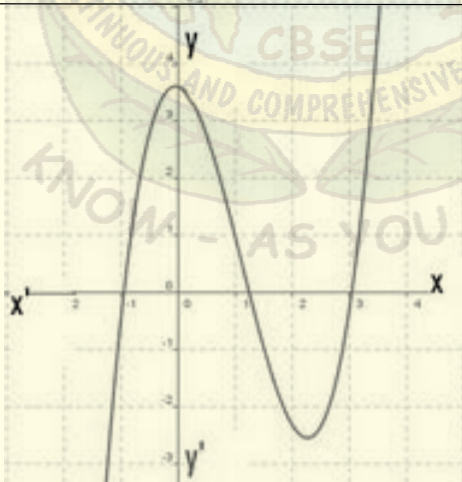| Topic	Polynomials
Nature of task	Content
Content Coverage	Graphical representation of zeroes of a polynomial
Learning Objectives	Students would be able to read graphs of polynomials and tell the number of zeroes and zeroes
Task	Explore the graphs
Execution of task	Teacher may draw graphs on the board or prepare a class worksheet for students which may be given to them.
Duration	1 period
Criteria for assessment	The task may be assessed by marks.
Follow up	Remedial worksheet for practice may be given.

The zeroes of a polynomial $p(x)$ are precisely the x-coordinates of the points, where the graph of $y = p(x)$ intersects the x-axis.

Observe the given graphs and fill the respective rows.

S.No.	Graph of y = f(x)	Number of Zeroes	Zeroes
1. Graph of a linear polynomial			
2. Graph of a quadratic polynomial			

3.	Graph of a quadratic polynomial			
4.	Graph of a quadratic polynomial			
5.	Graph of a cubic polynomial			

Task-3: Zeroes and Coefficients

Topic	Polynomials
Nature of task	Content
Content Coverage	zeroes and coefficients of a polynomial
Learning Objectives	To verify the relationship between zeroes and coefficients of a polynomial
Task	Explore the graphs
Execution of task	Teacher may explain the concept in the classroom and then assess students' knowledge by giving a class worksheet of 15 minutes in the end of the period or the beginning of next class.
Duration	1 period
Criteria for assessment	The task may be assessed by marks.
Follow up	Review and recall of concept OR Remedial worksheet for practice may be given.

Chapter Polynomials : $ax^2 + bx + c, a \neq 0, a, b, c,$ are real numbers is a quadratic polynomial.

Sum of zeroes = – coefficient of x / coefficient of x^2,

product of zeroes = constant term / coefficient of x^2

Quadratic Polynomial	Factorisation by splitting the middle term	Zeroes	Verfication
(1) $x^2 + 7x + 10$			Sum of Zeroes = Product of Zeroes =
(2) $x^2 - 3x - 28$			Sum of Zeroes = Product of Zeroes =

| Quadratic Polynomial	Factorisation by splitting the middle term	Zeroes	Verfication
(3) $3x^2 - x - 4$			Sum of Zeroes = Product of Zeroes =

Task-4: MCQ

Topic	Polynomials
Nature of task	Content Delivery
Content Coverage	Polynomial, degree, coefficients, constant, zeroes, types of polynomials
Learning Objectives	• Recall and review polynomials, degree, coefficients, constant, zeroes • Recall and recall splitting the middle term of a quadratic polynomial
Execution of task	Printed sheet of MCQ may be given to students during the content delivery
Duration	15–20 minutes
Criteria for assessment	Teacher may assign marks according to rating scale.

Multiple Choice Question

1. The degree of the polynomial whose graph is given below is :

    (A) 1

    (B) 2

    (C) ≥ 3

    (D) Can not be found
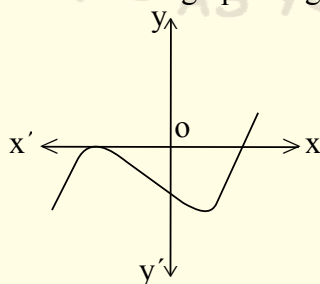
2. If the sum of the zeroes of the quadratic polynomial $3x^2 - kx + 6$ is 3, the value of k is:

    (A) 3   (B) −3   (C) 6   (D) 9

3. The other two zeroes of the polynomial $x^3 - 8x^2 + 19x - 12$ if its one zeroes is $x = 1$, are:

(A) −3, 4   (B) −3, −4   (C) 3, −4   (D) 3, 4

4. The quadratic polynomial, the sum and product of whose zeroes are −3 and 2, is:

(A) $x^2 + 3x - 2$ (B) $x^2 + 3x + 2$

(C) $x^2 + 3x + 2$ (D) $x^2 - 3x + 2$

5. The third zero of the polynomial $x^3 + 7x^2 - 2x - 14$, if two its zeroes are $\sqrt{2}$ and $-\sqrt{2}$, is:

(A) 7   (B) −7   (C) 14   (D) −14

6. If $\sqrt{\dfrac{5}{3}}$ and $-\sqrt{\dfrac{5}{3}}$ are two zeroes of the polynomial $3x^4 + 6x^3 - 2x^2 - 10x - 5$ then its other two zeroes are:

(A) −1, −1   (B) 1, −1   (C) 1, 1   (D) 3, −3

7. If $a - b$, a and $a + b$ are zeroes of the polynomial $x^3 - 3x^2 + x + 1$ the value of $(a + b)$ is:

(A) $1 \pm \sqrt{2}$ (B) $-1 + \sqrt{2}$ (C) $-1 - \sqrt{2}$ (D) 3

8. A real numbers α is called a zero of the polynomial $f(x)$, then

(A) $f(\alpha) = -1$ (B) $f(\alpha) = 1$ (C) $f(\alpha) = 0$ (D) $f(\alpha) = -2$

9. Which of the following is a polynomial:

(A) $x^2 + \dfrac{1}{x}$ (B) $2x^2 - 3\sqrt{x} + 1$

(C) $3x^2 - 3x + 1$ (D) $x^2 + x^{-2} + 7$

10. The product and sum of zeroes of the quadratic polynomial $ax^2 + bx + c$ respectively are:

(A) $\dfrac{b}{a}, \dfrac{c}{a}$ (B) $\dfrac{c}{a}, \dfrac{b}{a}$ (C) $\dfrac{c}{b}, 1$ (D) $\dfrac{c}{a}, \dfrac{-b}{a}$

11. The quadratic polynomial, sum and product of whose zeroes are 1 and −12 respectively is:

(A) $x^2 - x - 12$ (B) $x^2 + x - 12$ (C) $x^2 - 12x + 1$ (D) $x^2 - 12x - 1$

12. If the product of two of the zeroes of the polynomial $2x^3 - 9x^2 + 13x - 6$ is 2, the third zero of the polynomial is:

(A) −1   (B) −2   (C) $\dfrac{3}{2}$ (D) $-\dfrac{3}{2}$

Task-5: Home assignment

Topic	Polynomials
Nature of task	Post Content
Content Coverage	Complete Chapter
Learning Objectives	Mentioned earlier
Task	Assignment
Execution of task	To be done by students at home.
Duration	2 days
Criteria for assessment	It is a part of regular H.W. assessment.
Follow up	Suggest correction work to students (if any)

Home Assignments

1. Which of the following are not polynomials ?

    (A) $3x^3 + x^2 + x^{-2} + 7$
    (B) $x^2 + px + q$

    (C) $x^2 + \dfrac{1}{x^2} + 7$
    (D) $2x^3 + 3x^2 - 5x - 6$

2. What do you understand by the value of a polynomial at a given point ?

3. If $p(x) = 3x^3 - 2x^2 + 6x - 5$, find $p(2)$.

4. Find the quadratic polynomial whose one zeroes $2 + \sqrt{3}$.

5. Find a quadratic polynomial whose sum and product of zeroes are $\sqrt{2}$ and 3 respectively.

6. Find the zeores of the polynomial $mx^2 + (m + n) x + n$.

7. If m and n are zeroes of the polynomial $3x^2 + 11x - 4$, find the value of $\dfrac{m}{n} + \dfrac{n}{m}$

8. If a and b are zeroes of the polynomial $x^2 - x - 6$, the find a quadratic polynomial whose zeroes are $(3a + 2b)$ and $(2a + 3b)$.

9. If p and q are zeroes of the polynomial $t^2 - 4t + 3$, show that $\dfrac{1}{p} + \dfrac{1}{q} - 2pq + \dfrac{14}{3} = 0$

10. If $(x - 6)$ is a factor of $x^3 + ax^2 + bx - bx = 0$ and $a - b = 7$, find the values of a and b.

Facts Sheet

1. Polynomial of degrees 1, 2 and 3 are called linear, quadratic and cubic polynomials respectively.

2. A quadratic polynomials in x with real coefficients is of the form $ax^2 + bx + c$, where a, b, c are real numbers with $a \neq 0$.

3. The zeroes of a polynomial $p(x)$ are precisely the x-coordinates of the points, where the graph of $y = p(x)$ intersects the x-axis.

4. A quadratic polynomial can have at most 2 zeroes and a cubic polynomial can have at most 3 zeroes.

5. If a and b are the zeroes of the quadratic polynomial $ax^2 + bx + c$, then $a + b = -b/a$ and $ab = c/a$.

6. The division algorithm states that given any polynomial $p(x)$ and any non-zero polynomial $g(x)$, there are polynomials $q(x)$ and $r(x)$ such that $p(x) = g(x) \, q(x) + r(x)$, where $r(x) = 0$ or degree $r(x) <$ degree $g(x)$.

Carefully read points 1 and 2. Do questions given in point 3.

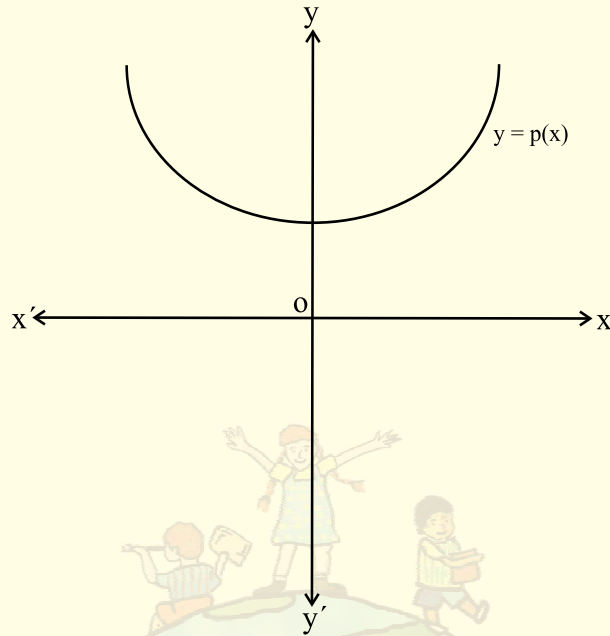1. Observe the following graph of $y = p(x)$ for some polynomial $p(x)$.
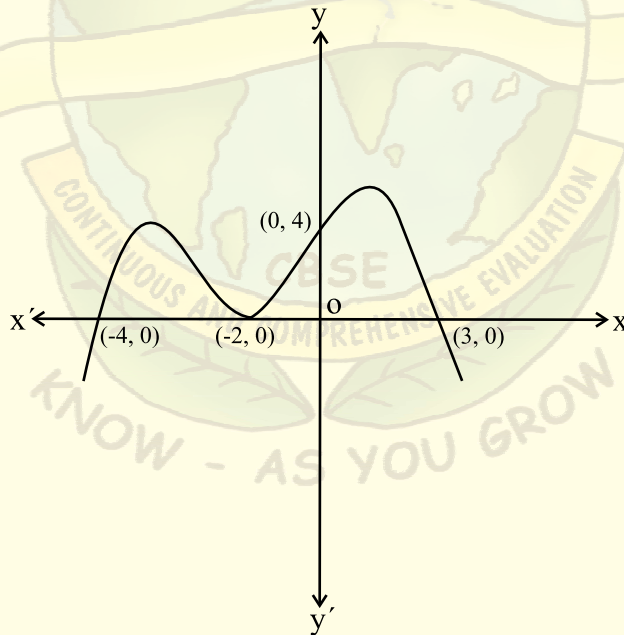
The graph of $y = p(x)$, cuts the x-axis at two points (3, 0) & (–4, 0) and touches the x-axis at (–2, 0).

It will have 3 zeroes

and zeroes are 3, –4, –2.

2.   Consider

The graph of $y = p(x)$ does not cut the x-axis, So it will not have any zero.

In general, given a polynomial $p(x)$ of degree n, the graph of $y = p(x)$ intersects the x-axis at atmost n points. Therefore, a polynomial $p(x)$ of degree n has atmost n zeroes.

3.   Find the number of zeroes and zeroes of $y = p(x)$, for some polynomial $p(x)$ from the following graph.

	No. of Zeroes	**Zeroes**

	No. of Zeroes	Zeroes