DIRECTORATE OF EDUCATION
Govt. of NCT, Delhi

SUPPORT MATERIAL

(2024-25)

CLASS : IX

MATHEMATICS

(ENGLISH MEDIUM)

Under the Guidance of

Shri Ashok Kumar
Secretary (Education)

Shri R. N. Sharma
Director (Education)

Dr. Rita Sharma
Addl. DE (School & Exam.)

Coordinators

Mr. Sanjay Subhas Kumar	**Mrs. Ritu Singhal**	**Mr. Raj Kumar**	**Mr. Krishan Kumar**
DDE (Exam)	OSD (Exam)	OSD (Exam)	OSD (Exam)

Production Team

Anil Kumar Sharma

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ASHOK KUMAR
IAS

सचिव (शिक्षा)
राष्ट्रीय राजधानी क्षेत्र
दिल्ली सरकार
पुराना सचिवालय, दिल्ली-110054
दूरभाष: 23890187 टेलीफैक्स : 23890119

Secretary (Education)
Government of National Capital Territory of Delhi
Old Secretariat, Delhi-110054
Phone : 23890187, Telefax : 23890119
E-mail : secyedu@nic.in

DE.5|228|Exam|Message/SM|2018|555
Dated: 01/07/2024

MESSAGE

In the profound words of Dr. Sarvepalli Radhakrishnan, "**The true teachers are those who help us think for ourselves**."

Every year, our teams of subject experts shoulder the responsibility of updating the Support Material to synchronize it with the latest changes introduced by CBSE. This continuous effort is aimed at empowering students with innovative approaches and techniques, thereby fostering their problem-solving skills and critical thinking abilities.

I am confident that this year will be no exception, and the Support Material will greatly contribute to our students' academic success.

The development of the support material is a testament to the unwavering dedication of our team of subject experts. It has been designed with the firm belief that its thoughtful and intelligent utilization will undoubtedly elevate the standards of learning and continue to empower our students to excel in their examinations.

I wish to extend my heartfelt congratulations to the entire team for their invaluable contribution in creating this immensely helpful resource for our students.

Wishing all our students a promising and bright future brimming with success.

(ASHOK KUMAR)

R.N. SHARMA, IAS
Director, Education & Sports

Directorate of Education
Govt. of NCT of Delhi
Room No. 12, Old Secretariat
Near Vidhan Sabha,
Delhi-110054
Ph.: 011-23890172
E-mail : diredu@nic.in

DE.5/228/Exam/Message/SM/2018/576
Dated. 04/07/2024

MESSAGE

It brings me great pleasure to present the support material specifically designed for students of classes IX to XII by our dedicated team of subject experts. The Directorate of Education remains resolute in its commitment to empower educators and students alike, extending these invaluable resources at no cost to students attending Government and Government-Aided schools in Delhi.

The support material epitomizes a commendable endeavour towards harmonizing content with the latest CBSE patterns, serving as a facilitative tool for comprehending, acquiring and honing essential skills and competencies stipulated within the curriculum.

Embedded within this initiative is a structured framework conducive to nurturing an analytical approach to learning and problem-solving. It is intended to prompt educators to reflect upon their pedagogical methodologies, forging an interactive conduit between students and academic content.

In the insightful words of Rabindranath Tagore, **"Don't limit a child to your own learning, for he was born in another time."**

Every child is unique, with their own interests, abilities and potential. By allowing children to learn beyond the scope of our own experiences, we support their individual growth and development, helping them to reach their full potential in their own right.

May every student embrace the joy of learning and be empowered with the tools and confidence to navigate and shape the future.

(R. N. SHARMA)

Dr. RITA SHARMA
Additional Director of Education
(School/Exam)

सत्यमेव जयते

Govt. of NCT of Delhi
Directorate of Education
Old Secretariat, Delhi-110054
Ph.: 23890185

D.O. No DE.5/228/Exam/Memo/SM/2018/570
Dated: 02/07/2024

MESSAGE

"Children are not things to be molded, but are people to be unfolded." - Jess Lair

In line with this insightful quote, the Directorate of Education, Delhi, has always made persistent efforts to nurture and unfold the inherent potential within each student. This support material is a testimony to this commitment.

The support material serves as a comprehensive tool to facilitate a deeper understanding of the curriculum. It is crafted to help students not only grasp essential concepts but also apply them effectively in their examinations. We believe that the thoughtful and intelligent utilization of these resources will significantly enhance the learning experience and academic performance of our students.

Our expert faculty members have dedicated themselves to the support material to reflect the latest CBSE guidelines and changes. This continuous effort aims to empower students with innovative approaches, fostering their problem-solving skills and critical thinking abilities.

I extend my heartfelt congratulations to the entire team for their invaluable contribution to creating a highly beneficial and practical support material. Their commitment to excellence ensures that our students are well-prepared to meet the challenges of the CBSE examinations and beyond.

Wishing you all success and fulfilment in your educational journey.

(Dr. Rita Sharma)

DIRECTORATE OF EDUCATION
Govt. of NCT, Delhi

SUPPORT MATERIAL

(2024-25)

CLASS : IX

MATHEMATICS

(ENGLISH MEDIUM)

NOT FOR SALE

PUBLISHED BY : DELHI BUREAU OF TEXTBOOK

भारत का संविधान

भाग 4क

नागरिकों के मूल कर्तव्य

अनुच्छेद 51 क

मूल कर्तव्य – भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह –

(क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;

(ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;

(ग) भारत की संप्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण बनाए रखे;

(घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;

(ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभावों से परे हो, ऐसी प्रथाओं का त्याग करे जो महिलाओं के सम्मान के विरुद्ध हों;

(च) हमारी सामाजिक-सांस्कृतिक गौरवशाली परंपरा का महत्त्व समझे और उसका परिरक्षण करे;

(छ) प्राकृतिक पर्यावरण की, जिसके अंतर्गत वन, झील, नदी और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणिमात्र के प्रति दयाभाव रखे;

(ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;

(झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;

(ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत् प्रयास करे, जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई ऊँचाइयों को छू सके; और

(ट) यदि माता-पिता या संरक्षक है तो छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य को शिक्षा के अवसर प्रदान करे।

Constitution of India

Part IV A (Article 51 A)

Fundamental Duties

It shall be the duty of every citizen of India —

(a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;

(b) to cherish and follow the noble ideals which inspired our national struggle for freedom;

(c) to uphold and protect the sovereignty, unity and integrity of India;

(d) to defend the country and render national service when called upon to do so;

(e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;

(f) to value and preserve the rich heritage of our composite culture;

(g) to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures;

(h) to develop the scientific temper, humanism and the spirit of inquiry and reform;

(i) to safeguard public property and to abjure violence;

(j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;

*(k) who is a parent or guardian, to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.

Note: The Article 51A containing Fundamental Duties was inserted by the Constitution (42nd Amendment) Act, 1976 (with effect from 3 January 1977).

*(k) was inserted by the Constitution (86th Amendment) Act, 2002 (with effect from 1 April 2010).

भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक [1][**संपूर्ण प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य**] बनाने के लिए, तथा उसके समस्त नागरिकों को :

सामाजिक, आर्थिक और राजनैतिक **न्याय,**

विचार, अभिव्यक्ति, विश्वास, धर्म

और उपासना की **स्वतंत्रता,**

प्रतिष्ठा और अवसर की **समता**

प्राप्त कराने के लिए,

तथा उन **सब में**

व्यक्ति की गरिमा और [2][**राष्ट्र की एकता और अखंडता**] सुनिश्चित करने वाली **बंधुता**

बढ़ाने के लिए

दृढ़संकल्प होकर **अपनी इस संविधान सभा में** आज तारीख 26 नवंबर, 1949 ई. को **एतद्द्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।**

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1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से) ''प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य'' के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977 से) ''राष्ट्र की एकता'' के स्थान पर प्रतिस्थापित।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a [1]**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the [2][unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

---

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)

MATHEMATICS (IX)

The Syllabus in the subject of Mathematics has undergone changes from time to time in accordance with growth of the subject and emerging needs of the society. The present revised syllabus has been designed in accordance with National Curriculum Framework 2005 and as per guidelines given in the Focus Group of Teaching of Mathematics which is to meet the emerging needs of all categories of students. For motivating the teacher to related the topics to real life problems and other subject areas, greater emphasis has been laid on applications of various concepts

The curriculum at secondary stage primarily aims at enhancing the capacity of students to employ Mathematics in solving day-to-day life problem and studying the subject as a separate discipline. IT is expected that students should acquired the ability to solve problem using algebraic methods and apply the knowledge of simple trigonometry to solve problem of height and distances. Carrying out experiments with numbers and forms of geometry, framing hypothesis and verifying these with further observations form inherent part of Mathematics learning at this stage. The proposed curriculum includes the study of number system, algebra, geometry, trigonometry, mensuration, statistics, graphs and coordinate geometry etc.

The teaching of Mathematics should be imparted through activities which may involve the use of concrete materials, models, patterns, charts, pictures, posters, games, puzzles and experiments.

Objectives

The broad objectives of teaching of Mathematics at secondary stage are to help the learners to:

- consolidate the Mathematical knowledge and skills acquired at the upper primary stage; acquire knowledge and understanding, particularly by way of motivation and visualization, of basic concepts, terms, principles and symbols and underlying processes and skills; develop mastery of basic algebraic skills.
- develop drawing skills;
- feel the flow of reason while proving a result or solving a problem:
- apply the knowledge and skills acquired to solve problems and wherever possible, by more than one method.

- to develop ability to think, analyze and articulate logically;
- to develop awareness of the need for national integration, protection of environment, observance of small family norms, removal of social barriers, elimination of gender biases;
- to develop necessary skills to work with modern technological devices and mathematical software's.
- to develop interest in mathematics as a problem-solving tool in various fields for its beautiful structures and patterns, etc.
- to develop reverence and respect towards great Mathematicians for their contributions to the field of Mathematics;
- to develop interest in the subject by participating in related competitions;
- to acquaint students with different aspects of Mathematics used in daily life;
- to develop an interest in students to study Mathematics as a discipline.

TERM-WISE SYLLABUS

SESSION: 2023-24

CLASS: IX

SUBJECT: MATHEMATICS (CODE: 041)

COURSE STRUCTURE

Units	Unit Name	Marks
I	Number Systems	10
II	Algebra	20
III	Coordinate Geometry	04
IV	Geometry	27
V	Mensuration	13
VI	Statistics & Probability	06
	Total	80
	Internal Assessment	20
	Grand Total	100

UNIT I: NUMBER SYSTEMS

Chapter-1: Real Numbers (18) Periods

1. Review of representation of natural numbers, integers and rational numbers on the number line. Rational numbers as recurring/terminating decimals. Operations on real numbers.

2. Examples of non-recurring/non-terminating decimals. Existence of non-rational numbers (irrational numbers) such as $\sqrt{2}$, $\sqrt{3}$ and their representation on the number line. Explaining that every real number is represented by a unique point on the number line and conversely, viz. every point on the number line represents a unique real number.

3. Definition of nth root of a real number.

4. Rationalization (with precise meaning) of real numbers of the type $\frac{1}{a+b\sqrt{x}}$ and $\frac{1}{\sqrt{x}+\sqrt{y}}$ (and their combinations) where x and y are natural number and a and b are integers.

5. Recall of laws of exponents with integral powers. Rational exponents with positive real bases (to be done by particular cases, allowing learner to arrive at the general laws.)

UNIT II: ALGEBRA

Chapter-2: Polynomials (26) Periods

Definition of a polynomial in one variable, with examples and counter examples. Coefficients of a polynomial, terms of a polynomial and zero polynomial. Degree of a polynomial. Constant, linear, quadratic and cubic polynomials. Monomials, binomials, trinomials. Factors and multiples. Zeroes of a polynomial. Motivate and State the Remainder Theorem with examples. Statement and proof of the Factor Theorem. Factorization of $ax^2 + bx + c$, $a \neq 0$ where a, b and c are real numbers, and of cubic polynomials using the Factor Theorem.

Recall of algebraic expressions and identities. Verification of identities:

$x + (y + z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$

$x \pm (y)^3 = x^3 \pm y^3 \pm 3xy(x \pm y)$

$x^3 \pm y^3 = (x \pm y)(x^2 \pm xy + y^2)$

$x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - xz)$

and their use in factorization of polynomials.

Chapter-4: Linear Equations in Two Variables (16) Periods

Recall of linear equations in one variable. Introduction to the equation in two variables. Focus on linear equations of the type $ax + by + c = 0$. Explain that a linear equation in two variables has infinitely many solutions and justify their being written as ordered pairs of real numbers, plotting them, and showing that they lie on a line.

UNIT III: COORDINATE GEOMETRY

Chapter-3: Coordinate Geometry (7) Periods

The Cartesian plane, coordinates of a point, names and terms associated with the coordinate plane, notations.

UNIT IV: GEOMETRY

Chapter-5: Introduction To Euclid's Geometry (7) Periods

History - Geometry in India and Euclid's geometry. Euclid's method of formalizing observed phenomenon into rigorous Mathematics with

definitions, common/obvious notions, axioms/postulates and theorems. The five postulates of Euclid. Showing the relationship between axiom and theorem, for example:

(Axiom) 1. Given two distinct points, there exists one and only one line through them.

(Theorem) 2. (Prove) Two distinct lines cannot have more than one point in common.

Chapter-6: Lines and Angles **(15) Periods**

1. (Motivate) If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and the converse.
2. (Prove) If two lines intersect, vertically opposite angles are equal.
3. (Motivate) Lines which are parallel to a given line are parallel.

Chapter-7: Triangles **(22) Periods**

1. (Motivate) Two triangles are congruent if any two sides and the included angle of one triangle is equal to any two sides and the included angle of the other triangle (SAS Congruence).
2. (Prove) Two triangles are congruent if any two angles and the included side of one triangle is equal to any two angles and the included side of the other triangle (ASA Congruence).
3. (Motivate) Two triangles are congruent if the three sides of one triangle are equal to three sides of the other triangle (SSS Congruence).
4. (Motivate) Two right triangles are congruent if the hypotenuse and a side of one triangle are equal (respectively) to the hypotenuse and a side of the other triangle. (RHS Congruence).
5. (Prove) The angles opposite to equal sides of a triangle are equal.
6. (Motivate) The sides opposite to equal angles of a triangle are equal.

Chapter-8: Quadrilaterals **(13) Periods**

1. (Prove) The diagonal divides a parallelogram into two congruent triangles.
2. (Motivate) In a parallelogram opposite sides are equal, and conversely.
3. (Motivate) In a parallelogram opposite angles are equal, and conversely.
4. (Motivate) A quadrilateral is a parallelogram if a pair of its opposite sides is parallel and equal.

5. (Motivate) In a parallelogram, the diagonals bisect each other and conversely.
6. (Motivate) In a triangle, the line segment joining the mid points of any two sides is parallel to the third side and is half of it and (motivate) its converse.

Chapter-9: Circles **(17) Periods**

1. (Prove) Equal chords of a circle subtend equal angles at the centre and (motivate) its converse.
2. (Motivate) The perpendicular from the centre of a circle to a chord bisects the chord and conversely, the line drawn through the centre of a circle to bisect a chord is perpendicular to the chord.
3. (Motivate) Equal chords of a circle (or of congruent circles) are equidistant from the centre (or their respective centres) and conversely.
4. (Prove) The angle subtended by an are at the centre is double the angle subtended by it at any point on the remaining part of the circle.
5. (Motivate) Angles in the same segment of a circle are equal.
6. (Motivate) If a line segment joining two points subtends equal angle at two other points lying on the same side of the line containing the segment, the four points lie on a circle.
7. (Motivate) The sum of either of the pair of the opposite angles of a cyclic quadrilateral is 180° and its converse.

UNIT V: MENSURATION

Chapter-10: Areas **(5) Periods**

Area of a triangle using Heron's formula (without proof).

Chapter-11: Surface Areas and Volumes **(17) Periods**

Surface areas and volumes of spheres (including hemispheres) and right circular cones.

UNIT VI: STATISTICS & PROBABILITY

Chapter-12: Statistics **(15) Periods**

Bar graphs, histograms (with varying base lengths) and frequency polygons.

- Mental Maths Practice
- Revision from Support Material

MATHEMATICS

Code (041)

QUESTION PAPER DESIGN

Class-IX (2024x25)

Time: 3 Hrs. **Max. Marks: 80**

S. No.	Typology of Questions	Total Marks	%Weight-age (approx.)
1.	**Remembering:** Exhibit memory of previously learned material by recalling facts, terms, basic concepts and answers. **Understanding:** Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions and stating main ideas.	43	54
2.	**Applying:** Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	19	24
3.	**Analysing:** Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations. **Evaluating:** Present and defend opinions by making judgments about information, validity or ideas, or quality of work based on a set of criteria. **Creating:** Compile information together in a different way by combining elements in a new pattern proposing alternative solutions.	18	22
	Total	**80**	**100**

Internal Assessment	**20 Marks**
Pen Paper Test and Multiple Assessment (5+5)	10 Marks
Portfolio	05 Marks
Lab Practical (Lab activities to be done from the prescribed books)	05 Marks

List of Group Leader and Subject-Experts For Preparation/Review of Support Material

Class - IX (2024-25)

Subject : Mathematics

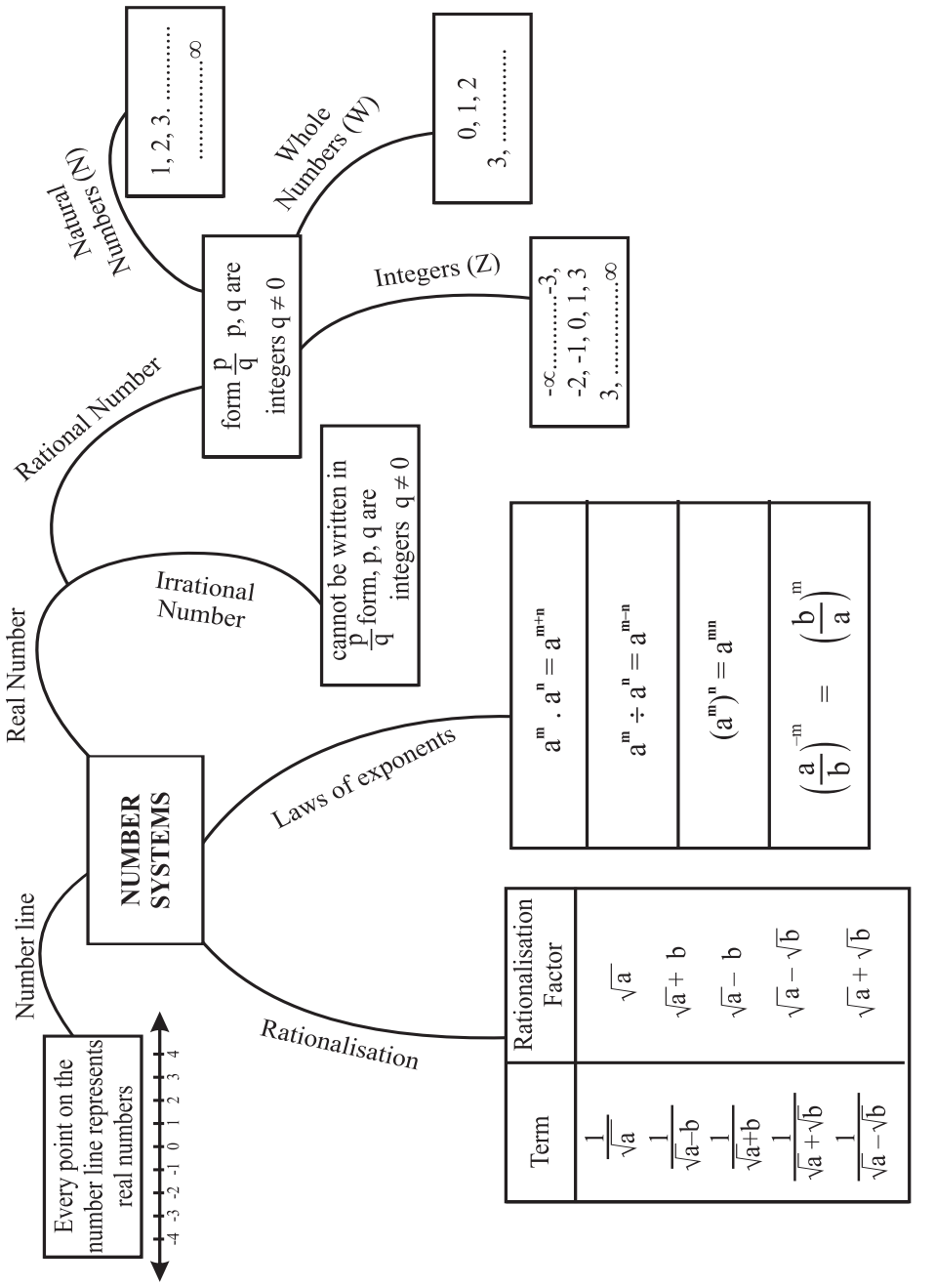
1.	Mr. Satyawan	Vice Principal SKV, Aram Bagh Lane, (2128081)
2.	Ms. Aakanksha	PGT (Mathematics) Core Academic Unit (CAU)
3.	Ms. Neha Chaudhary	TGT (Mathematics) Core Academic Unit (CAU)
4.	Ms. Gagandeep Kaur	TGT (Mathematics) GGSS, Majlis Park, Delhi (1309036)
5.	Ms. Rinku Gupta	TGT (Mathematics) RPSKV Rithala, Delhi (1413026)
6.	Mr. Julfikar Ahmad	TGT (Mathematics) Dr. Zakir Hussain Memorial Sr. Sec. School, Jafrabad (1105137)

CONTENTS

CHAPTER-1

NUMBER SYSTEMS

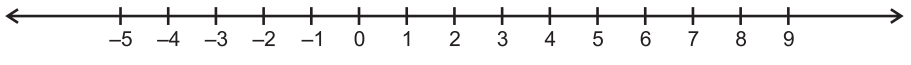
MIND MAP



CHAPTER-1

NUMBER SYSTEMS

KEY POINTS



- 1, 2, 3, ... are natural numbers which are represented by N.
- 0, 1, 2, 3, ... are whole numbers which are represented by W.
- ..... –3. –2, –1, 0, 1, 2, 3 ..... are integers which are represented by Z or I.
- A number is a rational if

  (a) it can be represented in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

  OR

  (b) its decimal expansion is terminating (e.g. $\frac{2}{5} = 0.4$)

  OR

  (c) its decimal expansion is non-terminating recurring (repeating) (e.g. $0.\overline{1234} = 0.1234234.....$)
- A number is irrational number if

  (a) it can not be represented in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

  OR

  (b) its decimal expansion is non-terminating non-recurring (e.g. 0.1010010001.....)
- All rational and irrational numbers collectively form real numbers.
- There are infinite rational numbers between any two rational numbers.
- There is a unique real number corresponding to every point on the number line. Also, corresponding to each real number, there is a unique point on the number line.
- Rationalisation of a denominator means to change the Irrational denominator to rational form.

- To rationalise the denominator of $\frac{1}{\sqrt{a} \pm b}$, we multiply this by $\frac{\sqrt{a} \mp b}{\sqrt{a} \mp b}$, where a is a natural number and b is an integer.
- If r is rational and$s$ is irrational then$r + s$, $r - s$, $r \cdot s$ are always irrational numbers but $\frac{r}{s}$ may be rational or irrational. For $r \neq 0$, $r \cdot s$ and $\frac{r}{s}$ are always irrational.
- Law of Exponents: Let $a > 0$ be a real number and m and n are rational numbers, then

  (1) $a^m \, a^n = a^{m+n}$ (2) $a^m \div a^n = a^{m-n}$

  (3) $(a^m)^n = a^{mn}$ (4) $a^m \, . \, b^m = (ab)^m$

  (5) $a^0 = 1$ (6) $a^{-m} = \frac{1}{a^m}$

- For positive real numbers a and b, the following identities hold

  (1) $\sqrt{a} \, . \sqrt{b} = \sqrt{ab}$ (2) $\sqrt{a} \div \sqrt{b} = \sqrt{\frac{a}{b}}$

  (3) $\left(\sqrt{a} + \sqrt{b}\right)\left(\sqrt{a} - \sqrt{b}\right) = a - b$ (4) $\left(\sqrt{a} + \sqrt{b}\right)^2 = a + 2\sqrt{ab} + b$

  (5) $\left(a + \sqrt{b}\right)\left(a - \sqrt{b}\right) = a^2 - b$

All natural numbers, whole numbers and integers are rational

Prime Numbers: All natural numbers that have exactly two factors (i.e., 1 and itself) are called prime numbers, e.g., 2, 3, 5, 7, 11, 13, 17, 19, 23, ... etc.

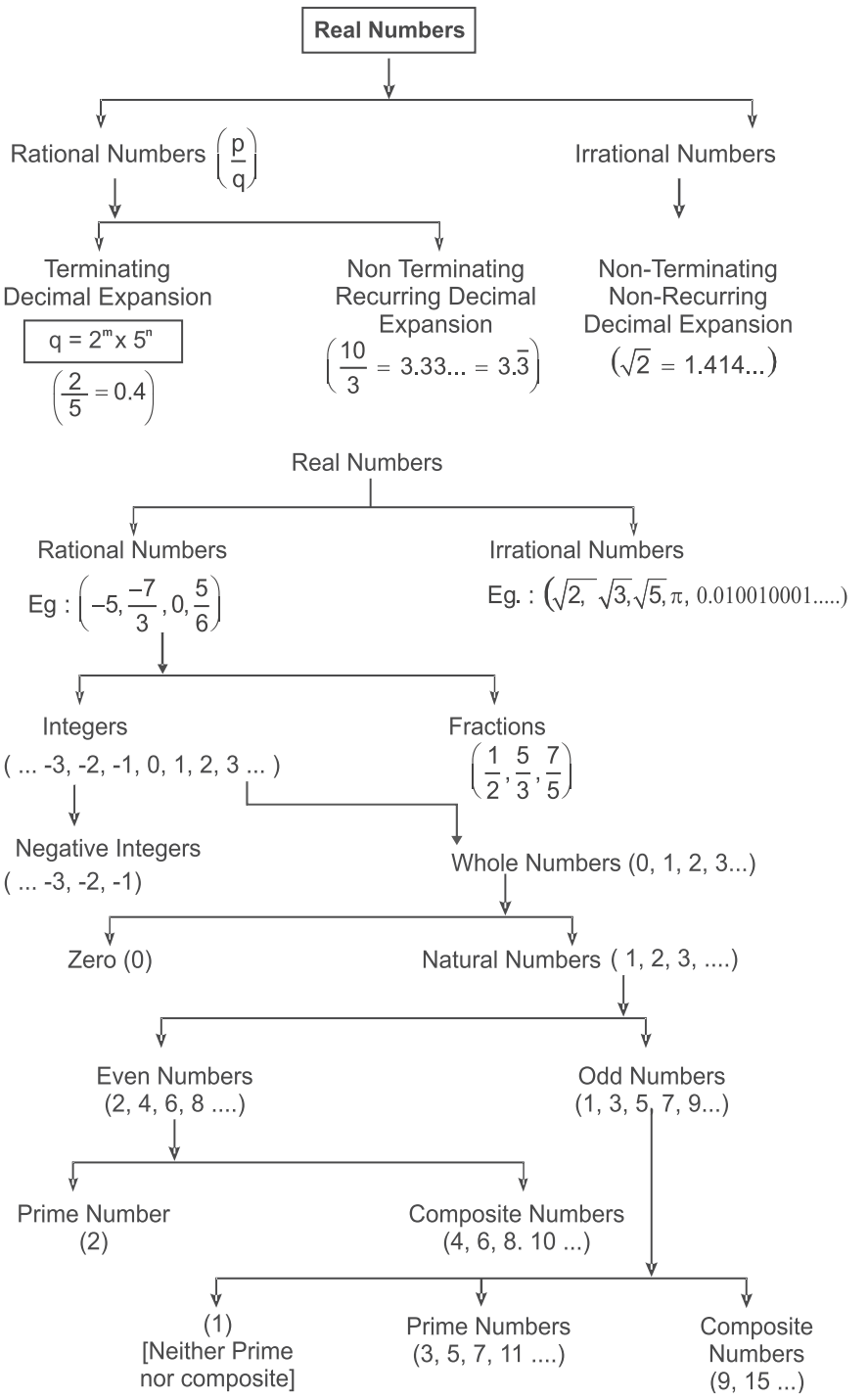
Composite Numbers: Those natural numbers which have more than two factors are known as composite numbers. e.g., 4, 6, 8, 9, 10, 12, ...

1 is neither prime nor composite.

$\sqrt[n]{a} = a^{1/n}$ where 'a' is positive real number and n is a positive integer

$a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m}$ where a is positive real number$m$ and n are co-prime integers and $n > 0$

Types of Numbers



Very Short Answer Questions (1 mark)

1. Which of the following is a rational number?

(a) $1 + \sqrt{5}$ (b) $2\sqrt{3}$

(c) 0 (d) π

2. Which of the following is irrational?

(a) $\sqrt{\frac{4}{9}}$ (b) $\frac{\sqrt{12}}{\sqrt{3}}$

(c) $\sqrt{81}$ (d) $\sqrt{5}$

3. If $x = 2 + \sqrt{3}$ then $(1/x)$ is equal to

(a) $2 + \frac{1}{\sqrt{3}}$ (b) $\frac{1}{2-\sqrt{3}}$

(c) $2 - \sqrt{3}$ (d) $\frac{1}{2} + \sqrt{3}$

4. An irrational number between $\sqrt{2}$ and $\sqrt{3}$ is

(a) $\frac{\sqrt{2}+\sqrt{3}}{2}$ (b) $\frac{-\sqrt{2}+\sqrt{3}}{2}$

(c) $\sqrt{2} \times \sqrt{3}$ (d) $\sqrt{5}$

5. If $5^{2y} = 25$ then 5^{-y} is equal to

(a) $\frac{-1}{5}$ (b) $\frac{1}{50}$

(c) $\frac{1}{625}$ (d) $\frac{1}{5}$

Fill in the blanks:

6. $\sqrt{6} \times \sqrt{8} =$ _____

7. The decimal expansion of the number $\sqrt{3}$ is _____ and _____

8. _____ is a whole number but not a natural number.

9. $\sqrt[2]{(81)^{0.50}} =$ _____

10. Between two distinct rational number there lie _____ rational numbers.

11. The sum and difference of rational and irrational number is always _____ numbers.

12. Every rational number is a _____ number.

13. Find a rational number between $\frac{-2}{3}$ and $\frac{1}{4}$.

14. Express $0.\overline{7}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

15. Find the value of $0.\overline{23} + 0.\overline{22}$ in the form $\frac{p}{q}$, where p & q are integres and $q \neq 0$.

16. Find the value of x, if $5^{x-3} . 3^{2x-8} = 225$

17. Find the value of $[(4 - 5(4 - 5)^4]^3$

18. Write first five whole numbers in $\frac{p}{q}$ form, where p and q are integers and $q \neq 0$.

19. Find two irrational numbers between $\sqrt{25}$ and $\sqrt{27}$.

20. Write two numbers whose decimal expansions are terminating.

21. Find the value of $(256)^{0.16} \times (256)^{0.09}$

22. Evaluate $\left(\frac{3}{5}\right)^3 \times \left(\frac{5}{3}\right)^5$

23. What can be the maximum number of digits in the repeating block of digits in the decimal expansion of $\frac{5}{7}$.

Short Answer Type-I Questions (2 Marks)

24. Represent following on number line

(a) $\frac{-7}{5}$ (b) $\sqrt{3}$

25. Find the value of x, $\sqrt[3]{2x+3} = 5$

26. Express the mixed recurring decimal $1.\overline{27}$ in the form $\frac{p}{q}$.

27. Simplify $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{80}+\sqrt{48}-\sqrt{45}-\sqrt{27}}$

28. Which of the following rational numbers will have a terminating decimal expansion or a non-terminating repeating (recurring) decimal expansion?

(a) $\frac{135}{50}$ (b) $\frac{4}{11}$

(c) $\frac{5^2 \times 3^3}{2 \times 5^3 \times 27}$ (b) $\frac{55}{9}$

29. Classify the numbers as terminating decimal or non-terminating recurring decimal or non-terminating non-recurring decimals.

(a) 0.1666 (b) 0.27696

(c) 2.142857142857..... (d) 2.502500250002.....

(e) $4.\overline{123456789}$

Also classify these numbers as rational and irrational numbers.

30. Classify the following numbers as rational or irrational numbers.

(a) $\frac{7\sqrt{7}}{\sqrt{343}}$ (b) $5+2\sqrt{23}-\left(\sqrt{25}+\sqrt{92}\right)$

(c) $\sqrt{360}$ (d) $\frac{22}{7}$

(e) π

31. Solve

(a) Add $\sqrt{125} + 2\sqrt{27}$ and $-5\sqrt{5} - \sqrt{3}$

(b) Multiply $\left(-3 + \sqrt{5}\right)$ and $\left(7 + \sqrt{3}\right)$

(c) Divide $2\sqrt{216} - 3\sqrt{27}$ by 3

Short Answer Type-II Questions (3 Marks)

32. If $\dfrac{3 + 2\sqrt{5}}{3 - 2\sqrt{5}} = p + q\sqrt{5}$, then find the value of 11 $(p + q)$

33. Simplify $\dfrac{(25)^{5/2} \times (81)^{1/4}}{(125)^{2/3} \times (27)^{2/3} \times 8^{4/3}}$

34. If $32^{2x-5} = 4 \times 8^{x-5}$ then find the value of x.

35. Evaluate

(a) $\dfrac{2^{38} + 2^{37} + 2^{36}}{2^{39} + 2^{38} + 2^{37}}$

(b) $\left(9 + \sqrt{2} - \sqrt{3}\right)^2$

(c) $\left[5\left(8^{1/3} + 27^{1/3}\right)^7\right]^{1/4}$

(d) $\left(6 - \sqrt{2}\right)\left(2 + \sqrt{3}\right)$

36. If $5^{2x-1} - (25)^{x-1} = 2500$ then find the value of x?

37. If x = $3 - 2\sqrt{2}$, show that $\left(\sqrt{x} - \dfrac{1}{\sqrt{x}}\right) = \pm 2$

38. If xyz = 1 then simplify

$$\left(1 + x + y^{-1}\right)^{-1} + \left(1 + y + z^{-1}\right)^{-1} + \left(1 + z + x^{-1}\right)^{-1}$$

39. Find the value of x if

(a) $25^{2x-3} = 5^{2x+3}$

(b) $(4)^{2x-1} - (16)^{x-1} = 384$

40. Solve

$$\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\frac{1}{\sqrt{4}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{6}}+\frac{1}{\sqrt{6}+\sqrt{7}}+\frac{1}{\sqrt{7}+\sqrt{8}}+\frac{1}{\sqrt{8}+\sqrt{9}}$$

41. Express $0.6 + 0.\overline{7} + 0.4\overline{7}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

Long Answer type Questions (5 marks)

42. Evaluate $\frac{64^{\frac{a}{6}}}{4^a} \times \frac{2^{2a+1}}{2^{a-1}}$

43. Simplify $\frac{1}{1+x^{b-a}+x^{c-a}}+\frac{1}{1+x^{a-b}+x^{c-b}}+\frac{1}{1+x^{a-c}+x^{b-c}}$

44. Simplify $\left(\frac{x^a}{x^{-b}}\right)^{a-b} \times \left(\frac{x^b}{x^{-c}}\right)^{b-c} \times \left(\frac{x^c}{x^{-a}}\right)^{c-a}$

45. Show that $\frac{7\sqrt{3}}{\left(\sqrt{10}+\sqrt{3}\right)}-\frac{2\sqrt{5}}{\left(\sqrt{6}+\sqrt{5}\right)}-\frac{3\sqrt{2}}{\left(\sqrt{15}+3\sqrt{2}\right)}=1$

46. Show that $a=\frac{\sqrt{7}-\sqrt{6}}{\sqrt{7}+\sqrt{6}}$ and $b=\frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}-\sqrt{6}}$, then find the value of $a^2 + b^2 + ab$

47. If $x = 9 - 4\sqrt{5}$ then find

(a) $x+\frac{1}{x}$ (b) $x-\frac{1}{x}$

(c) $x^2+\frac{1}{x^2}$ (d) $x^2-\frac{1}{x^2}$

(e) $x^3+\frac{1}{x^3}$ (f) $x^3-\frac{1}{x^3}$

(g) $\sqrt{x}+\frac{1}{\sqrt{x}}$

(h) $\sqrt{x}-\frac{1}{\sqrt{x}}$

(i) $x+\frac{14}{x}$

48. If $P = 5-2\sqrt{6}$ find

(a) $P^2+\frac{1}{P^2}$

(b) $P^2-\frac{1}{P^2}$

(c) $P^4+\frac{1}{P^4}$

49. Find the value of $\frac{4}{(216)^{-2/3}}+\frac{1}{(256)^{-3/4}}+\frac{2}{(243)^{-1/5}}$

50. If $\frac{9^n\times 3^2\times\left(3^{-n/2}\right)^{-2}-(27)^n}{3^{3m}\times 2^3}=\frac{1}{729}$ then prove that $m-n=2$

51. If $x = 2^y$ and $\frac{9\times 3^{2x}-3^x\times 3^{x-2}}{2}=360$. Find the value of y.

52. If $a = 2$, $b= 3$ then find the values of the following

(a) $(a^b+b^a)^{-1}$

(b) $(a^a+b^b)^{-1}$

53. If $ab + bc + ca = 0$, find the value of $\frac{1}{a^2-bc}+\frac{1}{b^2-ca}+\frac{1}{c^2-ab}$

CHAPTER-1
NUMBER SYSTEM
ANSWERS

1. (c) 0

2. (d) $\sqrt{5}$

3. (c) $2-\sqrt{3}$

4. (a) $\frac{\sqrt{2}+\sqrt{3}}{2}$

5. (d) $\frac{1}{5}$

6. $4\sqrt{3}$

7. Non-terminating and non-repeating

8. 0

9. 3

10. Infinite

11. Irrational

12. Real

13. Hint: $\frac{a+b}{2}$ or make denominators equal

$\frac{1}{12}$: (other answers are also possible)

14. $\frac{7}{9}$

15. $\frac{5}{11}$

16. Hint: Compare powers

$x = 5$

17. –1

18. $\frac{0}{1}, \frac{1}{1}, \frac{2}{1}, \frac{3}{1}, \frac{4}{1}$

19. $\sqrt{25} = 5$

$\sqrt{27} = 3\sqrt{3} = 3 \times 1.732 = 5.196$

Two irrational No. 5.012301234012345.....

5.1378424134876.....

(other answers are also possible)

20. $\frac{17}{5}, \frac{43}{10}$ (other answers are also possible)

21. 4

22. $\left(\frac{5}{3}\right)^2$

23. 6

25. Hint: cubing on both sides

$$\left(\sqrt[3]{2x+3}\right)^3 = 5^3$$

$$x + 3 \qquad 2 = 125$$

$$x = 61$$

26. $\frac{14}{11}$

27. 1

28. (a) Terminating decimal

(b) Non-terminating but recurring decimal

(c) Hint: simplify it first

Terminating decimal

(d) Non-terminating but recurring decimal

29. (a) Terminating decimal/Rational number

(b) Terminating decimal/Rational number

(c) Non-terminating but repeating/Rational number

(d) Non-terminating non-Repeating/Irrational number

(e) Non-terminating but Repeating/Rational number.

30. (a) Rational

(b) Rational

(c) Irrational

(d) Rational

(e) Irrational

31. (a) $5\sqrt{3}$

(b) $-21-3\sqrt{3}+7\sqrt{5}+\sqrt{15}$

(c) $4-3\sqrt{3}$

32. Hint: Rationalise the denominator

$$p=\frac{-29}{11},$$

$$q=\frac{-12}{11}$$

-41

33. Hint: $\dfrac{\left(5^2\right)^{5/2}\times\left(3^4\right)^{1/4}}{5^2\times3^2\times2^4}=\dfrac{5^3}{3\times2^4}=\dfrac{125}{48}$

34. Hint:

$$2^{5(2x-5)} = 2^2 \times 2^{3(x-5)}$$

$$2^{10x-25} = 2^{3x-15+2}$$

$x-25$ $\qquad$ 10 $\qquad$ $= 3x-13$

$$x = \frac{12}{7}$$

35. (a) Hint : $\dfrac{2^{36}\left(2^2+2^1+1\right)}{2^{37}\left(2^2+2^1+1\right)}=\dfrac{1}{2}$

(b) Hint: $(9)^2+\left(\sqrt{2}-\sqrt{3}\right)^2+2\times 9\left(\sqrt{2}-\sqrt{3}\right)=2\left(43-\sqrt{6}+9\sqrt{2}-9\sqrt{3}\right)$

(c) 25

(d) $12+6\sqrt{3}-2\sqrt{2}-\sqrt{6}$

36. Hint:

$$5^{2x-1}-5^{2(x-1)}=5^4\times 2^2$$

$$5^{2x-1}\,\frac{-5^{2x-1}}{5}=5^4\times 2^2$$

$$x=3$$

37. Hint:

$$\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^2=x+\frac{1}{x}-2=4$$

$$\left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)=\pm 2$$

38. Hint: replace

$$y=\frac{1}{xz}$$

$$=(1+x+xz)^{-1}+\left(1+\frac{1}{xz}+\frac{1}{z}\right)^{-1}+\left(1+z+\frac{1}{x}\right)^{-1}$$

$$=\frac{1}{1+x+xz}+\left(\frac{xz+1+x}{x^2}\right)^{-1}+\left(\frac{x+xz+1}{x}\right)^{-1}$$

$$=\frac{1}{1+x+xz}+\frac{xz}{1+x+xz}+\frac{x}{1+x+xz}$$

$$=\frac{1+zx+x}{1+x+xz}=1$$

39. (a) Hint:

$$5^{2(2x-3)} = 5^{2x+3}$$

$$x = \frac{9}{2}$$

(b) Hint:

$$2^{2(2x-1)} - 2^{4(x-1)} = 2^7 \times 3$$

$$2^{4x-2} - 2^{4x-4} = 2^7 \times 3$$

$$2^{4x-2}\,(1 - 2^{-2}) = 2^7 \times 3$$

$$x = \frac{11}{4}$$

40. Hint:

$$\frac{1}{1+\sqrt{2}} \times \frac{1-\sqrt{2}}{1-\sqrt{2}} = \frac{1-\sqrt{2}}{1-2} = -(1-\sqrt{2})$$

$$= \sqrt{2} - 1 + \sqrt{3} - \sqrt{2} + \sqrt{4} - \sqrt{3} + \sqrt{5} - \sqrt{4} + \sqrt{6} - \sqrt{5} + \sqrt{7} - \sqrt{6} + \sqrt{8} - \sqrt{7} + \sqrt{9} - \sqrt{8}$$

$$= \sqrt{9} - 1 = 3 - 1 = 2$$

41. $\frac{167}{90}$

42. 4

43. 1

44. 1

45. 1

46. Hint:

$$a = 13 - 2\sqrt{42}$$

$$b = 13 + 2\sqrt{42}$$

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

$$a^2 + b^2 + ab = \left(13 - 2\sqrt{42} + 13 + 2\sqrt{42}\right)^2 - \left(13 - 2\sqrt{42}\right)\left(13 + 2\sqrt{42}\right)$$

$$a^2 + b^2 + ab = (26)^2 - (169 - 168)$$

$$= 676 - 1 = 675$$

47. (a) 18

(b) $-8\sqrt{5}$

(c) 322

(d) $-144\sqrt{5}$

(e) Hint:

$$x^3+\frac{1}{x^3}=\left(x+\frac{1}{x}\right)^3-3\left(x+\frac{1}{x}\right)$$
$$=18^3-3\times 18=5778$$

(f) Hint:

$$x^3-\frac{1}{x^3}=\left(x-\frac{1}{x}\right)^3+3\left(x-\frac{1}{x}\right)$$
$$=(-8\sqrt{5})^3+3\times-8\sqrt{5}$$
$$=-2584\sqrt{5}$$

(g) $2\sqrt{5}$

(h) 4

(i) $135+52\sqrt{5}$

48. (a) 98

(b) Hint: $P^2-\frac{1}{P^2}=\left(P+\frac{1}{P}\right)\left(P-\frac{1}{P}\right)=-40\sqrt{6}$

(c) Hint: $P^4+\frac{1}{P^4}=\left(P^2+\frac{1}{P^2}\right)^2-2=9602$

49. 214

50. Hint:

$$\frac{3^{2n}\times 3^2\times 3^{\frac{-n}{2}\times -2}-3^{3n}}{3^{3m}\times 2^3}=\frac{1}{729}$$

$$\frac{3^{2n+2+n}-3^{3n}}{3^{3m}\times 2^3}=\frac{1}{729}$$

$$3^{3n-3m}=3^{-6}$$

$$n-m=-2$$

$$\therefore \quad m-n=2$$

51. Hint:

$$\frac{3^2\times 3^{2x}-3^x\times 3^{x-2}}{2}=360$$

$$\frac{3^{2x}\left(3^2-3^{-2}\right)}{2}=360$$

$$3^{2x}=81$$

$$x=2$$

$$y=1$$

52. (a) $\frac{1}{17}$

(b) $\frac{1}{31}$

53. Hint: $ab=-(bc+ca)$; $bc=-(ca+ab)$; $ca=-(ab+bc)$

$$=\frac{1}{a^2+ac+ab}+\frac{1}{b^2+ab+bc}+\frac{1}{c^2+bc+ca}$$

$$=\frac{1}{a(a+b+c)}+\frac{1}{b(a+b+c)}+\frac{1}{c(a+b+c)}$$

$$=0$$

CHAPTER-1
NUMBER SYSTEM
PRACTICE TEST

Time: 1 hr **M.M: 20**

1. Write one rational number and one irrational number. (1)

2. If $p = 5 - 2\sqrt{6}$ then find the value of $\frac{1}{p}$. (1)

3. Simplify $4\sqrt{3} + 3\sqrt{48} - \frac{5}{2}\sqrt{12}$ (2)

4. If $(5)^{2x-1} - (25)^{x-1} = 2500$ then find the value of x. (2)

5. Find the value of x and y

$$\frac{\sqrt{11} - \sqrt{7}}{\sqrt{11} + \sqrt{7}} = x - y\sqrt{77}$$ (3)

6. Represent $\left(2 + \sqrt{3}\right)$ on number line (3)

7. Simplify:

$$\frac{16 \times 2^{a+1} - 4 \times 2^{a}}{16 \times 2^{a+2} - 2 \times 2^{a+2}}$$ (3)

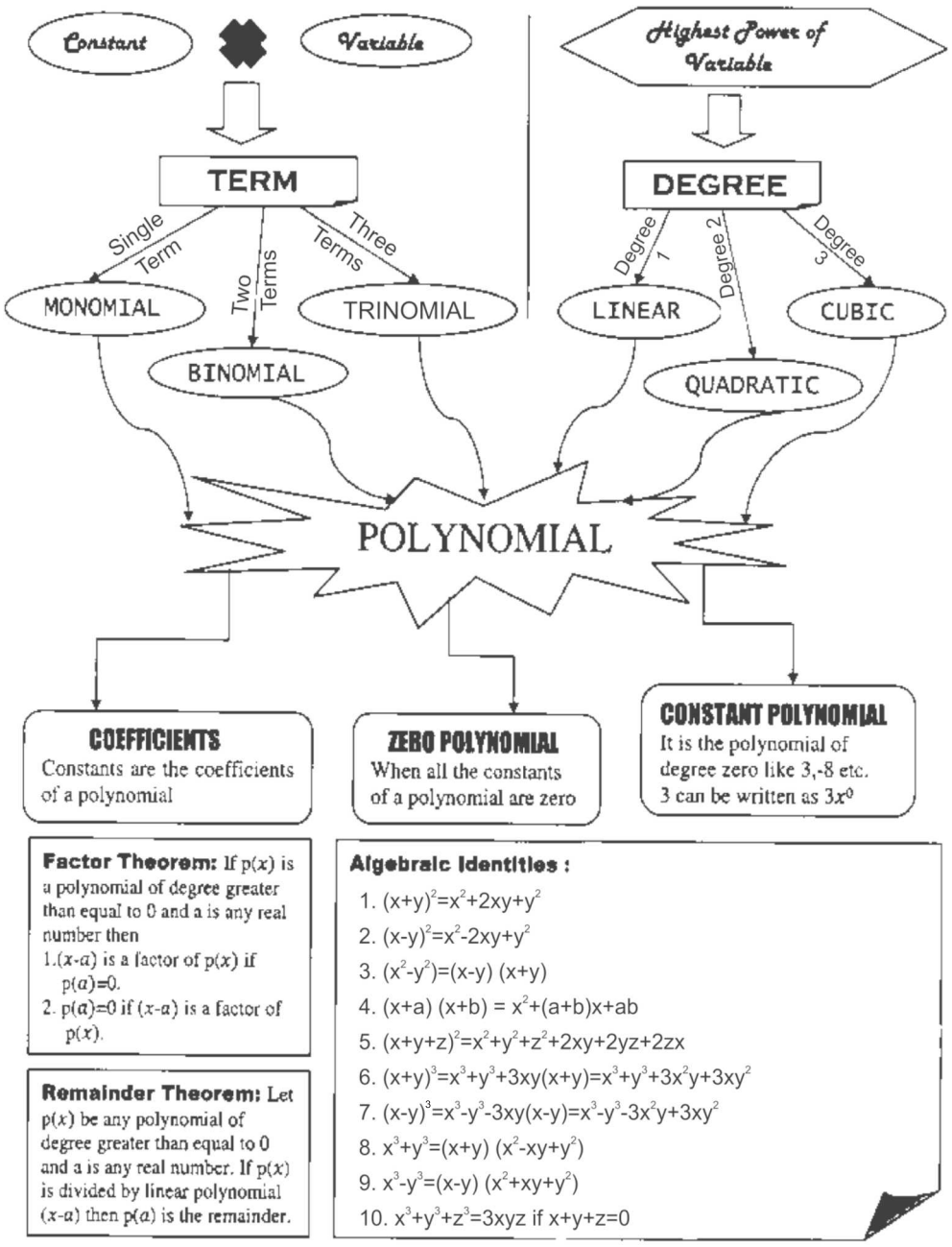
8. Express the following in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$

$0.\overline{4} + 0.1\overline{8} + 0.\overline{2}$ (5)

CHAPTER-2

POLYNOMIALS

MIND MAP



CHAPTER-2

Polynomials

KEY POINTS

Definition

A polynomial $p(x)$ in one variable x of degree n is an algebraic expression in x of the form $p(x) = a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + ... + a_2x^2 + a^1x + a_0$, where

(i) $a_0, a_1, a_2, ... a_n$ are constants and $a_n \neq 0$

(ii) $a_0, a_1, a_2, ... a_n$, are respectively the coefficients of $x^0, x^1, x^2, ..., x^n$ terms of the polynomial.

(iii) Each of $a_n x^n$, $a_{n-1}x^{n-1}$, $a_{n-2}x^{n-2}$, ..., a_2x^2, a_1x_1 a are called terms of the polynomial.

(iv) n is called the degree of the polynomial where n is a non-negative integer.

Zeros of Polynomial

For a polynomial $p(x)$ if $p(a) = 0$, where a is a real number we say that 'a' is a zero of the polynomial.

Facts about Polynomial:

1. A polynomial having four or more than four terms does not have particular name. These are simply called polynomials.
2. A polynomial of degree four or more than four does not have any particular name. Such a polynomial is usually called a polynomial of degree four or five or ... etc.
3. The degree of zero polynomial is not defined or we can not determine the degree of zero polynomial.
4. A polynomial of degree 'n' can have at most n zeroes.
5. A non-zero constant polynomial has no-zero.
6. Every real number is a zero of the zero polynomial.

Very Short Answer type Questions (1 Mark)

1. The coefficient of x^2 in the polynomial $4x^3 - 7x^2 + 2x + 1$ is :-

(a) 4 (b) 7

(c) –4 (d) –7

2. Which of the following is not a polynomial?

(a) $x + 1$ (b) $\sqrt{x} + 1$

(c) $x^2 + 1$ (d) $\left(\frac{1}{x} + 1\right)x^2$

3. If $x = -1$ is a zero of $x^3 - 2x^2 + 3ax + 5$, then value of a is :-

(a) 2 (b) $\frac{2}{3}$

(c) $\frac{3}{2}$ (d) –5

4. If $(x + 2)$ is a factor of $x^2 - kx + 14$, then find the value of k :-

(a) –9 (b) 9

(c) –2 (d) 14

5. When $p(x)$ $x^3 - 6x^2 + 2x - 4$ is divided by $x - 2$ then remainder is :-

(a) 16 (b) 24

(c) –16 (d) –24

6. If the side of a square is $(x + 2y - z)$ units, then its area is _____.

7. The polynomial $x^2 - a^2$ has _____ zeroes.

8. A quadratic polynomial can have at most _____ terms.

9. $(49)^3 - (30)^3 +$ _____ $= 3 \times 49 \times 30 \times 19$

10. $x^3 - 64$ is a polynomial of degree _____ having _____ terms.

11. Check whether $x = 3$ is a zero of the polynomial $x^3 - 3x^2 + x - 3$

12. If $p + q + r = 9$, then find the value of $(3 - p)^3 + (3 - q)^3 + (3 - r)^3$.

13. Find the remainder when $x^3 + 3x^2 + 2x$ is divided by x.

14. If $f(x) = x^2 - 3$, then find $f(1) + f(-1)$

15. Find the sum of coefficient of x^2 and coefficient of x in the polynomial $3x^3 - 4x^2 + 5x + 2$

Short Answer Type-I Questions (2 Marks)

16. Check whether $q(x)$ is a multiple of $r(x)$ or not.
Where $q(x) = 2x^3 - 11x^2 - 4x + 5$, $r(x) = 2x + 1$.

17. Show that $(x - 5)$ is a factor of $x^3 - 3x^2 - 4x - 30$.

18. Evaluate by using suitable identity: $(997)^2$

19. Find the zeroes of the polynomial $p(x) = x(x - 2)(x + 3)$

20. Find the remainder when $3x^2 - 7x - 6$ is divided by $(x - 3)$

21. Factorise : $8x^3 + \sqrt{27}\, y^3$

22. If $p(x) = x + 9$, then find $p(x) + p(-x)$

23. Find the product without multiplying directly 106×94

24. The factors of $5x^2 - 18x + 9$ are $(x + b)$ and $(x + b)$. Find the values of a and b.

25. Find $p(1) + p(-1) + p(10)$ if $p(x) = x^2 - 3x + 2$

26. Find $(x - y)^2$ if $\frac{x}{y} + \frac{y}{x} = 2$

27. Show that -1 is a zero of $3x^4 - x^3 + 3x - 1$.

28. Multiply $(x + 1)(x - y)$

Short Answer Type-II Questins (3 Marks)

29. Factorise: $64a^2 + 96ab + 36b^2$

30. Facrotise: $x^3 + 6x^2 + 11x + 6$

31. If $x^2 + y^2 = 49$ and $x - y = 3$, then find the value of $x^3 - y^3$.

32. Simplify: $(5a - 2b)(25a^2 + 10ab + 4ab^2) - (2a + 5b)(4a^2 - 10ab + 25b^2)$

33. Find the sum of remainders when $x^3 - 3x^2 + 4x - 4$ is divided by $(x - 1)$ and $(x + 2)$.

34. Find the product of $\left(p - \frac{1}{p}\right)\left(p + \frac{1}{p}\right)\left(p^2 + \frac{1}{p^2}\right)\left(p^4 + \frac{1}{p^4}\right)$

35. Factorise: $7\sqrt{2}k^2 - 10k - 4\sqrt{2}$

36. Simplify: $(3x - 4y)^3 - (3x + 4y)^3$

37. Simplify: $(x + y + z)^2 - (x - y - z)^2$.

38. Factorise: $125x^3 + 8y^3 + z^3 - 30xyz$

39. $x + 2$ is a factor of polynomial $ax^3 + bx^2 + x - 2$ and the remainder 4 is obtained on dividing this polynomial by $(x - 2)$. Find the value of a and b.

40. If the polynomials $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x + a$ leave the same remainder when divided by $(x - 3)$, find the value of a.

41. If $\left(\frac{9}{10}\right)^3 - \left(\frac{2}{5}\right)^3 - \left(\frac{1}{2}\right)^3 = \frac{x}{50}$, find x

42. If $(x - 3)$ and $\left(x - \frac{1}{3}\right)$ are factors of the polynomial $px^2 + 3x + r$, show that $p = r$.

Long Answer type Questions (5 Marks)

43. A literacy campaign was organised by Class IX girl students under NSS. Students made $(x - 5)$ rows and $(3x - 4)$ columns for the rally. Write the total number of students in the form of a polynomial.

44. (i) Using identity, find the value of $(-7)^3 + (5)^3 + (2)^3$.

(ii) Find dimensions of cuboid whose volume is given be the expression $4x^2 + 14x + 6$.

45. If $a + b + c = 0$, find the value of $\frac{(b+c)^2}{bc} + \frac{(c+a)^2}{ca} + \frac{(a+b)^2}{ab}$

46. Simplify: $\frac{(a^2-b^2)^3 + (b^2-c^2)^3 + (c^2-a^2)^3}{(a-b)^3 + (b-c)^3 + (c-a)^3}$

47. Factorize $(2a - b - c)^3 + (2b - c - a)^3 + (2c - a - b)^3$

48. If the polynomial $4x^3 - 16x^2 + ax + 7$ is exactly divisible by $x - 1$, then find the value of a. Hence factorise the polynomial.

49. If $\frac{x}{y} + \frac{y}{x} = -1$ where $x \neq 0, y \neq 0$ then find the value of $x^3 - y^3$

50. Simplify: $\frac{155 \times 155 + 155 \times 55 + 55 \times 55}{155 \times 155 \times 155 - 55 \times 55 \times 55}$

Answer

1. (d) -7

2. (b) $\sqrt{x}+1$

3. (b) $\frac{2}{3}$

4. (a) -9

5. (c) -16

6. $x^2 + 4y^2 + z^2 + 4xy - 4yz - 2xz$

7. Two

8. Three

9. $(-19)^3$

10. 3, 2

11. Yes

12. $p + q + r = 9$

$(3 - p) + (3 - q) + (3 - r) = 0$

$\therefore\ (3 - p)^3 + (3 - q)^3 + (3 - r)^3$

$= 3(3 - p)\,(3 - q)\,(3 - r)$

13. 0

14. $f(1) + f(-1)$

$= (-2) + (-2) = -4$

15. $(-4) + (5) = 1$

16. Since, $q\left(\frac{-1}{2}\right) = 4 \neq 0$

$\therefore$ $r(x)$ is not a multiple of $q(x)$.

17. Put $x = 5$ in given polynomial

18. 994009

19. 0, 2, –3

20. 0

21. $\left(2x+\sqrt{3}y\right)\left(4x^2-2\sqrt{3}xy+3y^2\right)$

22. 18

23. (100 + 6) (100 – 6) = 9964

24. $a = 5, b = -3$

25. 78

26. 0

28. $x^2 - xy + x - y$

29. $(8a + 6b)^2$

30. $(x + 1)(x + 2)(x + 3)$

31. 207

32. $117a^3 - 133b^3$

33. –34

34. $p^8 - \frac{1}{p^8}$

35. $\left(k-\sqrt{2}\right)\left(7\sqrt{2}k+4\right)$

36. $-128y^3 - 216x^2y$

37. $4xy + 4xz$

38. $(5x + 2y + z)(25x^2 + 4y^2 + z^2 - 10xy - 2yz - 5zx)$

39. $a = 0, b = 1$

40. $a = -1$

41. $x = 27$, {use, if $a + b + c = 0$ then $a^3 + b^3 + c^3 = 3abc$}

43. $3x^2 - 19x + 20$

44. (i) – 210, (ii) 2, $(x + 3)$, $(2x + 1)$

45. 3

46. $(a + b)\,(b + c)\,(c + a)$

47. $3\,(2a - b - c)\,(2b - c - a)\,(2c - a - b)$

48. $a = 5$, $(x - 1)\,(2x + 1)\,(2x - 7)$

49. 0

50. $$\frac{(155)^2 + 155 \times 55 + (55)^2}{(155)^3 - (55)^3} = \frac{(155)^2 + 155 \times 55 + (55)^2}{(155 - 55)\left((155)^2 + 155 \times 55 + (55)^2\right)}$$

$$= \frac{1}{100} = 0.01$$

CHAPTER-2

POLYNOMIALS

PRACTICE TEST

Time: 1 hr. **M.M. 20**

1. Show that $x = 1$ is a zero of the polynomial $3x^3 - 4x^2 + 8x - 7$. (1)

2. Find the value of the polynomial $2x + 5$ at $x = -3$. (1)

3. Find the zeroes of the polynomial $x^2 - 4x + 3$. (2)

4. If $x + y + z = 6$, $xy + yz + zx = 11$. Find the value of $x^2 + y^2 + z^2$. (2)

5. If $3x - 4$ is a factor of the polynomial $p(x) = 2x^3 - 11x^2 + kx - 20$, find the value of k . (3)

6. Factorise: $a^2 + b^2 + 2(ab + bc + ca)$ (3)

7. Factorise: $2\sqrt{2}a^3 + 8b^3 - 27c^3 + 18\sqrt{2}abc$ (3)

8. Factorise: (5)

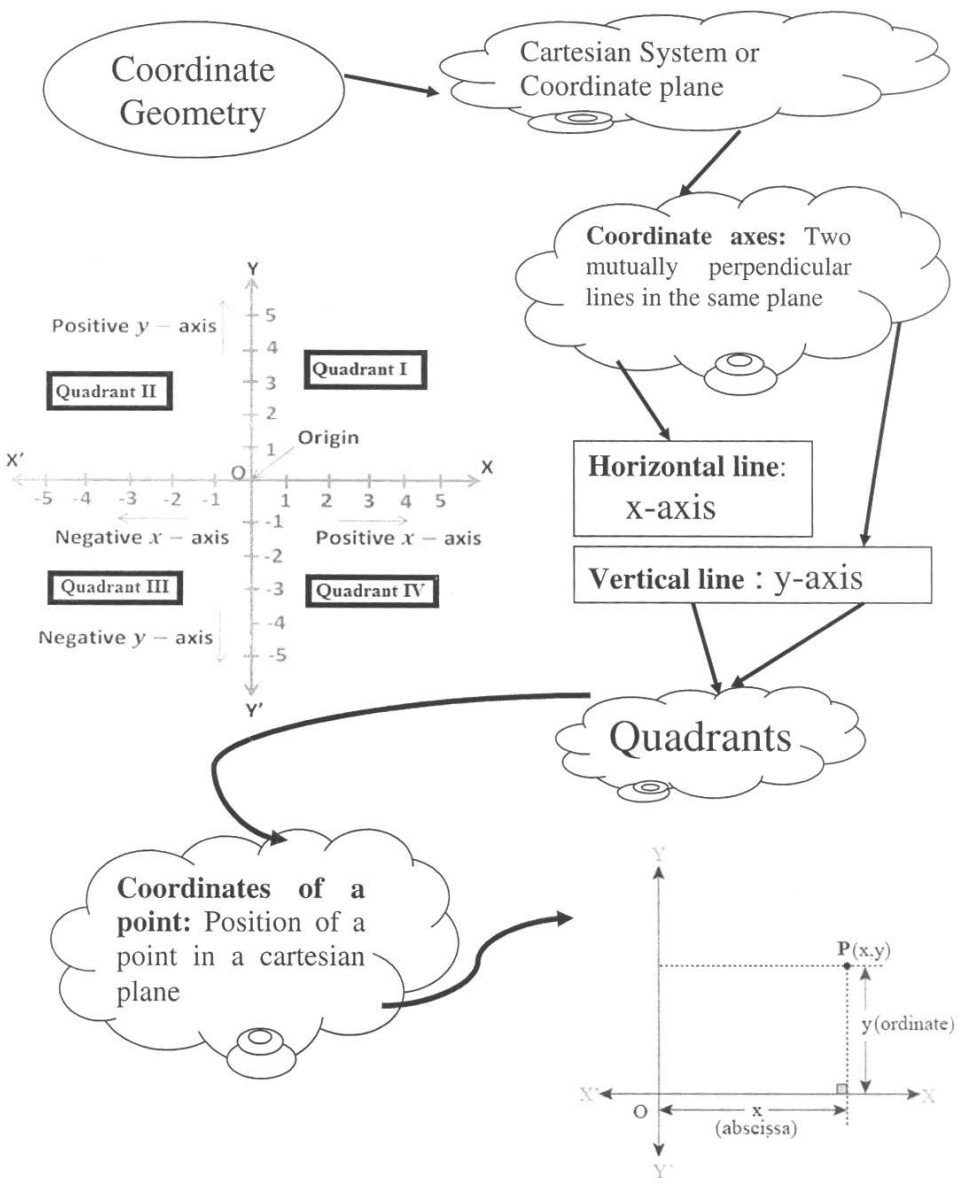
(i) $4x^2 + 20x + 25$

(ii) $6x^2 + 7x - 3$

CHAPTER-3

CO-ORDINATE GEOMETRY

MIND MAP



Key Points

- Co-ordinate Geometry is the branch of Mathematics in which we study the position of any object lying in a plane, called the Cartesian plane.
- In Cartesian system; there are two mutually perpendicular straight lines xx′ and yy′ intersecting at origin O.
- These mutually perpendicular straight lines, known as *x*axis and *y*-axis, divides the plane into four quadrants.
- The coordinates of a point is the position of the point in Cartesian plane and are determined by perpendicular distance from *x*-axis and *y*-axis.
- The perpendicular distance of a point from *y*-axis is called abscissa (*x*-coordinate) and from *x*-axis is called ordinate (*y*-coordinate).
- Any point in the Cartesian plane is shown by $P(a, b)$ where (a, b) are coordinates of point *P*. where a is abscissa and b is ordinate.

abscissa (*x*)	**ordinate (*y*)**	**Position of point**
positive (+)	positive (+)	Quadrant I
positive (+)	negative (–)	Quadrant IV
negative (–)	negative (–)	Quadrant III
negative (–)	positive (+)	Quadrant II

- The coordinate of a point on *x*-axis is of the form $(x, 0)$ and on *y*-axis is of the form $(0, y)$.
- If *x*-coordinate of two or more points are same, then the line joining these points is parallel to *y*-axis.
- If *y*-coordinate of two or more points are same, then the line joining these points is parallel to *x*-axis.

  NOTE: If a point lie on *x*-axis or *y*-axis then it does not lie in any quadrant.
- The mirror image of a point is just a reflection of this point about one of the axes.

  Mirror image about *x*-axis: sign of abscissa remains same but sign of ordinate changes.

  Mirror image about *y*-axis: sign of abscissa changes but sign of ordinate remains same.

  Mirror image about origin: signs of both-abscissa and ordinate changes.

Very Short Answer Questions (1 mark)

1. The abscissa of a point is the distance of the point from

(a) x-axis (b) y-axis

(c) origin (d) None of these

2. The y-coordinate of a point is the distance of that point from

(a) x-axis (b) y-axis

(c) origin (d) None of these

3. If both the coordinates of a point are negative then that point will lie in

(a) First quadrant (b) Second quadrant

(c) Third quadrant (d) Fourth quadrant

4. If abscissa of a point is zero then that point will lie

(a) on x-axis (b) on y-axis

(c) at origin (d) in Ist quadrant

5. If $x > 0$ and $y < 0$, then the point $(x, -y)$ lies in

(a) I quadrant (b) II quadrant

(c) III quadrant (d) IV quadrant

6. Point $(a, 0)$ lies

(a) on x-axis (b) on y-axis

(c) in third quadrant (d) in fourth quadrant

7. The signs of abscissa and ordinate of a point in the second quadrant are respectively.

(a) + , + (b) – , –

(c) – , + (d) + , –

8. The ordinate of a point is positive in

(a) I and IV quadrants (b) I quadrant only

(c) I and II quadrants (d) I and III quadrants

9. The point which lies on y-axis at a distance of 10 units in the negative direction of y-axis is

(a) (10, 0) (b) (0, 10)

(c) (–10, 0) (d) (0, –10)

10. The end points of a line segment lies in I quadrant and III quadrant. The line segment may pass through

(a) origin (b) negative x-axis

(c) positive y-axis (d) quadrant II

11. The point whose abscissa and ordinate have different signs will lie in

(a) I and II quadrants (b) I and III quadrants

(c) II and III quadrants (d) II and IV quadrants

12. Which of the point $P(0, 3)$, $Q(1, 0)$, $R(0, -1)$, $S(-5, 0)$, $T(1, 2)$ do not lie on x-axis?

(a) P and R only (b) Q and S only

(c) P, R and T (d) Q, S and T

13. If the coordinates of the points are $P(-2, 3)$ and $Q(-3, 5)$ then (abscissa of P) – (abscissa of Q) is

(a) –5 (b) 1

(c) –1 (d) –2

14. Point (1, 1), (1, –1), (–1, 1), (–1, –1)

(a) lie in I quadrant (b) lie in III quadrant

(c) lie in I and III quadrants (d) do not lie in the same quadrant

15. The point of intersection of the coordinates axes is

(a) Abscissa (b) Ordinate

(c) Quadrant (d) Origin

16. The abscissa and ordinate of the origin are

(a) (1, 0) (b) (1, 1)

(c) (0, 1) (d) (0, 0)

17. The angle formed between the coordinate axes is

(a) Zero angle (b) Right angle

(c) Acute angle (d) Obtuse angle

18. The perpendicular distance of the point $p(-4, -3)$ from x-axis is

(a) –4 units (b) –3 units

(c) 4 units (d) 3 units

19. The perpendicular distance of the point $p(-7, 2)$ from y-axis is

(a) –7 units (b) 7 units

(c) 2 units (d) –2 units

20. The distance of the point $p(3, 4)$ from the origin is

(a) 3 units (b) 4 units

(c) 7 units (d) 5 units

21. Which of the points $A(-5, 0), B(0, -3), C(3, 0), D(0, 4)$ are closer to the origin

(a) A (b) B

(c) D (d) Points B and C both

22. The mirror image of the point (0, 3) along y-axis is

(a) (0, –3) (b) (0, 3)

(c) (3, 0) (d) (–3, 0)

23. The coordinate axes divide the plane into four parts, each part is called _____.

24. It the coordinates of a point are (–2, 5), then its ordinate is _____ and its abscissa is _____.

25. The point (200, –111) lies in the _____ quadrant.

26. The abscissa of any point on the y-axis is _____.

27. The ordinate of any point on the x-axis is _____.

28. The points (0, 0), (0, 4) and (4, 0) form a/an _____ triangle.

29. If (x, y) represents a point and $xy > 0$, then the point may lie in _____ or _____ quadrant .

30. The points with coordinates (3, –1) and (–1, 3) are at _____ (same/ different) positions of the coordinate plane.

31. If the ordinate of points is 7 and abscissa is –5, then its coordinates are _____.

32. The coordinates of a point lying on x-axis having abscissa 5 are _____.

33. The co-ordinates of point describe the point in the place _____.

34. The coordinates of a point, which lies on negative x-axis at a distance of 6 units from y-axis, are _____ .

35. If the coordinates of the points are $P(0, -1)$ and $Q(2, 1)$ then (abscissa of P) – (abscissa of Q) is _____.

36. The measure of the angle between coordinate axes is _____.

37. In which quadrant do the given points lie.

(i) (3, –2) (ii) (17, –30)

(iii) (–2, 5) (iv) (–50, –20)

(v) (10, 100) (vi) (–81, 80)

38. On which axis do the given points lie:

(i) (11, 0) (ii) (–11, 0)

(iii) (0, – 100) (iv) (0, 14)

39. The abscissa and ordinate of a point A are –3 and –5 respectively then write down the coordinates of A.

40. Do $P(7, 0)$ and $Q(0, 7)$ represent the same point?

41. In which quadrant x coordinate is negative?

42. Name the figure formed when we plot the points (0, 0), (4, 4) and (0, 4) on a graph paper.

43. In which quadrant, does the point $A(x, y)$ with values $x > 0$ and $y > 0$ exists?

44. Write the coordinates of the fourth vertex of a square when three of its vertices are given by (1, 2) (5, 2) (5, –2).

45. If abscissa of any point is positive & ordinate is negative then in which quadrant do the point lie?

46. Write the coordinates of point whose perpendicular distance from x-axis is 5 units & perpendicular distance from y-axis is 3 units & it lies in II quadrant.

47. In which quadrant will a point lie if its both the coordinates are positive?

48. Write the coordinates of the point at which two coordinate axes meet.

49. Write the coordinates of the point which lies at a distance of x-units from x-axis and y units from y-axis.

50. Find the coordinates of the point which lies on x-axis at a distance of 5 units from y-axis.

51. Find the coordinates of the point which lies on y-axis at a distance of 9 units from x-axis in the negative direction.

52. In which quadrant of a Cartesian plane the ordinate of a point will be positive and abscissa will be negative?

53. On which axis the point $A(-3, 0)$ lies?

54. Which axis is parallel to the line joining the points (2, 4) and (2, –5)?

55. Find the image of the point (2, 3) about x-axis.

56. Find the mirror image of the point (–5, 6) about y-axis.

57. In which quadrant the mirror image of (–1, –4) lie about y-axis?

58. A point is in II quadrant. In which quadrant will its mirror image lie along x-axis?

Short answer type-I questions (2 marks)

59. Find the co-ordinates of two points on x-axis and two points on y-axis which are at equal distance from the origin.

60. Name the quadrant in which the graph of point $A(x, y)$ lies when

(i) $x > 0$ and $y > 0$ (ii) $x < 0$ and $y < 0$

61. Find the coordinates of the vertices of a rectangular figure placed in III quadrant in the Cartesian plane with length p unit on x-axis and breadth q units on y-axis.

62. Write the coordinates of any two points on the line segment joining the points A (4, –1) and B(4, 5).

Short answer type-II questions (3 marks)

63. If we plot the points $P(5, 0)$, $Q(5, 5)$, $R(-5, 5)$ and $S(-5, 0)$, which figure will we get? Name the axis of symmetry of this figure?

64. Find the coordinates of a point which is equidistant from the two points (–4, 0) and (4, 0). How many of such points are possible satisfying this condition?

65. A rectangular field is of length 10 units & breadth 8 units. One of its vertex lie on the origin. The longer side is along x-axis and one of its vertices lie in first quadrant. Find all the vertices.

66. Name the figure obtained by joining the points $B(5, 3), E(5,1), S(0, 1)$ and $T(0, 3)$. Also find the area of the figure.

67. Plot the point $P(-5, 4)$ and from it draw PM and PN as perpendicular to x-axis and y-axis respectively. Write the coordinates of the points M and N.

CHAPTER-3

CO-ORDINATE GEOMETRY

Answers

1. (b) y-axis
2. (a) x-axis
3. (c) Third quadrant
4. (b) y-axis
5. (d) IV quadrant
6. (a) on x-axis
7. (c) – , +
8. (c) I and II quadrants
9. (d) (0, –10)
10. (a) origin
11. (d) II and IV quadrants
12. (c) P, R and T
13. (b) 1
14. (d) do not lie in same quadrant
15. (d) origin
16. (d) (0, 0)
17. (b) Right angle
18. (d) 3 units
19. (b) 7 units
20. (d) 5 units
21. (d) points B and C both
22. (b) (0, 3)
23. quadrant
24. 5, –2
25. IV quadrant
26. 0
27. 0
28. isosceles
29. I or III
30. different
31. (–5, 7)
32. (5, 0)
33. uniquely
34. (–6, 0)
35. –2
36. 90°
37. (i) & (ii) IV quadrant
(iii) & (vi) II quadrant
(iv) III quadrant
(v) I quadrant
38. (i) & (ii) x-axis
(iii) & (iv) y-axis
39. (–3, –5)
40. No because abscissa and ordinates are different for both the points.
41. II and III
42. Triangle
43. I quadrant
44. (1, –2)
45. IV quadrant

46. (–3, 5)

47. I quadrant

48. (0, 0)

49. (y, x)

50. (5, 0)

51. (0, –9)

52. II quadrant

53. x-axis

54. y-axis

55. (2, –3)

56. (5, 6)

57. IV quadrant

58. III quadrant

59. ($\pm a$, 0), (0, $\pm a$) where a is any real number

60. (i) I quadrant

(ii) III quadrant

61. (0, 0), ($-p$, 0), ($-p$, $-q$), (0 $-q$)

62. Any two point with abscissa = 4 and ordinate lying between –1 and 5.

63. Rectangle, y-axis

64. Any point on y-axis, infinite

65. (0, 0), (10, 0), (10, 8), (0, 8)

66. Figure : Rectangle

Area : 10 sq. units.

67. M (–5, 0)

N (0, 4)

CHAPTER-3
COORDINATE GEOMETRY
PRACTICE TEST

Time: 1 hr. **M.M.: 20**

1. In which quadrant, the point (x, y) will lie, where x is positive and y is negative number? (1)

2. Write the coordinate of a point at a distance of 5 units from x-axis lying in II quadrant. (1)

3. Find the value of x and y if: (2)

(a) $(x - 4, 7) = (4, 7)$

(b) $(1, 2y - 3) = (1, 7)$

4. What is the distance of a point (7, –6) from x-axis and y-axis? (2)

5. In which quadrant, do the following points lie? (3)

(i) (4, –2) (ii) (–3, 7)

(iii) (–1, –2)

6. Write the mirror image of following points along x-axis. (3)

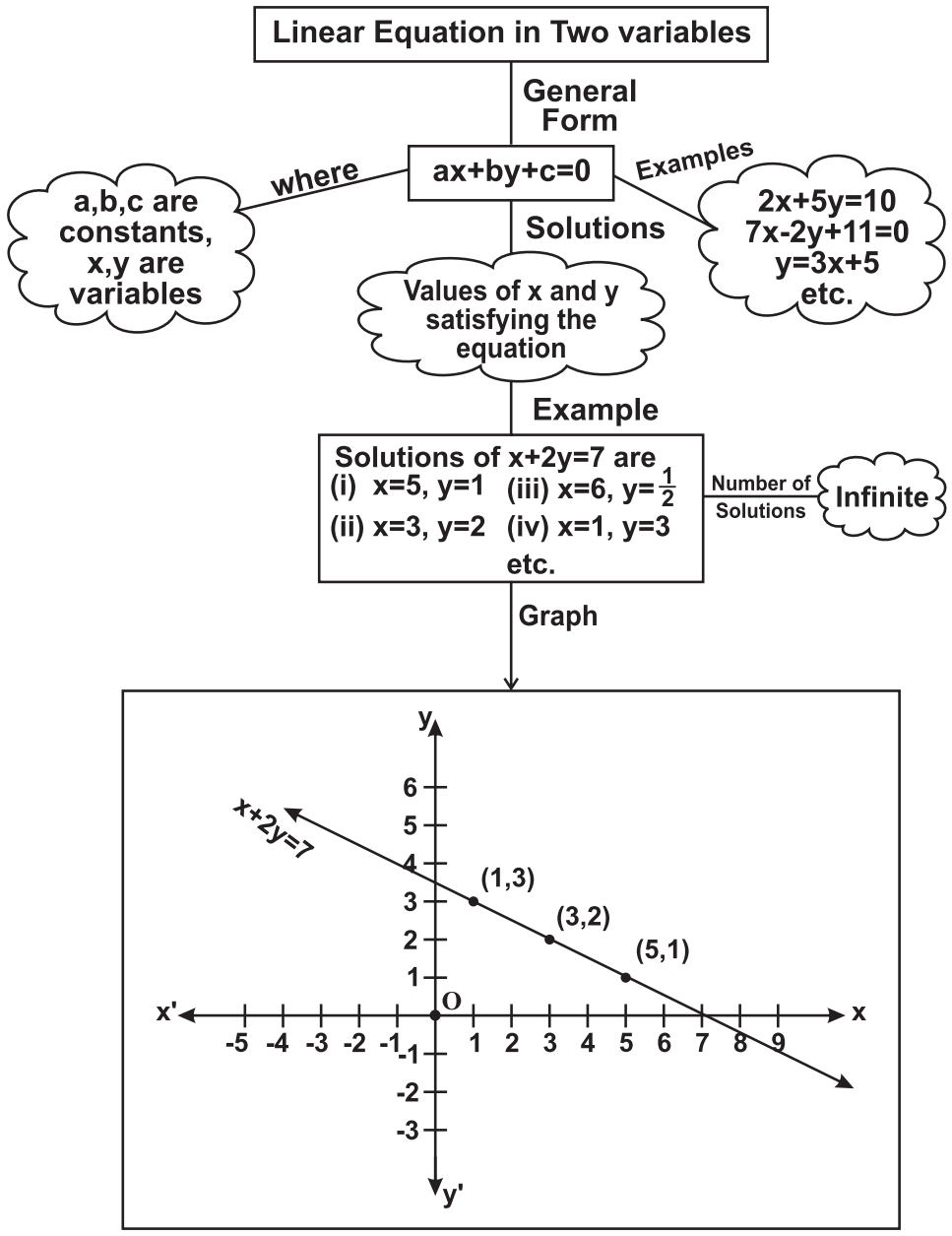
(–3, 5) , (2, 0) , (–4, –7)

7. Consider the points $O(0, 0)$, $A(4, 0)$ and $B(4, 6)$. Find the length of OA and AB. Find the coordinates of the fourth point C such that $OABC$ forms a rectangle. (3)

8. The base AB of two equilateral triangles ABC and ABD with side $2a$, lies along the x-axis such that the mid point of AB is at the origin. Find the coordinates of two vertices C and D of the triangles. Which type of Quadrilateral in $ABCD$? (5)

CHAPTER-4
LINEAR EQUATIONS IN TWO VARIABLES

MIND MAP



Key points

- **Linear equation in one variable:** An equation which can be written in the form $ax + b = 0$, where a, b are real numbers and $a \neq 0$ is called a linear equation in one variable.
- **Linear equation in two variables:** An equation which can be written in the form $ax + by + c = 0$, where a, b and c are real numbers and $a, b \neq 0$, is called a linear equation in two variables.

  Linear equation in one variable has a unique solution.

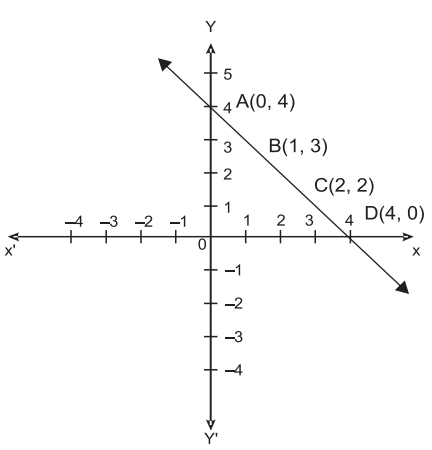
  $ax + b = 0 \Rightarrow x = -\frac{b}{a}$
- Linear equation in two variables has infinitely many solutions.
- The graph of every linear equation in two variables is a straight line.
- Every point on the line satisfies the equation of the line.
- Every solution of the equation is a point on the line. Thus, a linear equation in two variables is represented geometrically by a line whose points make up the collection of solutions of the equation.

Graph

- The pair of values of x and y which satisfies the given equation is called solution of the linear equation in two variables.

  Example: $x + y = 4$

  Solutions of equation $x + y = 4$ are (0, 4) (1, 3) (2, 2) (4, 0) and many more.



Very Short Answer Questions (1 Mark)

1. Which of the following is not a linear equation?

(a) $3x + 3 = 5x + 2$

(b) $x^2 + 5 = 3x - 5$

(c) $\frac{7}{3}x - 5 = 4x - 3$

(d) $(x + 2)^2 = x^2 - 8$

2. Which of the following is not a linear equation in two variables?

(a) $2x + 3y = 5$ (b) $3t + 2s = 6$

(c) $ax^2 + by = c$ (d) $ax + by = c$

3. A linear equation in two variables has maximum

(a) One solution (b) Two solutions

(c) Infinite solutions (d) Four solutions

4. The graph of $ax + by + c = 0$ is

(a) a straight line parallel to x-axis (b) a straight line parallel to y-axis

(c) a general straight line (d) not a straight line

5. If $x = 1, y = 1$ is a solution of equation $8x + 12ay = 63$, then the value of a is :

(a) 3 (b) 0

(c) –3 (d) 4

6. The equation of x-axis is :

(a) $x = k$ (b) $x = 0$

(c) $y = k$ (d) $y = 0$

7. Any point on the line $y = x$ is of the form :

(a) $(a, 0)$ (b) $(0, a)$

(c) (a, a) (d) $(a, -a)$

8. The equation $x = 0$ represents :–

(a) x-axis (b) y-axis

(c) a line parallel to x-axis (d) a line parallel to y-axis

9. Which of the following linear equation has solution $x = 2, y = 3$?

(a) $2x + y = 8$ (b) $x + 2y = 8$

(c) $x + y = 8$ (d) $-x + y = 8$

10. The graph of $2x + 3y = 6$ is a line which meets the y-axis at the point.

(a) (2, 0) (b) (3, 0)

(c) (0, 2) (d) (0, 3)

11. At what point, the graph of $3x + 2y = 9$, cuts the y-axis?

12. Let y varies directly as x. If $y = 15$ when $x = 5$, then write a linear equation.

13. Write the point of intersection of the lines $x = 2$ and $y = -3$

14. What is the distance of the point $(3, -7)$ from x-axis?

15. What is the distance of the point $(-5, -4)$ from y-axis?

16. Express the linear equation $\sqrt{2}x - 4 = 5y$ in the form of $ax + by + c = 0$ and thus indicate the values of a, b and c.

17. Express x in terms of y for the equation $3x + 4y = 7$.

18. Express y in the terms of x.

$y + 35x = 9$

19. On which axis does the point (9,0) lie?

20. Find a solution of $x + y = 5$ which lies on y-axis.

21. Express the equation $5y = 9$ as linear equation in two variables.

22. Write the linear equation which is parallel to x-axis and is at a distance of 2 units from the origin in upward direction.

23. Check whether $(1, -2)$ is a solution of $2x - y = 6$.

24. Check whether $x = 2$ and $y = 2$ is a solution of $2x + y = 6$.

25. How many solutions are there for equation $y = 5x + 2$.

26. Find the value of K, if $x = -1$ and $y = 1$ is a solution of equation $Kx - 2y = 0$

27. If the graphs of equation $2x + Ky = 10K$ intersects x-axis at point (5, 0), find the value of K.

28. The graph of the linear equation $4x = 6$ is parallel to which axis?

29. At which point the graph of $2x - y = 6$, cuts x-axis?

30. The graph of the equation $x + 3=0$ lies on which side of y axis?

31. The graph of the equation $2y-1=0$ lie on which side of the x axis?

Fill in the blanks:

32. (a) The equation of a line parallel to x-axis is _____ $=a$, where a is any non-zero real number.

(b) The equation of a line parallel to y-axis is _____ $=a$, where a is any non-zero real number.

33. The graph of every linear equation in two variables is a _____.

34. An equation of the form $ax + b = 0$, where a, b are real numbers and $a \neq 0$, in the variable x, geometrically represents _____.

35. The coefficient of x in the linear equation $2(x + y) - x = 7$ is _____

36. State whether the following statements are true or false :-

(a) The linear equation $7x + 9y = 8$ has a unique solution

(b) All the points (2, 0), (–3, 0), (4, 2) lie on the x-axis

(c) The line parallel to y-axis at a distance of 5 units to the left of y-axis is given by the equation $x = -5$.

(d) The graph of every linear equation in two variables need not be a line.

(e) The graph of the linear equation $x + 2y = 5$ passes through the point (0, 5)

Short Answer Type-I Questions (2 marks)

37. Find any two solutions of equation

$x + 2y = x + 5$

38. Find the value of P if $x = 2$, $y = 3$ is a solution of equation $5x + 3Py = 4a$

39. If the points $A(3, 5)$ and $B(1, 4)$ lies on the graph of line $ax + by = 7$, find the value of a.

40. Write the coordinates of the point where the graph of the equation $5x - 2y = 10$ intersect both the axes.

41. Write the equations of two lines passing through (3, 10).

42. The cost of coloured paper is 7 more than 1/3 of the cost of white paper. Write this statements in linear equation in two variables.

43. Draw the graph of equation $x + y = 5$.

44. The graph of linear equation $2x - y = 6$ will pass through which quadrants(s).

45. How many solution of the equations $3x - 2 = x - 3$ are there on the

(i) Number line

(ii) Cartesian plane.

46. Find the points where the graph of $x + y = 4$ meets line which is

(i) parallel to x-axis at 3 units from origin in positive direction of y-axis.

(ii) parallel to y-axis at 2 units on left of origin.

Short Answer Type-II Questions (3 marks)

47. The total number of legs in a herd of goats and hens is 40. Represent this situation in the form of a linear equation in two variables.

48. Find the value of a and b, if the line $ax + by = 24$ passes through, (2, 0) and (1, 2)

49. Determine the point on the graph of the linear equation $2x + 5y = 19$ whose ordinate is 1½ times its abscissa.

50. Find the points where the graph of the following equation cuts the x-axis and y-axis $2x = 1 - 5y$.

51. Write the equation of the line parallel to x-axis at a distance of 4 units above the origin.

52. If the points $A(4, 6)$ and $B(1, 3)$ lie on the graph of $ax + by = 8$ then find the value of a and b.

53. Find the value of 'a' if $(1, -1)$ is the solution of the equation $2x + ay = 5$. Find two more solutions of the equation.

54. Find two solutions of the equation $4x + 5y = 28$. Check whether $(-2, 10)$ is solution of the given equation.

55. Write the equation of line passing through (3, –3) and (6, –6).

56. If $x = 3k - 2, y = 2k$ is a solution of equation $4x - 7y + 12 = 0$, then find the value of k.

57. If $(m - 2, 2m + 1)$ lies on equation $2x + 3y - 10 = 0$, find m.

58. Given $F=\left(\frac{9}{5}\right)C+32$, where F is temperature in Fahrenheit and C is temperature in Celsius.

(i) If the temperature is 35°C, what is the temperature in Fahrenheit?

(ii) If the temperature is 30°C, what is the temperature in Fahrenheit?

59. Draw the graph of the linear equation $2x + 3y = 6$. Find out the coordinates of the points where the line intersets x-axis and y-axis.

60. Draw the graph for the linear equation $3x + 4y = 12$. If $x = 8$, find the value of y with the help of graph.

61. Draw the graph of $y = x$ and $2y = -5x$ on the same graph.

62. Give the geometrical representation of $5x + 7 = 0$ as equation:

(i) in one variable

(ii) in two variables

63. Draw the graph of the linear equation $2y - x = 7$. With the help of graph check whether $x = 3$ and $y = 2$ is the solution of the equation:

64. Draw the graph of linear equation $3x - y = 4$. From the graph find the value of p and q if the graph passes through $(p, -4)$ and $(3, q)$

65. Draw the graph of equations $2x + 3y = -5$ and $x + y = -1$ on the same graph. Find the co-ordinate of the point of intersection of two lines.

66. Show that the points $A(1, -1)$, $B(2, 6)$ and $C(0, -8)$ lie on the graph of the linear equation $7x - y = 8$.

Long answer type questions (5 Marks)

67. Write $3y = 8x$ in the form of $ax + by + c = 0$. Write x in terms of y. Find any two solutions of the equation. How many solutions you can find out?

68. Rohan and Ramita of Class IX decided to collect ₹25 for class cleanliness. Write it in linear equation in two variables. Also draw the graph.

69. Sarika distributes chocolates on the occasion of children's Day. She gives 5 chocolates to each child and 20 chocolates to adults. If number of children is represented by 'x' and total distributed chocolates as 'y'.

(i) Write it in the form of linear equation in two variables.

(ii) If she distributed 145 chocolates in total, find number of children?

70. Priyanka and Arti decided to donate ₹1600 for the Army widows. Assuming Priyanka's share as 'x' and Arti's share as 'y':

(a) Form a linear equation in two variables.

(b) If Priyanka donates thrice the amount donated by Arti, then find out the amount donated by both.

71. Riya participates in Diwali Mela with her friends for the charity to centre of handicapped children. They donate ₹3600 to the centre from the amount earned in Mela. If each girl donates ₹150 and each boy donates ₹200, they

(a) Form the linear equation in two variables.

(b) If number of girls are 8, find number of boys.

72. Aftab is driving a car with uniform speed of 60 km/hr. Assuming total distance to be y km and time taken as x hours, form a linear equation. Draw the graph. From the graph read the following:

(i) distance travelled in 90 minutes.

(ii) Time taken to cover a distance of 150 km.

73. The parking charges of a car in a private parking is ₹ 20 for the first hour and ₹10 for subsequent hours. Taking total parking charges to be y and total parking time as x hours form a linear equation. Write it in standard form and indicate the values of a, b and c. Draw the graph also.

74. We know that $C = 2\pi r$, taking $\pi = 22/7$, circumference as y units, radius as x units, form a linear equation. Draw the graph. Check whether the graph passes through (0, 0). From the graph read the circumference when radius is 2.8 units.

CHAPTER-4

LINEAR EQUATIONS IN TWO VARIABLES

Answers

1. (b) $x^2 + 5 = 3x - 5$

2. (c) $ax^2 + by = c$

3. (c) Infinite solutions

4. (c) a general straight line

5. (a) 3

6. (d) $y = 0$

7. (c) (a, a)

8. (b) y-axis

9. (b) $x + 2y = 8$

10. (c) (0, 2)

11. (0, 4.5)

12. $y = 3x$

13. (2, –3)

14. 7 units

15. 5 units

16. $\sqrt{2}x - 5y - 4 = 0$

$a = \sqrt{2}, b = -5, c = -4$

17. $x = \frac{7 - 4y}{3}$

18. $y = \frac{9 - 5x}{3}$

19. x-axis

20 (0, 5)

21. $0x + 5y = 9$

22. $y = 2$

23. No

24. Yes

25. Infinitely many solutions

26. $k = -2$

27. $k = 1$

28. Parallel to y-axis

29. (3, 0)

30. On left side

31. Above x-axis

32. (a) y

(b) x

33. Straight line

34. a point on number line

35. 1

36. (a) F (b) F (c) T (d) F (e) F

37. (1, 4) (0, 5) (or any other possible solutions)

38. $b = \frac{4a - 10}{9}$

39. $3a + 5b = 7$; $a + 4b = 7$

$b = 2$, $a = -1$

40. The Graph of $5x - 2y = 10$ will intersect x-axis when $y = 0$ ie $x = 2$ and point is (2,0)

Similarly for y-axis put $x = 0 \Rightarrow$ y = -5

Hence points are (2,0) and (0,-5)

41. $3x - y + 1 = 0$, $x + y = 13$ (or any other possible equation)

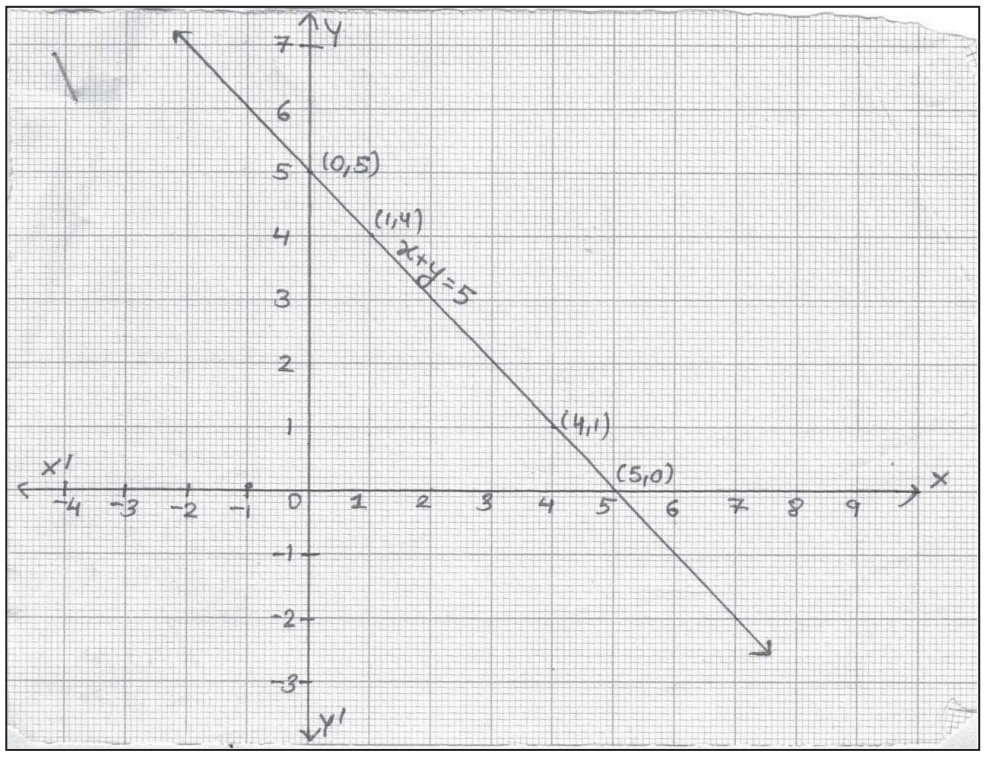
42. Let the cost of coloured paper be ₹ x

Let the cost of white paper be ₹ y, then

$x = 1/3\ y + 7$ or $3y - y = 21$

43. $x + y = 5$

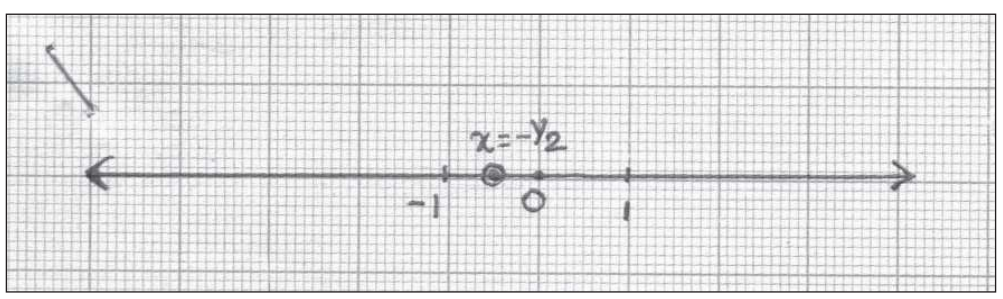
x	0	5	1
y	5	0	4



44. I, IV, III

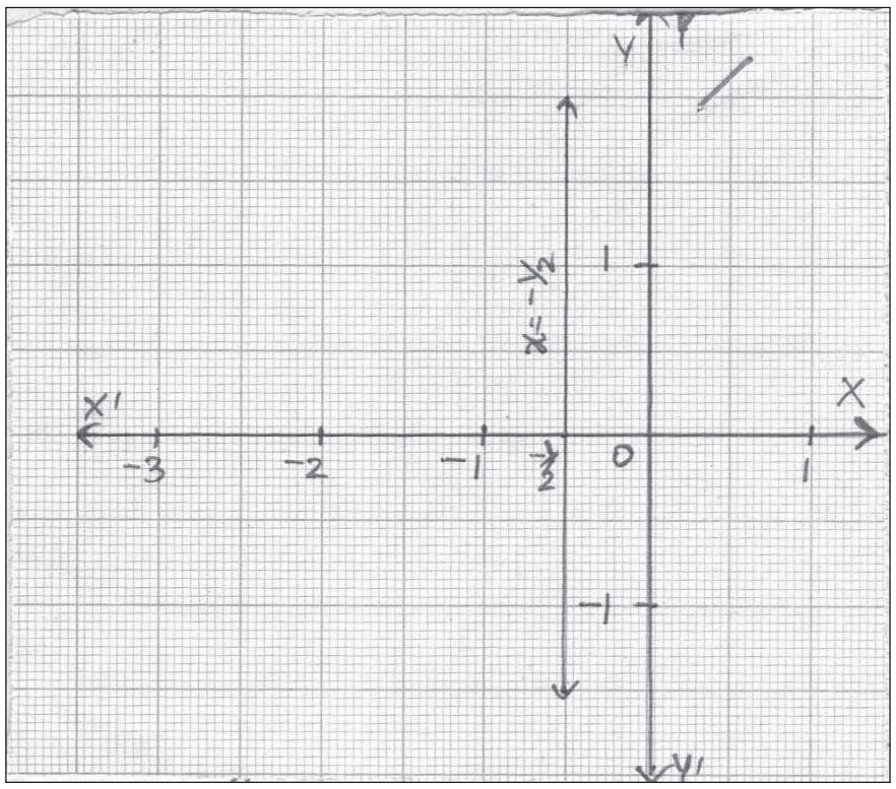
45. (i) $3x - 2 = x - 3 \Rightarrow x = -\frac{1}{2}$

On number line only one solution i.e.,



(ii) On Cartesian plane infinitely many solutions i.e., $1 \cdot x + 0 \cdot y = -\frac{1}{2}$

x	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$
y	–1	0	1



(A line parallel to y-axis)

46. (i) Parallel to x-axis $\Rightarrow$ abscissa is zero

3 units from origin is opposite direction of y-axis

$\Rightarrow$ ordinate in 3

putting $n = 0$, $y = 3$

is $n + y = 4$

$\Rightarrow n = 1$

Hence point is (1,3)

(ii) Parallel to y-axis $\Rightarrow$ ordinate is zero

2 units on left of origin $\Rightarrow$ abscissa is -2

putting $x = -2$, $y = 0$

is $x + y = 4$

$\Rightarrow y = 6$

Hence point is (-2,6)

47. Let number of goats = x

Number of hens = y

$$4x + 2y = 40$$

or

$$2x + y = 20$$

48. Putting $x = 2$ and $y = 0$

$= a = 2$

Now putting $x = 1$ and $a = 2$

$= b = 6$

49. Let required pt. be (x', y')

$$A/Q,\ y' = 1\frac{1}{2}x' = \frac{3}{2}x' \qquad \text{------- (1)}$$

(x', y') lies on graph of $2x + 5y = 19$

$x' + 5y' = 19$ 2 ------- (2)

from (1) and (2)

$$2x' + 5\left(\frac{3}{2}x'\right) = 19$$

$x' + 15x' = 38$ 4 $\Rightarrow x' = 2$

$$y' = \frac{3}{2} \times 2 = 3$$

so point will be (x', y') i.e. (2, 3)

50. cuts x-axis at $\left(\frac{1}{2}, 0\right)$, cuts y-axis at $\left(0, \frac{1}{5}\right)$

51. $y = 4$

52. $4a + 6b = 8 \quad \Rightarrow 2a + 3b = 4$

$a + 3b = 8$

After solving $a = -4$ and $b = 4$

53. Putting $x = 1$ and $y = -1$

$\Rightarrow a = -3$

any two correct solution

54. Given equation is $4x + 5y = 28$

LHS $= 4x + 5y$

Putting $x = -2$

LHS = 42

But RHS = 28

Hence LHS ≠ RHS

$\Rightarrow$ (–2, 10) is not a solution of equation $4x + 5y = 28$

55. $x + y = 0$

56. $4[3k - 2] - 7[2k] + 12 = 0$

$\Rightarrow 12k - 8 - 14k + 12 = 0$

$\Rightarrow k = 2$

57. $2[m - 2] + 3[2m + 1] - 10 = 0$

$m - 4 + 6m + 3 - 10 = 0$

$m = \frac{11}{8}$

58. (i) $F = \left(\frac{9}{5}\right) C + 32$

when $C = 35$

$\Rightarrow F = \left(\frac{9}{5}\right)(35) + 32$

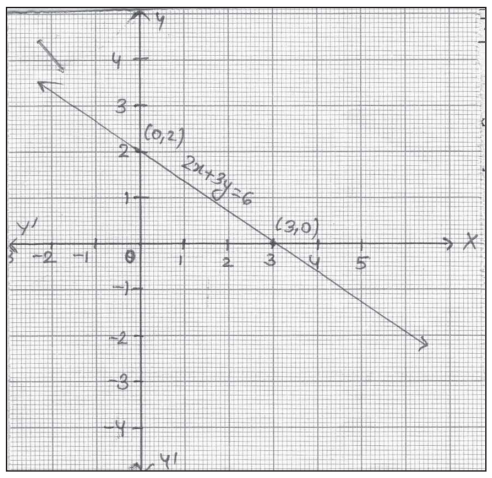
$\Rightarrow F = 95°$ F

(ii) $F = \left(\frac{9}{5}\right)(30) + 32$

$= 9 \times 6 + 32$

$= 86°$ F

59. $2x + 3y = 6$

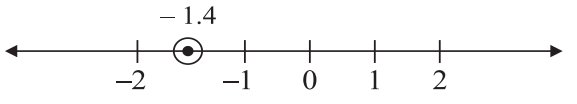


x-axis co-ordinates (3, 0) ; y-axis co-ordinates (0, 2)

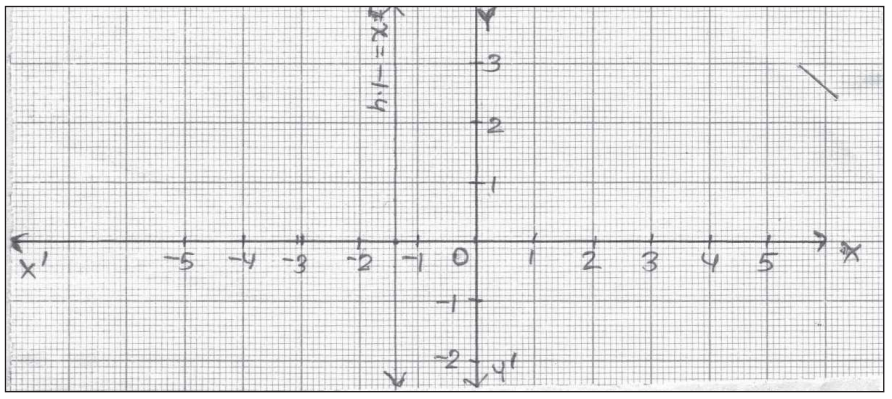
60. $y = -3$

62. $x = \frac{-7}{5}$ or $x = -1.4$

(i)



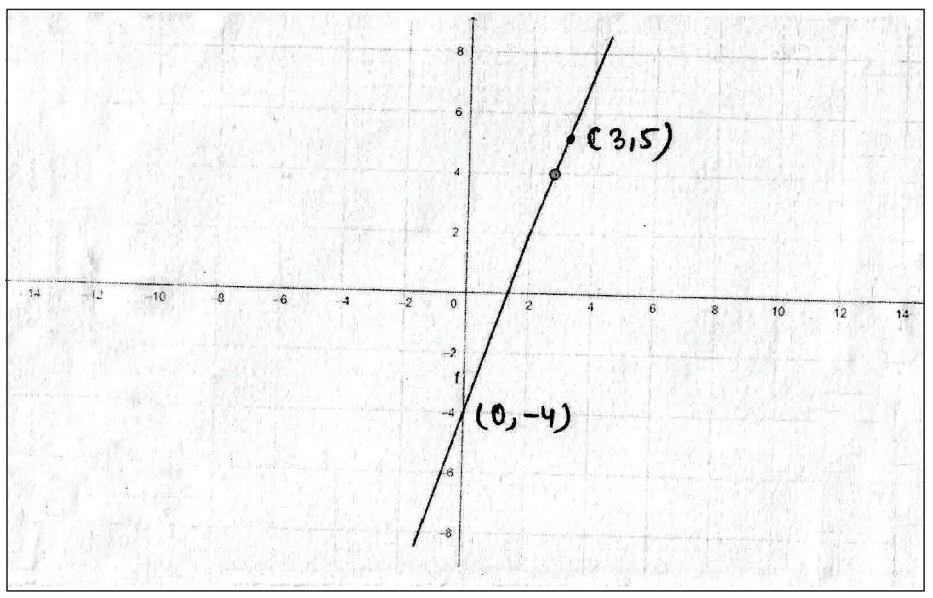
(ii)



63. No

64. Similarly $(3, q)$ lies on this line when $x = 3, y = 5$

$\Rightarrow \quad q = 5$



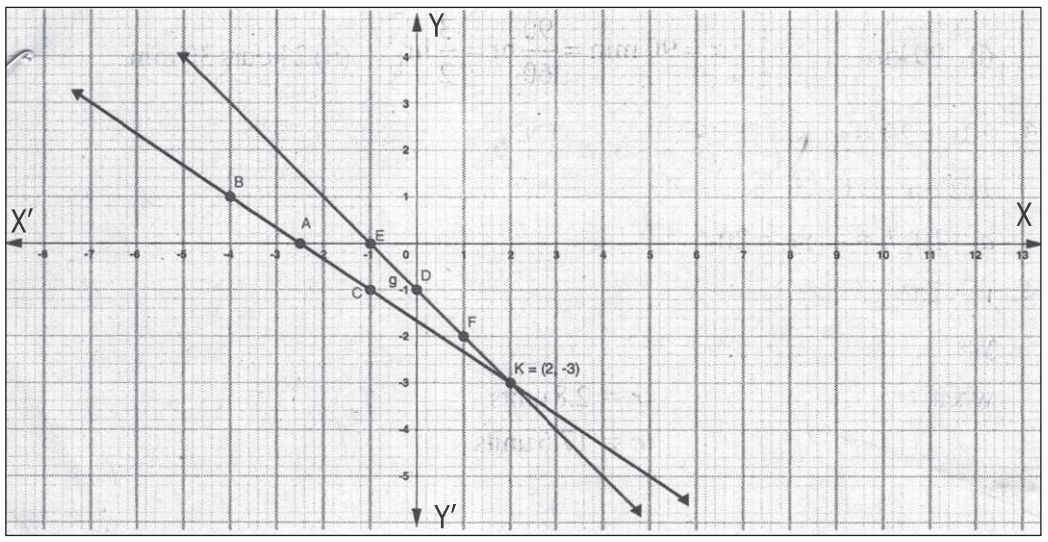
65. $2x + 3y = -5$

$\Rightarrow x = \dfrac{-5 - 3y}{2}$ .... (1)

x	–2.5	–4	–1
y	0	1	–1

$x + y = -1$

x	0	–1	1
y	–1	0	–2



Point of intersection is (2, –3)

67. $8x - 3y + 0 = 0; x = \dfrac{3y}{8}$

(0, 0) (3, 8)

Infinitely many solutions.

68. $x + y = 25$ [where x-Rohan's collection and y-Ramita's collection

69. (i) $5x + 20 = y$

(ii) Put $y = 145$ in $5x + 20 = y$

$\Rightarrow x = 25$

70. (a) $x + y = 1600$

(b) Priyanka = ₹1200 [$\because x = 3y$]

Arti = ₹400

71. (a) Let number of girl be x and no. of boys be y

$150x + 200y = 3600$

(b) Number of boys = 12

72. Using speed $= \frac{\text{distance}}{\text{time}} \Rightarrow y = 60x$

(i) 90 km $\left[\because x = 90 \text{ min} = \frac{90}{60}\text{hr} = \frac{3}{2}\text{hr}\right]$

(ii) 2 hours 30 min.

73. $20 + 10(x - 1) = y$

$\Rightarrow 20 + 10x - 10 = y$

$\Rightarrow 10x - y + 10 = 0$

so $a = 10, b = -1, c = 10$

74. $y = 2 \text{ x } \frac{22}{7} \text{ x } x \Rightarrow 7y = 44x$

yes , graph passes through (0,0)

Where $r = 2.8$ units $c = 17.6$ units

Chapter - 4
Linear Equations in Two Variables
Practice Test

Time: 1 hr. **M.M.: 20**

1. The graph of linear equation $2y = 5$ is parallel to which axis? (1)

2. Write the linear equation of the graph which is parallel to y-axis and is at a distance of 3 units on left from the origin (1)

3. Find the value of a and b if the line $5bx - 3ay = 30$ passes through $(-1, 0)$ and $(0, -3)$. (2)

4. Write two linear equation passing through the points $(2, -3)$ (2)

5. Write the linear equation $x + \sqrt{3}y = 4$ in the form of $ax + by + c = 0$ and hence write the values of a, b and c. Write also x in terms of y (3)

6. Find the solutions of linear equation $2x + y = 4$ which represents a point on/ which (3)

(i) on x-axis

(ii) on y-axis

(iii) perpendicular distance of 3 units above x-axis

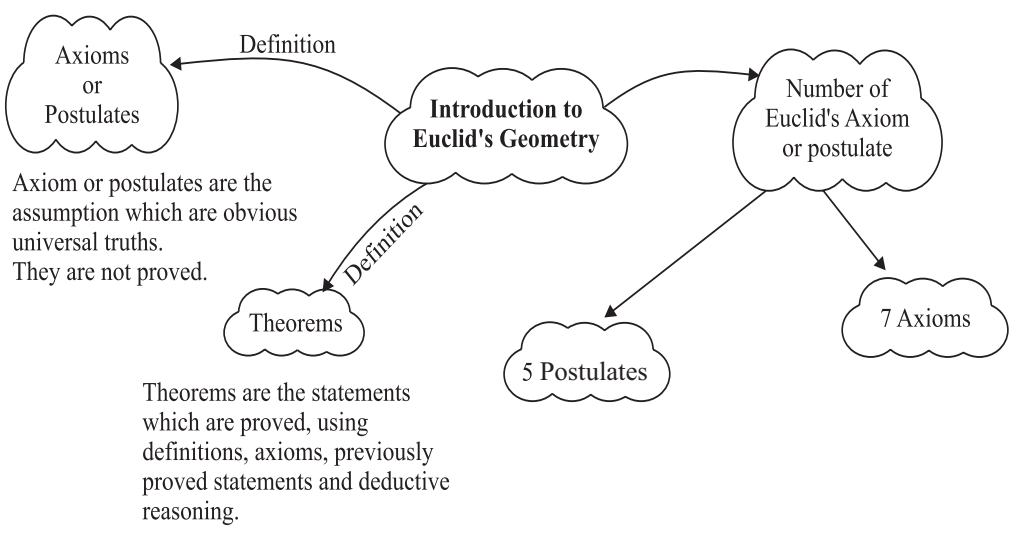
7. Give the geometrical representation of $2x + 5 = 0$ as a linear equation in (3)

(a) one variable

(b) two variables

8. A taxi charges ₹15 for first kilometer and ₹8 each for every subsequent kilometer. For a distance of x km, an amount of ₹ y is paid. Write the linear equation representing the above information and draw the graph. (5)

Chapter-5
INTRODUCTION TO EUCLID'S GEOMETRY



Key points

- **Introduction:** Euclidean geometry, which is taught today is named after Euclid – he is known as "the father of geometry". Euclid also studied and contributed in other areas of mathematics, including number theory and astronomy.
- **Axiom or Postulates:** Axiom or Postulates are the assumptions which are obvious universal truths. They are not proved.
- **Theorems:** Theorems are statements which are proved, using definitions, axioms, previously proved statements and deductive reasoning.

Some of Euclids Axioms

1. Things which are equal to the same thing are equal to one another.
2. If equals are added to equals, the wholes are equal.
3. If equals are subtracted from equals, the remainders are equal.
4. Things which coincide with one another are equal to one another.
5. The whole is greater than the part.
6. Things which are double of the same things are equal to one another
7. Things which are halves of the same things are equal to one another.

Euclid's Postulates and Definitions

- **Postulates 1:** A straight line may be drawn from any one point to any other points.
- **Postulate 2:** A terminated line can be produced indefinitely.
- **Postulate 3:** A circle can be drawn with any centre and any radius.
- **Postulate 4:** All right angles are equal to one-another.
- **Postulate 5:** If a straight line falling on two straight line makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produces indefinitely, meet on that side on which the sum of angles is less than two right angles.

Definitions

1. A Point is that which has no part.
2. A line is breadthless length.
3. The ends of a line are points
4. A straight line is a line which lies evenly with the points on it self.
5. A surface is that which has length and breadth only.
6. The edges of a surface are lines.
7. A plane surface is a surface which lies evenly with the straight lines on it self.

Very Short Answer type Questions (1 Marks)

1. **Through two points:**
   (a) A unique line can be drawn (b) No line can be drawn
   (c) Two lines can be drawn (d) More than two lines can be drawn
2. **Euclid arranged all known work in the field of mathematics in his treatise called:**
   (a) Elements (b) Axioms
   (c) Theorems (d) Postulates
3. **Things which are double of the same things are:**
   (a) Halves of the same thing (b) Double of the same thing
   (c) Equals (d) Four times of the same thing

4. A mathematical statement whose truth has been logically established is called:

(a) An Axiom (b) A postulate

(c) A Theorem (d) None of the above

5. Two lines having a common point are called:

(a) parallel lines (b) intersecting lines

(c) coincident (d) None of the above

6. A proof is required for _____ (Postulate, Axioms, Theorem)

7. The number of line segments determined by three collinear points is _____ (Two, three, only one)

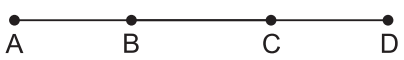
8. Euclid stated that if Equals are subtracted from equal then the remainders are equal is the form of _____ (an axiom, a definition, a postulate)

9. A point has _____ dimensions.

10. There are _____ number of Euclid's postulates.

11. Write the number of dimensions, that a surface contain.

12. In given figure $AB = CD$ then AC and BD are equal or not?



13. How many lines can pass through a single point?

14. Write Euclid's fifth postulate.

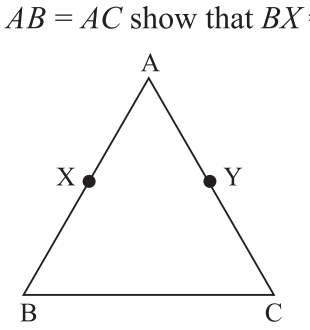
15. If $a + b = 15$ and $a + b + c = 15 + c$

which axiom of Euclid does the statement illustrate?

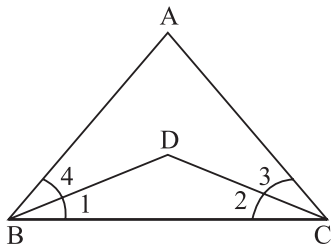
Short Answer type-I Questions (2 Marks)

16. If $x + y = 10$ and $x = z$ then show that $z + y = 10$

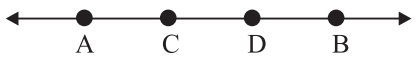
17. In given figure $AX = AY$, $AB = AC$ show that $BX = CY$



18. In the given figure $\angle ABC = \angle ACB$, $\angle 3 = \angle 4$ show that $\angle 1 = \angle 2$

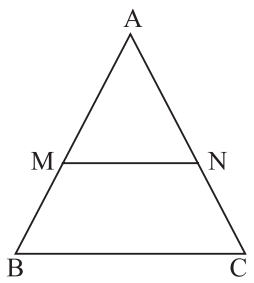


19. In the given figure if $AD = CB$ then prove that $AC = BD$

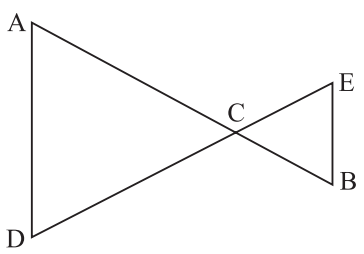


20. Solve the equation $x - 10 = 15$, state which axiom do you use here.

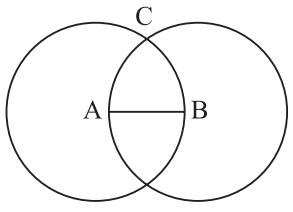
21. In the given figure if $AM = \frac{1}{2} AB$, $AN = \frac{1}{2} AC$ and $AM = AN$ then show that $AB = AC$



22. In the given figure $AC = DC$, $CB = CE$ then show that $AB = DE$



23. In figure, A and B are centres of the two intersecting circles, which intersect at C. Prove that $AB = AC = BC$

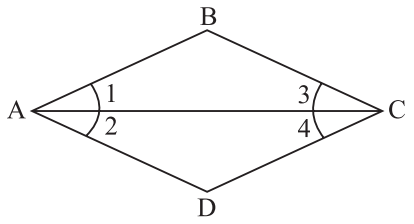


24. Prove that every line segment has one and only one mid point.

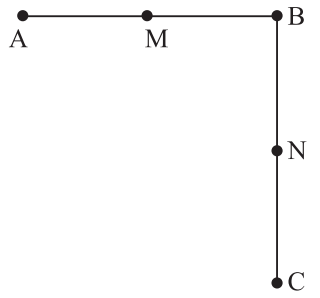
25. Kartik and Himank have the same weight. If they each gain weight by 3 kg how will their new weight be compared? State Euclid's axiom used.

Short Answer type-II Questions (3 Marks)

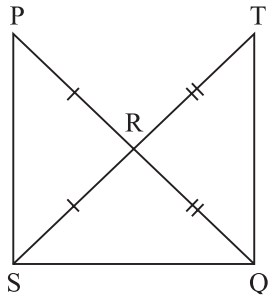
26. In the given figure $\angle 1 = \angle 2$ and $\angle 2 = \angle 3$ then show that $\angle 1 = \angle 3$



27. In the given figure $AB = BC$, M is the mid point of AB and N is the mid-point of BC. Show that $AM = NC$



28. In the given figure $PR = RS$ and $RQ = RT$. Show that $PQ = ST$ and write the Euclid's axiom to supports this.



29. An equilateral triangle is a polygon made up of three line segments out of which two line segments are equal to the third one and all the angles are 60° each.

Can you justify that all the sides and all the angles are equal in equilateral triangle?

30. Ram and Shyam are two students of class IX. They have given equal donation to a blind school in the month of March. In April each student double their donation.

(a) compare their donation in April.

(b) which mathematical concept have been covered in this question?

CHAPTER-5

INTRODUCTION TO EUCLID'S GEOMETRY

Answers

1. (a) A unique line can be drawn

2. (a) Elements

3. (c) Equals

4. (a) An axiom

5. (b) Intersecting lines

6. Theorem

7. only one

8. An axiom

9. Zero

10. Five

11. Two

12. Equal

13. Infinite

14. If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines if produced indefinitely, meet on that side on which the sum of angles is less than two right angles.

15. Second axiom

16. Given $x + y = 10$ --- (1)

and $x = z$ --- (2)

on subtracting y from both sides, of eq^{n} (1)

$x + y - y = 10 - y$ [by axiom 3]

$z = 10 - y$ [from eq 2]

on adding y on both sides, we get

$z + y = 10 - y + y$ [by axiom 2]

$z + y = 10$

17. $AB = AC$ --- (1)

$AX = AY, AY$ --- (2)

According to Euclid's axiom (3), if equals are subtracted from equals then remainders are also equal

Subtracting equation (2) from equation (1)

$$AB - AX = AC - AY$$

$$BX = CY \qquad \text{(Hence proved)}$$

18. $\angle ABC = \angle ACB$ --- (1)

$\angle \qquad 4 = \angle 3$ --- (2)

eq^n (1) – eq^n (2)

$$\angle ABC - \angle 4 = \angle ACB - \angle 3 \qquad \text{[using axiom 3]}$$

$$\angle 1 = \angle 2$$

19. $AD = CB$

$$AC + CD = CD + DB$$

on subtracting CD from both sides

$$AC + CD - CD = CD + DB - CD \qquad \text{(using axiom 3)}$$

$$AC = DB$$

20. $x - 10 = 15$

Adding 10 both sides

$$x - 10 + 10 = 15 + 10 \qquad \text{[by axiom 2]}$$

$$x = 25$$

21. Given; $AM = \frac{1}{2} AB$ --- (i)

$$AN = \frac{1}{2} AC \qquad \text{--- (ii)}$$

$$AM = AN \qquad \text{--- (iii)}$$

from eq^{n}s (i), (ii) & (iii), we get

$$\frac{1}{2} AB = \frac{1}{2} AC$$

$$AB = AC \qquad \text{[by axiom 7]}$$

22. $AC = DC$ --- (1)

$CB = CE$ --- (2)

By Euclid's axiom 2

If two equals are added to equals, then the wholes are equal.

Adding eq^{n} (1) and eq^{n} (2)

$$AC + CB = DC + CE$$

$$AB = DE$$

23. $AB = AC$ --- (1) [Radius of the same circle]

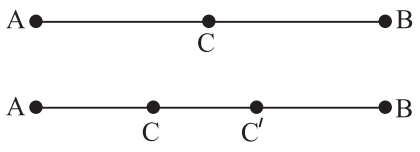
$BC = AB$ --- (2) [Radius of the same circle]

from eq^{n} (1) and eqn (2)

$$AB = AC = BC \text{[by axiom 1]}$$

24. We have C as the mid point of the line segment AB, so $AC = BC$

Let there are two mid-point C & C' of AB



Then, $AC = \frac{1}{2} AB$ $AC' = \frac{1}{2} AB$

$\Rightarrow AC = AC'$ [by axiom 1]

which is possible only when C coincides C', so point C lies on C'.

25. Kartik's weight = Himank's weight

Kartik's weight + 3 kg = Himank's weight + 3kg [by axiom 2]

Their new weight will be equals By Euclid's second axiom. If equals are added to equals then wholes are equal.

26. $\angle 1 = \angle 2$ --- (1)

$\angle 2 = \angle 3$ --- (2)

from equation (1) and (2)

$\angle 1 = \angle 3$ [By axiom 1]

27. $AB = BC$

$$AM + BM = BN + CN$$

$AM = 2CN$ 2

[M & N are mid-point of AB & BC respectively]

$AM = CN$ [By Euclid's axiom 6]

28. $PR = RS$ --- (1)

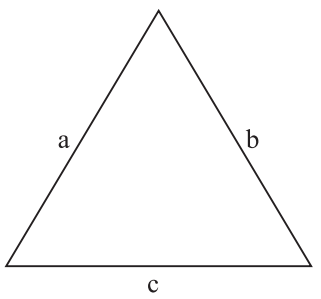
$RQ = RT$ --- (2)

Adding equation (1) and (2)

$$PR + RQ = RS + RT$$

$PQ = ST$ [By axiom 2]

29.



$a = b$ and $b = c$

$\Rightarrow$ $a = b = c$ [By axiom 1]

All sides of triangle are equal since all the angles are of 60° in an equilateral triangle so they must be equal to one another.

30. Ram's donation in March = Shyam's donation in March --- (1)

Ram's donation in April = 2 × Ram's donation in March --- (2)

Shyam's donation in April = 2 × Shyam's donation in March --- (3)

Using equation (1), (2) & (3)

$\Rightarrow$ Ram's donation in April = Shyam's donation in April [using axiom 6]

CHAPTER-5
Practice Test
Introduction to Euclid's Geometry

Time: 1 hr. **M.M. 20**

1. How many line segments can be determined by three collinear points. (1)

2. How many lines can pass through a given point? (1)

3. State Euclid's first postulate. (2)

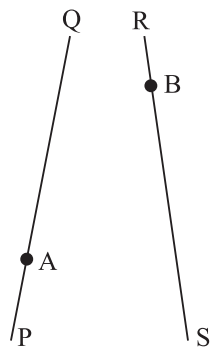
4. Solve the equation $x + 3 = 10$ and state the Euclid's axiom used (2)

5. If a point C lies between two points A and B such that $AC = BC$ then prove that $AC = \frac{1}{2} AB$. Explain by drawing the figure. (3)

6. It is known that $x + y = 10$, then $x + y + z = 10 + z$. State the Euclid's axiom that illustrates the statement. (3)

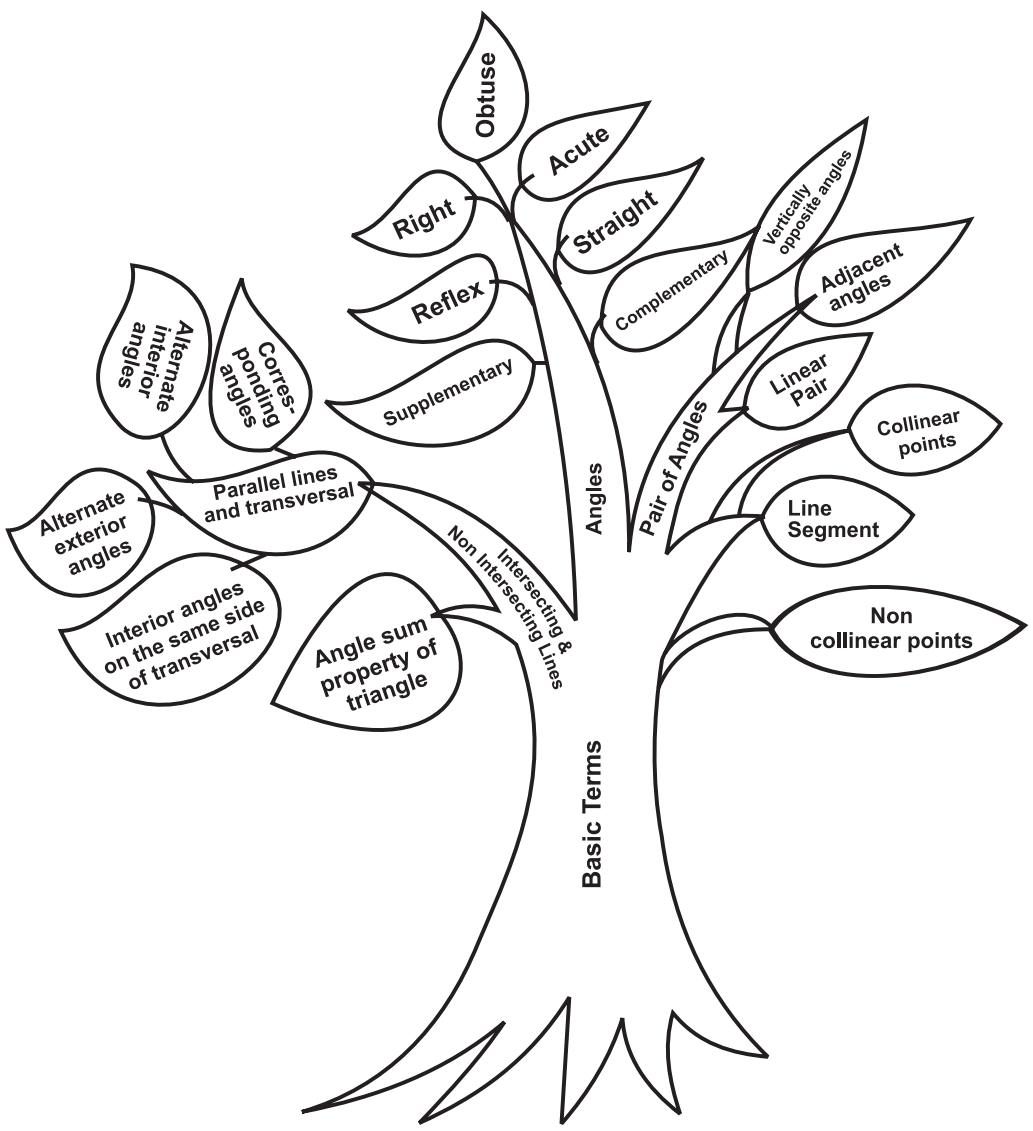
7. State Euclid's fifth postulate, explain it and compare it with version of parallel lines (3)

8. In the figure $PQ = RS$, A and B are points on PQ and RS such that $AP = \frac{1}{3} PQ$ and $RB = \frac{1}{3} RS$ show that $AP = RB$. State which axiom you use here. Also give two more axioms other than the axiom used in the above situation. (5)



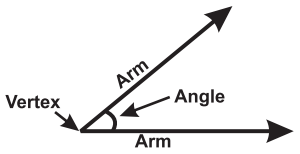
CHAPTER-6
LINES AND ANGLES

MIND MAP

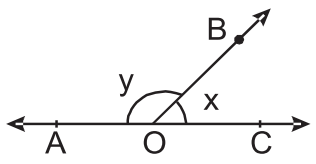


Key points

- Line is a collection of points which has only length, neither breadth nor thickness.
- **Line Segment:** A part or portion of a line with two end points.
- **Ray:** A part of a line with one end point.
- **Collinear points:** Three or more points lying on the same line.
- **Non-Collinear Points:** Three or more points which do not lie on same line.
- **Angle:** An angle is formed when two rays originate from the same end point. The rays making angle are called the arms and the end point is the vertex.

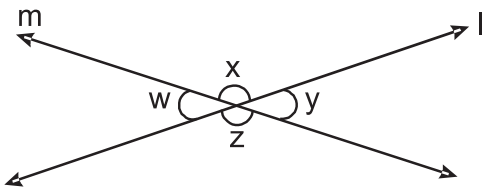


- **Acute Angle:** An angle measure between 0° and 90°
- **Right angle:** Angle exactly equal to 90°
- **Obtuse angle:** An angle greater than 90° but less than 180°
- **Straight angle:** An angle exactly equal to 180°
- **Reflex angle:** An angle greater than 180° but less than 90°
- **Complimentary angles:** A pair of angles whose sum is 90°
- **Supplementary angle:** A pair of angles whose sum is 180°
- **Complete angle:** An angle whose measure is 360°
- **Adjacent angles:** Two angles are adjacent if
  (i) they have a common vertex,
  (ii) a common arm,
  (iii) their non common arms are on opposite side of common arm.
- **Linear pair of angle:** A pair of adjacent angles whose sum is 180°



$\angle AOB$ and $\angle COB$ are forming linear pair.

- **Vertically opposite angles:** Angles formed by two intersecting lines on opposite side of the point of intersection.

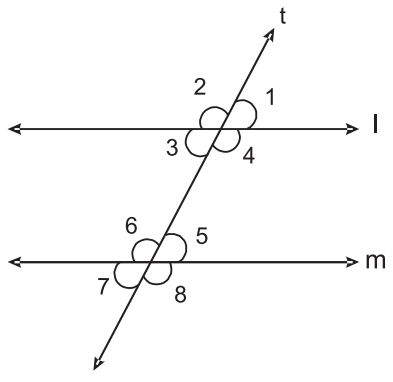


$\angle x = \angle z$
$\angle y = \angle w$

- **Intersecting lines:** Two lines are said to be intersecting when the perpendicular distance between the two lines is not same every where. They intersect at some point.
- **Non Intersecting lines:** Two lines are said to be non-intersecting lines when the perpendicular distance between them is same every where. They do not intersect. If these lines are in the same plane these are known as Parallel lines.
- **Transversal line:** In the given figure $l \parallel m$ and t is transversal then

(a) $\left.\begin{array}{l}\angle 1 = \angle 3 \\ \angle 2 = \angle 4 \\ \angle 5 = \angle 7 \\ \angle 6 = \angle 8\end{array}\right]$ Vertically opposite angle

(b) $\left.\begin{array}{l}\angle 1 = \angle 5 \\ \angle 2 = \angle 6 \\ \angle 3 = \angle 7 \\ \angle 4 = \angle 8\end{array}\right]$ Corresponding angle



(c) $\left.\begin{array}{l}\angle 3 = \angle 5 \\ \angle 4 = \angle 6\end{array}\right]$ Alternate Interior angle

(d) $\left.\begin{array}{l}\angle 2 = \angle 8 \\ \angle 1 = \angle 7\end{array}\right]$ Alternate Exterior angle

(e) $\left.\begin{array}{l}\angle 3 + \angle 6 = 180° \\ \angle 4 + \angle 5 = 180°\end{array}\right]$ Angles on the same sides of a transversal are supplementary.

$\angle 3, \angle 6$ and $\angle 4, \angle 5$ are called co-interior angles or allied angles or consecutive interior angles.

- Sum of all interior angles of a triangle is 180°.
- Two lines which are parallel to the third line are also parallel to each other.

Very Short Answer Questions (1 mark)

1. **If an angle is equal to its complement, then the angle is**

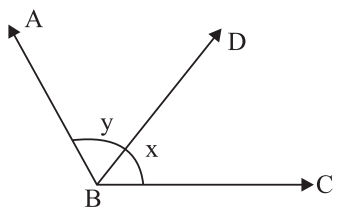
   (a) 90° (b) 0°

   (c) 48° (d) 45°

2. **In the given fig. for what value of $x + y$, ABC will be a straight line?**

   (a) 90° (b) 180°

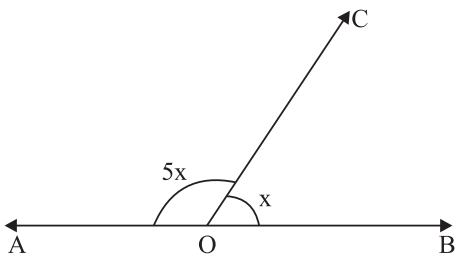
   (c) 360° (d) 270°



3. **In fig. $\angle AOC$ and $\angle BOC$ form a linear pair. Determine the value of x**

   (a) 30° (b) 150°

   (c) 15° (d) 75°



4. **The reflex angle of 110° is**

   (a) 70° (b) 90°

   (c) 250° (d) 190°

5. **One of the angles of a pair of supplementary angle is 10° more than its supplement, the angles are:**

   (a) 90°, 90° (b) 86°, 94°

   (c) 85°, 95° (d) 42.5°, 47.5°

6. **If three or more points does not lie on the same straight line, the points are called**

   (a) Concurrent points (b) Collinear points

   (c) Non-collinear points (d) Adjacent point

7. If angles x and y form a linear pair and $x - 2y = 30°$, then the value of y is

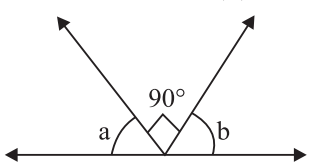
(a) 50° (b) 110°

(c) 210° (d) 60°

8. In the figure, AB is a straight line, then the value of $(a + b)$ is

(a) 0° (b) 90°

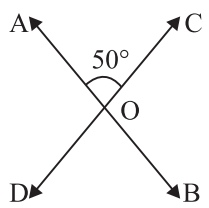
(c) 180° (d) 60°



9. If $\angle AOC = 50°$ then the value of $\angle BOD$ is _____

(a) 50° (b) 40°

(c) 130° (d) 25°



10. If two parallel lines are intersected by a transversal, then the interior angles on the same side of transversal are

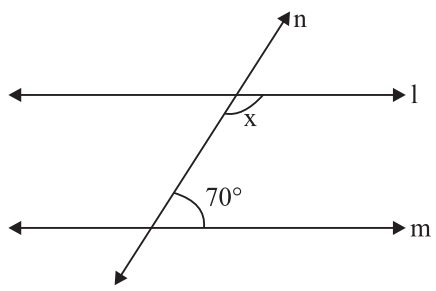
(a) equal (b) Adjacent

(c) supplementary (d) complementary

11. In figure, $l \parallel m$ value of x is _____

(a) 70° (b) 35°

(c) 210° (d) 110°



12. Three parallel lines intersect at _____ points

(a) one (b) two

(c) three (d) zero

13. If one angle of *a* linear pair is acute, then the other angle will be

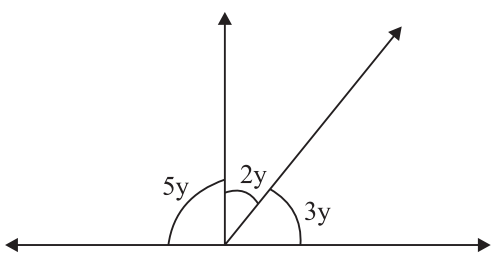
(a) right angle (b) obtuse angle

(c) acute angle (d) straight angle

14. In the given figure, the value of *y* is

(a) 18° (b) 9°

(c) 30° (d) 36°



15. A ray has only _____ end point.

16. A line segment has a _____ length.

17. If two lines are non-intersecting, then they will be _____.

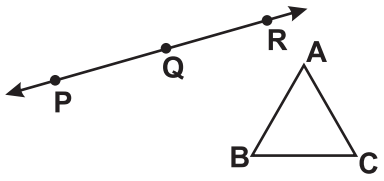
18. An angle whose measure is more than 0° but less than 90°, is called an _____ angle.

19. A straight angle has _____ right angles.

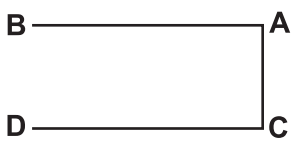
20. An angle whose measure is more than 180° but less than 360° is called _____ angle.

21. If an angle is equal to its supplement, then its measure is _____.

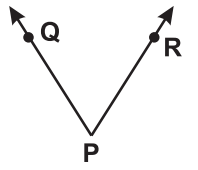
22. In the given figure, identify group of collinear points from (*P*, *Q*, *R*) and (*A*, *B*, *C*)



23. In the given figure, write the name of line segment whose one end point is B.

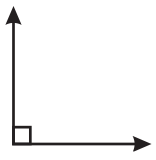


24. In the given figure, name the vertex of the angle.



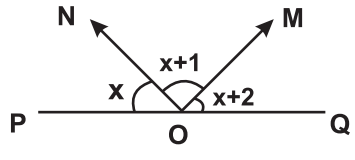
25. In the above figure, name the two arms of the angle.

26. Which type of angle is formed in the given figure

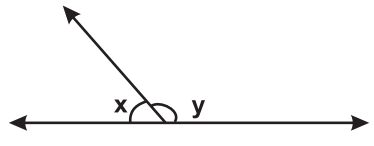


Short Answer type-I Questions (2 Marks)

27. In the given figure *POQ* is a straight line and*OM* and O*N* are two rays. The three adjacent angles so formed are consecutive numbers. Find the value of x.

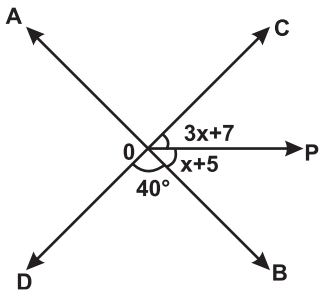


28. If angle x and y form linear pair and twice of x is 30° less than y, then find the value of x and y.



29. One of the angles of a pair of supplementary angles is 2° more than its supplement. Find the angles.

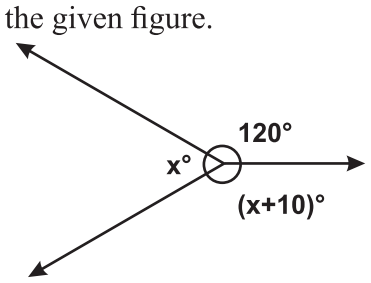
30. In the given figure *AB* and *CD* are two straight lines intersecting at *O* and *OP* is a ray. What is the measure of $\angle AOD$? Also find the value of x.



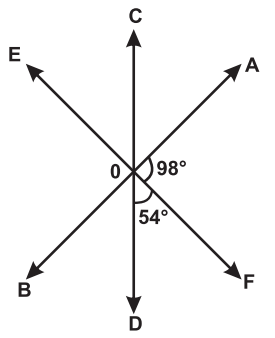
31. If the difference between two supplementary angles is 40°, then find smaller angle.

32. Find the angle which is four times more than its complement.

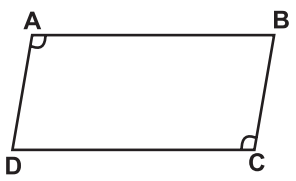
33. Find the value of x in the given figure.



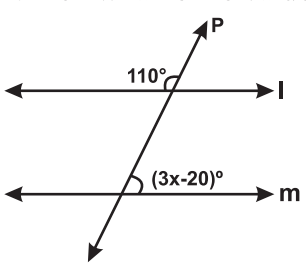
34. In the given figure, three straight lines AB, CD and EF intersect at point O Find the measure of $\angle BOC$.



35. In the given figure, $AB \parallel DC$ and $AD \parallel BC$. Prove that $\angle DAB = \angle DCB$.



36. In the given figure, if $l \parallel m$ then what is the value of x.

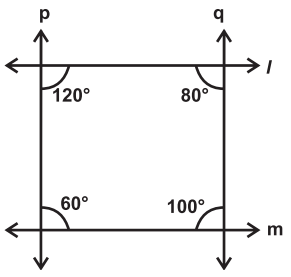


Short Answer Type-II Questions (3 marks)

37. By contributing money, 5 friends bought pizza. They want to divide equally among themselves. But one of them was given double share as he was very hungry. Find the angle of the piece of pizza each received.

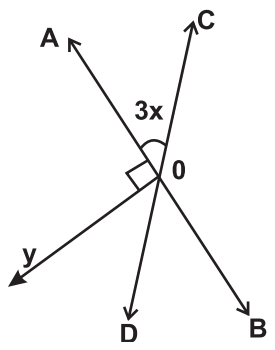
38. Prove that if two lines intersect then vertically opposite angles are equal.

39. In the figure, choose the pair of lines which are parallel. Give reasons also.

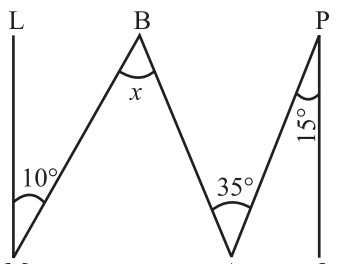


40. If one of the angle of two intersecting lines is right angle then prove that other three angles will also be right angles.

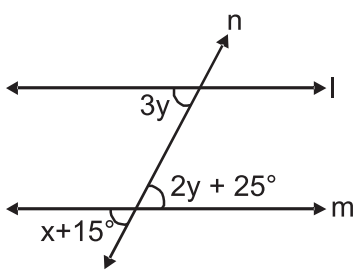
41. AB and CD are intersecting lines. OD is bisector of $\angle BOY$. Find x.



42. In the given figure $QP \parallel ML$, find the value of x.



43. In the given figure $l \parallel m$ and n is the transversal, find x.



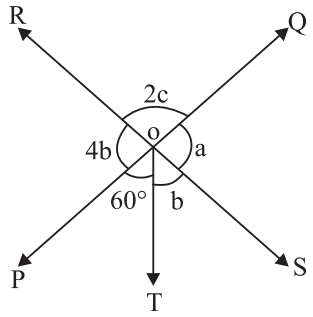
44. Two lines are respectively perpendicular to two parallel lines show that they are parallel to each other.

45. Prove that the bisectors of the angles of a linear pair form a right angle.

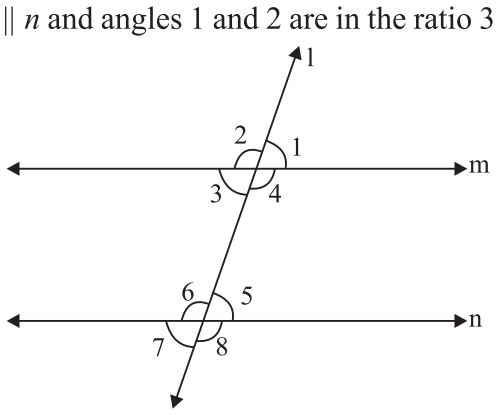
46. If two complementary angles are such that two times the measure of one is equal to three times the measure of the other. Find the measure of larger angle.

Long Answer Questions (5 Marks)

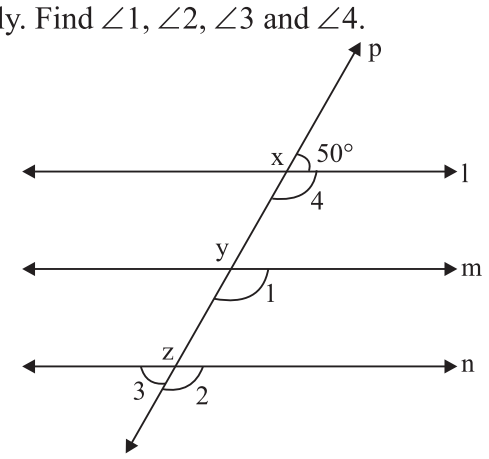
47. In the figure, two straight lines PQ and RS intersect each other at point O. If $\angle POT = 60°$. Find the value of a, b and c.



48. In figure, lines $m \parallel n$ and angles 1 and 2 are in the ratio 3: 2. Find all the angles

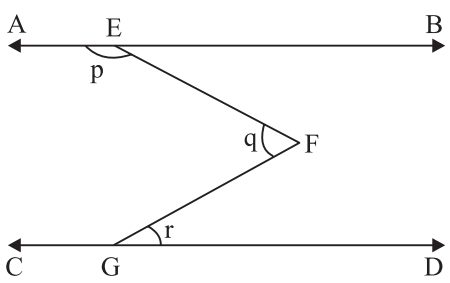


49. In figure l, m and n are parallel lines intersected by a transversal p at x, y and z respectively. Find $\angle 1$, $\angle 2$, $\angle 3$ and $\angle 4$.



50. If the arms of one angle are respectively parallel to the arms of another angle, then show that the two angles are either equal or supplementary.

51. In the given figure, $AB \parallel CD$. Prove that $p + q - r = 180°$



Chapter - 6
Lines and Angles
Answers

1. (d) 45°

2. (b) 180°

3. (a) 30°

4. (c) 250°

5. (c) 85°, 95°

6. (c) Non-collinear points

7. (a) 50°

8. (b) 90°

9. (a) 50°

10. (c) Supplementary

11. (d) 110°

12. (d) zero

13. (b) obtuse

14. (a) 18°

15. one

16. Definite

17. parallel

18. Acute

19. Two

20. Reflex

21. 90°

22. P, Q, R

23. $\overline{BA}$

24. P

25. PQ, PR

26. Right angle

27. 59°

28. $y - 2x = 30°$

$x = 50°, y = 130°$

29. 89°, 91°

30. $\angle AOD = 140°, \quad x = 32°$

31. 70°

32. 72°

33. 115°

34. 152°

35. Hint: Use the property that sum of interior angles on the same side of transversal are supplementary

36. 30°

37. 4 equal pieces = 60º, one double piece = 120º

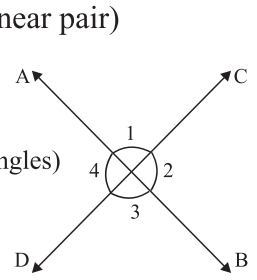
39. (Hint: $l \| m, p \| q$ because sum of interior angles on the same side of transversal is 180°.)

40. $\angle 1 = \angle 2 = 180°$ (linear pair)

$\Rightarrow \angle 2 = 90°$

$\angle 1 = \angle 3$, $\angle 2 = \angle 4$ (Vertically opposite angles)

$\Rightarrow \angle 3 = \angle 4 = 90°$



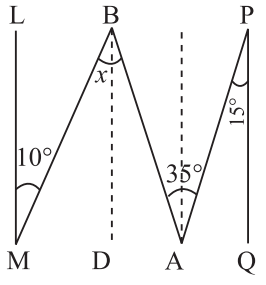
41. $x = 15°$

42. Draw $BD \parallel LM$ & $AC \parallel LM$ & $LM \parallel PQ$

$\angle PAC = \angle QPA = 15°$ (Alternate interior angles)

$\therefore \quad \angle CAB = 20°$

$x = 30°$

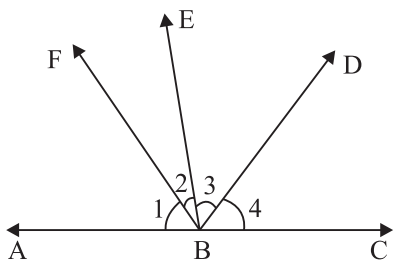


43. $3y = 2y + 25°$ (Alternate interior angles)

$x + 15° = 3y$ (Corresponding angles)

$x = 60°$

45. Given: $\angle ABE$ and $\angle EBC$ make linear pair BF and BD are bisectors of $\angle ABE$ and $\angle EBC$ respectively.



$\therefore \quad \angle ABE + \angle EBC = 180^0$

$$\frac{\angle ABE}{2} + \frac{\angle EBC}{2} = \frac{180^0}{2}$$

$\angle 2 + \angle 3 = 90^0$

$\angle FBD = 90°$

46. $2x = 3\,(90 - x)$

$\Rightarrow \quad x = 54°$

47. $5b + 60° = 180°$ (linear pair)

$\Rightarrow \quad b = 24°$

$a = 4b$ (vertically opp. $\angle$s)

$\Rightarrow \quad a = 96°$

$60° + b = 2c$ (vertically opp. $\angle$s)

$\Rightarrow \quad c = 42°$

48. $\angle 1 = \angle 5 = \angle 3 = \angle 7 = 108°$

$\angle 2 = \angle 6 = \angle 4 = \angle 8 = 72°$

49. $\angle 1 = \angle 2 = \angle 4 = 130°$

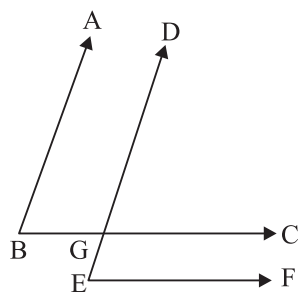
$\angle 3 = 50^o$

50. Case-1

$\angle ABC = \angle DGC$ (corresponding angles)

$\therefore \quad BC \parallel EF$

$\angle ABC = \angle DEF$

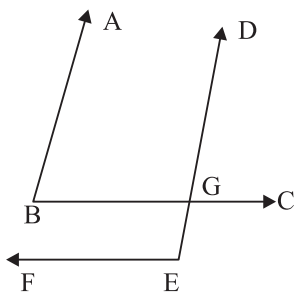


Case-2

$\angle ABC + \angle DGB = 180°$ (interior angles)

$\angle DGB = \angle DEF$ (corresponding angles)

$\angle ABC + \angle DEF = 180°$



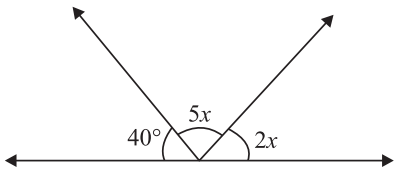
CHAPTER-6
LINES AND ANGLES
PRACTICE TEST

Time: 1 hr **M.M: 20**

1. If $\angle ABC = 142°$, find reflex $\angle ABC$. (1)

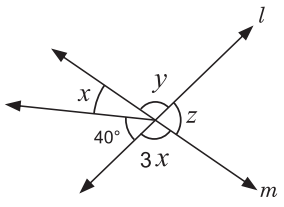
2. Two angles form a linear pair. If one of the angle is acute, what is the type of other angle. (1)

3. Find the value of x in the given figure. (2)



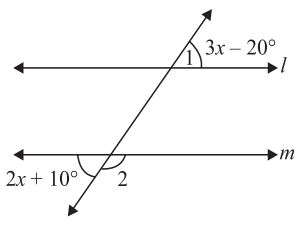
4. If the difference between two supplementary angles is 40° then find the angles. (2)

5. l and m are the intersecting lines in the given figure. Find the value of x, y and z. (3)

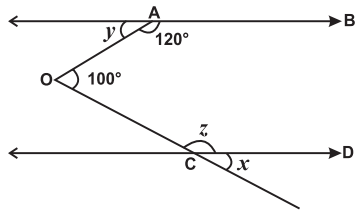


6. If complementary angles are in ratio 5 : 4 then find the angles. (3)

7. If $l \parallel m$ then find the angles $\angle 1$ and $\angle 2$. (3)

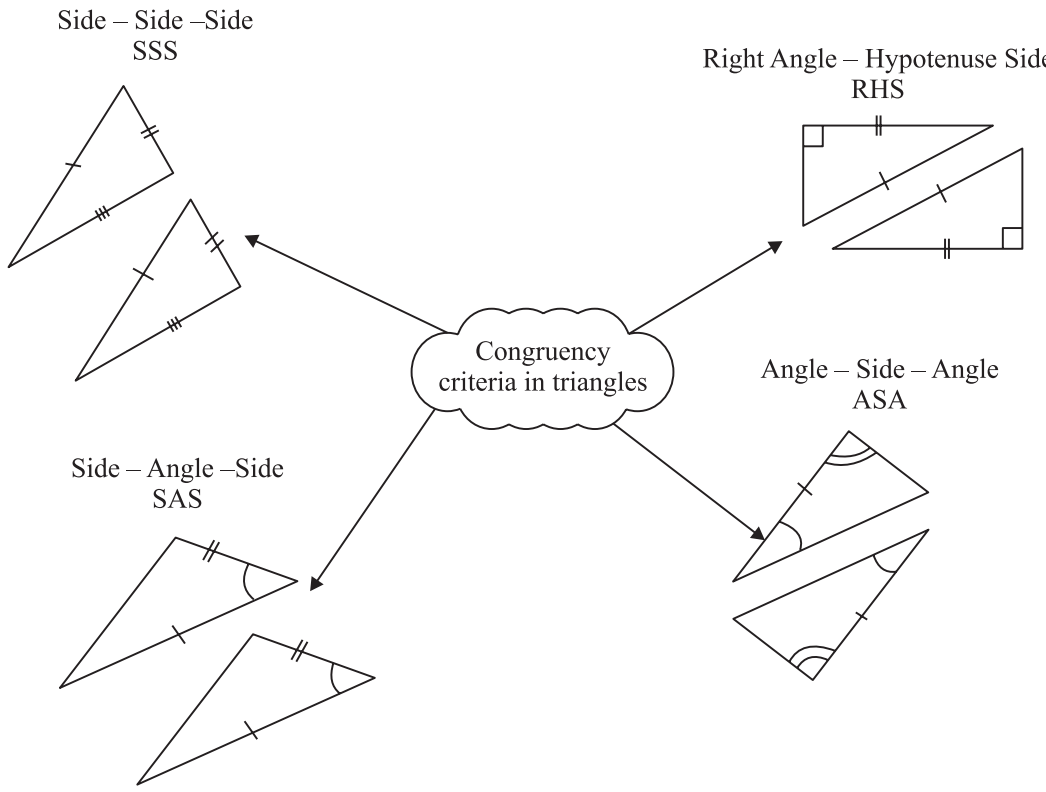


8. If $AB \parallel CD$, find the value of x, y and z. (5)



Chapter-7
TRIANGLES

MIND MAP



Key points

Congruence in different shapes

- Two figures having the same shape and size are called congruent figures.
- Two plane figures are congruent, if each one when superimposed on the other, covers the other exactly.
- Two line segments are congruent, if they have equal lengths.
- Two angles of equal measures are congruent.
- Two circles of the same radii are congruent.
- Two squares of the same sides are congruent.
- Two rectangles are congruent, if they have the same length and breadth.

Congruency Criteria:

- If two triangles ABC and DEF are congruent under the correspondence $A \leftrightarrow D$, $B \leftrightarrow E$ and $C \leftrightarrow F$, then symbolically, it is expressed as $\Delta ABC \cong \Delta DEF$.
- There are four congruent criteria for triangles:

  (a) Side-Angle-Side (SAS) congruence rule: Two triangles are congruent, if two sides and included angle of one triangle are respectively equal to two sides and the included angle of the other triangle.

  (b) Angle-Side-Angle (ASA) congruence rule: Two triangles are congruent, if two angles and the included side of one triangle are respectively equal to the two angles and the included side of the other triangle.

  (c) Side-Side-Side (SSS) congruence rule: Two triangles are congruent, if three sides of one triangle are respectively equal to three sides of the other triangle.

  (d) Right angle-Hypotenuse-Side (RHS) congruence rule: Two right triangles are congruent, if the hypotenuse and one side of one triangle are respectively equal to the hypotenuse and one side of other triangle.

Very Short Answer Question (1 Mark)

1. Which of the following is not a criterion for congruency of triangles?

(a) SSS (b) RHS

(c) AAA (d) SAS

2. If $AB \cong CD$ then

(a) $AB < CD$ (b) $AB + CD = 0$

(c) $AB = CD$ (d) $AB > CD$

3. If $\Delta ABC \cong \Delta DEF$ then

(a) $AC = DE$ (b) $BC = DF$

(c) $FE = CB$ (d) $AB = DF$

4. If one angle of a triangle is equal to the sum of the other two angles, then the triangle is

(a) an equilateral triangle (b) an isosceles triangles

(c) an obtuse triangle (d) a right triangle

5. **If *AB* = *QR*, *BC* = *PR* and *CA* = *PQ*, then**

(a) $\Delta ABC \cong \Delta PQR$ (b) $\Delta CBA \cong \Delta PRQ$

(c) $\Delta BAC \cong \Delta RPQ$ (d) $\Delta PQR \cong \Delta$BCA

6. Two figures are congruent if they have the _____ shape and same _____.

7. Two circles are congruent if they have _____ radii.

8. Two equilateral triangles are congruent, if they have _____ sides.

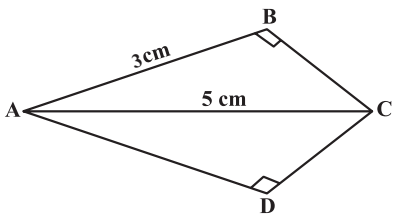
9. Two square are congruent if they have _____ sides.

10. If $\Delta PQR \cong \Delta LMN$ then QR = _____

11. In ΔABC, $AB = AC$ and $\angle B = 40°$, then find $\angle$C.

12. Write correct symbolic form of congruency if $AB = QR$, $BC = PR$ and $CA = PQ$.

13. In the given figure, AC is bisector of $\angle BAD$. AB = 4 cm and AC = 5 cm, then find AD.

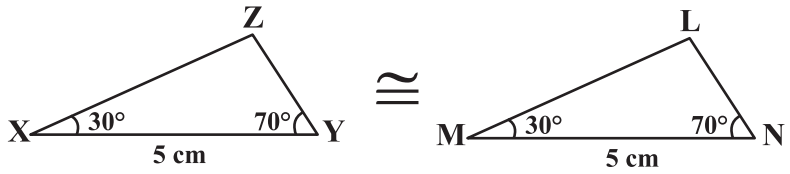


14. Find the diameter of circle O_2, if circle $O_2 \cong$ Circle O_1 and radius of circle O_1 is 6 cm

15. Write the congruence criteria for triangles ΔABC and ΔQPR where $AB = QP$, $\angle B = \angle P$ and $BC = PR$.

16. For right angled triangle ΔABC, $AB = BC$, find $\angle A$.

17. Write the congruence criteria for the following triangles.



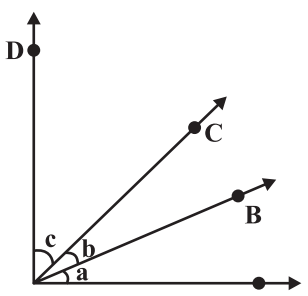
18. Name the side equal to side NL if $\Delta PQR \cong \Delta LMN$.

19. Line segment MN = 4 cm and TP = 4.2 cm. Are they congruent?

20. What does it mean if two triangles are congruent by SSS criteria?

21. In ΔPQR, $\angle R = \angle P$, $QR = 4$ cm and $PR = 5$ cm. Find PQ.

22. In the given figure if $a = b = c$, then name the angle congruent to $\angle AOC$.



23. What does 'R' stands for in RHS congruence?

24. In ΔBCD and ΔWXY, $BD = WX$ and $\angle B = \angle X$. What should be the third possibility to satisfy ASA congruency criterion?

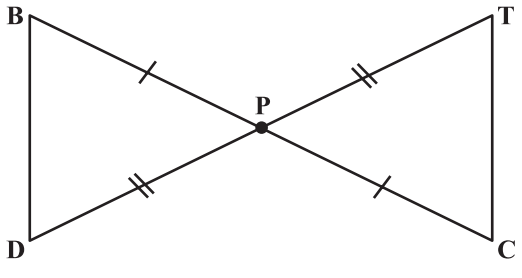
25. If $\Delta ABC \cong \Delta MNO$ then $\angle ABC = ?$

Short Answer type-I questions (2 marks)

26. If $\Delta ABP \cong \Delta KST$ then

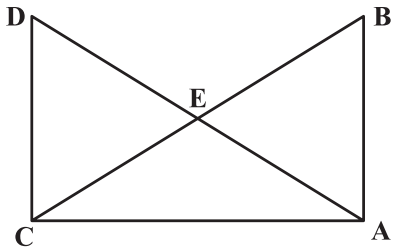
(a) $\angle P =$ _____ (b) $KT =$ _____

27. In the following figure, which of the two triangles are congruent? Name them in symbolic form.



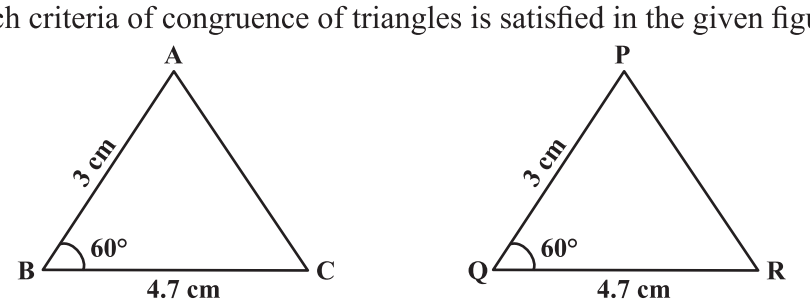
28. Explain why AAA is not a criteria for congruency of two triangles.

29. In the given, if $AB = CD$, $AD = BC$ then prove that $\Delta ADC \cong \Delta CBA$



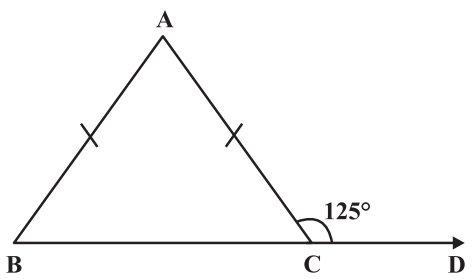
30. If ΔABC is an isosceles triangle such that $AB = AC$, then prove that altitude AD from A on BC bisects it.

31. Which criteria of congruence of triangles is satisfied in the given figure.

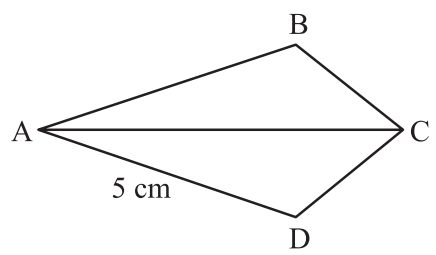


32. In a ΔPQR, $\angle P = 110°$, $PQ = PR$. Find $\angle Q$ and $\angle R$.

33. In the given figure $AB = AC$ and $\angle ACD = 125°$. Find $\angle A$



34. In the given figure, AC bisects $\angle A$ and $\angle C$. If $AD = 5$ cm find AB.



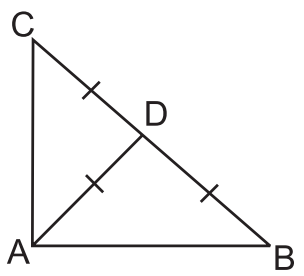
35. The vertex angle of an isosceles triangle is 80°. Find out the measure of base angles.

Short Answer type-II Questions (3 Marks)

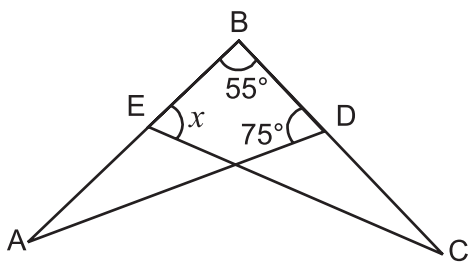
36. ABC is a triangle and D is the mid-point of BC. The perpendicular from D to AB and AC are equal. Prove that triangle is isosceles.

37. Prove that angles opposite to equal sides of an isosceles triangles are equal.

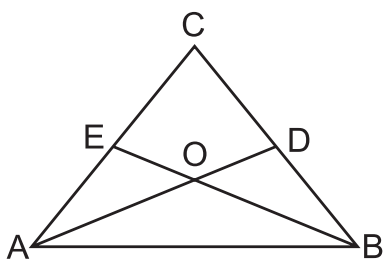
38. In the given figure, If $AD = BD = CD$, find $\angle BAC$



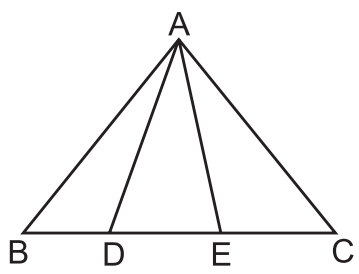
39. In the given figure, if $AB = BC$ and $\angle A = \angle C$ then find the value of x.



40. In the given figure $\angle ABC = \angle BAC$, D and E are points on BC and AC respectively such that $DB = AE$. If AD and BE intersect at O then prove that $OA = OB$.



41. In the given figure, if $AB = AC$, $\angle BAD = \angle CAE$ then prove that ΔADE is an isosceles triangle.



42. In ΔDEF, DM is the angle bisector of$\angle EDF$ that intersectsEF at$M$. If $DM = MF$, and $\angle E = 2\angle F$ then prove that $\angle EDF = 72°$

43. Prove that each angle of an equilateral triangle is 60^0.

Long Answer Questions (5 Marks)

44. The altitudes AF, BD and CE of ΔABC are equal. Prove that ΔABC is an equilateral triangle.

45. Two sides AB, BC and median AM of one ΔABC are respectively equal to sides PQ, QR and median PN of ΔPQR. Show that.

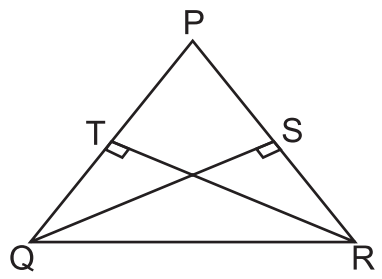
(i) $\Delta ABM \cong \Delta PQN$

(ii) $\Delta ABC \cong \Delta PQR$

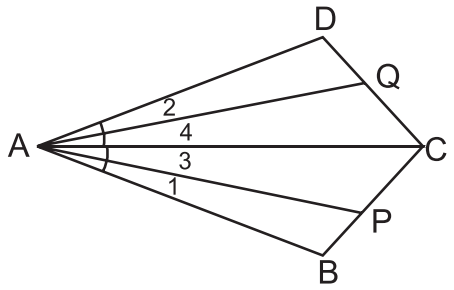
46. In the given figure, PQR is a triangle in which altitudes QS and RT to sides PR and PQ are equal. Show that.

(i) $\Delta PQS \cong \Delta PRT$

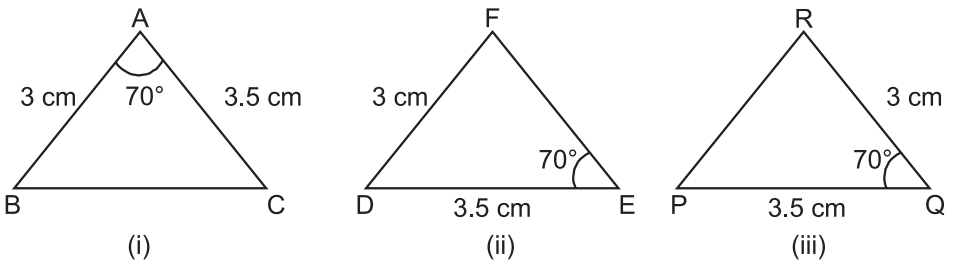
(ii) PQR is an isosceles triangle



47. In the given figure, $AB = AD$, $\angle 1 = \angle 2$ and $\angle 3 = \angle 4$. Prove that $AP = AQ$.



48. Vandana wishes to literate the poor children of the nearby slum area. She makes flash cards for them as shown in the given figure.



(a) Which two flash cards are congruent.

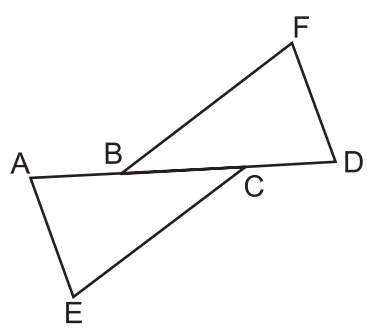
(b) Which criteria of congruency is satisfied here?

(c) Write the third side of both the triangles using *CPCT*.

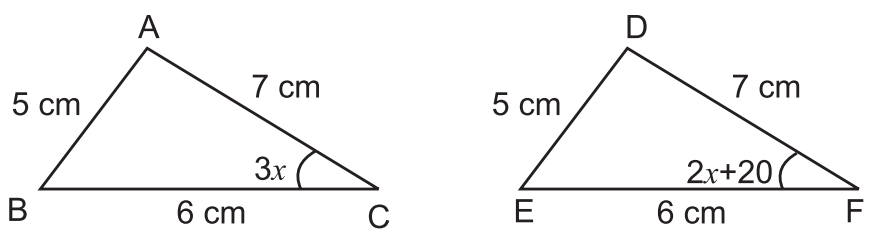
49. In the given figure $AB = CD$, $CE = BF$ and $\angle ACE = \angle DBF$. Prove that

(i) $\Delta ACE \cong \Delta DBF$

(ii) $AE = DF$



50. Show that the triangles ΔABC and ΔDEF in the given figure are congruent. Hence find the value of x.



Chapter - 7

TRIANGLES

Answers

1. (c) AAA

2. (c) $AB = CD$

3. (c) $FE = CB$

4. (d) a right triangle

5. (b) $\Delta CBA \cong \Delta PRQ$

6. same, size

7. equal

8. equal

9. equal

10. QR = MN

11. 40°

12. $\Delta ABC \cong \Delta QRP$

13. AD = 3cm

14. 12 cm

15. SAS

16. $\angle A = 45°$

17. ASA

18. $NL = RP$

19. No

20. It means all three sides of one triangle are respectively equal to three sides of other triangle.

21. PQ = 4 cm

22. $\angle BOD$

23. Right angle

24. $\angle D = \angle W$

25. Sides of squares must be equal

26. (a) $\angle T$ (b) AP

27. $\Delta PBD \cong \Delta PCT$ or any correct form

28. Becuase many triangles are possible with given three angles.

29. In ΔADC and ΔCBA

$AB = CD$ (given)

$AD = BC$ (given)

$AC = AC$ (common)

$\therefore\ \Delta ADC \cong \Delta CBA$ (by SSS congruence rule)

30. In ΔABD and ΔACD

$AB = AC$ (given)

$AD = AD$ (common)

$\angle ADB = \angle ADC$ (each 90°)

$\therefore\ \Delta ABD \cong \Delta ACD$ (By RHS congruence rule)

$\Rightarrow BD = CD$ (by CPCT)

31. SAS

32. $\angle Q = \angle R = 35°$

33. $\angle A = 70°$

34. $AB = 5$ cm

35. 50°, 50°

36. In ΔBDE and ΔCDF

$BD = CD$ (given)

$DE = DF$ (given)

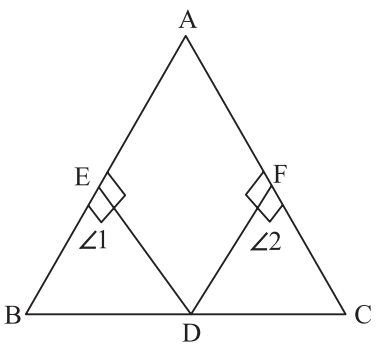
$\angle 1 = \angle 2$ (each 90°)

By RHS congruence rule

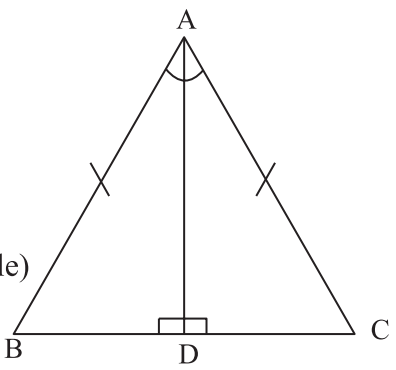
$\Delta BDE \cong \Delta CDF$

$\Rightarrow$ $\angle B = \angle C$ (By *CPCT*)

$\Rightarrow$ $AB = AC$ ($\because$ sides opposite to equal angles are equal)



37. Construction: $AD \perp BC$



In ΔADB and ΔADC

$AB = AC$ (given)

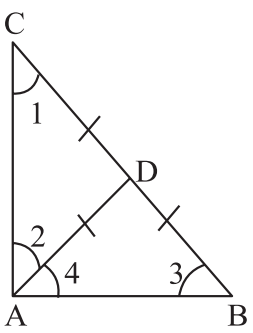
$AD = AD$ (common)

$\angle ADB = \angle ADC$ (each 90°)

$\therefore \quad \Delta ADB \cong \Delta ADC$ (By RHS congruence rule)

$\Rightarrow \angle B = \angle C$ (By *CPCT*)

38.



Angles opposite to equal sides are equal

In ΔACD $\angle 1 = \angle 2$ ----(1)

and In ΔABD $\angle 4 = \angle 3$ ----(2)

$\angle A + \angle B + \angle C = 180°$ (angles sum property)

$\angle 2 + \angle 4 + \angle 3 + \angle 1 = 180°$ (using eq^n 1, eq^n 2)

$\angle 2 + \angle 4 + \angle 4 + \angle 2 = 180°$

$2(\angle 2 + \angle 4) = 180°$

$$\angle 2 + \angle 4 = \frac{180°}{2} = 90°$$

$$\angle BAC = 90°$$

39. In ΔBAD and In ΔBCE

$AB = BC$ (given)

$\angle A = \angle C$ (given)

$\angle B = \angle B$ (common)

$\Delta BAD \cong \Delta BCE$ (ASA)

$\angle x = 75°$ (by CPCT)

40. In ΔABE and ΔABD

$AB = AB,\ AE = BD$

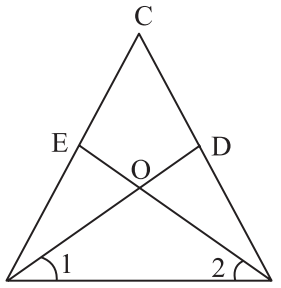
$\angle EAB = \angle DBA$

$\therefore\ \Delta ABE \cong \Delta ABD$ (By *SAS*)

$\Rightarrow\ \angle ABE = \angle BAD$ (By *CPCT*)

In $\angle OAB$

$\angle 1 = \angle 2 \Rightarrow OA = OB$



41. $AB = AC \Rightarrow \angle B = \angle C$

In ΔABD and ΔACE

$\angle BAD = \angle CAE,\ AB = AC,\ \angle B = \angle C$

$\therefore\ \Delta ABD \cong \Delta ACE$(By *ASA*)

$\Rightarrow\ AD = AE$(By *CPCT*)

$\therefore$ *ADE* is an isosceles triangle.

42. $\angle EDM = \angle FDM,\ \angle FDM = \angle DFM.$

Using angle sum property in ΔDEF, find $\angle EDF.$

43. All sides of an equilateral triangle are equal,

$\therefore$ all angles will be equal (angles opposite to equal sides are equal)

44. In ΔBDC and ΔBEC

$BD = EC,\ BC = BC,\ \angle BEC = \angle BDC\ (90°)$

$\therefore\ \Delta BDC \cong \Delta BEC$ (By RHS)

$\therefore\ \angle B = \angle C$ similarly $\angle A = \angle B$ & $\angle A = \angle C$

$\Rightarrow\ \angle A = \angle B = \angle C$

$\Rightarrow\ AB = BC = AC$

Hence ΔABC is an equilateral triangle.

45. $\Delta ABM \cong \Delta PQN$ (By *SSS*)

$\Rightarrow\ \angle B = \angle Q$ (By *CPCT*)

$\therefore\ \Delta ABC \cong \Delta PQR$ (By *SAS*)

46. In ΔQTR and ΔRSQ,

$QR = QR$, $\angle QTR = \angle RSQ$, $RT = SQ$

$\therefore$ $\Delta QTR \cong \Delta RSQ$ (By RHS)

$\therefore$ $\angle Q = \angle R$ (By *CPCT*) $\Rightarrow PQ = PR$ {It is an isosceles triangle}

In ΔPSQ and ΔPTR

$RT = SQ$, $\angle PTR = \angle PSQ$, $PR = PQ$

$\therefore$ $\Delta PSQ \cong \Delta PTR$ (By RHS)

47. $\angle 1 = \angle 2$ eq^{n}...(1)

$\angle 3 = \angle 4$ eq^{n}...(2)

eq^{n} (1) + eq^{n} (2)

$\Rightarrow \angle 1 + \angle 3 = \angle 2 + \angle 4$

$\angle CAB = \angle CAD$ --- (3)

$AC = AC$ --- (4)

$AB = AD$ --- (5)

using (3), (4), (5)

$\Delta ADC \cong \Delta ABC \Rightarrow \angle ADC = \angle ABC$

In ΔADQ & ΔABP

$\angle 2 = \angle 1$, $AB = AB$, $\angle ABP = \angle ADQ$

$\angle ADQ = \angle ABP$

$\Rightarrow \Delta ADQ \cong \Delta ABP$ (By *ASA*)

$\therefore$ $AP = AQ$ (By *CPCT*)

48. (a) $\Delta ABC \cong \Delta QRP$

(b) *SAS*

(c) $BC = RP$

49. $AB = CD$

Adding BC on both side then $\Delta ACE \cong \Delta DBF$ (By *SAS*)

50. $3x = 2x + 20$

$x - 32x = x = 20$

Chapter-7 Triangles

Practice Test

Time: 1 hr. **M.M. 20**

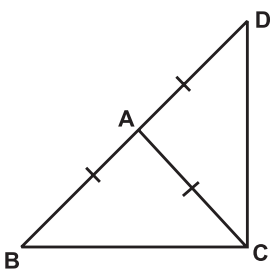
1. Find the measures of each exterior angle of an equilateral triangle. (1)

2. The _____ of an isosceles triangle divides it into two congruent triangles. (1)

3. The vertical angles of an isosceles triangle is thrice the one of its base angle. Find the base angle. (2)

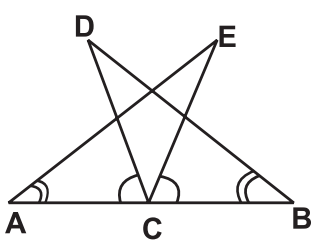
4. Prove that in an isosceles triangle, the angles opposite to the equal sides are equal. (2)

5. In the given figure, $AB = AC$ and side BA is produced to D such that $AB = AD$. Prove that $\angle BCD = 90°$ (3)

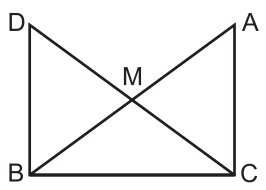


6. Prove that medians of an equilateral triangle are equal. (3)

7. In the given figure C is the midpoint of AB, $\angle DCA = \angle ECB$ and $\angle DBC = \angle EAC$. Prove that $DC = EC$ and $BD = AE$. (3)

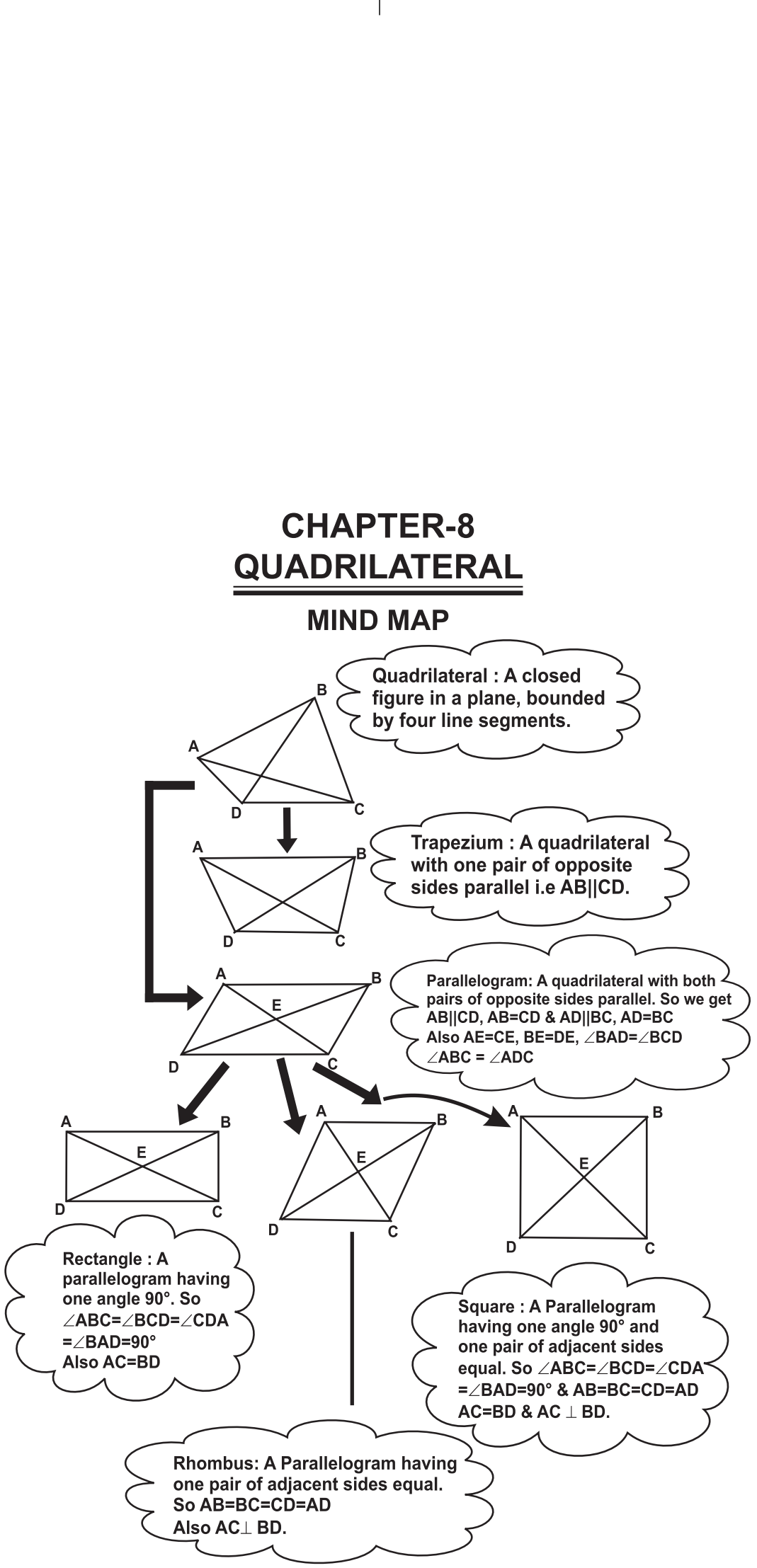


8. In the given figure ABC is a right angled triangle, right angle at C. M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that $DM = CM$. D is joined to B. Show that $CM = \frac{1}{2} AB$. (5)



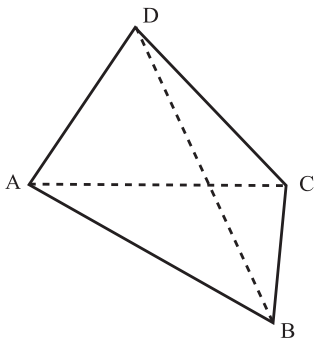
CHAPTER-8
QUADRILATERAL

MIND MAP



Key points

1. **Quadrilateral:** It is a closed figure bounded by four line segments. In a quadrilateral there are.



   (i) Two pairs of opposite sides (no common point).

   e.g., *AB* & *CD*, *BC* & *AD*

   (ii) Two pairs of opposite angles $\angle A$ & $\angle C$ and $\angle B$ & $\angle D$.

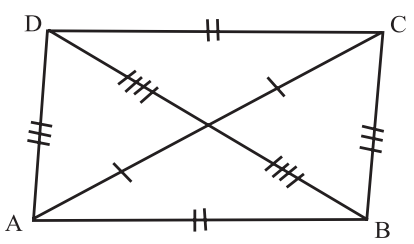
   (iii) Four pairs of adjacent sides *AB* & *BC*,*BC* & *CD*, *CD* & *AD* and *AD* & *AB* (one common Point)

   (iv) Four pairs of adjacent angles (one common side)$\angle A$ & $\angle B$, $\angle B$ & $\angle C$, $\angle C$ & $\angle D$, $\angle D$ & $\angle A$.

   (v) Line segment joining opposite vertices is called diagonal of quadrilateral e.g., *AC* & *BD*.

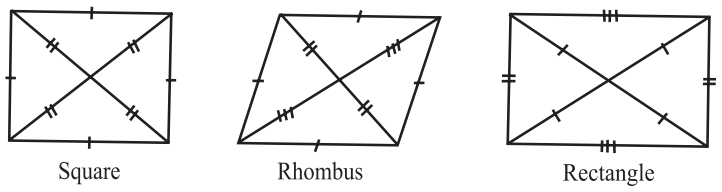
   (vi) Sum of the angles of a quadrilateral is 360°, $\angle A + \angle B + \angle C + \angle D = 360°$.

2. **Parallelogram:** A quadrilateral is a parallelogram if.



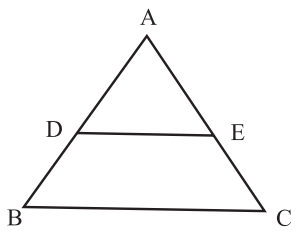
- Both the pairs of opposite sides are equal/parallel or
- Both the pairs of opposite angles are equal or
- Diagonals bisects each other or
- One pair of opposite sides is equal and parallel

3. A diagonal of a parallelogram divides it into two congruent triangles. Other examples of parallelogram.



Square Rhombus Rectangle

4. Theorem: A line segment joining the mid point of two sides of a triangles is parallel to the third side and is half of it. If D & E are mid points then $DE \parallel BC$ and $DE = \frac{1}{2} BC$.



5. Converse of mid point theorem.

The line drawn through the mid point of one side of a triangle, parallel to another side bisects the third side. So, if D is mid point of AB and $DE \parallel BC$ then E will be mid point of AC.

Very Short Answer type Questions (1 Marks)

1. Three angles of a quadrilateral are 75°, 90°, 75° the fourth angle is

(a) 90° (b) 95°

(c) 105° (d) 120°

2. $ABCD$ is a rhombus such that $\angle ACB = 40°$ then $\angle ABD$ is

(a) 40° (b) 45°

(c) 50° (d) 60°

3. The bisectors of the angles of a parallelogram enclose a

(a) Parallelogram (b) Square

(c) Rhombus (d) Rectangle

4. The figure obtained by joining the midpoint of the sides of a quadrilateral taken in order is a

(a) Square (b) Parallelogram

(c) Rectangle (d) Rhombus

5. The diagonals AC and BD of a parallelogram $ABCD$ intersect each other at point "O" If $\angle DAC = 32°$ and $\angle AOB = 70°$ then $\angle DBC$ is equal to

(a) 24° (b) 86°

(c) 38° (d) 32°

6. The angles of quadrilateral are in the ratio 3 : 4 : 5 : 6 The respective angles of the quadrilateral are

(a) 60°, 80°, 100°, 120° (b) 120°, 100°, 80°, 60°

(c) 120°, 60°, 80°, 100° (d) 80°, 120°, 100°, 60°

7. Line segment joining the mid points of two sides of a triangles is parallel to the third side and is _____ of it.

(a) Trisect (b) Bisect

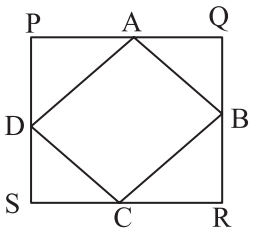
(c) Half (d) One Fourth

8. The diagonals of a rhombus are 12 cm and 16 cm. The length of that side of rhombus is :-

(a) 12 cm (b) 16 cm

(c) 8 cm (d) 10 cm

9. Points *A, B, C* and *D*are midpoints of the sides of square *PQRS*. If the area of *PQRS* is 36 Sq. cm, the area of *ABCD* is _____ Sq. cm.



(a) 9√2 (b) 18√2

(c) 9 (d) 18

10. The perimeter of a rhombus is 60 cm. If the length of its longer diagonal measures 24 cm, the length of the shorter diagonal is _____ cm.

(a) 20 (b) 18

(c) 15 (d) 9

11. Which statements is true about all parallelogram

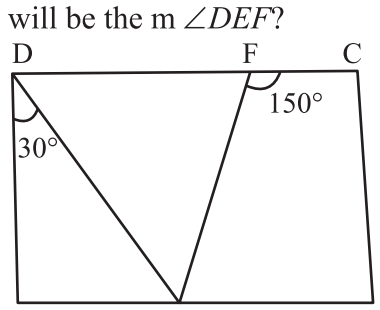
(a) The diagonals are congruent.

(b) The area is the product of two adjacent sides

(c) the opposite angles are congruent

(d) The diagonals are perpendicular to each other.

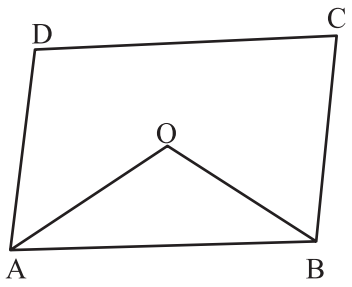
12. In the given figure $ABCD$ is a rectangle. If $m\angle ADE = 30°$ and $m\angle CFE = 150°$. What will be the m $\angle DEF$?



13. Given four points A, B, C, D such that three points A, B and C are collinear. Name the closed figure obtained by joining these point in order.

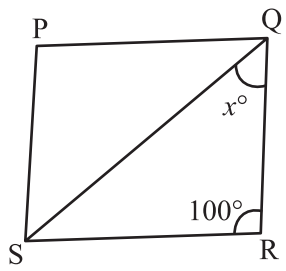
14. What is the sum of any two consecutive angles of parallelogram?

15. In parallelogram $ABCD$, bisectors of angles A and B intersect each other at " O". Find the value of angles AOB.



16. If an angle of a parallelogram is two-third of its adjacent angle then find the smallest angle of the parallelogram.

17. In the given figures $PQRS$ is a rhombus. Find the value of x.



18. Two adjacent angles in a parallelogram are in the ratio 2 : 4. Find the values of these two angles.

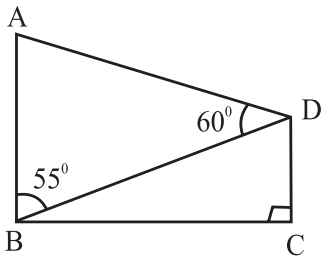
19. In a rhombus $ABCD$, if $\angle A = 60°$ find $\angle B$, $\angle C$ & $\angle D$.

20. The angles of a quadrilateral are in the ratio 1 : 2 : 4 : 5. Find the measure of each angle.

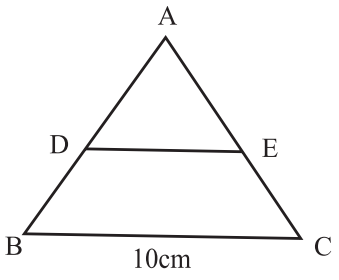
21. If in parallelogram $ABCD$, $\angle A = (2x + 15)°$, $\angle B = (3x - 25)°$ then find the value of x?

22. In a parallelogram if all the four angles are in the ratio 1 : 1 : 1 : 1 then, what type of parallelogram is this?

23. In the figure, $AB \parallel CD$, what will be the measure of $\angle ADC$?

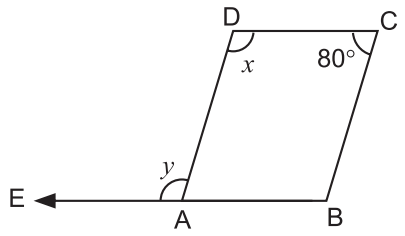


24. In the figure, if D & E are respectively the mid point of AB & AC, what will be the length of ED?

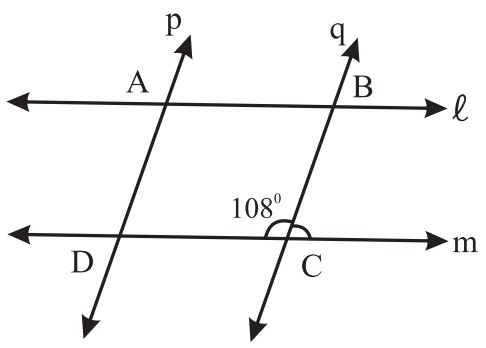


25. $ABCD$ is a rhombus in which $\angle ACB = 40°$, then what will be value of $\angle ADB$?

26. In the figure, $ABCD$ is a parallelogram find value of $(x + y)$.



27. In the figure line $l \parallel m$ and $p \parallel q$, $\angle BCD = 108°$ find all four angles of quadrilateral $ABCD$.



28. Which of the following statements are true (t) and which are false (f)?

(a) In a parallelogram, the diagonals are equal ( )

(b) If all the angles of a quadrilateral are equal it is a parallelogram ( )

(c) The diagonals of parallelogram bisect each other ( )

(d) The diagonals of rhombus are equal ( )

(e) All the angles of parallelogram are acute angles ( )

(f) In a trapezium both pairs of opposite sides are parallel. ( )

29. Opposite angles of a parallelogram are _____.

30. Diagonals of a rectangle _____ each other and are_____.

31. If in a rectangle $ABCD$, diagonal AC bisects $\angle A$ as well as $\angle C$ then $ABCD$ is a _____.

32. A quadrilateral is a parallelogram if its both the pairs of opposite sides are _____.

33. Diagonals of a rhombus _____ each other and are _____.

34. Diagonals of a square are _____, _____ and _____.

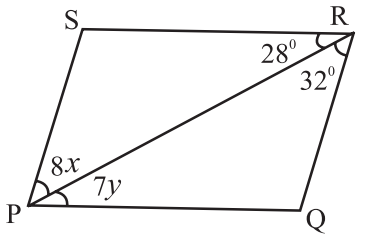
Short Answer type-I Question (2 Marks)

35. Prove that the sum of all the four angles of a quadrilateral is 360^0.

36. Show that opposite angles of a parallelogram are equal.

37. In a parallelogram $ABCD$ $\angle B$=110° determine the measure of $\angle A$ and $\angle D$.

38. In the figure if *PQRS* is a parallelogram, then find the value of x and y.



39. The diagonals of a parallelogram *ABCD* interest at *O*. *A* line through *O* intersects *AB* at *X* and *DC* at *Y*. Prove that $OX = OY$.

40. In a parallelogram *ABCD* diagonals *AC* and *BD* intersect at *O* and $AC = 7.4$ cm and $BD = 6.2$ cm. Find the length of *AO* and *BO*.

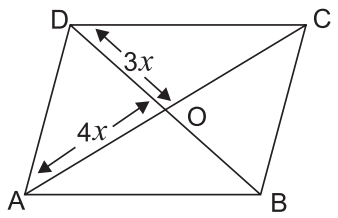
41. Two opposite angles of a parallelogram are $(5x - 3)$ and $(4x + 12)$. Find the measure of each angle of the parallelogram.

42. Diagonals of a quadrilateral *ABCD* bisect each other if $\angle A = 35°$ determine $\angle B$.

43. The perimeter of a parallelogram is 30 cm. If longer side is 9.5 cm then find the length of shorter side.

44. In a parallelogram *ABCD* diagonals *AC* and *BD* intersects at *O* and $AC = 12.6$ cm and $BD = 9.4$ cm. Find the measures of *OC* and *OD*.

45. *ABCD* is a rhombus in which $DO = 3x$ and $AO = 4x$, find perimeter of quadrilateral *ABCD*.

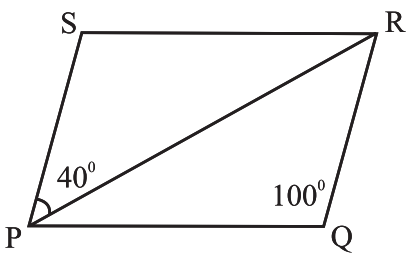


46. The angles of a quadrilateral are $(x + 20)°$, $(x - 20)°$, $(2x + 5)°$, $(2x - 5)°$. Find the value of x.

Short Answer type-II Questions (3 Marks)

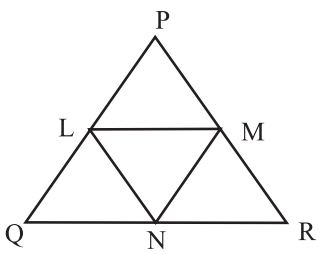
47. If *ABCD* in a rhombus with $\angle ABC = 50°$ then find $\angle ACD$.

48. In the adjoining figure if $PQRS$ is a parallelogram where $\angle PQR = 100°$ and $\angle SPR = 40$. Find $\angle PRQ$ and $\angle SRQ$.



49. Prove that the line segment joining the mid points of two sides of a triangle is parallel to the third side.

50. In the given figure L, M and N are mid point of the sides PQ, PR and QR respectively of ΔPQR. If $PQ = 4.4$ cm, $QR = 5.6$ cm and $PR = 4.8$ cm then find the perimeter of ΔLMN.



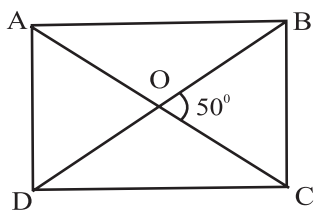
51. A quadrilateral is a parallelogram if one pair of opposite sides are equal and parallel. Prove it.

52. If the diagonals of a quadrilateral bisect each other then quadrilateral is a parallelograms. Prove it.

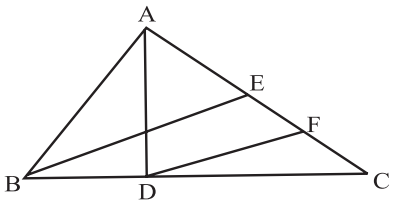
53. In a parallelograms $PQRS$, M and N are points on PQ and RS such that $PM = RN$. Prove that $MS \parallel NQ$.

54. In a parallelogram $ABCD$, AP and CQ are drawn perpendiculars from vertices A and C on diagonal BD. Prove that $\Delta APB \cong \Delta CQD$.

55. The diagonals of a rectangle $ABCD$ meet at O. If $\angle BOC = 50°$ then find $\angle ODA$

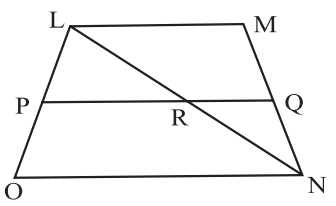


56. In the given figure AD and BE are the medians of ΔABC and $BE \parallel DF$ prove that $CF = 1/4\ AC$.

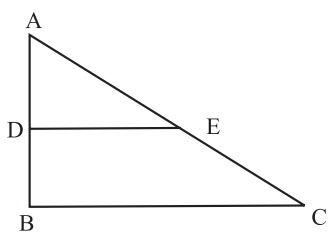


Long Answer type Questions (5 Marks)

57. In the figure $LMNO$, is a trapezium in which LM is parallel to side ON and P is the mid point of side LO. If Q is a point on the side MN such that segment PQ is parallel to side ON Prove that Q is the mid point of MN and $PQ = \frac{1}{2}(LM + ON)$.



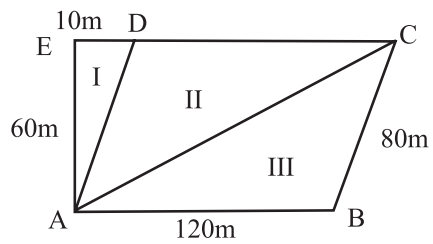
58. In the figure, ΔABC is right angles at B. If $AB = 9$ cm, $AC = 15$ cm. and D and E are the mid points of AB and AC respectively calculate



(i) The length of BC

(ii) The area of trapezium $BCED$

59. A farmer has divided his field into three parts as in the figure. First part is used to take care of his cattle. While II and III are used to grow two different crops.



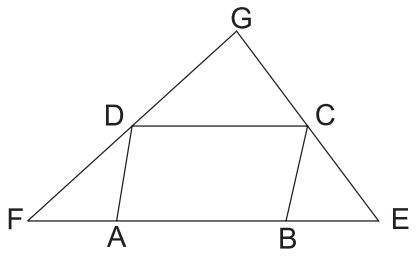
Answer the following:

(i) How much area has been used to take care for cattles?

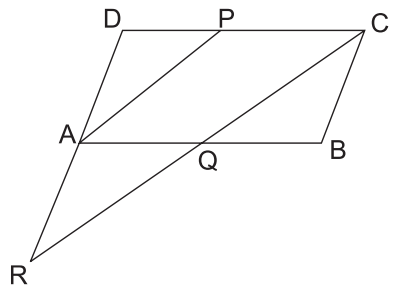
(ii) Are the two areas part II and part III equal? Justify.

(iii) What is the total area of the field?

60. *ABCD* is a parallelogram. Side *AB* is produced on both sides to *E* & *F* as in figure such that *BE* = *BC* & *AF* = *AD*. Show that *EC* & *FD* when produced meets at right angle.



61. *P* is mid point of side *CD* of a parallelogram *ABCD*. A line through *C* parallel to *PA* intersects *AB* at Q & DA produced at*R*. Prove that *DA* = *AR* & *CQ* = *QR*.



Chapter - 8

QUADRILATERAL

Answers

1. (d) 120°

2. (c) 50°

3. (d) Rectangle

4. (b) Parallelogram

5. (c) 38°

6. (a) 60°, 80°, 100°, 120°

7. (c) Half

8. (d) 10 cm

9. (d) 18

10. (b) 18

11. (c) The opposite angles are congruent

12. 90°

13. A triangle

14. 180°

15. 90°

16. 72°

17. 40°

18. 60°, 120°

19. 120°, 60°, 120°

20. 30°, 60°, 120°, 150°

21. 38°

22. Rectangle

23. 115°

24. 5 cm

25. 50°

26. 200°

27. 108°, 72°, 108°, 72°

28. (a) *F* (b) *F* (c) *T* (d) *F* (e) *F* (f) *F*

29. Equal

30. Bisect, equal

31. square

32. parallel or equal

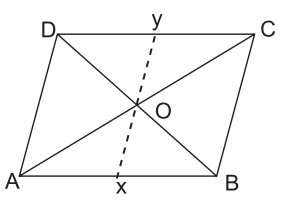
33. Bisect, Perpendicular to each other

34. Equal, bisect each other, perpendicular to each other.

37. 70°, 110°

38. $x = y = 4$

39.



In ΔAOX & ΔCOY

$$OA = OC$$

$$\angle AOX = \angle COY \quad \text{(vertically opposite)}$$

$$\angle OAX = \angle OCY \quad \text{(Aleternate interior angles)}$$

$$\Delta AOX \cong \Delta COY \ (ASA)$$

$$OX = OY \ (CPCT)$$

40. $OA = \frac{1}{2} AC$ (Diagonals of a parallelogram bisect each other)

$$= \frac{1}{2} \times 7.4 = 3.7 \text{ cm}$$

Similarly $OB = \frac{1}{2} BD = 3.1$ cm.

41. $5x - 3 = 4x + 12$

$x = 15°$

So angles are $5x - 3 = 5 \times 15 - 3 = 72°$

Other angles will be 108°, 72°, 108°

42. 145°

43. Let longer side be $a = 9.5$ cm and shorter side be 'b'

Perimeter $= 2a + 2b = 30$

$$2 \times 9.5 + 2b = 30$$

$$2b = 11$$

$$b = 5.5\text{cm}$$

44. $OC = \frac{1}{2} AC = 6.3$ cm

$$OD = \frac{1}{2} BD = 4.7 \text{ cm}$$

45. In right ΔOAD

$$AD^2 = (3x)^2 + (4x)^2$$

$$AD^2 = 9x^2 + 16x^2$$

$$AD = 5x$$

Perimeter $= 20x$ units

46. Sum of all the angles of a quadrilateral is 360°

$$x = 60$$

47. $ABCD$ is a rhombus.

$\Rightarrow ABCD$ is a parallelogram

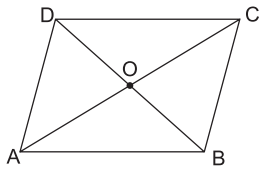
$\angle ABC = \angle ADC$

$\angle ODC = 25^0$

in ΔOCD

$\angle OCD + \angle ODC + \angle COD = 180°$

$\Rightarrow \angle ACD = 65^0$



48. Consider $PS \| RQ$ and PR as transversal then consider $PQ \| RS$ and PR as transversal

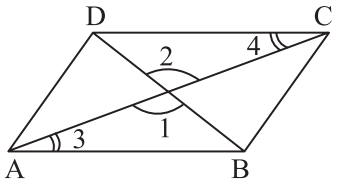
$\angle PRQ = 40°, \angle SRQ = 80°$

50. $MN = \frac{1}{2} PQ = 2.2$ cm

Similarly $LM = 2.8$ cm. $LN = 2.4$ cm

Perimeter = 7.4 cm

52.



Proof: $OA = OC$ (given)

$OB = OD$

$\angle 1 = \angle 2$ (V.O.A)

$\Rightarrow \quad \Delta AOB \cong \Delta COD$ (why?)

$\Rightarrow \quad AB = CD$ --- (1) (*CPCD*)

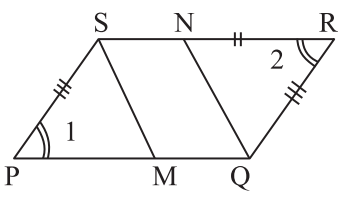
& $\angle 3 = \angle 4$ (*CPCD*)

$AB \parallel CD$ --- (2) (Why ?)

from (1) & (2)

ABCD is a || gm

53.



Proof: In ΔPMS & ΔRNQ

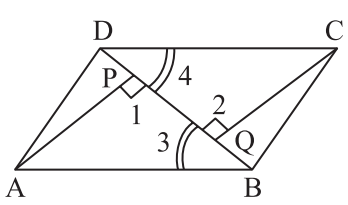
$= QR$ PS (opp. sides of a || gm)

$PM = RN$ (given)

$\angle 1 = \angle 2$ (opp angles of a || gm)

$\Delta PMS \cong \Delta RNQ$

54.



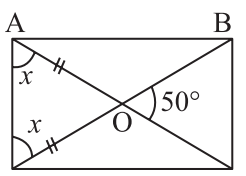
In ΔAPB & ΔCQD

$\angle 1 = \angle 2$ and $\angle 3 = \angle 4$

$$AB = CD$$

$\Rightarrow$ $\Delta APB = \Delta CQD$ [By AAS]

55.



D C

$$\angle BOC = \angle AOD = 50°$$

In ΔAOD

$$x + x + 50 = 180° \text{ [Angle sum property of triangle]}$$
$$2x = 180 - 50$$
$$x = 65° = \angle ODA$$

56. Hint- In ΔABC

$$EC = \frac{1}{2} AC \text{ [BE is median]}$$

In ΔBEC

$$CF = \frac{1}{2} EC$$

58. 12 cm, 40.5 cm^2

59. Hint:

(iii) Area of Trapezium $ABCE = \frac{1}{2} (130 + 120) \times 60$

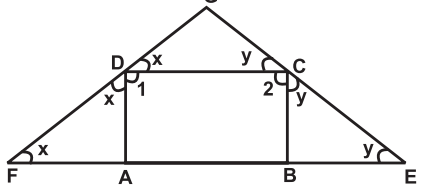
Ans. (i) 300 m^2

(ii) Yes

(iii) 7500m^2

60. In parallelogram $ABCD$

G



$$\angle 1 + \angle 2 = 180° \qquad \text{--- (1)}$$

$$x + x + \angle 1 = 180°$$

$$x = 90 - \frac{1}{2}(\angle 1) \qquad \text{---- (2)}$$

similarly $$y = 90° - \frac{1}{2}(\angle 2) \qquad \text{---- (3)}$$

In ΔDGC, $\angle DGC + x + y = 180^{o}$

61. $APCQ$ is a parallelogram

Q is mid point of AB

in ΔAQR & ΔBQC

$$\angle AQR = \angle BQC$$
$$\angle QAR = \angle QBC$$
$$AQ = BQ$$
$$\Delta AQR \cong \Delta BQC$$

Practice Test

QUADRILATERALS

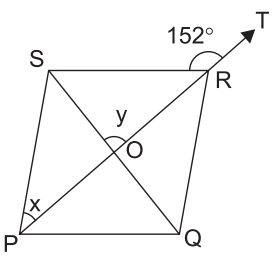
Time: 1 Hr. **M.M. 20**

1. The angles of quadrilateral *ABCD* are in the ratio 2 : 3 : 5 : 8. Find the measure of smallest angle. (1)

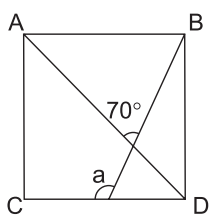
2. Two opposite angles of a Parallelogram are $(5x - 3)°$ and $(4x + 12)°$. Find the measure of each angle of the parallelogram. (1)

3. In a ΔPQR, median *PS* is produced to a point *T* such that $PS = ST$. Prove that *PQTR* is a parallelogram. (2)

4. In the fig. *PQRS* is a rhombus in which the diagonal*PR* is produced to *T*. If $\angle SRT = 152°$, find *x* and *y*. (2)



5. *ABCD* is a square. A line *BM* intersects *CD* at *M* and the diagonal *AC* at *O* such that $\angle AOB = 70°$, find *a* (3)



6. *AD* is median of ΔABC &*E* is the mid point of *AD*.*BE* is produced to meet *AC* in *F*. Prove that $AF = 1/3\ AC$. (3)

7. Show that the bisectors of angles of a parallelogram form a rectangle. (3)

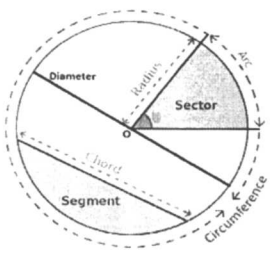
8. Show that the quadrilateral formed by joining the mid point of the sides of a square is also a square. (5)

CHAPTER-9

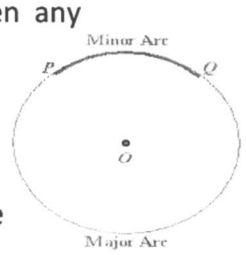
CIRCLES

MIND-MAP

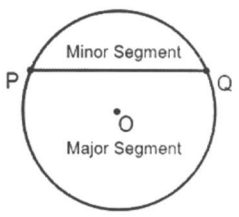
Terms related to Circle



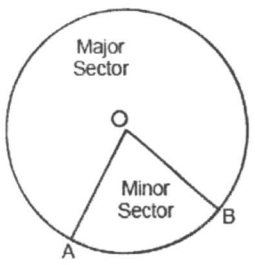
Sections formed between any two points on circum ference



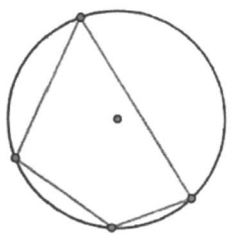
Sections formed between chord & arc



Sections formed between radii and arc



Cyclic Quadrilateral : A quadrilateral having its all four vertices on the circumference of a circle



Some theorems on circle

- Equal chords of a circle subtends equal angles at the centre of a circle.
- The perpendicular from the centre of a circle bisects the chord.
- Equal chords of a circle are equidistant from the centre of a circle.
- The sum of either pair of opposite angles of a cyclic quadrilateral is 180^0.
- The angle subtended by an arc at the centre is double the angle subtended by it on the remaining part of the circle.

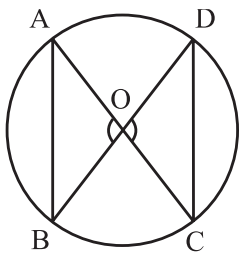
Key points

The collection of those points in a plane which are at a fixed distance from a given fixed point is called a circle. The fixed point is called centre of the circle and the fixed distance is called radius.

Theorem : Equal chords of a circle subtends equal angles at centre.

If $AB = CD$ then

$\angle AOB = \angle COD$

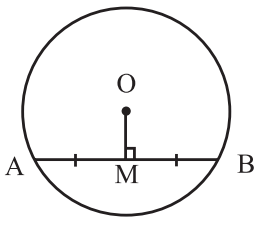


Converse : If angles subtended by chord at centre are equal, then chords are equal.

Theorem : The perpendicular from centre to a chord of a circle, bisects the chord.

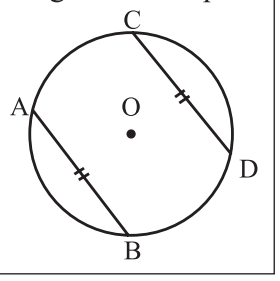
If $OM \perp AB$ then

$AM = BM$



Converse : The line joining the mid-point of the chord to the centre of a circle is prependicular to the chord.

Property : If two chords of a circle are equal then corresponding arcs are equal.

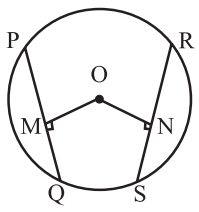


Converse : If arcs of a circle are equal then corresponding chords are also equal.

Theorem : Equal chords of a circle are equidistant from centre.

If PQ = RS

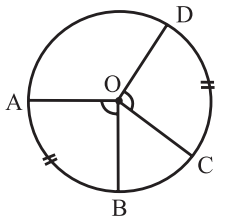
then OM = ON



Converse : Chords equidistant from centre are equal in length.

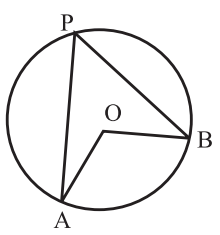
Property : Congruent arcs or equal arcs of a circle subtend equal angle at the centre.

$\Rightarrow \angle AOB = \angle COD$



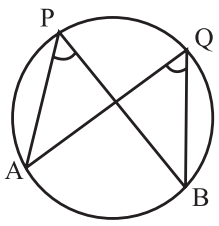
Theorem : The angle subtended by an arc at the centre of circle is twice the angle which is subtended at remaining part of the circle.

$\Rightarrow \angle AOB = 2\angle APB$



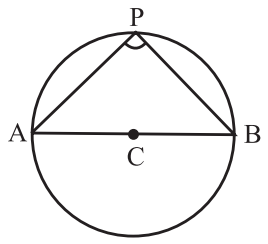
- Any two angles in the same segment of the circle are equal.

$\angle APB = \angle AQB$



- Angle in a semicircle is a right angle.

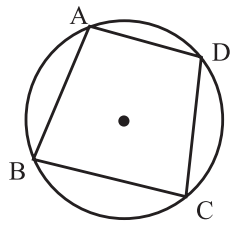
$\Rightarrow \angle APB = 90^{o}$



Theorem : In a cyclic quadrilateral, the sum of opposite angles is 180°.

$\angle A + \angle C = 180°$

$\angle B + \angle D = 180°$



Converse : If sum of the opposite angles of a quadrilateral is 180° then the quadrilateral is cyclic.

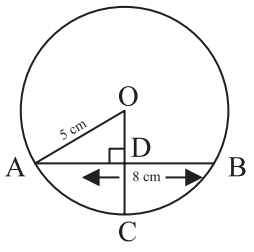
Very Short Answer Questions (1 Mark)

1. The angles in the same segment of a circle are:

(a) Equal (b) Complementary

(c) Supplementary (d) Vertically Opposite Angles

2. In fig, $OA = 5$ cm, $AB = 8$ cm and OD is perpendicular to AB. CD is equal to:



(a) 2 cm (b) 3 cm

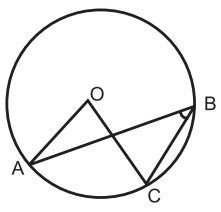
(c) 4 cm (d) 5 cm

3. The radius of a circle is 13 cm and the length of one of its chords is 10cm. The distance of the chord from the centre is:

(a) 11.5 cm (b) 12 cm

(c) $\sqrt{69}$ cm (d) 23 cm

4. In fig. if $\angle ABC = 20°$, then $\angle AOC$ is equal to:



(a) 20° (b) 40°

(c) 60° (d) 10°

5. AB and BC are chords of a circle such that $AB = 12$ cm, $BC = 16$ cm and AB is perpendicular to BC. The radius of the circle passing through the point A,B and C is:

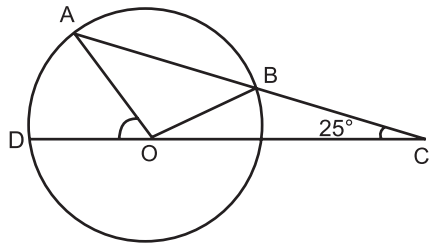
(a) 6 cm (b) 8 cm

(c) 10 cm (d) 12 cm

6. In the given figure, AB is chord of a circle with centre$O$ and AB is produced to C such that $BC = OB$. Also, CO is joined and produced to meet the circle in D. If $\angle ACD = 25°$, then $\angle AOD = ?$

(a) 50° (b) 75°

(c) 90° (d) 100°



7. For the points A, B, C and D to be concyclic, $\angle BDC$ and $\angle BAC$ should be equal to:

(a) 180° (b) 90°

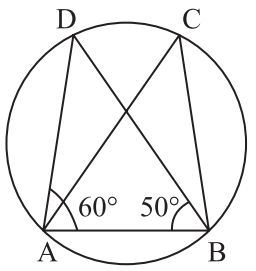
(c) 45° (d) 100°

8. AD is a diameter of a circle and AB is a chord. If AD = 34 cm, AB = 30 cm the distance of AB from the centre of the circle is:

(a) 17 cm (b) 15 cm

(c) 4 cm (d) 8 cm

9. In the given figure, $\angle DAB = 60°$ and $\angle ABD = 50°$ then $\angle ACB$ = ?



(a) 50° (b) 60°

(c) 70° (d) 80°

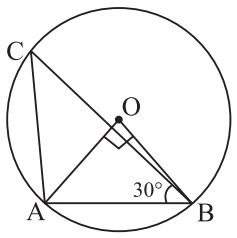
10. In figure $\angle AOB = 90°$ and $\angle CBA = 30°$, then $\angle CAO$ is equal to:

(a) 30°

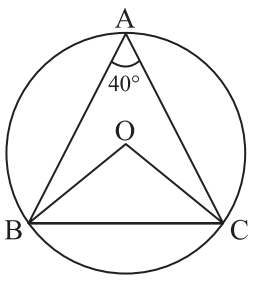
(b) 45°

(c) 90°

(d) 60°



11. In the given figure O is the centre of a circle and $\angle BAC = 40°$, then $\angle OBC$ = ?



(a) 40° (b) 50°

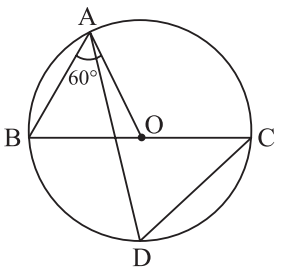
(c) 80° (d) 20°

12. An equilateral triangle of side 9 cm is inscribed in a circle. The radius of the circle is:

(a) 3 cm (b) $3\sqrt{2}$ cm

(c) $3\sqrt{3}$ cm (d) 6 cm

13. In fig. BC is a diameter of the circle and $\angle BAO = 60°$, then $\angle ADC$ is equal to:



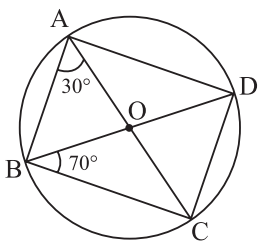
(a) 30° (b) 60°

(c) 120° (d) 45°

14. In the given figure, the measure of $\angle BCD$ is :

(a) 80° (b) 30°

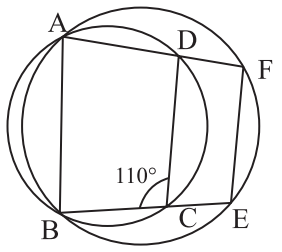
(c) 70° (d) 100°



15. In the given figure $ABCD$ and $ABEF$ are cyclic quadrilaterals. If $\angle BCD = 110°$ then $\angle BEF = ?$

(a) 110° (b) 55°

(c) 90° (d) 70°



16. $ABCD$ is a cyclic quadrilateral such that AB is a diameter of the circle circumscribing it and $\angle ADC = 140°$, then $\angle BAC$ is equal to:

(a) 80° (b) 30°

(c) 50° (d) 40°

17. The length of the chord which is at a distance of 12 cm from the centre of a circle of radius 13 cm is:

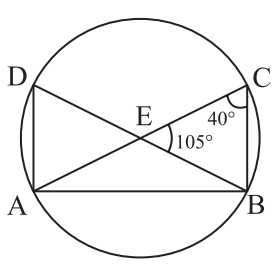
(a) 5 cm (b) 10 cm

(c) 12 cm (d) 13 cm

18. In the given figures, $\angle ECB = 40°$ and $\angle CEB = 105°$, then $\angle EAD = ?$

(a) 35° (b) 20°

(c) 50° (d) 40°



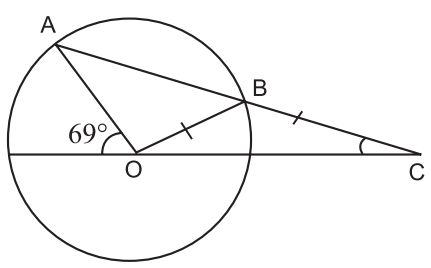
19. In the following figure, BC = radius OB. Find the value of $\angle OCB$.

(a) 69°

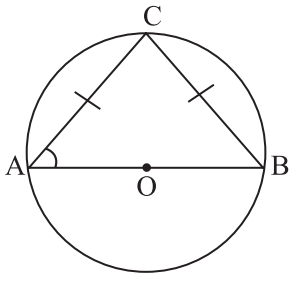
(b) 46°

(c) 92°

(d) 23°



20. In the given figure, AOB is the diameter of the circle and $AC = BC$. Find $\angle CAB$.



(a) 60° (b) 46°

(c) 45° (d) 70°

21. A segment of a circle is the region between an arc and a _____ of the circle.

22. An arc of a circle is called a _____ if the ends of the arc lie on the ends of a diameter.

23. The degree measure of a semi circle is _____.

24. A circle divides the plane into _____ parts.

25. The diameter is the _____ chord of the circle.

26. Circles having the same centre and different radii are called _____ circle.

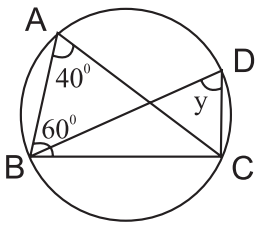
27. Angle in a semicircle is a _____ angle.

28. If two chords of a circle are equal then the corresponding arcs are _____.

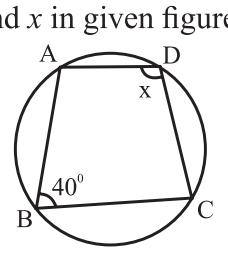
29. If the sum of a pair of opposite angles of a quadrilateral is 180°, then quadrilateral is _____.

30. A round pizza is cut into 4 equal pieces. Each piece represent a _____.

31. Find y in given figure.



32. Find x in given figure.

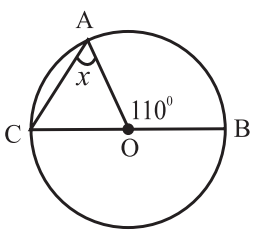


33. AD is a diameter of a circle andAB is a chord. IfAD = 34 cm, AB = 30 cm then find BD.

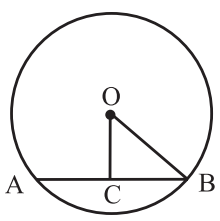
34. Given two concentric circles with centre O. A line cut the circle at A, B, C and D respectively. If AB = 10 cm, then find the length of CD.

Short Answer Type-I Questions (2 Marks)

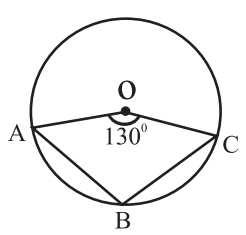
35. Find x in given figure.



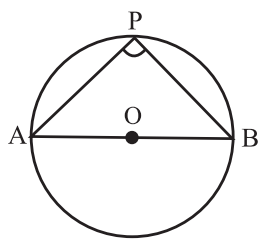
36. In given figure, OC is perpendicular segment drawn from centre$O$ on chord AB. If OB = 5 cm and OC = 3 cm then find length of AB.



37. In given figure, O is centre of circle. If $\angle AOC = 130°$ then find $\angle$ABC.



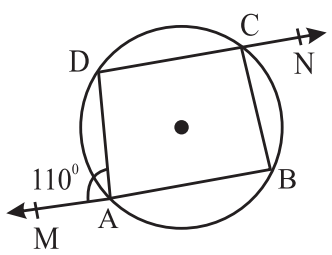
38. In given figure, AOB is diameter of circle & P is any point on the circle. Find $\angle APB$.



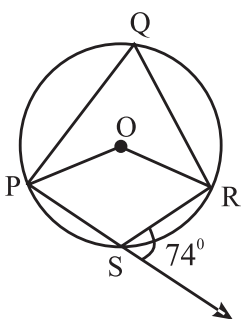
39. Prove that the cyclic parallelogram is a rectangle.

40. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

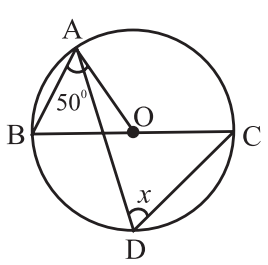
41. In the following figure, find the value of $\angle BCN$.



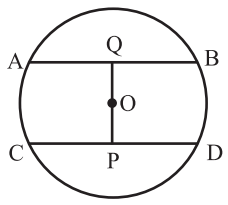
42. In the given figure, find the value of reflex angle POR.



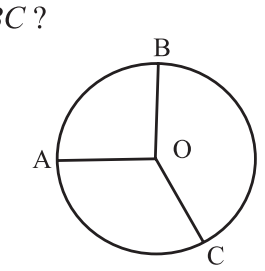
43. Find the value of x in figure if O is centre of circle and $\angle OAB = 50°$



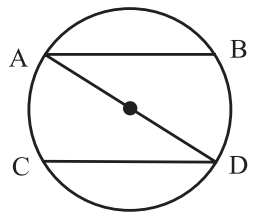
44. In the given figure, O is centre of the circle with radius 5 cm, $OP \perp CD$, $OQ \perp AB$, $AB \parallel CD$, $AB = 6$ cm and $CD = 8$ cm. Determine PQ.



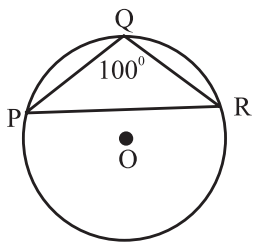
45. In the given figure, O is the centre of a circle and $\angle AOB = 90°$, $\angle BOC = 120°$. What is measure of $\angle ABC$?



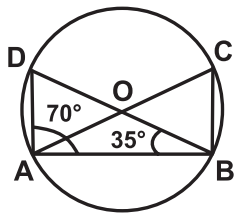
46. In the given figure, AB and CD are parallel chords and length of arc AC = 14 cm. What is length of arc BD?



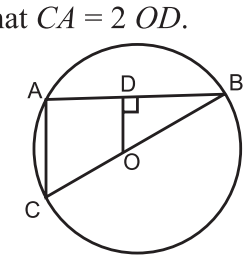
47. In given figure, $\angle PQR = 100°$ where P, Q & R are points on the circle with centre O. Find $\angle OPR$.



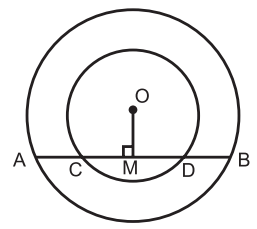
48. In the given figure, O is centre of circle. If $\angle ABD = 35°$ and $\angle BAD = 70°$, find $\angle ACB$.



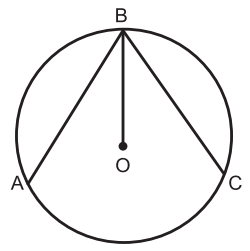
49. In fig. OD is perpendicular to the chord AB of a circle whose centre is O and BC is a diameter. Show that $CA = 2\ OD$.



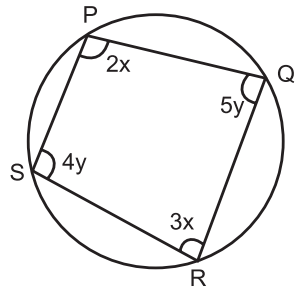
50. Two concentric circles with centre O where AB is chord of outer circle which intersects the inner circle at C and D are shown in figure. If $AB = 12$ cm and $CD = 8$ cm, find AD.



51. In figure, $AB = BC$ and O is the centre of the circle. Prove that BO bisects $\angle ABC$.

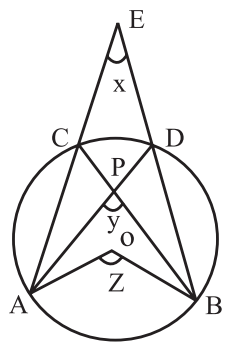


52. In figures, $PQRS$ is a cyclic quadrilateral. Find the value of x and y.



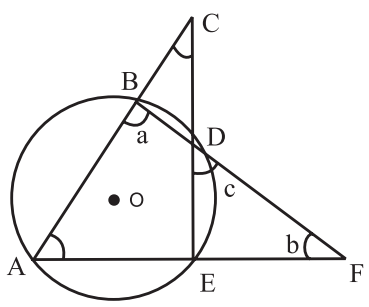
Short Answer type-II Questions (3 marks)

53. In the given figure, O is the centre of a circle. Prove that $\angle x + \angle y = \angle z$.

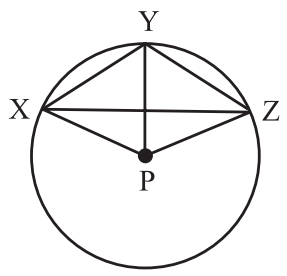


54. If two non parallel sides of a trapezium are equal then prove that it is cyclic quadrilateral.

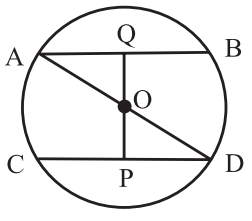
55. In the given figure, determine *a, b* and c if $\angle BCD = 43°$ and $\angle BAF = 62°$.



56. In the figure, P is the centre of a circle. Prove that $\angle XPZ = 2\,(\angle XZY + \angle YXZ)$.

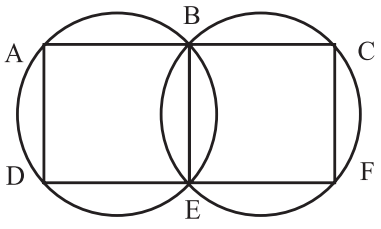


57. In the given figure, AD is diameter of the circle whose centre is O and $AB \parallel CD$. Prove that $AB = CD$.

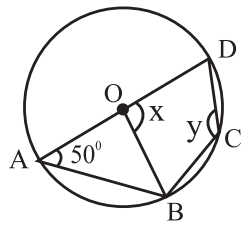


58. In an equilateral triangle, prove that the centroid and the circumcentre coincide.

59. In the given figures, *A, B, C* and *D, E, F* are two sets of collinear points. Prove that *AD* || *CF*.



60. In given figure, *O* is centre of circle and *DAB* = 50°. Calculate the value of *x* and *y*.



61. If two equal chords of a circle intersect within the circle, then prove that the segment of one chord is equal to corresponding segment of other chord.

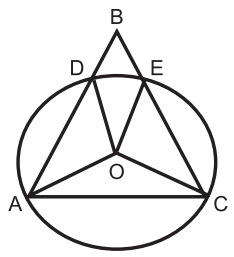
62. Prove that if a pair of opposite angles of a quadrilateral are supplementary, then the quadrilateral is cyclic.

63. The bisector of angle *A, B* and *C* of a Δ*ABC* intersect its circum circle at *D, E* and *F* respectively. Prove that the angles of a triangle*DEF* are $90° - \frac{1}{2} \angle A$, $90° - \frac{1}{2} \angle B$, $90° - \frac{1}{2} \angle C$ respectively.

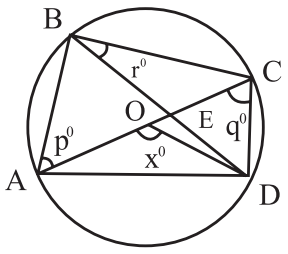
64. Find the sum of the angles in the four segments exterior to a cyclic quadrilateral.

65. Let the vertex$B$ of a triangleABC be located outside a circle and let the sides AC and CB of the triangle intercepts equal chordsAD and CE with the circle. Prove that $\angle ABC$ is equal to half the difference of the angle subtended by the chords AC and DE at the centre.

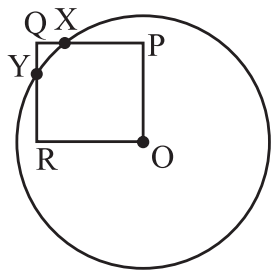
$$\angle ABC = \frac{1}{2}(\angle DOE - \angle AOC)$$



66. In the adjoining figure AC is diameter of a circle with centre O and chord $BD \perp AC$, intersecting each other at E. Find out the values of p, q, r in terms of x if $\angle AOD = x°$, $\angle BAC = p°$, $\angle ACD = q°$, $\angle CBD = r°$.

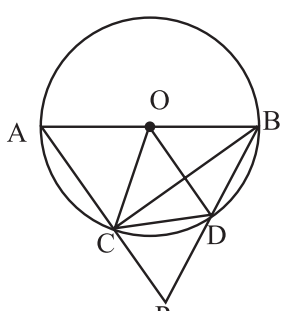


67. In the given figure $OPQR$ is a square.A circle drawn with centre O cuts the square in X and Y. Prove that $QX = QY$.

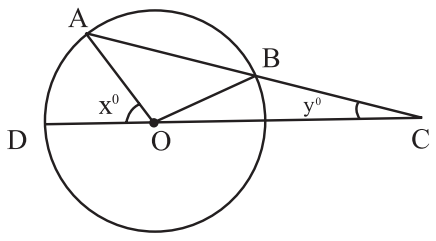


68. Prove that the opposite angles of a cyclic quadrilateral are supplementary.

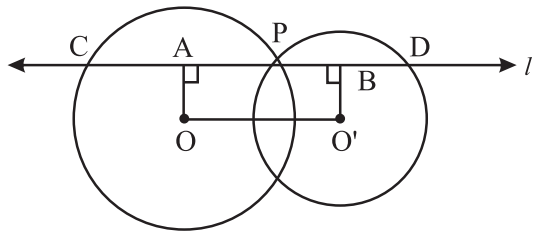
69. In the given figure, AB is a diameter of a circle (O, r) and chord CD = radius OC. AC and BD when produced meet at P. Prove that $\angle APB$ is 60°.



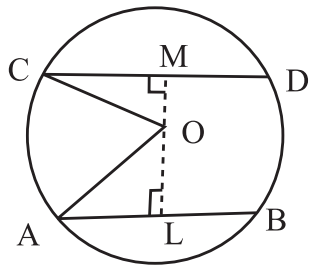
70. In the given figure, AB is chord of a circle with centre O and AB is produced to C such that $BC = OB$. Also, CO is joined and produced to meet the circle in D. If $\angle ACD = y°$ and $\angle AOD = x°$ then prove that $x = 3y$.



71. Two circles whose centres are O and O' intersect at P. Through P, a line l parallel to OO', intersecting the circle at C and D is drawn. Prove that $CD = 2OO'$.



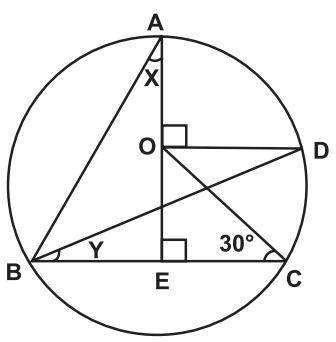
72. AB and CD are two parallel chords of a circle which are on opposite sides of the centre O such that AB = 10 cm, CD = 24 cm and the distance between AB and CD is 17 cm. Find the radius of the circle.



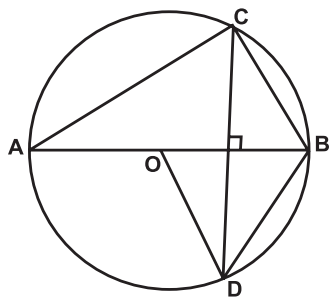
Long Answer type Questions (5 marks)

73. AB and AC are two chords of a circle of radius r such that $AB = 2AC$. If p and q are the distance of AB and AC from the centre, prove that $4q^2 = p^2 + 3r^2$

74. In figure, O is the centre of the circle, $\angle BCO = 30°$, $AE \perp BC$ and $DO \perp AE$. Find x and y.



75. In figure, O is the centre of the circle, $BD = OD$ and $CD \perp AB$. Find $\angle CAB$.



76. Prove that the angle subtended by an arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.

77. Show that if two chords of a circle bisect one another they must be diameters.

78. Prove that the quadrilateral formed by angle bisectors of a cyclic quadrilateral is also cyclic.

Chatper - 9

CIRCLE

Answers

1. (a) equal

2. (a) 2 cm

3. (b) 12 cm

4. (b) 40°

5. (c) 10 cm

6. (b) 75°

7. (b) 90°

8. (d) 8 cm

9. (c) 70°

10. (d) 60°

11. (b) 50°

12. (c) $3\sqrt{3}$ cm

13. (b) 60°

14. (a) 80°

15. (a) 110°

16. (c) 50°

17. (b) 10 cm

18. (a) 35°

19. (d) 23°

20. (c) 45°

21. chord

22. semi-circle

23. 90°

24. three

25. longest

26. concentric

27. right

28. equal

29. cyclic

30. sector

31. $y = 40°$

32. 140°

33. 16 cm

34. CD = 10 cm

35. 35°

36. $AB = 8$ cm

37. $\angle ABC = 115°$

38. $\angle APB = 90°$

40. Angle by minor arc = 30°

Angle by major arc = 150°

41. $\angle BCN = 70°$

42. $\angle PSR + \angle RST = 180° \Rightarrow \angle PSR = 106°$

reflex $\angle POR = 2\angle PSR = 212°$

43. $\angle AOB = 80°$

$\angle AOB + \angle AOC = 180°$

$\angle AOC = 100°$

$\angle ADC = \frac{1}{2} \angle AOC$

$\Rightarrow x = 50°$

44. $AQ = \frac{1}{2} AB \Rightarrow AQ = 3$ cm

In ΔAOQ

$(OA)^2 = (AQ)^2 + (OQ)^2$

$\Rightarrow OQ = 4$ cm

Similarly $OP = 3$ cm

$PQ = 7$ cm

45. $\angle AOB + \angle BOC + \angle AOC = 360°$

$\Rightarrow \angle AOC = 150°$

$\angle ABC = \frac{1}{2} \angle AOC = 75°$

46. $BD = 14$ cm

47. $\angle OPR = 10°$

48. $\angle ABD + 70° + 35° = 180°$

$\Rightarrow \angle ADB = 75°$

$\angle ACB = \angle ADB = 75°$

49. $OD \parallel AC$

$\Rightarrow OD = \frac{1}{2}$CA

$\Rightarrow CA = 2\ OD$

50. $AM = 6$ cm

$MD = 4$ cm

$AD = (6 + 4)$ cm $= 10$ cm

51. Δ's $AOB \cong \Delta COB$ (by SSS)

$\Rightarrow \angle OBA = \angle OBC$

$\Rightarrow \angle OBC$ bisects $\angle ABC$

52. $2x + 3x = 180° \Rightarrow x = 36°$

$y + 45y = 180°$

$y = 20°$

53. $\angle ACB = \angle ADB$ (Angles in same segment)

$\angle z = 2\angle ACB$

$\Rightarrow \angle z = \angle ACB + \angle ADB$

$\angle y = \angle ACB + \angle CAD$

$\Rightarrow \angle z = \angle y - \angle DAC + \angle ADB$

But, $\angle ADB - \angle DAC = \angle x$

$\Rightarrow \angle x + \angle y = \angle z$

55. $a = 105°$, $b = 13°$, $c = 62°$

56. $\angle XPY = 2\angle XZY$

$\angle YPZ = 2\angle YXZ$

$\angle XPZ = 2(\angle XZY + \angle YXZ)$

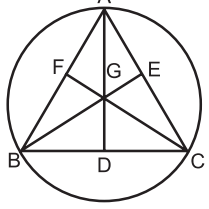
57. $\Delta AOQ \cong \Delta POD$

$\Rightarrow OQ = OP$ (by *CPCT*)

$\Rightarrow AB = CD$

58.

A



$\Delta BEC \cong \Delta BFC$

$\Rightarrow BE = CF$

sim. $\Delta CAF \cong \Delta CAD$

$\Rightarrow\ CF = AD$

So $AD = BE = CF$

$\frac{2}{3}AD = \frac{2}{3}BE = \frac{2}{3}CF$

$GA = GB = GC$

Hence centroid and circumcentre are coincident

59. $\angle DAB + \angle BED = 180°$

But $\angle BED = \angle BCF$

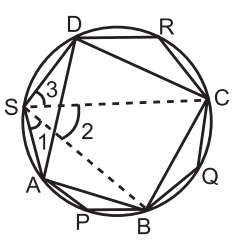
$\Rightarrow \angle DAB + \angle BCF = 180°$

Hence $AD \parallel CF$

60. $\angle AOB = 80°$

$\Rightarrow x = 100°, y = 130°$

64.



$\angle 1 + \angle P = 180°$

$\angle 2 + \angle Q = 180°$

$\angle 3 + \angle R = 180°$

$\angle 1 + \angle P + \angle 2 + \angle Q + \angle 3 + \angle R = 3 \times 180°$

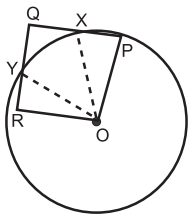
$\Rightarrow \angle P + \angle Q + \angle R + \angle S = 6 \times 90°$

66. $p = 90° - \frac{1}{2}x$, $q = \frac{1}{2}x$

$r = \frac{1}{2}(180° - x)$

$= 90° - \frac{1}{2}x$

67.



$QR = QP$ ($\because$ OPQR is square)

$\Delta ORY \cong \Delta OPX$

$\therefore\ RY = PX$

$\Rightarrow QR - RY = QP - PX$

$\Rightarrow QY = QX$

70. $BC = OB$

$\Rightarrow \angle BOC = y$

$\angle ABO = 2y, \angle OAB = 2y$

$(2y) + (2y) + (180 - x - y) = 180°$

$\Rightarrow x = 3y$

71. $CA = AP$

$\Rightarrow\ CP = 2AP$

Similarly $BP = BD$

$\Rightarrow PD = 2\ PB$

$CD = 2\ AP + 2\ PB$

$CD = 2OO'$

72. In ΔALO

$OA^2 = OL^2 + AL^2$

$r^2 = x^2 + 5^2$ ---(1)

In ΔOMC

$OC^2 = OM^2 + CM^2$

$r^2 = (17 - x)^2 + (12)^2$ ---(2)

from (1) & (2)

$34x = 408$

$x = 12$ cm

$\therefore\ r = 13$ cm

In ΔABE,

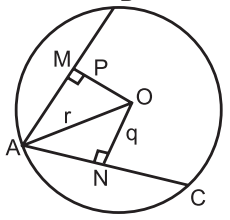
$60° + x + 90° = 180°$

$x = 30°$

$x = 30°\ ,\ y = 15°$

B

73.



In ΔAMO

$OA^2 = OM^2 + AM^2$

$\Rightarrow \left(\frac{AB}{2}\right)^2 = r^2 - p^2\ \ (OM \perp AB)$

$(AB)^2 = 4r^2 - 4P^2$

Similarly $AC^2 = 4r^2 - 4q^2$

$AB^2 = 4AC^2$ ($\because$ AB = 2AC)

$\Rightarrow\ 4r^2 - 4p^2 = 4(4r^2 - 4q^2)$

$\Rightarrow\ 4q^2 = p^2 + 3r^2$

74. $\angle EOC = 180° - 30° - 90° = 60°$

$\angle COD = 180° - 60° - 90° = 30°$

$\angle COB = 2\angle CBD = 1$

$2y = 30° \Rightarrow\ y = 15°$

Similarly

$\angle ABC = \frac{1}{2}\angle AOC$

$\Rightarrow\ \angle ABC = \frac{1}{2}(90° + 30°)$

$\Rightarrow\ \angle ABC = 60°$

75. Since $OB = OD = BD$

$\Rightarrow\ \Delta OBD$ is an equilateral triangle

$\therefore\ \angle BOD = 60° \Rightarrow \angle AOD = 120°$

Now $\angle ACD = 1/2\angle AOD = 60°$

$\Rightarrow \angle CBA = 60°$

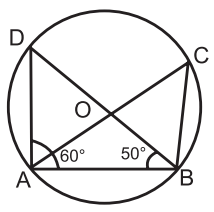
Hence $CAB = 30°$

(Angle sum property)

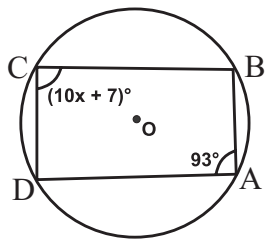
CHAPTER-9
Practice Test
Circles

Time : 1 hr. **M.M. 20**

1. In fig, $\angle DAB = 60°$ and $\angle ABD = 50°$. Find $\angle ACB$. (1)

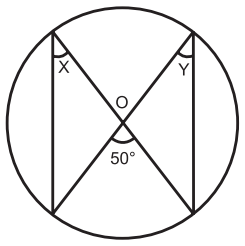


2. A circle passes through *A, B, C* and *D* as shown in figure. If $\angle BAD = 93°$ find *x*. (1)



3. The chord of a circle is equal to its radius. Find the angle subtended by this chord at the minor arc of the circle. (2)

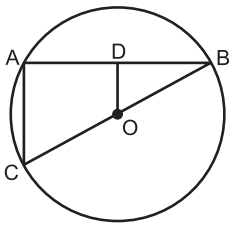
4. In the given figure, find x where O is the centre of the circle. (2)



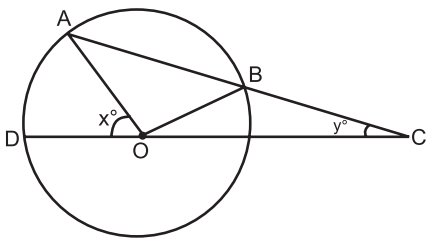
5. Prove that equal chords of a circle subtend equal angles at the centre. (3)

6. Prove that the sum of either pair of the opposite angles of a cyclic quadrilateral is 180°. (3)

7. In the given figure, OD is perpendicular to chord AB of a circle with centre O. If BC is a diameter then show that AC = 2OD (3)



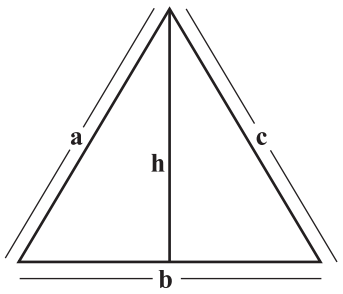
8. In figure, AB is a chord of a circle with centre O and AB is produced to C. Also, CO is joined and produced to meet the circle in D. If $\angle ACD = y°, \angle AOD = x°$ and $x = 3y$, then prove that $BC = OB$. (5)



CHAPTER-10

HERON'S FORMULA

Mind Map



Area of triangle (general formula) = $\frac{1}{2} \times b \times h$

where b = base

and h = height

Area of triangle (Herons formula) = $\sqrt{s(s-a)(s-b)(s-c)}$

where s is semi-perimeter and $s = \frac{a+b+c}{2}$

a, b and c are sides of a triangles

Keys points

- When base and height of a triangle are known, then area of triangle is found using general formula.
- Herons formula is used to find area of triangle when all the three sides of triangle are known.
- All sides of an equilateral triangle are equal.
- An isosceles triangle has two equal sides while a scalene triangle has no side equal.
- The sum of all the sides is called the perimeter.
- $(s-a) + (s-b) + (s-c) = 3s - (a+b+c) = s$
- Herons formula can be used to find the area of any kind of triangle.
- Altitude of an equilateral triangle $= \frac{\sqrt{3}a}{2}$

  a - side
- For right angle triangle

  $(\text{Base})^2 + (\text{altitude})^2 = (\text{Hypothenuse})^2$

Very Short Answer Questions (1 mark)

1. The altitude of an equilateral triangle is 9 cm. The area of this triangle is:

(a) $18\sqrt{3}$ cm^2 (b) $24\sqrt{3}$ cm^2

(c) $25\sqrt{3}$ cm^2 (d) $27\sqrt{3}$ cm^2

2. The sides of a triangle are 3 cm, 4 cm and 5 cm. The area of triangle will be:

(a) 6 cm^2 (b) 8 cm^2

(c) 5 cm^2 (d) 6 cm^2

3. An isosceles right triangle has area 8 cm^2. The length of the hypotenuse is:

(a) $\sqrt{24}$ cm (b) $\sqrt{32}$ cm

(c) $\sqrt{48}$ cm (d) $\sqrt{16}$ cm

4. The side of an equilateral triangle is 12 cm. The area of this triangle is :

(a) 72 cm^2 (b) 36 cm^2

(c) $12\sqrt{3}$ cm^2 (d) $36\sqrt{3}$ cm^2

5. The base of a triangular field is three times its height. If area of field is 13.5 hectares then its base is:

(a) 900 m (b) 600 m

(c) 1200 m (d) 300 m

6. The perimeter of an isosceles triangle is 32 cm. The ratio of equal sides to the base is 3 : 2. The sides of triangle are:

(a) 8 cm, 8 cm, 12 cm (b) 8 cm, 8 cm, 8 cm

(c) 8 cm, 12 cm, 12cm (d) 12 cm, 12 cm, 12 cm

7. The height corresponding to the longest side of the triangle whose sides are 42 cm, 34 cm and 20 cm in length is:

(a) 15 cm (b) 36 cm

(c) 16 cm (d) 23 cm

8. For an isosceles triangle having base b and each of equal side a, the perimeter will be _____.

9. Two sides of a triangle are 8 cm and 11 cm and its perimeter is 32 cm. The length of third side will be _____.

10. The formula used to find the area of scalene triangle is called _____.

11. The sides of a triangle are in ratio 2 : 1 : 3 and its perimeter is 24 cm. The length of the longest side of triangle will be _____.

12. The perimeter of an equilateral triangle is 60 cm. Its area will be _____.

13. Find the area of a triangle whose base and altitude are 6 cm and 3 cm respectively.

14. The area of a triangle of base 35 cm is 420 sq. cm. Find its altitude.

15. Find the area of a triangle whose base is 15 cm long and the corresponding height is 9.8 cm.

16. Find the area of an equilateral triangle with side $2\sqrt{3}$ cm.

17. Find the area of an equilateral triangle of side 'a' units.

18. Find the area of an isosceles triangle each of whose equal sides is 13 cm and base is 24 cm.

19. The height of an equilateral triangle is 6 cm. Find its side.

20. Find the semi-perimeter of an equilateral triangle of side 2a units.

Short Answer type-I Question (2 Marks)

21. Find the area of an equilateral triangle whose sides are 4 cm each.

22. If sum of two sides of a triangle is 17 cm and its perimeter is 30 cm, find the length of third side.

23. If each side of a triangle is double then its perimeter of triangle increased by how much?

24. If area of a triangle is 50 cm^2 and one of its sides is 10 cm then find the length of corresponding altitude.

25. The sides of a triangle are 11 cm, 60 cm and 61 cm. Find the altitude to the smallest side.

26. The ratio between the sides of a triangle are 3 : 5 : 7 and its perimeter is 300 cm. Find the sides of triangle.

27. Find the area of isosceles triangle whose non equal side is of 12 cm and its corresponding altitude is 7.5 cm.

28. a, b and c are the sides of a triangle. If $(s-a) = 5$ cm, $(s-b) = 10$ cm and $(s-c) = 1$ cm, then find the value of a, b and c.

29. The area of an equilateral triangle is $36\sqrt{3}$ cm^2. Find the side of the equilateral triangle.

Short Answer Type-II Questions (3 Marks)

30. The cost of levelling a right angled triangular park is₹2 per km ^{2}. The cost of levelling the whole part is ₹2700. If horizontal side of the park is 45 km long then find the length of longest side of the park.

31. Find the area of a triangle if $(s - a) = 35$, $(s - b) = 30$ and $(s - c) = 25$ where a, b, c are sides of triangle and s is its semi-perimeter. (take $\sqrt{105} = 10.25$)

32. The sides of a triangular field are 51 m, 37 m and 20 m. Find the number of flower beds that can be prepared if each bed is to occupy 9 m^2 of area.

33. Using Heron's formula, show that the area of an equilateral triangle is $\frac{\sqrt{3}}{4}x^2$, where x is the side.

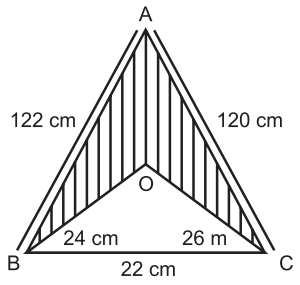
34. The sides of a triangle are x, $x + 1$, $2x - 1$ and its area is $x\sqrt{10}$ sq. units. Find the value of x.

35. The perimeter of a triangle is 50 cm. One side of a triangle is 4 cm longer than the smaller side and the third side is 6 cm less than twice the smaller side. Find the area of the triangle.

36. Find the area of shaded region in the figure.

How may triangular flower beds of 6 m^2 can be made from this area?

[use $\sqrt{105} = 10.25$]



37. The sides of a triangular sheet are 5 cm, 12 cm and 13 cm. Find the cost of painting on the sheet at the rate of ₹30 per cm^2.

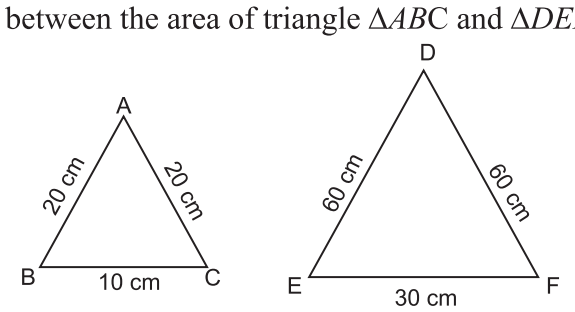
38. One side of a right angled triangle is 20 cm and the difference in lengths of its hypotenuses and other side is 8 cm. Find the other side and area of the triangle.

39. The perimeter of a triangle is x cm and its sides are p, q and r cm. What will be the area of triangle? Use the Heron's formula.

40. If every side of a equilateral triangle is doubled, then find the percentage increase in the area of the triangle.

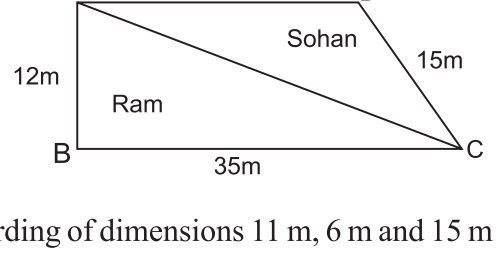
Long Answer Questions (5 Marks)

41. Find the ratio between the area of triangle ΔABC and ΔDEF.



42. While selling clothes for making flags, a shopkeeper claims to sell each piece of cloth in the shape of an equilateral triangle of each side 12 cm while actually he was selling the same in the shape of an isosceles triangle with side 12 cm, 10 cm and 10 cm. How much cloth was he saving in selling each flag?

43. A piece of land is in the shape as given in the figure, has been cut along diagonal AC. The two pieces of land has been distributed between Ram and Sohan. Who will get larger piece of land in terms of area and how much? [Use $\sqrt{10} = 3.15$]

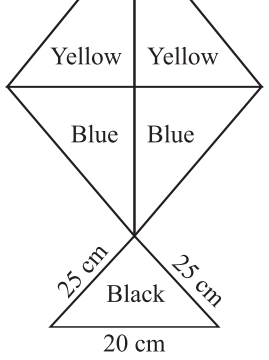


44. A triangular hoarding of dimensions 11 m, 6 m and 15 m is used for commercial activities. The hoarding yield an earning of ₹5000 per m^2 per month.

Calculate the total earning by the hoarding in a month. [Use $\sqrt{2} = 1.41$]

45. In the given kite ABCD is a square having diagonal 48 cm. How much paper of each colour is required to make this kite?

[Use [$\sqrt{21} = 4.58$]



Chapter - 10
Heron's Formula
Answers

1. (d) $27\sqrt{3}$ cm^2

2. (a) 6 cm^2

3. (b) $\sqrt{32}$ cm

4. (d) 12 cm

5. (a) 900 m

6. (c) 8 cm, 12 cm, 12 cm

7. (c) 16 cm

8. $2a + b$ units

9. 13 cm

10. Heron's formula

11. 12 cm

12. $100\sqrt{3}$ cm^2

13. 9 cm^2

14. 24 cm

15. 73.5 cm^2

16. $3\sqrt{3}$ cm^2

17. $\frac{\sqrt{3}}{4}a^2$ units^2

18. 50 cm

19. $4\sqrt{3}$ cm

20. 3a units

21. $4\sqrt{3}$ cm^2

22. 13 cm

23. 4 times

24. 10 cm

25. 60 cm

26. 60 cm, 100 cm, 140 cm

27. 45 cm^2

28. $a = 11$ cm, $b = 6$ cm, $c = 15$ cm

29. 12 cm

30. 75 km

31. $s = 90$
Area = 1537.5

32. No of flower beds
$$= \frac{\text{Area of field}}{\text{Area of 1 Flower Bed}} = 34$$

34. $S = \frac{4x}{2} = 2x$;
Area =
$$\sqrt{2x(2x-x)(2x-x-1)(2x-2x+1)}$$
$$\Rightarrow x\sqrt{10} = x\sqrt{2(x-1)}$$
$$\Rightarrow x = 6$$

35. Let the length of smallest side = x m
$\therefore$ Other two sides will be $x + 4$ and $2x - 6$
$\therefore$ Perimeter of triangle = $x + x + 4 + 2x - 6$
$\Rightarrow x = 13$
Area of Δ = 109.6 m^2

36. Area = 1074 m^2,

No. of flower beds = 179

37. ₹ 900

38. Let given side 'a' = 20, hypotenuse = b
other side = c

By Pythagoras theorem

$a^2 = b^2 - c^2$

$\Rightarrow a^2 = (b - c)(b + c)$

$\Rightarrow 20^2 = 8 \times (b + c)$

$\Rightarrow b + c = 50$

So $a = 20$, $b = 29$, $c = 21$

39. $\sqrt{\frac{x}{2}\left(\frac{x}{2}-p\right)\left(\frac{x}{2}-q\right)\left(\frac{x}{2}-r\right)}$

40. 300% [Hint: Increase in area of triangle
= Area of new triangle – Area of given triangle

Percentage Increase = $\frac{\text{Increased Area}}{\text{Initial Area}} \times 100$]

41. 1 : 9

42. Area of equilateral part = 62.352 cm^2

Area of isosceles part = 48 cm^2

[Difference = 14.352 cm^2]

43. Ram, 210 m^2

44. ₹1,41,000

40. Area of yellow part = area of blue part

= 288 cm^2

Required blue / yellow paper = 576 cm^2

Required black paper = 229 cm^2

CHAPTER-10
HERON'S FORMULA
PRACTICE TEST

Time: 1 hr **M.M: 20**

1. If $(s - a) = 4$ cm, $(s - b) = 20$ cm, $(s - c) = 11$ cm. Find s. (1)

2. The sides of triangle are 35 cm, 54 cm and 61 cm. Find the length of its longest altitude. (1)

3. Find the area of isosceles triangle whose equal sides are of length 15 cm each and the third side is 12 cm. (2)

4. If each side of triangle is doubled, then find the ratio of area of new triangle thus formed and the given triangle. (2)

5. A triangular park ABC has sides 120m, 80m and 50m. A gardner has planted some trees inside the park leaving 5 m width along each side of park. Find the area in which he planted the trees. (3)

6. The sides of a triangle are in the ratio 25 : 17 : 12 and its perimeter is 540 cm. Find the area of the triangle. (3)

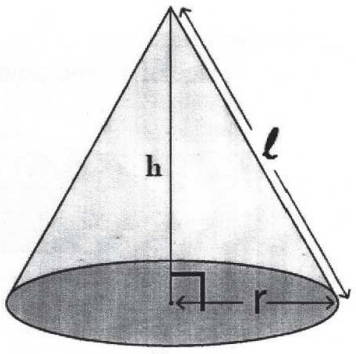
7. The length of sides of a triangle are 7 cm, 12 cm and 13 cm. Find the length of perpendicular from opposite vertex to the side whose length is 12 cm. (3)

8. The cost of fencing an equilateral triangular field at ₹5 per metre is ₹1920. Find its area & all sides. (5)

CHAPTER-11

SURFACE AREAS AND VOLUMES

MIND MAP



Cone

Slant height of cone $l = \sqrt{h^2 + r^2}$

Curved Surface area of cone $= \pi rl$

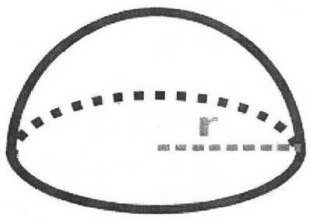
Total Surface area of cone $= \pi rl + \pi r^2$
$= \pi r(l + r)$

Volume of cone $= \frac{1}{3}\pi r^2 h$

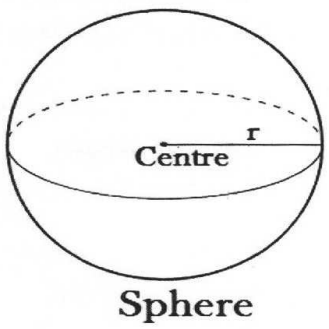
Total Surface area of hemisphere $= 3\pi r^2$

Curved Surface area of hemisphere $= 2\pi r^2$

Volume of hemisphere $= \frac{2}{3}\pi r^3$



Hemisphere



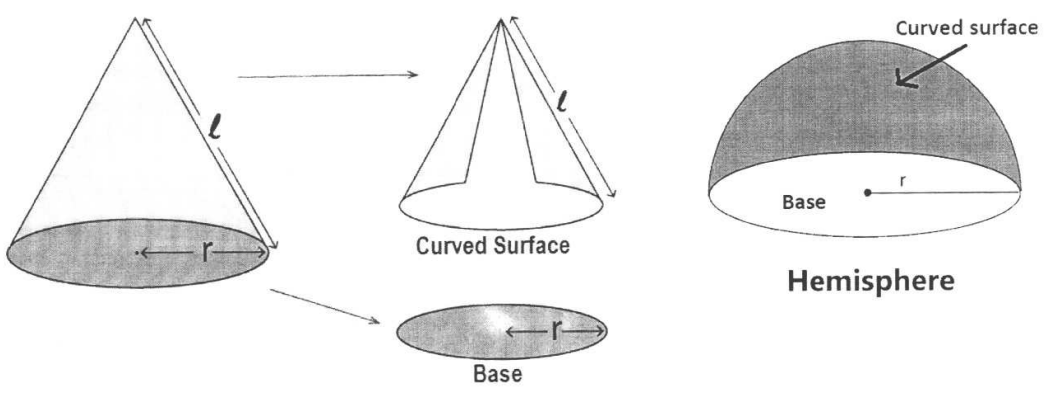
Sphere

Total Surface area of Sphere $= 4\pi r^2$

Volume of Sphere $= \frac{4}{3}\pi r^3$

Keys points

- The surface of a solid object or shape can be flat or non-flat. The non-flat surface is known as curved surface.
- Surface Area is the area of the surface of a solid object or shape.
  (i) **Lateral / Curved Surface Area :-** Area of the curved surface of a solid object or shape.



  (ii) **Total Surface Area :-** Area of all the surfaces, curved and flat both, of a solid object or shape.
- **Volume** is the shape occupied by any solid object. For hollow objects, volume is termed as capacity.
- Surface area is a **two-dimensional** measurement and measured as square-units i.e. m^2, cm^2, whereas volume is a **three-dimensional** measurement and measured as cubic-units i.e. m^3, cm^3.
- Examples of surface area are : Wrapping a gift, painting a wall, covering a bowl with a lid etc.
- Examples of volume are : Water in tank, matchboxes in a packet, soup in a bowl etc.
- A sphere has only curved surface. So, curved surface area of a sphere is also its total surface area.
- The height, slant height and radius of a cone together form a right angled triangle where height and radius are sides but slant height is the hypotenuse.
- $1m^3 = 1000\ l$ (litre)
- $1000\ cm^3 = 1\ l$ (litre)

Very Short Answer Questions (1 Mark)

1. If the volume of a sphere is numerically equal to its surface area. Then radius of sphere is:

(a) 1 unit (b) 3 unit

(c) 2 unit (d) 6 unit

2. The surface area of a solid hemisphere having radius r is:

(a) $2\pi r^2$ (b) $3\pi r^2$

(c) $4\pi r^2$ (d) $\frac{2}{3}\pi r^3$

3. The height of cone of diameter 10 cm and slant height 13 cm is:

(a) 12 cm (b) 13 cm

(c) $\sqrt{69}$ cm (d) $\sqrt{194}$ cm

4. The radius of a sphere is 2r. Its volume will be:

(a) $\frac{32}{3}\pi r^3$ (b) $4\pi r^3$

(c) $\frac{4}{3}\pi r^3$ (d) $\frac{8\pi^3}{3}$

5. If the radius of a sphere is increased by 10% then its volume will be increased by:

(a) 11.1% (b) 22.1%

(c) 33.1% (d) 44.1%

6. The radius of the sphere is 7 cm. The surface area of the sphere is _____.

7. If the radius of a sphere is doubled then the ratio of their volume is _____.

8. The diameter of sphere whose surface area is 55.44 m^2 is _____.

9. Total surface area of a cone whose radius is $\frac{p}{2}$ and slant height is l is _____.

10. Volume of a cone $= \frac{1}{3}$ (radius)$^2 \times$ _____.

11. The radius of a hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. Find the radius of the surface area of the balloon in the two cases.

12. The radius of a sphere is 21 cm. What is the surface area of the sphere?

13. The slant height of a cone is 20 cm and its diameter is 24 cm. The height of the cone is:

(a) 12 cm (b) 16 cm

(c) 10 cm (d) 14 cm

14. If the radius of a sphere is halved then its surface-area will become

(a) half (b) one-third

(c) double (d) one-fourth

15. Find the curved surface area of a cone having slant height 29 cm and base radius 21 cm.

16. Find the volume of a sphere having surface area 616 m^2.

Short Answer type-I Questions (2 Marks)

17. A conical pit of diameter 7 m is 25 m deep. Find its capacity in kilolitres.

18. The diameter of a hemispherical bowl is 21 cm. What is the quantity of milk (in litres) it can hold?

19. A right angled triangle having sides 6 cm, 8 cm and 10 cm is rotated about the side 8 cm. Find the total surface area of the solid so obtained.

20. A birthday cap is in the form of a cone of radius 10 cm and height 15 cm. How much area of a sheet is required to make 10 such caps? (Use $\pi = 3.14$)

21. The total surface area of a sphere and hemisphere is equal. Find the ratio of their volumes.

22. What is the volume of the largest cone that can be inscribed completely in a hollow hemispehere of radius 7 cm?

23. Which is false? Correct the false statement.

(a) Volume of the hollow sphere = $\frac{4}{3}\pi\left(R^3 - r^3\right)$

(b) Volume of a hemisphere = $\frac{2}{3}\pi r^3$

(c) Total surface area of a hemisphere = $3\pi r^2$

(d) Curved surface area of a hemisphere = πr^2

24. A cone is 8.4 cm high and the radius of its base is 2.1 cm. It is melted and recast into a sphere. Find the radius of the sphere.

25. Find the area of canvas required for a conical tent of height 24 m and base radius 7 m.

26. Find the ratio of total surface area of a sphere and a hemisphere of same radius.

27. If the radius and slant height of a cone are $\frac{r}{2}$ and $2l$ then find its total surface area.

28. A cone and a hemisphere have equal base and equal volumes. Find the ratio of their heights.

Short Answer type-II Questions (3 Marks)

29. A hemispherical bowl is to be painted from inside at the rate of ₹ 20 per 100 m^2. The total cost of painting is ₹ 30.80. Find the inner surface area of the bowl.

30. The radius of a sphere is 10 cm. If the radius is increased by 1 cm then prove that volume of the sphere is increased by 33.1%.

31. The diameter of a hemisphere is decreased by 30%. What will be the percentage change in its total surface area?

32. The volume of a sphere is 4851 cm^3. How much should its radius be reduced so that its volume becomes $\frac{4312}{3}$ cm^3?

33. The volumes of the two spheres are in the ratio 64 : 27. Find the ratio of their surface areas.

34. Twenty Seven solid iron spheres each of radius r and surface area S are melted to form sphere with surface area S'. Find the

(i) radius R of the new sphere.

(ii) Ratio of S and S'.

35. The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm^3.

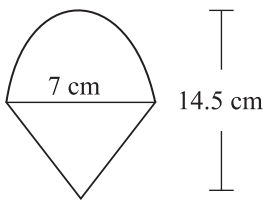
36. The base radius of a cone and radius of a Hemisphere is 12 cm. The height of the cone is 16 cm. Which of these has greater curved surface area?

37. Gautam has some balls of radius 2.1 cm. The total volume of the balls is 582.12 cm^3. How many balls does Gautam has?

Long Answer type Questions (5 Marks)

38. A right circular cone is 5.4 cm high and radius of its base is 2 cm. It is melted and recast into another right circular cone with radius of base as 1.5 cm. Find the equal height of the new cone. Prove that both the cones have equal volume.

39. A toy in the form of a cone mounted on a hemisphere of diameter 7 cm. The total height of the toy is 14.5 cm. Find the volume and the total surface are of the toy.



(Take $\pi = \frac{22}{7}$)

40. The slant height of a cone is 14 cm and its curved surface area is 308 cm^2. Find the volume and total surface area of the cone.

41. If h, c and v respectively, are the height, the curved surface and volume of the cone then prove that $3pvh^3 - c^2h^2 + 9v^2 = 0$

42. The curved surface area of a cone is two-third of its total surface area. If total surface area of the cone is 231 cm^2 then find the volume of the cone.

43. A hemispherical steel bowl is 0.25 cm thick and its inner radius is 5 cm. Find the cost of coating the complete bowl at the rate of 0.85 per cm^2. (Use $\pi = 3.14$)

Chapter - 11
Surface Area and Volumes
Answers

1. (b) 3 units

2. (b) $3\pi r^2$

3. (a) 12 cm

4. (a) $\frac{32}{3}\pi r^3$

5. 33.1%

6. 616 cm^2

7. 1 : 8

8. 2.1 m

9. $\frac{\pi p^2}{4} + \pi pl$

10. height

11. 1 : 4

12. 5544 cm^2

13. (b) 16 cm

14. (d) one-forth

15. 1914 cm^2

16. 1437.3 cm^3

17. $r = \frac{7}{2}$ m, $h = 25$ m

$$\text{capacity} = \frac{1925}{6}\text{m}^3$$
$$= 320.83 \text{ kl}$$

18. Volume = 2425.5 cm^3

$$\text{Quantity of milk} = \frac{2425.5}{1000}$$
$$= 2.43 \text{ litre}$$

19. $h = 8$ cm, $l = 10$ cm, $r = 6$ cm

$$\text{Total surface area} = \pi r(l + r)$$
$$= \frac{22}{7} \times 6 \times 16 = 301.7 \text{ cm}^2$$

20. $1570\sqrt{13}$ cm^2

21. $3\sqrt{3} : 4$

22. $\frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 7$

$$= \frac{22 \times 49}{3} = \frac{1078}{3} \text{ cm}^3$$

23. (d) Curved surface area of a hemisphere = πr^2

24. 2.1 cm

25. 550 m^2

26. 4 : 3

27. $\pi r\left(1 + \frac{r}{4}\right)$

28. 2 : 1

29. 154 m^2

30. $r_1 = 10$ cm $\Rightarrow$ $v_1 = \frac{4}{3}\pi(10)^3$

$r_2 = 11$ cm $\Rightarrow$ $v_2 = \frac{4}{3}\pi(11)^3$

Increase in volume of sphere

$$= \left(\frac{v_2 - v_1}{v_1} \times 100\right)\% = \frac{331}{1000} \times 100\%$$
$$= 3.31\%$$

31. $r = 0.7r$

New diameter of hemisphere = 0.7d ; radius = $0.7\frac{d}{2}$

Decrease in total surface area = $\left[\frac{3\pi\left(\frac{d}{2}\right)^2 - 3\pi\left(\frac{0.7d}{2}\right)^2}{3\pi\left(\frac{d}{2}\right)^2} \times 100\right]\%$

$= 0.51 \times 100 = 51\%$

32. $V_1 = \frac{4}{3}\pi R^3 = 4851 \Rightarrow R = \frac{21}{2} = 10.5$ cm

$V_2 = \frac{4}{3}\pi r^3 = \frac{4312}{3} \Rightarrow r = 7$ cm

Decrease in radius = 10.5 – 7 = 3.5 cm

33. $\frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{64}{27} \Rightarrow \left(\frac{r_1}{r_2}\right) = \frac{4}{3}$

Ratio of surface area $= \frac{4\pi r_1^2}{4\pi r_2^2} = \left(\frac{r_1}{r_2}\right)^2 = 16:9$

34. (1) $R = 3r$ (2) $S : S' = 1 : 9$

35. 345.39 g

36. CSA of hemisphere = 288 π cm^2
l = 20 cm,
CSA of cone = 240 π cm^2
So, hemisphere has more CSA.

37. 15 balls

38. Volume of new cone = Volume of old cone

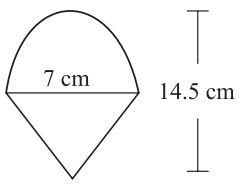
$\Rightarrow \pi (1.5)^2 \times h = \pi (2)^2 \times 5.4$

$\Rightarrow h = 9.6$ cm

Volume difference $= \frac{1\pi}{3}(5.4 \times 2 \times 2 - 1.5 \times 1.5 \times 9.6) = 0$

39. Volume of toy = CSA of (cone + hemisphere) $= 231\ cm^3$

Total surface area of toy = $204.05\ cm^2$



40. radius $r = 7$ cm

TSA = $462\ cm^2$

Volume = $\frac{1078}{\sqrt{3}}\ cm^3$

41. Let r - radius and l - Slant height

$l = \sqrt{r^2 + h^2}$, $v = \frac{1}{3}\pi r^2 h$, $c = \pi rl$

$\therefore\ 3\pi vh^3 - c^2h^2 + 9v^2$

$= 3\pi \times \frac{1}{3}\pi r^2 h \times h^3 - (\pi rl)^2 h^2 + 9\left(\frac{1}{3}\pi r^2 h\right)^2$

$= \pi^2 r^2 h^4 - \pi^2 r^2 l^2 h^2 + \pi^2 r^4 h^2$

$= \pi^2 r^2 h^4 - \pi^2 r^2 h^2 (r^2 + h^2) + \pi^2 r^2 h^2$

$= \pi^2 r^2 h^4 - \pi^2 r^4 h^2 - \pi^2 r^2 h^4 + \pi^2 r^4 h^2 = 0$

42. CSA = $\frac{2}{3}$ TSA $\Rightarrow$ CSA = $154\ cm^2$

Also CSA + πr^2 = TSA $\Rightarrow \pi r^2 = 77\ cm^2$

$\Rightarrow r^2 = \frac{49}{2}\ cm^2$

Now CSA = $154\ cm^2 \Rightarrow l = 7\sqrt{2}$ cm

Volume of cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3} \times \frac{22}{7} \times \frac{49}{2} \times 7\sqrt{2} = \frac{539\sqrt{2}}{3}\ cm^3$

43. Inner radius $r = 5$ cm; Outer radius $R = 5.25$ cm

TSA of bowl = Outer SA + Inner SA + Area of thickness

$= 2\pi R^2 + 2\pi r^2 + (\pi R^2 - \pi r^2)$

$= 2p(R^2 + r^2) + \pi(R^2 - r^2)$

$= 256.7\ cm^2$ (approx)

Cost of coating = ₹ 218.19

CHAPTER-11
SURFACE AREA AND VOLUMES
PRACTICE TEST

Time: 1 hr **M.M: 20**

1. The volume of a sphere is 310.4 cm^3. Find its radius. (1)

2. Three spheres of radii 3 cm, 4 cm, 5 cm are melted to form a new sphere. Find the radius of the new sphere. (1)

3. The ratio of radius and slant height of a cone is 4:7. If the curved surface area of cone is 192 cm^2 then find its radius. (2)

4. A semicircular sheet of paper of diameter 14 cm is bend to form a conical cup. Find the capacity of the cup. (2)

5. The seed of a corn has dimensions 1.8 cm × 0.8 cm × 0.2 cm. The height of the corn-tube is 13.7 cm and its radius is 4.2 cm. Assuring that the corn seeds are of same size, find the number of seeds on the corn-tube. (3)

6. The radius of a sphere is 5 cm. If the radius is increased by 20% then how much percentage increase will be in the volume? (3)

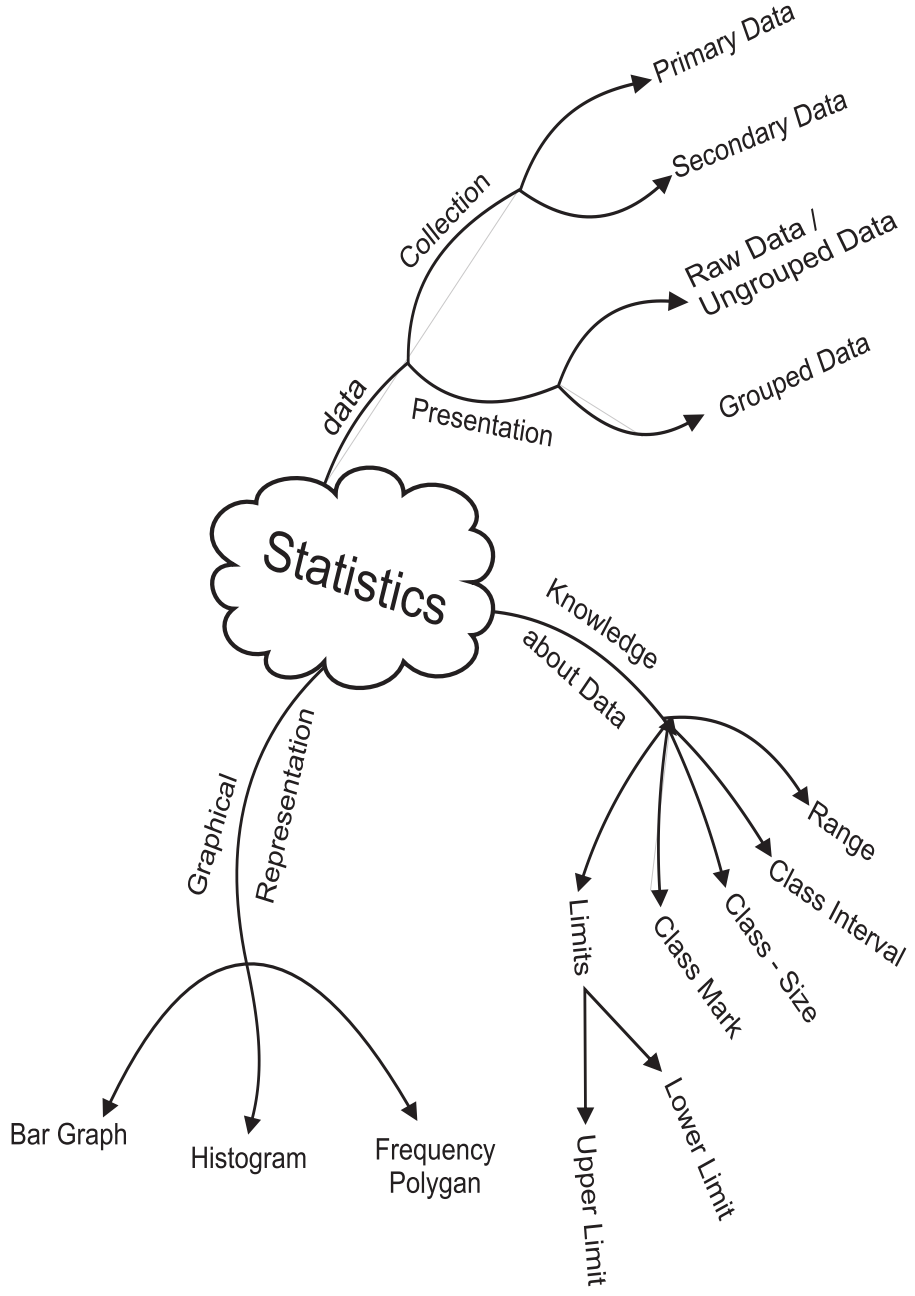
7. The surface area of the cone is double of the other and slant height of the second cone is double of the first cone. Find the ratio of their radii. (3)

8. Ajay kept ice-cream in a hemi spherical bowl of 28 cm diameter. He filled ice-cream in ice-cream cones of 8 cm diameter and height 6 cm. A hemisphere of diameter 8 cm is also kept over the cone. In how many cups the ice-cream is filled? (5)

CHAPTER-12

STATISTICS

MIND MAP



Key points

- In statistics we study collection, presentation, analysis and interpretation of data.
- The facts or figures collected with a definite purpose are called data.
- The number of times an observation occurs in the given data is called frequency of the observation.
- Class intervals are the groups in which all observations are divided.
- For class-interval 20-30, 30 is called upper class limit and 20 is called lower class limit.
- Class mark = $\frac{\text{Lower class limit + upper class limit}}{2}$

Very Short Answer type Questions (1 Mark)

1. The facts or figures, collected with a definite purpose are:

(a) Frequency (b) Data

(c) Tally Marks (d) Bars

2. To compare this years result with last years result, teacher went to the class and collected this years number of distinctions from the students. For last years number of distinctions, she opened the result register and wrote the required number of distinctions. The data collected by her from the students and register respectively, are examples of:

(a) Primary data & secondary data

(b) Primary data & raw data

(c) Both primary data

(d) Secondary data & Primary data

3. How is histogram different from bar graph.

(a) Histogram is same as bar graph but joined together.

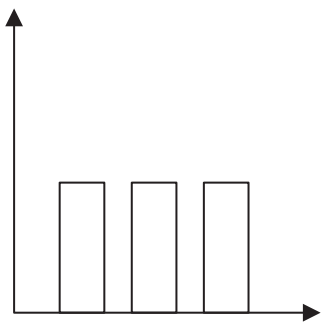
(b) no difference

(c) Class- intervals are used in histogram.

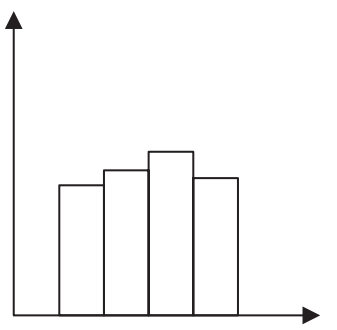
(d) A and B both are correct.

4. Which of the figures represent a histogram correctly:

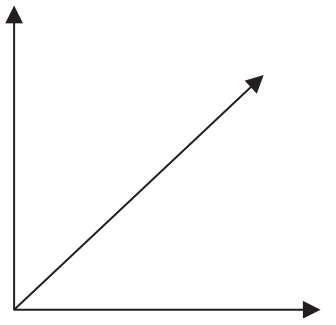
(a)



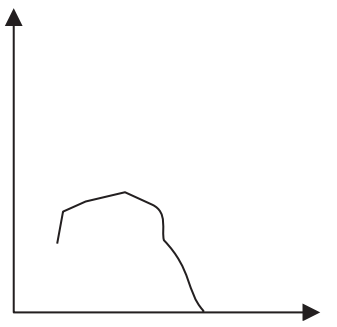
(b)



(c)



(d)



5. In a histogram when we join midpoints of the tops of the rectangles (bars) we get:

(a) Bar Graph (b) line graph

(c) Frequency Polygon (d) Pie graph

6. To draw a frequency polygon, we need _____ of the class interval for x-axis and frequency of the respective class for y-axis.

(a) upper limit (b) lower limit

(c) class-mark (d) range

7. In a continuous frequency distribution, class mark of a class is 15 and lower limit is 13, then its upper limit is:

(a) 16 (b) 14

(c) 13 (d) 17

8. If class mark of a class-interval is 8.5 and the class size is 5, then the class limits of the corresponding class-interval is:

(a) 6.5 - 11.5 (b) 6 - 11

(c) 5.5 - 10.5 (d) 7 - 12

9. Let x be the class mark and I be the upper limit of a class-interval in a continuous frequency-distribution.

The lower limit of the class is:

(a) $2x + y$ (b) $2x - y$

(c) $x - y$ (d) $x + y$

10. The difference between the highest and lowest values of the data is called _____ of that observations.

11. The marks of 5 students in a subject out of 50 are 32, 48, 50, 27 and 37, the range is _____.

12. A set of data contains 64 as the highest value and its range is 13, the lowest value of the data is _____.

13. The mid point of a class is called _____.

14. The class mark of the class interval 4.7-6.3 is _____.

15. Class size of class intervals 5.5-15.5, 15.5-25.5, 25.5-35.5 is _____.

Short Answer type-I Questions (2 Marks)

16. If class mark of a class-interval is 18.5 and the class size is 5, find the class limit of the corresponding class interval.

17. In a continuous frequency distribution, class mark of a class is 15 and lower limit is 13. Find its upper limit.

18. The class marks of a continuous distribution are 3.05, 3.15, 3.25, 3.35, 3.45, and 3.55. Find the class interval corresponding to the class mark 3.35

19. The weight (in kg) of 25 students are given below 35, 38, 36, 37, 38, 35, 37, 36, 35, 38, 36, 36, 35, 35, 38, 37, 35, 36, 38, 38, 35, 35, 36, 38, 37

Complete the following frequency table:

Weights :	35	36	37	38
Frequency :	____	____	____	____

20. The class marks of a distribution are 104, 114, 124, 134. Determine the class size and the class limits.

21. Following data gives the number of children in 30 families.

2, 1, 0, 3, 4, 2, 4, 3, 0, 1, 2, 4, 5, 3, 2, 2, 2, 1, 1, 1, 0,2, 0, 3, 2, 1, 0, 4, 5, 1

represent it in the form of a frequency distribution.

Short Answer type-II Questions (3 Marks)

22. Given below are the runs scored by 18 players in one day cricket match:

3, 7, 16, 27, 46, 122, 73, 24, 7, 3, 0, 8, 46, 3, 99, 45, 28, 79

Form a frequency table for above data with equal class intervals one of these being 0-25 (excluding 25). Which class has maximum frequency?

23. The time taken (in second) by 25 students in an examination to solve certain questions is given below.

20, 16, 20, 27, 27, 28, 30, 33, 37, 50, 40, 42, 46, 28, 43, 46, 46, 48, 49, 52, 58, 59, 60, 64, 52

By taking class interval of size 10, make a frequency distribution table. Which class has minimum frequency?

24. Draw the histogram from the following data

Class	0-10	10-20	20-30	30-40	40-50
Frequency	8	15	20	12	16

25. Given below is a cumulative frequency distribution table showing the marks scored by 50 students of a class.

Marks	Number of students
Below 20	17
Below 40	22
Below 60	29
Below 80	37
Below100	50

Form a frequency table from the above data.

26. Given below are the seats won by different political parties in a state assembly election :

Political Party	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Seat won	75	55	37	29	10	37	50

Draw a bar graph for above data.

Long Answer type Questions (5 Marks)

27. Given below is the data of students who participated in different activities.

Activity	Sports	Meditation	Yoga	Walking
No. of Girls	42	35	100	120
No. of Boys	90	64	130	86

Draw double bar graph. Which has maximum number of boys?

28. Draw histogram to represent the data given below.

Age (in years)	No of children
1-2	5
2-3	4
3-5	10
5-7	12
7-10	9
10-15	10
15-17	8

29. Construct a histogram from the following distribution of total marks obtained by 40 students of IX class in a test.

Class Marks (mid point)	5	15	25	35	45	55
No. of Students	3	7	6	14	8	2

30. For the following data, draw a frequency polygon.

Marks obtained	10-20	20-30	30-40	40-50	50-60
No. of Students	6	8	3	9	4

31. Draw a frequency polygon for the following data

Marks	Frequency
0-10	03
10-20	09
20-30	18
30-40	16
40-50	12
50-60	02

32. The blood group of 30 students of class IX are recorded as follows. If O is a universal donar and AB is a universal recipient then –

A, B, B, B, O, B, B, A, AB, A, O, B, O, AB, O

AB, AB, B, AB, B, A, O, AB, B, A, O, AB, A, A, AB

(a) Make a frequency distribution table for the above data.

(b) Mr. '*X*' meets an accident and needs blood. His blood group is AB. How many of these students are universal donors and how many are universal recipients?

33. A doctor suggests two ways for treatment of a particular disease one by taking medicine only and other by doing meditation and yoga.

Age group	No. of patients taking medicines	No. of patients doing meditation and yoga
20-30	20	05
30-40	30	12
40-50	42	20
50-60	40	30
60-70	30	20

Represent the data of both the ways of treatment on the same graph by two frequency polygons.

34. The following table shows number of voluntary blood donors per day in voluntary blood donation camp organized in Delhi.

Days	No. of Donors
Sunday	100
Monday	80
Tuesday	110
Wednesday	80
Thursday	60
Friday	70
Saturday	120

(i) Draw a bar graph showing above information.

(ii) On which day donation was maximum and on which day it was minimum?

Chapter - 12

STATISTICS

Answers

1. (b) Data

2. (d) Secondary data and Primary data

3. (c) Class intervals is used in histogram.

4. (b)

5. (c) Frequency polygon

6. (c) class mark

7. (d) 17

8. (b) 6-11

9. (b) $2x - y$

10. Range

11. 23

12. 51

13. class mark

14. 5.5

15. 10

16. 16-21

17. 17

18. 3.3-3.4

19.

Weight	35	36	37	38
Frequency	8	6	4	7

20. class size = 10
class limits = 99-109, 109-119, 119-129, 129-139

21.

No. of Children	Tally Marks	No. of Families
0	𝍸	5
1	𝍸 ||	7
2	𝍸 |||	8
3	||||	4
4	||||	4
5	||	2

22.

Class-Interval	Tally Marks	Frequency
0–25	𝍸 ||||	9
25–50	𝍸	5
50–75	|	1
75–100	||	2
100–125	|	1

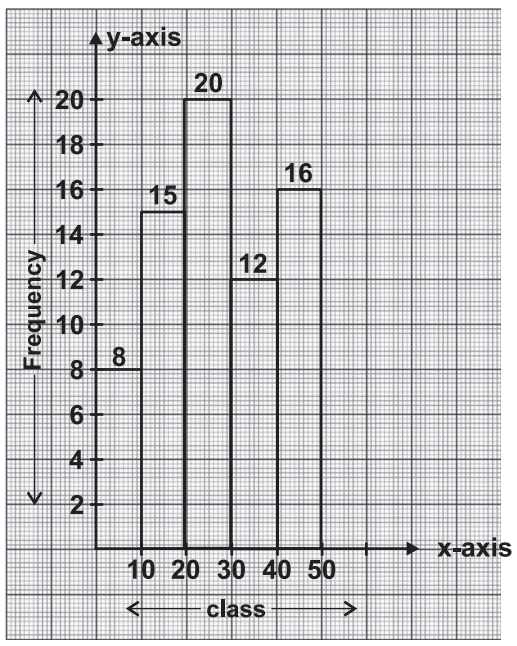
0 - 25 has maximum frequency.

23.

Class-Interval	Tally Marks	Frequency
15–25	|||	3
25–35	𝍸 |	6
35–45	||||	4
45–55	𝍸 |||	8
55–65	||||	4

15 - 25 has minimum frequency.

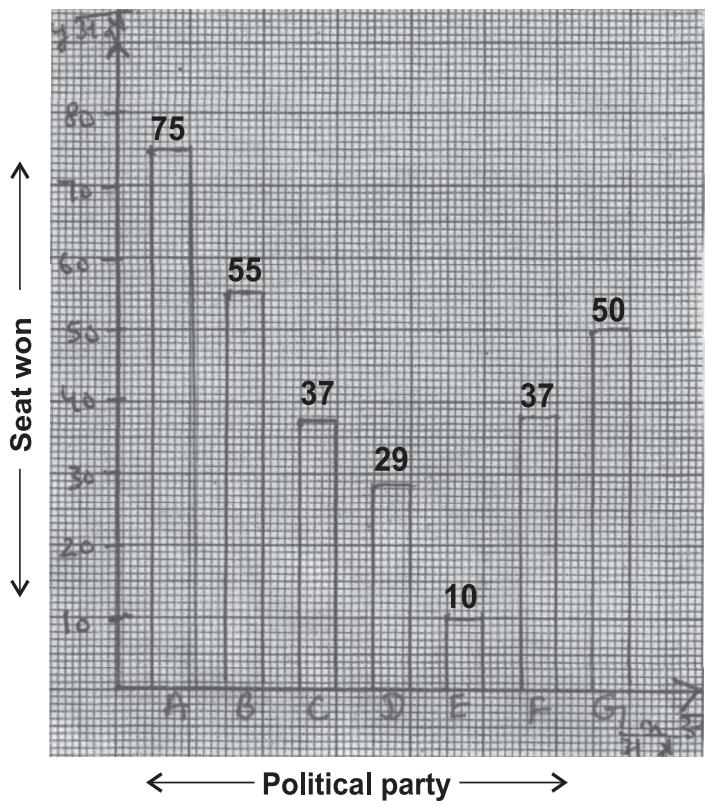
24.



25.

Class-Interval	Frequency
0-20	17
20-40	5
40-60	7
60-80	8
80-100	13

26.



Chapter - 12
STATISTICS
Practice Paper

Time : 1 Hr. **M.M. 20**

1. Write class limits of the following class marks: (1)

47, 52, 57, 62, 67, 72, 77

2. The class-mark of class interval 8-15 is _____ (1)

3. The following data gives the number of children in 20 families: (2)

1, 2, 0, 3, 2, 1, 0, 4, 3, 2, 2, 0, 1, 2, 3, 2, 2, 0, 4, 3

Represent it in the form of a frequency distribution.

4. The class marks of a distribution are 25, 35, 45, 55, 65. Determine the class size and the class limits. (2)

5. The time taken (in seconds) by 25 students in an examination to solve certain question is given below: (3)

18, 22, 17, 25, 27, 33, 35, 19, 21, 20, 17, 16, 25, 27, 33, 34, 38, 42, 43, 41, 37, 22, 19, 44, 36

By taking class intervals of size 10, make a frequency distribution table.

6. Given below is a cumulative frequency distribution table showing the marks scored by 50 students of a class: (3)

Marks	Below 20	Below 40	Below 60	Below 80	Below 100
No. of students	17	22	29	37	50

Form a frequency table from the above data.

7. Draw the histogram from the following data : (3)

Age (in yrs)	18-20	20-22	22-24	24-26	26-28	28-30
No. of persons	5	4	6	9	7	2

8. Given below is the data of students who participated in different activities. (5)

Activity	Sports	Meditation	Yoga	Walking
No. of girls	25	32	17	27
No. of boys	35	18	22	25

Draw double bar graph. Which Activity has maximum number of girls and which has minimum number of boys ?

ASSERTION REASONING BASED QUESTIONS

In the following questions, there is one Assertion (A) and one reason (R). Choose the correct answer of these questions from the four options (a), (b), (c) and (d) given below:

(a) Both A and R are correct and R is the correct explanation of the assertion
(b) Both A and R are correct but R is not the correct explanation of the assertion
(c) A is true but R is false.
(d) A is false but R is true.

1. Assertion (A) : $\sqrt{5}$ is an irrational number
   Reason (R) : A number is called irrational, if it can not be written in the form p/q, where p and q are integers and $q \neq 0$.
2. Assertion (A) : 7 is rational number.
   Reason (R) : The square root of all rational numbers is irrational.
3. Assertion (A) : 0.258..... is a terminating decimal.
   Reason (R) : A decimal in which a digit or a set of digits is repeated periodically is called a repeating or a recurring decimal .
4. Assertion (A) : The degree of the polynomial $(x^2 - 2)(x - 3)(x + 4)$ is 3.
   Reason (R) : A polynomial of degree 3 is called a cubic polynomial.
5. Assertion(A) : –7 is a constant polynomial.
   Reason (R) : The degree of a constant polynomial is zero.
6. Assertion(A) : The expression $3x^4 - 4x^{3/2} + x^2 = 2$ is not a polynomial because the term $-4x^{3/2}$ contains a rational power of x.
   Reason (R) : The highest exponent in various terms of an algebraic expression in one variable is called its degree.
7. Assertion (A) : The point (–2, 0) lies on the y-axis and (0, 4) lies on the x-axis.
   Reason (R) : Every point on the x-axis has zero distance from the x-axis and every point on the y-axis has zero distance from the y-axis.
8. Assertion (A) : The abscissa of a point (5, 2) is 5.
   Reason (R) : The perpendicular distance of a point from the y-axis is called its abscissa.
9. Assertion (A) : If the ordinate of a point is equal to its abscissa, then the point will lie either in the first quadrant or in the fourth quadrant.

Reason (R) : A point whose both coordinates are negative will lie in the third quadrant.

10. Assertion (A) : The values of a, b and c in linear equation $9y = 2x + 9$ are 2, –9 and 9 respectively.
    Reason (R) : The general form of linear equation in two variables is $ax + by + c = 0$

11. Assertion (A) : The equation $9x = 100$ is parallel to y-axis.
    Reason (R) : The graph of $x = a$ is a straight line parallel to the y-axis

12. Assertion (A) : $x + y = 9$ has only two solutions (0, 9) and (9, 0).
    Reason (R) : Every linear equation in two variables has infinitely many solutions.

13. Assertion (A) : Parallel lines are those lines which never intersect each other.
    Reason (R) : Two or more lines can be parallel.

14. Assertion (A) : An infinite number of lines can be drawn to pass through a given point.
    Reason (R) : A line segment has two end-points.

15. Assertion (A) : Raj and Ali have the same weight. If each gain weight by 3 kg, then second Euclid's axiom will be used to compare their weights.
    Reason (R) : According to Euclid's second axiom, when equals are added to equals the wholes are equal.

16. Assertion (A) : An angle exceeds its complement by 20°, then the angle is 52°.
    Reason (R) : Two angles are said to be complementary if the sum of the measures of their angles is 90°.

17. Assertion (A) : If $a = 35°$ and $b = 155°$, then angles 'a' and 'b' form a linear pair of angles.
    Reason (R) : The sum of a linear pair of angles is always 180°.

18. Assertion (A) : If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 5 : 4, then the larger of the two angles is 100°.
    Reason (R) : If a transversal intersects two parallel lines, then the sum of the interior angles on the same side of the transversal is 180°.

19. Assertion (A) : If $\Delta ABC \cong \Delta PQR$ by SSS congruence rule then AB = QR.
Reason (R) : If two triangles are congruent then corresponding parts of congruent triangles are equal.

20. Assertion (A) : Two angles measures a° and 3a-80°. If each angle is opposite to equal sides of an isosceles triangle, then the value of a is 40°.
Reason (R) : The sides opposite to equal angles of a triangle are equal.

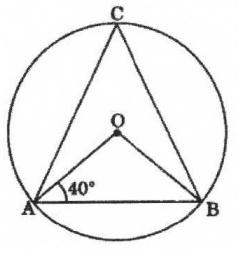
21. Assertion : All the sides of a square are of equal length.
Reason (R) : All squares are congruent.

22. Assertion(A) : The angles of a quadrilateral are$x°$, $(x - 10)°$, $(x + 30)°$ and $(2x)°$. The smallest angle is equal to 58°.
Reason(R) : The sum of the angles of a quadrilateral is 360°.

23. Assertion(A) : The adjacent sides of a quadrilateral have one common point.
Reason(R) : The opposite sides of a quadrilateral have two common point.

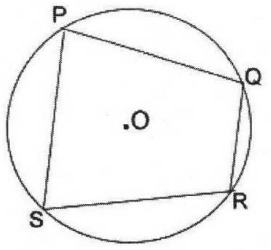
24. Assertion(A) : Every square is rhombus.
Reason(R) : Every rhombus is a square.

25. Assertion (A) : In the figure, $\angle ACB = 50°$.
Reason (R) : The angle in the semicircle is a right angle.



26. Assertion (A) : The part of a circle cut from the chord is sector of the circle.
Reason (R) : A sector of a circle is the region between its radii and arc.

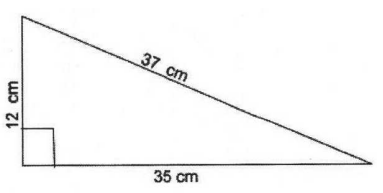
27. Assertion (A) : In figure, PQRS is a cyclic quadrilateral.
Reason (R) : The opposite angles of a cyclic quadrilateral are supplementary.



28. Assertion (A) : If the sides of a triangle are 6 cm, 11 cm and 23 cm then the value of 's' is 40 cm.
Reason (R) : 's' is the semi-perimeter of the triangle.

29. Assertion (A) : The area of an equilateral triangle having side a is given by $\frac{\sqrt{3}}{4} a^2$.
Reason (R) : The area of an equilateral triangle cannot be found using Heron's formula.

30. Assertion (A) : The area of the given right angled triangle is 210 cm^2.
Reason (R) : The general formula to find the area of triangle is $\sqrt{\frac{1}{2}} \times$ base $\times$ height



31. Assertion (A) : If the curved surface area of a sphere is $64\pi r^2$, then the radius of the sphere is $2r$.
Reason (R) : The volume of a sphere is $\frac{4}{3}\pi r^3$.

32. Assertion (A) : The slant height of a cone is $l = h^2 - r^2$, where h is the height and r is the radius
Reason (R) : The slant height l, height h and radius r of a cone are the sides of a right angled triangle.

33. Assertion (A) : The curved surface area of the hemisphere is 25.12 cm^2
Reason (R) : The diameter of the hemisphere is 4 cm.

34. Assertion (A) : Range = Maximum value – Minimum value
Reason (R) : The range of the first 6 multiples of 6 is 9.

35. Assertion (A) : The class mark of the class interval 90-120 is 105.
Reason(R) : Class mark = $\frac{1}{2}$ (upper limit + lower limit)

36. Assertion(A) : For class intervals 10-20, 20-30, 20 is included in interval 20-30.
Reason(R) : The number is always included in the lower limit of the class interval.

ANSWERS

Assertion Reasoning Based Questions

1. (a) Both A and R are correct and R is the correct explanation of the assertion
2. (c) A is true but R is false.
3. (d) A is false but R is true.
4. (d) A is false but R is true.
5. (a) Both A and R are correct and R is the correct explanation of the assertion.
6. (b) Both A and R are correct but R is not the correct explanation of the assertion.
7. (a) Both A and R are correct and R is the correct explanation of the assertion.
8. (a) Both A and R are correct and R is the correct explanation of the assertion
9. (d) A is false but R is true.
10. (a) Both A and R are correct and R is the correct explanation of the assertion.
11. (a) Both A and R are correct and R is the correct explanation of the assertion.
12. (d) A is false but R is true.
13. (b) Both A and R are correct but R is not the correct explanation of the assertion.
14. (b) Both A and R are correct but R is not the correct explanation of the assertion.
15. (a) A and R are correct and R is the correct explanation of the assertion.
16. (d) A is false but R is true.
17. (d) A is false but R is true.
18. (a) Both A and R are correct and R is the correct explanation of the assertion.
19. (a) Both A and R are correct and R is the correct explanation of the assertion.
20. (d) A is false but R is true.
21. (c) A is true but R is false.
22. (a) Both A and R are correct and R is the correct explanation of the assertion.

23. (c) A is true but R is false.

24. (c) A is true but R is false.

25. (b) Both A and R are correct but R is not the correct explanation of the assertion.

26. (d) A is false but R is true.

27. (b) Both A and R are correct but R is not the correct explanation of the assertion.

28. (d) A is false but R is true.

29. (c) A is true but R is false.

30. (c) A is true but R is false.

31. (b) Both A and R are correct but R is not the correct explanation of the assertion.

32. (d) A is false but R is true.

33. (a) Both A and R are correct and R is the correct explanation of the assertion.

34. (c) A is true but R is false.

35. (a) Both A and R are correct and R is the correct explanation of the assertion.

36. (a) Both A and R are correct and R is the correct explanation of the assertion.

CASE STUDY BASED QUESTIONS

1. Eco-club of a school decided to develop a garden of the school and planted three types of plants *A, B* and *C*. Plant A are x in number and number of plant B are same as number of plant C. The total number of plants is 100. Based on the above information answer the following questions-

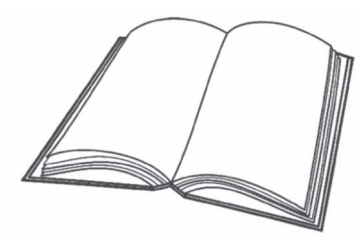
(i) Write the correct representation of the above situation in the form of linear equation.

(ii) If number of plants of type *A* is 50, then find number of plant of type *B*.

(iii) If number of plants of type *A* and *B* together is 75, then find number of plant of type *C*.

(iv) Find the number of plants of type *C*, if number of plants of type A is 60.

2. The RWA of a locality is running a lending library to develop the habit of reading books among society. To run this library they change a fixed amount of ₹10 for first five days for a book and ₹3 for each day there after.



Based on above information, answer the following questions:

(i) If you borrow the book for 7 days what amount you will have to pay?

(ii) If you borrow the book and paid total amount as ₹40, then find the number of days for which book was borrowed.

(iii) Find the linear equation to represent the condition by taking as total number of days ($x \geq 5$) and total amount paid as ₹ y.

(iv) In the linear equation, if $x = 7$ then find the value of y.

3. During Covid-19 door to door survey, A front line health worker recorded the temperature of the family of five members, their name and age is given below.

Name	Age (in years)
Uma	65
Raj kumar	40
Savita	37
Rohan	14
Jyoti	10

The linear equation that convert temperature from Fahrenheit (°F) to Celsius (℃) is given by

$$C = \frac{5F - 160}{9}$$

(i) If temperature of Uma is 97.7°F , then find her temperature in ${}^{0}C$.

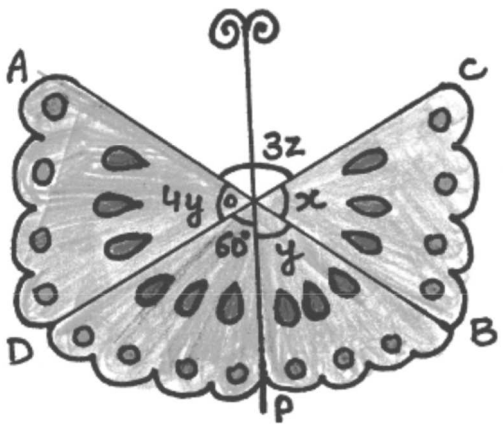
(ii) If temperature of Raj Kumar is $37°C$ then find his temperature in ${}^{0}F$.

(iii) If Celsius is taken on x-axis and Fahrenheit is taken on y-axis, then graph will not pass through which quadrant?

(iv) If normal temperature of a human body lies between 36.5° C, and 37.5ºC then in Fahrenheit temperature will lie in which range?

4. Rashmi was making a toy butterfly with sticks for her younger sister. She arranged the sticks as shown in figure. AB and CD are two sticks intersecting (joined) at O and a third stick OP is also joined to hold the toy butterfly.

Based on the above information, answer the following questions:-



(i) At what angle does Rashmi inclined the two sticks *AB* and *CD*?

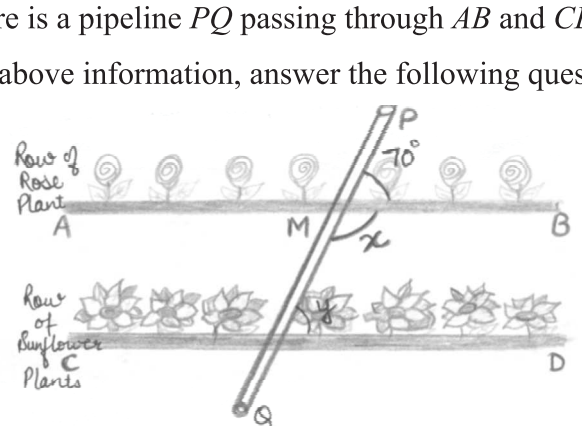
(ii) If the sticks AB and CD of equal lengths 10 cm are joined at the mid point, then find the value of *OA*.

(iii) Find the value of *y* and *z* in the figure.

(iv) Find the value of *x* and also find $x + 4y$.

5. Four students Shreya, Khushi, Vaibhav and Sushant of Class-IX are selected in Eco club of the school for plantation work. Shreya and Vaibhav planted a row of jasmine plants as show in figure with line *AB*. Now Khushi and Sushant want to plant another row CD of sunflower plants parallel to jasmine plants row. Also there is a pipeline *PQ* passing through *AB* and *CD*.

Based on the above information, answer the following questions:-



(i) At what angle with *PQ* should Khushi and Sushant plant row *CD* to make it parallel to row *AB*?

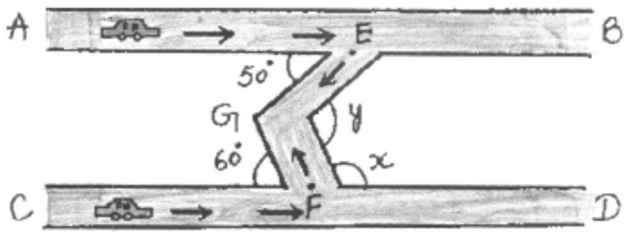
(ii) Which type of angle is formed by pair of *x* and *y*?

(iii) What will be the value of x and y?

(iv) What will be the sum of angle between AB and CD marked as x and y ? What will be the value of $2x + y$?

6. Two cars are moving on two parallel roads represented as AB and CD respectively in the given figure. First car reached at point E and takes a turn towards its right at an angle of 50°. At the same time, second car reaches at point F and takes a turn towards its left at an angle of 60°. They both meet at a point G.

Based on the above information and given figure, answer the following questions (without considering the width of the roads)

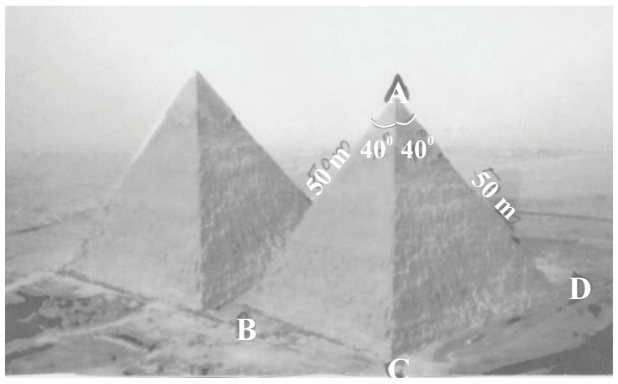


(i) What will be the measure of angle x marked in the figure?

(ii) What will be the measure of $\angle EGF$ marked as y ?

(iii) What will be the measures of reflex $\angle EGF$? If EF is joined, what type of triangle will EGF made ?

7. The Egyptian pyramids are ancient structures located in Egypt. The pyramid of Khufu is the biggest - Egyptian pyramid. It is one of the seven wonders of the Ancient world still in existence.



A pyramid is a structure whose outer surface are triangular and converge to a single step at the top. The base of pyramid can be triangle, quadrilateral or any

polygon. Geeta a mathematics student visits Egypt and observes the pyramid (shown in the figure)

Based on the above information answer the following questions:

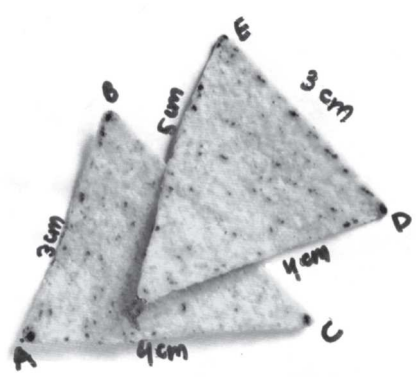
(i) Name the triangle which is congruent to $\angle ABC$

(ii) By which property triangles are congruent.

(iii) BC = _____

(iv) Using CPCT write all congruent parts?

8. Sanjana and Anshu are two friends, both of them are fond of eating chips. Once they were eating triangular chips and suddenly Sanjana noticed that all the chips look alike and she recalled the chapter of triangles that had been taught by the teacher in school.



She decided to measure the sides of the chips and she founds out that all chips were of same measurement 3 cm, 4 cm, and 5 cm. As shown in figure.

Based on the information given above answer the following questions :

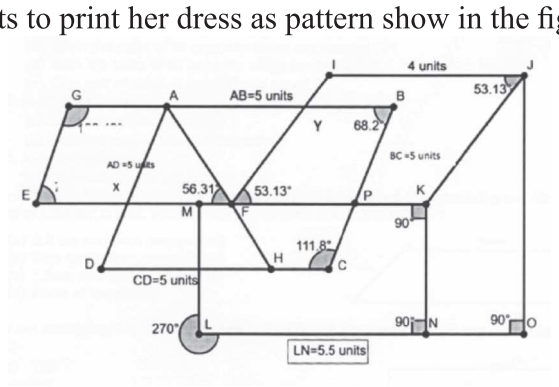
(i) Which type of triangle were the chips?

(ii) Were the triangular chips congruent if yes, which property was used?

(iii) BC = _____

(iv) $\angle A$ = _____

9. Rohita wants to print her dress as pattern show in the figure



(i) Rohita wants to order a block of shape $ABCD$. What shapes should Rohita mention to the carpenter for a wooden block for printing $ABCD$?

(ii) What is the shape of LNKM?

(iii) She wants to colour two pairs of parallel lines with same shade. Write any two such pairs

(iv) Rohita needs to know the measure of $\angle AFY$ to construct $\triangle AFY$. What should be $\angle AFY$?

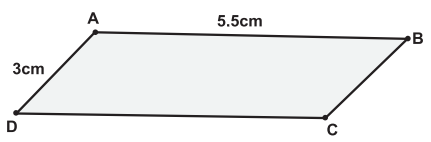
10. Class IX-C wants to decorate the display board of their class. They are using following concepts for cutting paper shapes for decoration-

(1) A quadrilateral is called a parallelogram if – Both the pairs of opposite sides are equal.

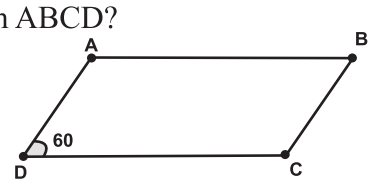
(2) In a parallelogram – (a) opposite angles are equal (b) Adjacent angles are supplementary

(3) In a parallelogram (a) diagonals bisect each other

(i) To decorate the border of the board they want to cut shapes like parallelogram $ABCD$, using sheets of different colors. What should length of CD and BC_____?

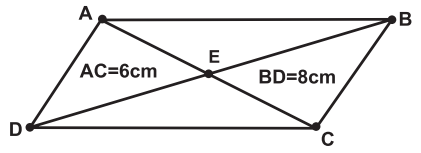


(ii) To cut parallelogram $ABCD$ they fixed $\angle D = 60°$. What should be $\angle B$ to get parallelogram ABCD?



(iii) What should be $\angle A$ to get parallelogram $ABCD$?

(iv) Some of the parallelograms were cut to get triangles such as to design flowers at the corner of the board. If BD is kept 8 cm long and AC is 6 cm then what should be length AE?

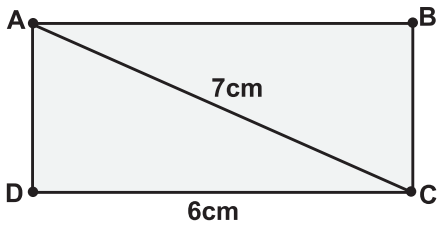


11. (1) A parallelogram is called a Rectangle if one of its angle is 90°. It makes all the angles of the rectangle 90°. Its diagonals of the rectangle become equal and bisect each other.

(2) A parallelogram is called a square if one of its angles is 90°. and one pair of adjacent sides are equal. it makes all the angles of the square as 90°. and all the sides equal. The diagonals of a square become equal and bisect each other at 90°.

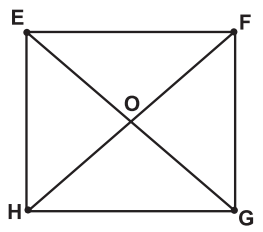
Sahil is using above learnings to design a wall-hanging. He is using wires to structure a frame and then is going to wrap up wool around the wires.

(i) The first frame he structured from wires is rectangle *ABCD*, as shown in figure. if the diagonal wire is 7 cm and side is 6 cm then what should be length of BC to get required rectangle?



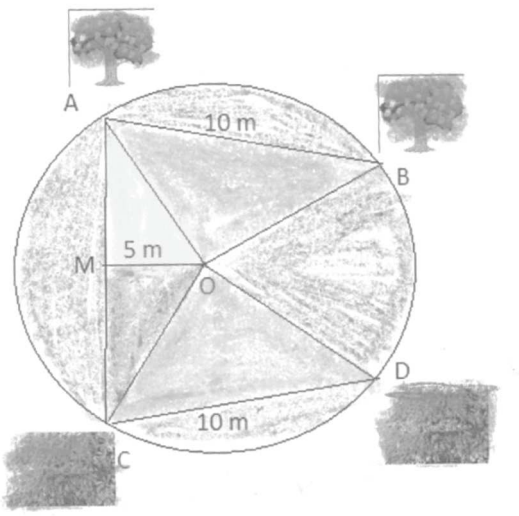
(ii) What should be length of wire *BD*?

(iii) The second frame is square *EFGH*. He has a left out piece of wire having length 8 cm. He wants to take this piece as diagonal of *EFGH* i.e., GE = 8 What should be the length of wire HF?



(iv) What should be the length of wire EF?

12. A farmer has a circular garden as shown in the picture. He has different types of trees, plants and flower plants in his garden. In the garden, there are two mango trees *A* and *B* at a distance of A *B* = 10 m. Similarly, the garden has two Litchi trees at the same distance of 10 m as shown at *C* and *D*. *AB* subtends $\angle AOB = 80°$ at the center *O*. The perpendicular distance of *AC* from centre is 5 m and the radius of the garden is 13 m.



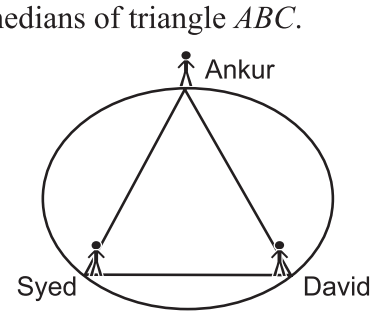
(i) What is the value of $\angle COD$?

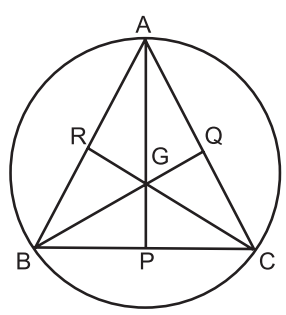
(ii) What is the distance between mango tree A and Litchi tree C ?

(iii) If $\angle BOD = 70^{\circ}$ then show that $\angle CAB = 75^{\circ}$.

(iv) What is the value of $\angle OCD$?

13. A circular park of radius 20m is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in hand to talk to each other as shown in figure. AP, BQ and CR are the medians of triangle ABC.





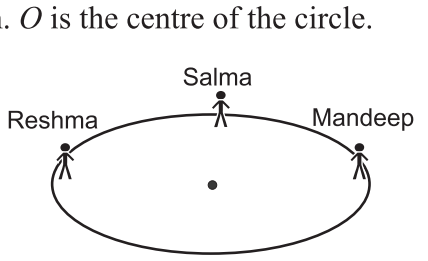
(i) What is the length of AG ?

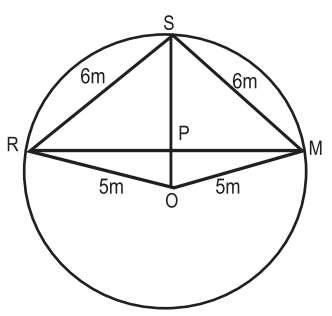
(ii) What is the length of AP ?

(iii) Find the measure of angle $\angle BGC$ and $\angle ABQ$.

(iv) Find length AB.

14. Three girls Reshma, Salma and Mandeep are playing a game by standing on a circle of radius 5m at R, S and M respectively as shown in figure. Reshma throws a ball to Salma, Salma to Mandeep and Mandeep to Reshma. The distance between Reshma and Salma and between Salma and Mandeep is 6 cm. *O* is the centre of the circle.





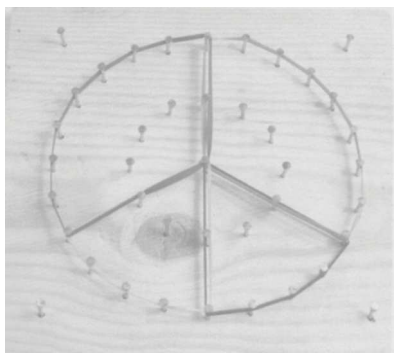
(i) Find the ratio $\angle MOS : \angle MRS$.

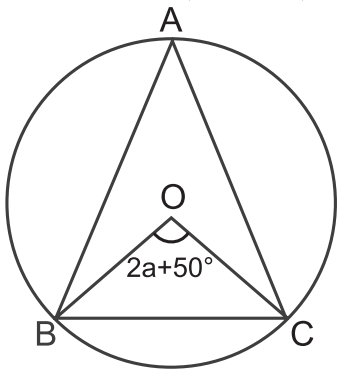
(ii) Find the length of perpendicular from *O* to the chord *SM*.

(iii) Find *OP*.

(iv) What is the distance between Reshma and Mandeep ?

15. During a practical activity in mathematics lab, students were using circular Geo-board. The angle subtended by $\overset{\frown}{BC}$ at the centre is $(2a + 50°)$.





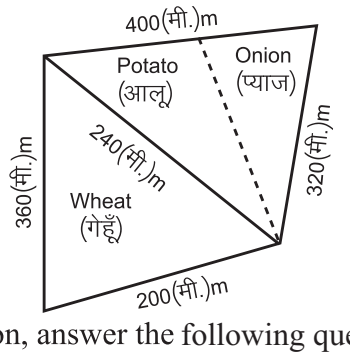
(i) What is the measure of $\angle BAC$?

(ii) If $a = 30°$, then find the measure of $\angle BAC$.

(iii) If $a = 50°$, then find reflex $\angle BOC$.

(iv) The radius of the circle is 10 cm and $a = 20^{\circ}$, find the length of *BC*.

16. Sarla Devi has a triangular field with sides 240m, 200m, and 360m, where she grew wheat. In another triangular field with sides 240m, 320m and 400m adjacent to the previous field, she wanted to grow potatoes in one part and onions in the other part. To divide this field into two equal parts, she joined the mid-point of the longer side to its opposite vertex. She grew potato in one part and onions in another.



Based on the above information, answer the following question :

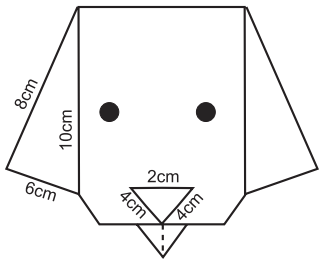
(i) What is the area of the wheat field?

(ii) What is the area of the field used for growing potatoes?

(iii) What is the area of the field used for growing onions? Find the ratio of the areas of the fields used for growing potatoes and onions.

(iv) What will be the total area of land she has? Express the area in hectare also.

17. During summer vacations, Rohit was getting bored due to lockdown in his city. Because of the COVID pandemic, he couldn't go out to play with his friends. His mother suggested him to start making some origami craft material. He learn origami craft through Internet and made a puppy as shown in figure.



Based on the above information and measurement of different parts of the figure, answer the following questions:

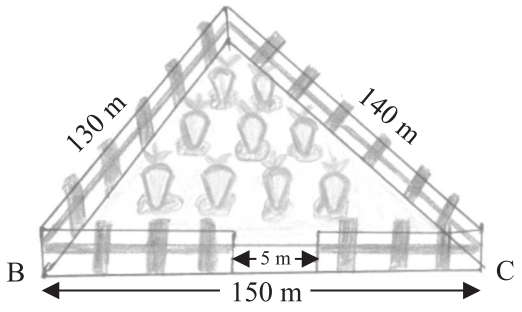
(i) What is the area of one ear of the puppy? (both ears are similar)

(ii) What is the area of the paper used to make nose of the puppy?

(iii) If the tongue of the puppy is in the shape of equilateral triangle, with side 2 cm each, then what is the area of the paper used to make tongue? What will be the length of the middle line of the tongue as shown in figure?

(iv) If the total area of paper used to make the puppy is 96 cm^2, then find the area of paper used to make the face (except ears, nose and tongue) of the puppy.

18. A triangular field has vertices *A, B* and *C*. The length of the sides are 130m, 140m, and 150m. The farmer wants to fence his field all around leaving a space 5 m wide with gate on one side. The cost of fencing it with barbed wire is ₹20 per metre. After fencing farmer cultivates carrot in the field.



Based on the above information, answer the following questions:-

(i) Find the semi perimeter of the triangular field.

(ii) Find the perimeter of the field.

(iii) Find the cost of fencing the field.

(iv) Find the total area of the field.

19. Juhi a young girl found a spherical shaped coconut. She consumed the water of the coconut and used her creativity by decorating the outer spherical covering of the coconut and sold it. The radius of the coconut was 2.1 cm. (considering the thickness of coconut negligible and coconut fully filled with water).

Based on the above situation, answer the following questions:-

(i) What was the surface area of spherical coconut?

(ii) If Juhi could decorate only half coconut using paper then what would be the area of required paper?

(iii) If the price for decorating coconut is Rs 5 per sq cm then what would be price of decorating the whole coconut?

(iv) What was the volume of coconut water Juhi consumed?

20. Traffic cone are used outdoor during road work in various situations such as traffic redirection, advance warning of hazards or the prevention of traffic.

A traffic cone has the radius of 2.1 cm and height 20 cm. Answer the following questions based on the above data:-

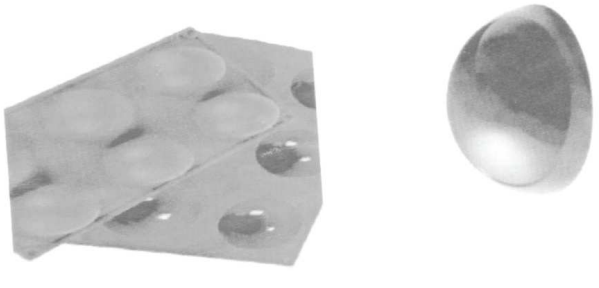
(i) What is the slant height of the traffic cone?

(ii) What will be the total surface area of the traffic cone?

(iii) If the price of painting is ₹ 8 per sq. m, then find the price of painting the curved surface of 20 such traffic cones.

(iv) What will be the volume of each traffic cone?

21. Kaushal a IX class student loves chocolates. On his birthday his mother gifts him a chocolate baking tray. The tray has 6 hemispherical cavities each of diameter 8.4 cm. Kaushal prepares the chocolates on his birthday using this tray and share these hemispherical chocolates with his friends.



On the basis of above information answer the following questions :-

(i) Find the radius of the hemispherical chocolate.

(ii) Find the volume of each hemispherical chocolate.

(iii) Kaushal wants to cover each chocolate with paper. How much paper will be required for whole tray of chocolates?

(iv) If Neha eats two third of the chocolates (Assuming the tray is full of chocolates). How much volume of chocolates does she eat?

22. In a classroom of class IX, an activity on real numbers is done with the students. A student has to pick a card and has to answer the questions written on it. The cards picked up by first 4 students and their questions written on it are given below. Find out its correct option/ answer.

(i) Which type of number is $\sqrt{10}$?

(ii) $\frac{1}{3}$ is an a/an_____ number.

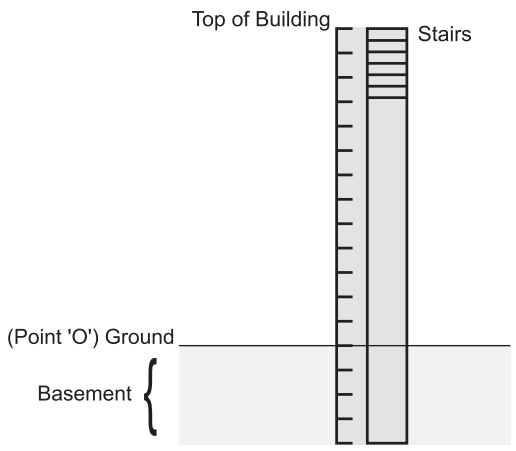
(iii) For what value of p' $\frac{251}{2^3 \times p^2}$ is an non-terminating recurring decimal.

Which type of number has decimal expansion as non-terminating recurring.

(iv) $(256)^{0.16} \times (256)^{0.09} =$ _____.

23. A building has 13 floors above and 4 floors below the ground (basement). Stairs run to the lowest ground of the basement to the top of the building. Ramesh is standing on the ground. If that point is considered "0" and after every 4 steps of stairs, either above or below, he counts "1". Also, below the ground he counts negative numbers.

Represent his position by number in each of the following cases-



(i) What would he count if he has climbed 16 stairs above?

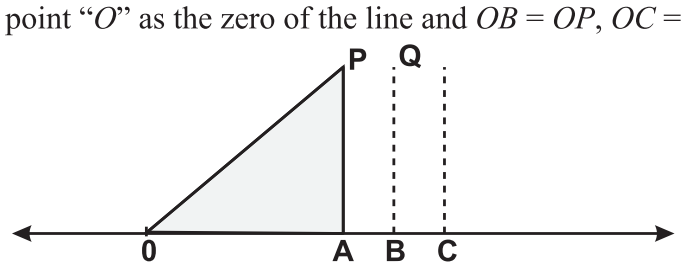
(ii) If has gone three steps below the ground then at what number he will be?

(iii) If he has climbed seven steps above the ground and then goes down 10 stairs what is the number of his position?

(iv) Solve $\frac{2}{4} - \left(\frac{-1}{4}\right)$ and name the numbers used to represent his location position.

24. A school wants to plant in a row as distance shown in the figure Height of each tree is considered equal and is taken as 1 unit. Distance OA is also 1 unit. First Tree is planted at point B and second at C.

Consider point "O" as the zero of the line and $OB = OP$, $OC = OQ$ then



[Neglect width of the tree]

(i) Find the distance OB.

(ii) Find the distance OC.

(iii) Simplify $\frac{1}{OB}$, what type of number it is?

(iv) Making denominator of $\frac{OB}{OC}$ rational, what will we get?

25. A tree plantation campaign was organised in a government school. Under this campaign, the students of class-IX were planted total 2079 trees. The trees were arranged in rows and columns. The number of rows were and number of columns were $(x - 1)$.

(i) If total 2079 trees planted then find the value of x ?

(ii) Find the numbers of rows and columns.

(iii) Find the polynomial for the above situation.

(iv) Find the factors the polynomial.

26. Mahesh wants to paint a wall of his room. He decides to paints the wall in two colours, pink and white, divided diagonally. The length and breath of the wall are $(x + 4)$ and $(3x + 2)$ respectively. The diagonal of the wall is $x^2 + 3x$.

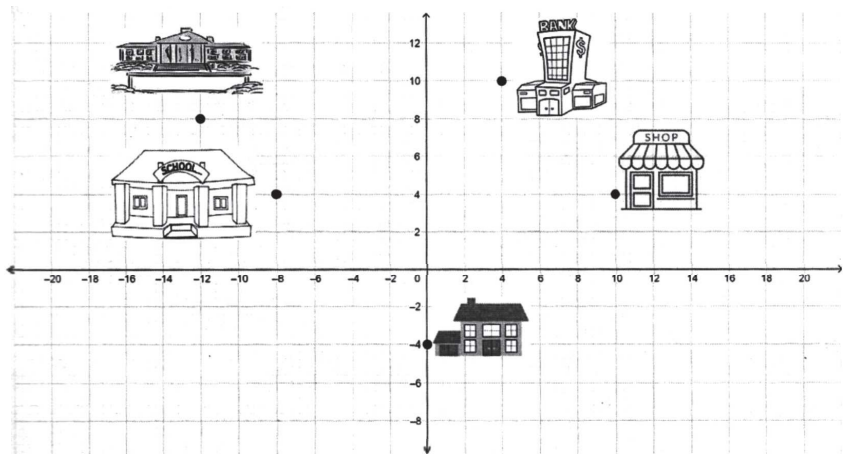
(i) The area of the wall is _____ polynomial.

(ii) What is the area of the walls?

(iii) Mahesh wished to draw flowers in the squared area of the wall. By how much length should be reduced?

(iv) If $x = 2$, then find the area to be painted pink?

27. One day, whole going to the office, Suchitra has to go to her son's school to attend PTM. Then she worked in the office and left early as some guests are arriving at her house in the evening. She went to the bank after the office and then to the shop to purchase some groceries to welcome the guests. The route of Suchitra has been shown in the Cartesian plane in the figure below. The location of Suchitra's house in Cartesian plane is (0,–4).



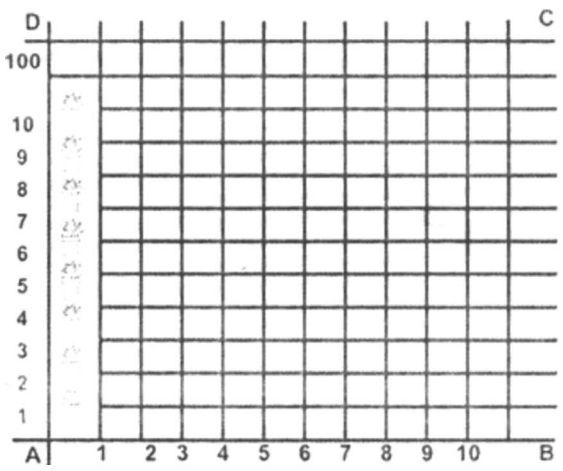
(i) Write the coordinates of Suchitra's house?

(ii) Name the building having same ordinate.

(iii) Write the coordinates of shop and bank. Find (ordinate of shop) – (abscissa of bank).

(iv) Which buildings are in quadrant II? Write their coordinates.

28. To make the student aware of personal health and hygiene, a race was organized on rectangular playground *ABCD* of a school. The lines were drawn with chalk powder at a distance of 1m each and 100 flower pots were placed at a distance of 1 m from each other along *AD*. Meeta ran $\frac{1}{4}$ th of the distance *AD* on the third line and posted a red flag. Mayank ran $\frac{1}{5}$ th of the distance *AD* on the seventh line and posted a green flag.



(i) What are the coordinates of red flag?

(ii) What are the coordinates of green flag?

(iii) What is the mirror image of green flag along x-axis and along y-axis.

(iv) Find the difference of ordinates and abscissa of red flag and green flag.

29. The diagram shows a model of pyramid placed on a Cartesian plane in a mathematics lab in a school. Based on the diagram, answer the following questions.

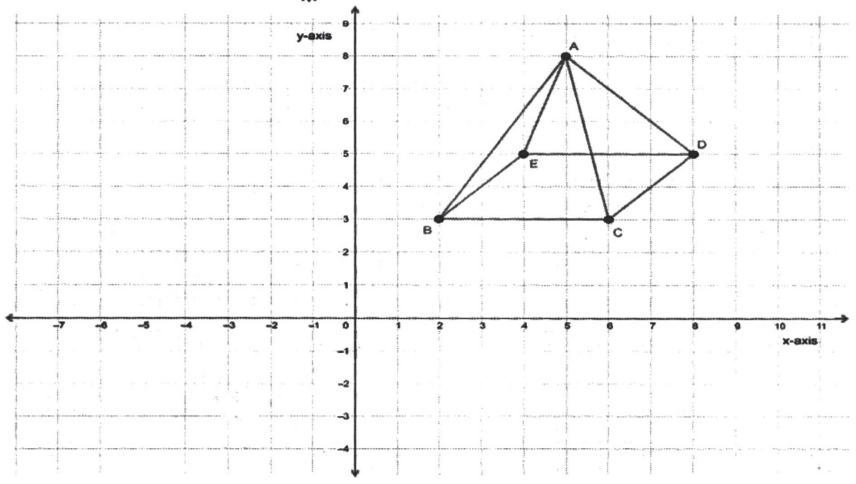
(i) What are the coordinates of the axis of the pyramid?

(ii) What is the perpendicular distance between the edges of B*C* and *ED*?

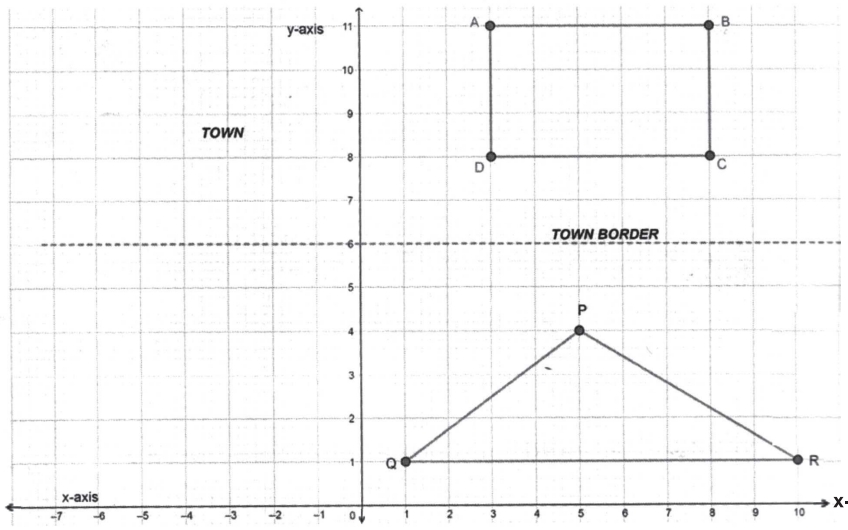
(iii) If the pyramid is moved 2 units to the right, what will be the coordinates of vertex *D*?

(iv) If the pyramid is moved 3 units below its actual position, what will be the coordinates of vertex *B*?

(v) If the vertex B would lie on the origin, what will be the coordinates of vertex E ?



30. The municipal corporation decides to open a school in the town. The corporation chooses a plot *ABCD* in the town area to build the school. But this plot belongs to Mr. Amar singh, who gets agreed to exchange it with the triangular plot *PQR* outside the town border. The coordinates of both the plots *ABCD* & *PQR* are shown in the Cartesian plane as below:



(i) What are the coordinates of vertex C ?

(ii) What is the area of rectangular plot $ABCD$?

(iii) What is the area of triangular plot PQR ?

(iv) Find the ratio of $Ar(ABCD)$ to $Ar(PQR)$.

31. A group of students decided to make project on statistics. They collected the data of heights (in cm) of 51 girls of Class IX*A,B* and C of their school. After collecting the data, they arranged the data in the following frequency distribution table form:

Height (in cm)	No. of girls
135 – 140	4
140 – 145	7
145 – 150	18
150 – 155	11
155 – 160	6
160 – 165	5

Based on the information, answer the following questions:

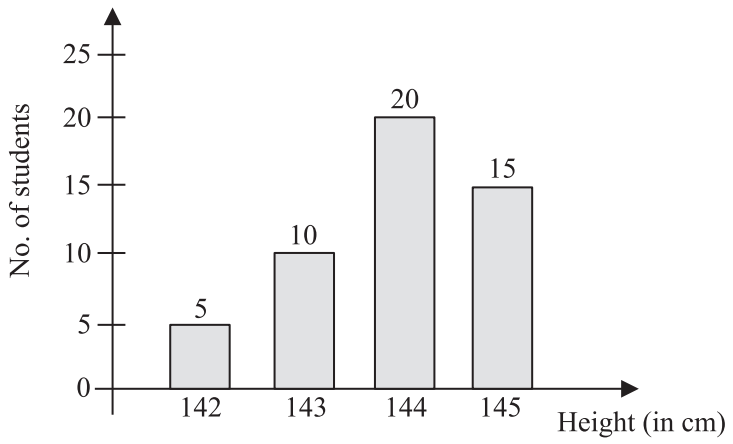
(i) Write the class interval with highest frequency?

(ii) How many students have height less than 155 cm?

(iii) How many students are there of height 150 cm or above?

(iv) How many students are there whose height is more than 140 cm but less than 160 cm?

32. The following bar graph represents the heights (in cm) of 50 students of class IX of a particular school.



Based on the graph, answer the following questions:

(i) What is the percentage of the total student whose height is more than 142 cm?

(ii) How many students in the class have maximum height?

(iii) How many students have their height between 142 cm and 145 cm.

(iv) What is the range of the data?

ANSWER

1. (i) $x + 2y = 100$
(ii) 25
(iii) 25
(iv) 20

2. (i) ₹ 16
(ii) 15 days
(iii) $3x - y = 5$
(iv) 16

3. (i) 36.5
(ii) 98.6
(iii) IV
(iv) 97.7 and 99.5

4. (i) 96°
(ii) 5 cm
(iii) 24°, 28°
(iv) 96, 192

5. (i) 70°
(ii) Interior angles formed by the transversal on the same side
(iii) 110°, 70°
(iv) 180°, 290°

6. (i) 120°
(ii) 110°
(iii) 250°, Scalene Triangle

7. (i) ΔADC
(ii) *SAS* Congruency Criteria
(iii) $BC = CD$

8. (i) Scalene triangle
(ii) yes, triangles congruent by *SSS* congruency criteria.
(iii) $BC = EF$
(iv) $\angle A = \angle D$

9. (i) (b) Square
(ii) (c) Rectangle
(iii) (c) $AB = CD$ & $KN = JO$
(iv) (a) *JKNO*
(v) 70.56

10. (i) (c) 5.5 cm and 5 cm roop
(ii) (b) 60°
(iii) (a) 120°
(iv) (b) 3 cm
(v) (c) 4 cm

11. (i) (b) $\sqrt{13}$ cm
(ii) (b) 7 cm
(iii) (a) 8 cm
(iv) (c) $4\sqrt{2}$ cm
(v) (b) 4 cm

12. (i) 80°
(ii) 24 m
(iv) 50°

13. (i) 20 m
(ii) 30 m
(iii) $\angle BGC = 120^o$ and $\angle ABQ = 30^o$
(iv) $20\sqrt{3}$ m

14. (i) 2 : 1
(ii) 4 m

(iii) 1.4 m

(iv) 9.6 m

15. (i) $a + 25°$

(ii) 55°

(iii) 280°

(iv) 210^0

(v) $10\sqrt{2}$ cm

16. (i) $16000\sqrt{2}$ cm^2

(ii) 19200 m^2

(iii) 19200 m^2, 1 : 1

(iv) 61000 sq.m, 6.1 Hectares

17. (i) 24 cm^2

(ii) $\sqrt{15}$ cm^2

(iii) $\sqrt{3}$ cm^2, $\sqrt{3}$ cm

(iv) $\left(48-\sqrt{15}-\sqrt{3}\right)$ cm^2

18. (i) 210 m

(ii) 420 m

(iii) ₹ 8300

(iv) 8400 m^2

19. (i) 55.44 sq.cm

(ii) 0.002772 sq.m

(iii) ₹ 277.20

(iv) 38.808 ml

20. (i) 20.109 cm

(ii) 146.5 cm

(iii) ₹ 2.11

(iv) 92.4 cm^3

21. (i) 4.2 cm

(ii) 665.28 cm^2

(iii) 997.92 cm^2

(iv) 620.92 cm^2

22. (i) It is an irrational number

(ii) Rational number

(iii) P ≠ 2, 5 Rational

(iv) 4

23. (i) 4

(ii) $\frac{-3}{4}$

(iii) $\frac{-3}{4}$

(iv) $\frac{3}{4}$, Integers

24. (i) $\sqrt{2}$ units

(ii) $\sqrt{3}$ units

(iii) $\frac{\sqrt{2}}{2}$, Irrational

(iv) $\frac{\sqrt{6}}{3}$

25. (i) $x = 32$

(ii) 65, 31

(iii) $x^2 - x - 2080$

(iv) $(2x - 65)(x - 32)$

26. (i) quadratic

(ii) $(x + 4)(3x + 2)$

(iii) $2(x - 1)$

(iv) 24

27. (i) (-8, 4)

(ii) shop and school

(iii) Shop (10, 4) Bank (4, 10)

(ordinate of shop) – (abscissa of bank) = 4 – 4 = 0

(iv) School and office, school (–8, 4) office (–12, 8)

28. (i) (3, 25)

(ii) (7, 20)

(iii) along x-axis (7, –20) along y-axis (–7, 20)

(iv) ordinate difference = 25 – 20 = 5

abscissa difference = 3 – 7 = –4

29. (i) (5, 8)

(ii) 2 units

(iii) (10, 5)

(iv) (4, 2)

(v) (2, 2)

30. (i) (8,8)

(ii) 15 sq. units

(iii) 13.5 sq. units

(iv) 10 : 9

31. (i) 145 – 150

(ii) 40

(iii) 22

(iv) 42

32. (i) 90%

(ii) 20

(iii) 30

(iv) 3

PRACTICE QUESTION PAPER - I

MATHEMATICS

Class-IX

Time allowed : 3hrs **Max. Marks : 80**

General Instructions:

1. This question paper has 5 sections A, B, C, D and E.

2. Section A has 20 multiple choice questions (MCQs) carrying 1 mark each.

3. Section B has 5 short answer-I (SA-I) type questions carrying 2 marks each.

4. Section C has 6 short answer-II (SA-II) type questions carrying 3 marks each.

5. Section D has 4 long answer (LA) type questions carrying 5 marks each.

6. Section E has 3 case based integrated units of assessment (4 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.

7. All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 questions of 5 marks, 2 questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of section E.

8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section-A

Section A consists of 20 questions of 1 mark each.

1. $\sqrt[4]{\sqrt[3]{3^2}}$ equals:

(a) $3^{-1/6}$ (b) $3^{1/6}$

(c) 3^{-6} (d) 3^{6}

2. Sides of a triangle are in the ratio of 3 : 5 : 7 and its perimeter is 300 cm. Its area will be:

(a) $1000\sqrt{3}$ sq. cm (b) $1500\sqrt{3}$ sq. cm

(c) $1700\sqrt{3}$ sq. cm (d) $1900\sqrt{3}$ sq. cm

3. It is given that $\Delta ABC \cong \Delta FDE$ and $AB = 5$ cm, $\angle B = 40°$ and $\angle A = 80°$ then which one is true?

(a) $DF = 5$ cm, $\angle F = 60°$ (b) $DF = 5$ cm, $\angle E = 60°$

(c) $DE = 5$ cm, $\angle E = 60°$ (d) $DE = 5$ cm, $\angle D = 60°$

4. If $x^{1/3} + y^{1/3} + z^{1/3} = 0$ then which equation is correct?

(a) $x^3 + y^3 + z^3 = 0$ (b) $x + y + z = 3x^{1/3}\, y^{1/3}\, z^{1/3}$

(c) $x + y + z = 3xyz$ (d) $x^3 + y^3 + z^3 = 3xyz$

5. When $P(x) = x^3 - 3x^2 + 5$ then what is the value of $P(-1)$?

(a) 3 (b) –1

(c) 9 (d) 1

6. To rationalize the denominator of $\frac{1}{\sqrt{a}+b}$, we multiply this by

(a) $\frac{1}{\sqrt{a}+b}$ (b) $\frac{1}{\sqrt{a}-b}$

(c) $\frac{\sqrt{a}+b}{\sqrt{a}-b}$ (d) $\frac{\sqrt{a}-b}{\sqrt{a}-b}$

7. Find the value of k for which $x = 1$, $y = 2$ is the solution of equation $2x + 3y = k$

(a) 5 (b) 6

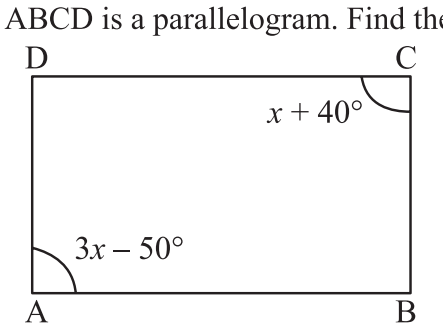
(c) 7 (d) 8

8. If the point P lies in between M and N and C is mid point of MP, then:

(a) $MC + PN = MN$ (b) $MP + CP = MN$

(c) $MC + CN = MN$ (d) $CP + CN = MN$

9. In the given figure, ABCD is a parallelogram. Find the value of x.



(a) 25° (b) 80°

(c) 75° (d) 45°

10. Distance of chord AB from the centre is 12 cm and length of the chord is 10 cm. Then the diameter of the circle is

(a) 26 cm (b) 13 cm

(c) $\sqrt{244}$ cm (d) 20 cm

11. What is the total surface area of a cone with radius is $r/2$ and slant height $2l$?

(a) $2\pi (l + r)$ (b) $\pi r\left(l + \frac{r}{4}\right)$

(c) $\pi r (l + r)$ (d) $2\pi r$

12. How many dimensions a point has?

(a) 1 (b) 0

(c) 3 (d) 2

13. The class mark of class 150–160 is

(a) 150 (b) 160

(c) 155 (d) 10

14. The class mark of a class is 10 and its class width is 6. The lower limit of the class is

(a) 5 (b) 7

(c) 8 (d) 8

15. Any point on the x-axis is of the form

(a) (x, y) (b) $(0, y)$

(c) $(x, 0)$ (d) (x, x)

16. The centre of a circle lies in _____ of the circle.

(a) Exterior (b) Interior

(c) Boundary (d) None of these

17. Consecutive angles of a parallelogram are

(a) equal (b) supplementary

(c) complementary (d) complete angle

18. The curved surface area of a sphere is 616 cm^2. Its radius is

(a) 7 cm (b) 5 cm

(c) 6 cm (d) 8 cm

Direction: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R).

Choose the correct option:

19. Statement A (Assertion): –7 is a constant polynomial.

Statement R (Reason): Degree of a constant polynomial is zero.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
(c) Assertion (A) is true but reason (R) is false
(d) Assertion (A) is false but reason (R) is true

20. Statement A (Assertion) : Cuboid is a three dimensional shape.
Statement B (Reason) : A solid has three dimensions
(a) Both assertion (A) and reason (R) are true and reason (R) is correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not correct explanation of assertion (A)
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true

Section-B

Section B consists of 5 questions of 2 marks each.

21. Express $0.\overline{47}$ in the form of $\frac{p}{q}$

OR

Evaluate $27^{2/3} \times 27^{1/3} \times 27^{-4/3}$

22. Find the area of triangle two sides of which are 8 cm and 11 cm and the perimeter is 32 cm.

23. Find the points where the graph of equation $2x + 3y = 6$ cuts the x-axis and the y-axis.

24. Find the angle which is four times its complement.

OR

If the difference between two supplementary angles is 40° then find the smaller angle.

25. Write the equation of two lines passing through (3, 10).

Section-C

Section C consists of 6 questions of 3 marks each.

26. Solve $\left[5\left(8^{1/3} + 27^{1/3}\right)^3\right]^{1/4}$

27. The sides of a triangular field are 40 cm, 9 cm and 41 cm. Find the number of flower beds that can be prepared in the field, if each flower bed, on an average needs 18 cm^2 space.

28. If $x^2 + y^2 = 49$ and $x - y = 3$ then find the value of $x^3 - y^3$.

29. Find the value of a and b

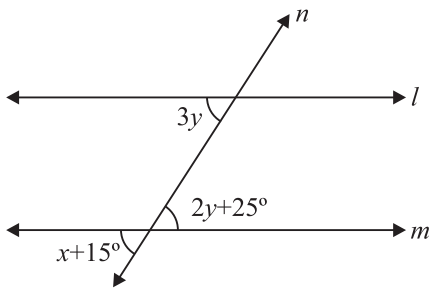
$$\frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}-\sqrt{3}} = a + b\sqrt{6}$$

30. Factorize $8x^3 + \sqrt{27}y^3$

OR

If $P(x) = x^2 - 3x + 2$ then find the value of $P(1) + P(-1) + P(0)$

31. In the given figure $l \parallel m$ and n is the transversal, find x.



Section-D

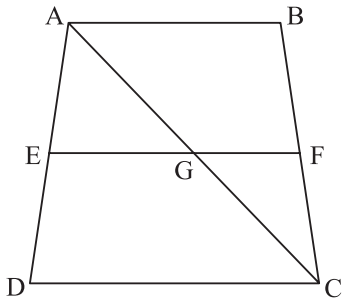
Section D consists of 4 questions of 5 marks each.

32. If $(x + 2)$ is a factor of polynomial $ax^3 + bx^2 + x - 6$ and get remainder of 4 in dividing polynomial by $(x - 2)$ then find values of a and b.

33. Show that the quadrilateral formed by joining the mid-points of the sides of a square is also a square.

OR

In the given figure ABCD is a trapezium in which side AB is parallel to side DC and E is the mid-point of the side AD. If F is a point in the side BC such that line segment EF is parallel to DC then prove that EF = $\frac{1}{2}$(AB + DC)



34. AC and BD are two chords of a circle that bisect each other.

Prove that:

(i) AC and BD are diameter

(ii) ABCD is a rectangle.

35. If the diameter of a sphere is reduced by 25% by how much percentage the surface area is reduced?

OR

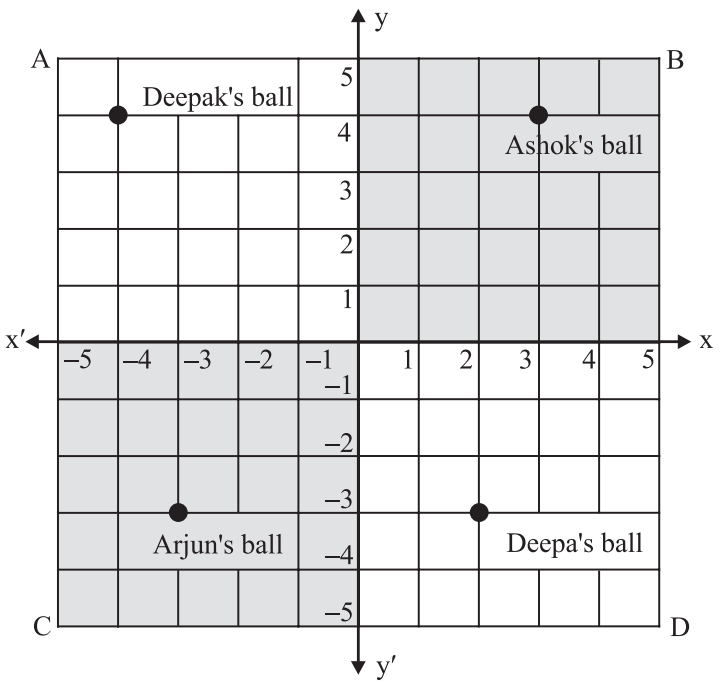
The inner and outer diameter of a hollow hemispherical container are 24 cm and 25 cm respectively. If the cost of painting 1 cm^2 of surface is ₹ 0.05, then what will be the cost of painting total surface of the container. (use $\pi = 22/7$)

Section-E

Section E consists of 3 questions of 4 marks each.

Case study based questions are compulsory.

36.



There is a square park ABCD in the middle of a colony in Delhi. Four children Deepak, Ashok, Arjun and Deepa went to play with their balls. The colour of the ball of Ashok, Deepak, Arjun and Deepa are red, blue, yellow and green respectively.

All four children roll their ball from centre point O in the direction of XOY, X′OY, X′OY′ and XOY′. Their balls stopped as shown in the above image.

Answer the following questions (*Attempt any one out of iii and iv*)

(i) What the line XOX′ is called? (1 mark)

(ii) What the centre point is called? (1 mark)

(iii) What are the coordinates of the ball of Ashok and Deepa? (2 marks)

(iv) What is the distance of the Arjun's ball from X axis and Y axis? (2 marks)

37. The COVID-19 pandemic, also known as the corona virus pandemic was caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). It was first identified in December 2019 in Wuhan, China.

During survey, the ages of 80 patients infected by COVID and admitted in the one of the City hospital were recorded and the collected data is represented in the frequency distribution table.

Age (in yrs)	**No. of patients**
5–15	6
15–25	11
25–35	21
35–45	23
45–55	14
55–65	5

Based on the information answer the following questions: (*Attempt one out of iii and iv*)

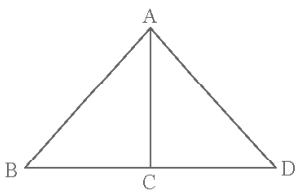
(i) Which class interval is of highest frequency? (1 mark)

(ii) Which age group was affected the least? (1 mark)

(iii) Draw histogram for the above data. (2 marks)

(iv) Draw frequency polygon for the above data. (2 marks)

38. Teena has a picture of triangles as given in the figure in which side AB is equal to side AD and ∠BAC is equal to ∠DAC.



Based on the above information answer the following questions: (*Attempt one out of iii and iv*)

(i) Name the congruent triangles in the given figure. (1 mark)

(ii) By which property these triangles are congruent? (1 mark)

(iii) Which angle of ΔADC is equal to $\angle ABC$ of ΔABC and why? (2 marks)

(iv) Is CD = BC? If yes why? (2 marks)

ANSWER

Section-A

1. (b) $3^{1/6}$

2. (b) $1500\sqrt{3}$ sq. cm

3. (b) DF = 5 cm, $\angle E = 60^{\circ}$

4. (b) $x + y + z = 3x^{1/3}y^{1/3}z^{1/3}$

5. (d) 1

6. (d) $\dfrac{\sqrt{a}-b}{\sqrt{a}-b}$

7. (d) 8

8. (c) MC + CN = MN

9. (d) 45°

10. (a) 26 cm

11. (b) $\pi r\left(l+\dfrac{r}{4}\right)$

12. (b) 0

13. (c) 155

14. (b) 7

15. (c) $(x, 0)$

16. (b) Interior

17. (b) Supplementary

18. (a) 7 cm

19. (a)

20. (a)

Section-B

21. Let $x = 0.\overline{47}$ ...(1)

$100x = 47.\overline{47}$ ...(2)

$x = \frac{47}{99}$

OR

$27^{\frac{2}{3}+\frac{1}{3}-\frac{4}{3}} = 27^{-\frac{1}{3}} = 3^{-1} = \frac{1}{3}$

22. $a = 8$ cm

$b = 11$ cm

Perimeter $= 32$ cm

$c = 13$

$s = 16$ cm

Area of $\Delta = \sqrt{16(16-8)(16-11)(16-13)}$

$= \sqrt{16\times8\times5\times3}$

$= 8\sqrt{30}$ cm^2

23. Cut at x-axis $\Rightarrow$ $y = 0$

$\therefore \quad x2 + 3 \times 0 = 6$

$x = 3$

Cut at x-axis $\Rightarrow$ $x = 0$

$2 \times 0 + 3y = 6$

$y = 2$

Therefore required points are (3, 0) and (0, 2)

24. Let angle $= x$

Complementary angle $= 90 - x$

$= 4(90 - x) \qquad x$

$x = 72^\circ$

Angles are 72°, 18°.

OR

Let angle = x

Supplementary angle = $180 - x$

$$x - (180 - x) = 40^{\circ}$$

$$x = 110^{\circ}$$

$\therefore$ Smaller angle = $180^{\circ} - 110^{\circ} = 70^{\circ}$

25. $x + y - 13 = 0$

$y - x - 7 = 0$

Section - C

26. $\left[5\left(8^{\frac{1}{3}} + 27^{\frac{1}{3}}\right)^3\right]^{\frac{1}{4}} = \left[5\left(2+3\right)^3\right]^{\frac{1}{4}} = (5 \times 5^3)^{\frac{1}{4}} = 5^{4 \times \frac{1}{4}} = 5^1 = 5$

27. a =40 cm, b = 9 cm, c = 41 cm

$$S = \frac{40+9+41}{2}$$

$$S = 45$$

$$\text{Area of } \Delta = \sqrt{45(45-40)(45-9)(45-41)}$$

$$= 180 \text{ cm}^2$$

$$\text{Number of beds} = \frac{180}{18} = 10$$

28. Given : $x^2 + y^2 = 49$

$x - y = 3$

$(x - y)^2 = 3^2$

$x^2 + y^2 - 2xy = 9$

$49 - 2xy = 9$

$xy = 20$

$x^3 - y^3 = (x - y)(x^2 + y^2 + xy)$

$= 3(49 + 20)$

$= 207$

29. $\frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}-\sqrt{3}} \times \frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}+\sqrt{3}} = \frac{\left(\sqrt{2}+\sqrt{3}\right)^2}{\left(\sqrt{2}\right)^2-\left(\sqrt{3}\right)^2}$ =

$= -5-2\sqrt{6} = a+b\sqrt{6}$

$a = -5,\ b = -2$

30. $8x^3+\sqrt{27}y^3 = (2x)^3+(\sqrt{3}y)^3$

$a^3+b^3 = (a+b)(a^2+b^2-ab)$

$= (2x+\sqrt{3}y)(4x^2+3y^2-2\sqrt{3}xy)$

OR

$P(x) = x^2-3x+2$

$P(1) = 1-3+2 = 3-3 = 0$

$P(-1) = (-1)^2-3(-1)+2 = 6$

$P(0) = 0-3\times 0+2 = 2$

$P(1)+P(-1)+P(0) = 6+2 = 8$

31. $3y = 2y+25^\circ \Rightarrow y = 25^\circ$ (Alternate interior angles)

$x+15^\circ = 2y+25^\circ$

$x+15^\circ = 2\times 25^\circ+25^\circ$ (Vertically opposite angles)

$x+15^\circ = 75$

$x = 60^\circ$

Section-D

32. $-2a+b = 2,\ 2a+b = 2$, By Solving $a = 0,\ b = 2$

35. 43.75%

OR

$3\pi\left(\frac{25}{2}\right)^2+\pi\times 12^2 = \frac{2451\pi}{4}$

$= \frac{2451}{4}\times\frac{22}{7}\times\frac{5}{100}$

$=$ ₹ 96.28

Section-E

36. (i) x-axis

(ii) Origin

(iii) (3, 4) and (2 – 3)

(iv) 3 units and 3 units

37. (i) 35–45 has highest frequency

(ii) 55–65 has lowest frequency

So least affected.

38. (i) ΔABC and ΔADC

(ii) SAS

(iii) $\angle ADC$ By CPCT

(iv) CD = BC by CPCT

PRACTICE QUESTION PAPER-II

MATHEMATICS

Class-IX

Time allowed : 3hrs **Max. Marks : 80**

General Instructions:

1. This question paper has 5 sections A, B, C, D and E.

2. Section **A** has 20 MCQs carrying 1 mark each.

3. Section **B** has 5 questions carrying 2 marks each.

4. Section **C** has 6 questions carrying 3 marks each.

5. Section **D** has 4 questions carrying 5 marks each.

6. Section **E** has 3 case based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.

7. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of section E.

8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section-A

Section A consists of 20 questions of 1 mark each.

1. Rational number $\frac{2}{25}$ is equal to :

(a) 0.08 (b) 0.8

(c) 0.02 (d) 0.2

2. The value of $125^{-1/3}$ is :

(a) $\frac{1}{125}$ (b) $\frac{1}{15}$

(c) $\frac{1}{5}$ (d) $\frac{1}{25}$

3. The zeros of the polynomial $P(x) = (x + 1)(x + 2)$ are :

(a) –1, 2 (b) –1, –2

(c) 1, –2 (d) 1, 2

4. If $(x - 1)$ is a factor of $x^2 + ax + 5$, then the value of a is :

(a) 6 (b) 1

(c) –6 (d) 3

5. The linear equation $7x - 3y = 10$ has :

(a) a unique solution (b) two solution

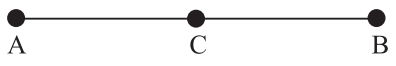
(c) No solution (d) Infinite many solutions

6. If (1, 2) is a solution of the linear equation $4x + y = k$ then the value of k is :

(a) 6 (b) –6

(c) 5 (d) –5

7. If a point C lies between two points A and B such that AC = BC, then



(a) AC = AB (b) $AC = \frac{1}{2}AB$

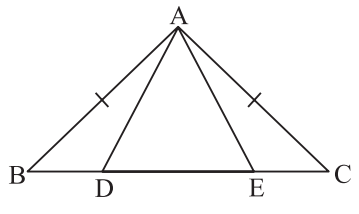
(c) $AB = \frac{1}{2}AC$ (d) AC = 2AB

8. The angle which is four times its complement is :

(a) 45º (b) 60º

(c) 72º (d) 18º

9. In figure, AB = AC and BE = CD. If $\Delta ACD \cong \Delta ABE$ then AD =



(a) AC (b) AE

(c) AB (d) None of these

10. The angles of a quadrilateral are in the ratio 1 : 2 : 2 : 4 then respective angles of the quadrilateral are :

(a) 36º, 72º, 108º, 144º (b) 120º, 100º, 80º, 60º

(c) 60º, 80º, 100º, 120º (d) 40º, 80º, 80º, 160º

11. The quadrilateral formed by joining the mid points of the sides of a quadrilateral PQRS, taken in order, is a rectangle, if

(a) PQRS is rectangle (b) PQRS is a parallelogram

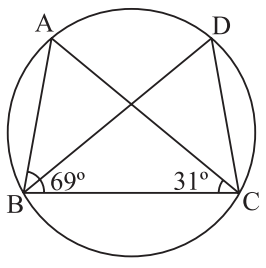
(c) Diagonals of PQRS are perpendicular (d) Diagonals of PQRS are equal

12. A chord 6 cm long is drawn in a circle with a diameter equal to 10 cm, then its perpendicular distance from centre is :

(a) 5 cm (b) 4 cm

(c) 6 cm (d) 7 cm

13. In figure, $\angle ABC = 69^\circ$, $\angle ACB = 31^\circ$, then $\angle BDC$ is :



(a) 60° (b) 80°

(c) 90° (d) 100°

14. Area of an equilateral triangle of side l units is :

(a) $\frac{\sqrt{3}}{4}l^2$ (b) $\frac{\sqrt{3}}{2}l^2$

(c) $\frac{\sqrt{3}}{2}l$ (d) $\frac{\sqrt{3}}{4}l$

15. The volume of the sphere with diameter $3r$ units is :

(a) $\frac{4}{3}\pi r^3$ (b) $\frac{9}{2}\pi r^3$

(c) $36\pi r^3$ (d) $\frac{27}{2}\pi r^3$

16. The volume of the right circular cone with radius 6 cm and height 3.5 cm is :

(a) 127 cm^3 (b) 132 cm^3

(c) 137 cm^3 (d) 147 cm^3

17. The class mark and class size of a class interval are 12.5 and 5 respectively, then the class interval is :

(a) 10–15 (b) 12–13

(c) 11–14 (d) 8–13

18. In the class intervals 15–25, 25–35, the number 25 is included in

(a) 15–25 (b) 25–35

(c) both the interval (d) None of the intervals

Direction: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R).

Choose the correct option:

19. Statement A (Assertion): The degree of the polynomial $7y^5 - 2y^3 + 7y + 1$ is 5

Statement R (Reason): The highest power of the variable in a polynomial is called the degree of the polynomial

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false

(d) Assertion (A) is false but reason (R) is true

20. Statement A (Assertion): InΔ ABC, $\angle B = 70^o$ and inΔ PQR, $\angle P = 70^o$ so $\angle B = \angle P$

Statement R (Reason): All right angles are equal

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false

(d) Assertion (A) is false but reason (R) is true

Section-B

Section B consists of 5 questions of 2 marks each.

21. Simplify : $(16^{-1/5})^{5/2}$

OR

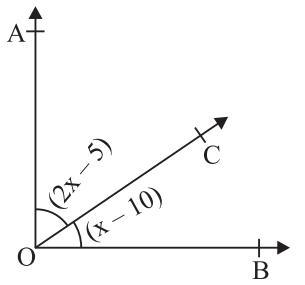
Simplify : $(\sqrt{5}-2)(\sqrt{3}-\sqrt{5})$

22. If the point $(2k - 3, k + 2)$ lies on the graph of equation $2x + 3y + 15 = 0$, find the value of k.

23. The total number of legs in a herd of goats and hens is 40. Represent this situation in the form of a linear equation in two variables.

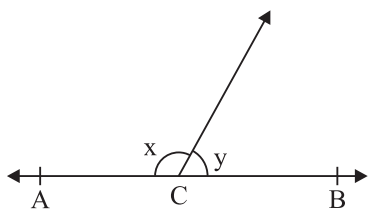
24. Find the area of an isosceles triangle each of whose equal side is 13 cm and whose base is 24 cm.

25. In figure AO ⊥ OB, find ∠AOC and ∠BOC.



OR

In figure, if ACB is a straight line and $x : y = 2 : 1$. Find the value of x and y.



Section-C

Section C consists of 6 questions of 3 marks each.

26. Evaluate: $\sqrt[4]{16} - 6\sqrt[3]{343} + 18\sqrt[5]{243} - \sqrt{196}$

27. Simplify: $\left(\sqrt{7} - \sqrt{2}\right)^2 - \left(\sqrt{7} + \sqrt{2}\right)^2$

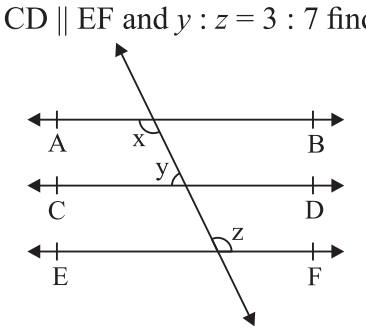
28. If $a + b + c = 4$ and $a^2 + b^2 + c^2 = 14$, find $ab + bc + ca$

29. Factorize : $(x - y)^2 - 7(x^2 - y^2) + 12(x + y)^2$

OR

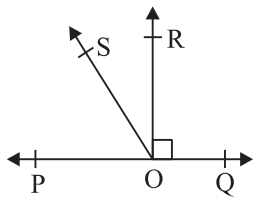
Simplify: $\dfrac{(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3}{(a - b)^3 + (b - c)^3 + (c - a)^3}$

30. In figure, if AB || CD, CD || EF and $y : z = 3 : 7$ find x, y and z.



OR

In figure, POQ is a line. Ray OR is perpendicular to line PQ • OS is another ray lying between rays OP and OR.



Prove that $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$

31. A triangular park in a city has dimensions 30 m, 26 m and 28 m. A gardener has to plant grass inside it at ₹ 1.50 per m^2. Find the amount to be paid to the gardener.

Section-D

Section D consists of 4 questions of 5 marks each.

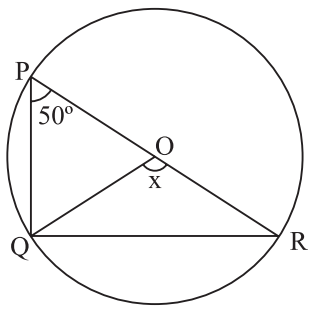
32. The polynomials $ax^3 - 3x^2 + 4$ and $2x^3 - 5x + a$, when divided by $(x - 2)$, leave the remainders p and q respectively. If $p - 2q = 4$, find the value of a.

33. Show that the bisectors of angles of a parallelogram form a rectangle.

OR

ABCD is a rhombus and P, Q, R and S are the mid-points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rectangle.

34. Prove that the angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle. Using the above theorem, find the values of x in the given figure.



OR

Prove that the quadrilateral formed by the internal angle bisectors of any quadrilateral is cyclic.

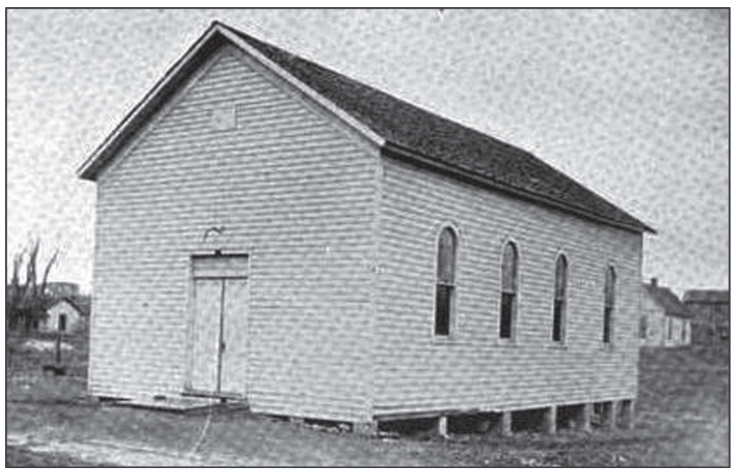
35. A bus stop is barricaded from the remaining part of the road by using 50 hollow cones made of recycled card board. Each one has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is ₹12 per m^2, what will be the cost of painting all these cones?

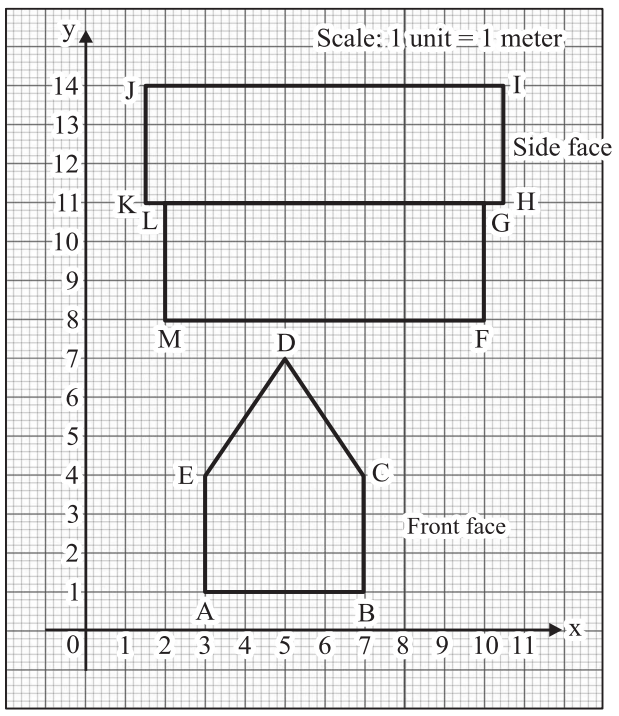
[use $\pi = 3.14$ and take $\sqrt{1.04} = 1.02$]

Section-E

Section E consists of 3 case study based questions of 4 marks each.

36. Side and Front face of the house are plotted on the graph sheet.





i) Find the coordinates of the points A and B.

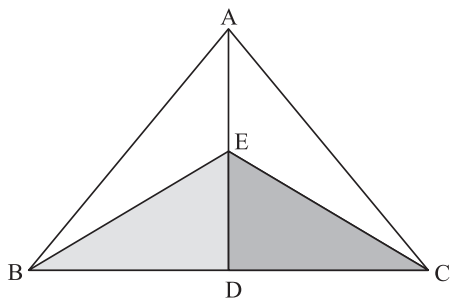
ii) Mention the points whose coordinates are (5, 7) and (2, 11).

iii) Find the area of the pentagon ABCDE.

OR

Find the difference between (Abscissa of G) and (Ordinate of J)

37. During a rangoli competition Ananya made a geometrical rangoli as shown below:



On measuring the dimensions it was found that AB and AC are equal and BE and CE are also equal.

i) Which side is common in triangles AEB and AEC?

ii) Are triangles BED and DEC congruent?

iii) Show that $\angle ABE = \angle ACE$.

OR

Show that $\angle ADC = 90°$.

38. The award list of a mid term examination of Mathematics of class IX A is shown below:

Roll No.	Marks (out of 80)
1	32
2	35
3	61
4	68
5	72
6	73
7	54
8	17
9	28
10	16
11	32
12	35
13	32
14	38
15	34

Roll No.	Marks (out of 80)
16	44
17	65
18	72
19	78
20	15
21	30
22	32
23	35
24	54
25	62
26	66
27	5
28	19
29	76
30	9

i) What are the minimum and the maximum marks obtained?

ii) Find the range of data.

iii) Taking class interval 0-10, 10-20 and so on, construct a frequency distribution table.

OR

How many students scored marks in class interval 30-35.

ANSWERS

Section-A

1. (a) 0.08

2. (c) $\frac{1}{5}$

3. (b) –1, –2

4. (c) –6

5. (d) Infinite many solution

6. (a) 6

7. (b) $AC = \frac{1}{2}AB$

8. (c) 72°

9. (b) AE

10. (d) 40°, 80°, 80°, 160°

11. (c) Diagonals of PQRS are perpendicular

12. (b) 4 cm

13. (b) 80°

14. (a) $\frac{\sqrt{3}}{4}l^2$

15. (b) $\frac{9}{2}\pi r^3$

16. (b) 132 cm^3

17. (a) 10–15

18. (b) 25–35

19. (a)

20. (b)

Section-B

21. $\frac{1}{4}$ OR $\sqrt{15}-5-2\sqrt{3}+2\sqrt{5}$

22. $k = \frac{-15}{7}$

23. $2x + y = 20$

24. 60 cm^2

25. $\angle AOC = 65^o$; $\angle BOC = 25^o$ OR $x = 120^o$; $y = 60^o$

Section-C

26. 0

27. $-4\sqrt{14}$

28. 1

29. $(x + 2y)(3x + 5y)$ OR $(a + b)(b + c)(c + a)$

30. $x = 126^o$ $y = 54^o$ $z = 126^o$

31. ₹ 504

Section-D

32. 4

34. $x = 100^o$

35. ₹ 384.34 (approx)

Section-E

36. (i) A(3, 1) B(7, 1)

(ii) D, L

(iii) 18 sq. units OR –4

37. (i) AE

(ii) Yes

38. (i) 5, 78

(ii) 73

(iii)

C.I	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
f	2	4	2	9	1	2	5	5

OR

6

PRACTICE QUESTION PAPER-III

MATHEMATICS

Class-IX

Time allowed : 3hrs **Max. Marks : 80**

General Instructions:

1. This question paper has 5 sections A, B, C, D and E.

2. Section **A** has 20 multiple choice questions (MCQs) carrying 1 mark each.

3. Section **B** has 5 short answer-I (SA-I) type questions carrying 2 marks each.

4. Section **C** has 6 short answer-II (SA-II) type questions carrying 3 marks each.

5. Section **D** has 4 long answer (LA) type questions carrying 5 marks each.

6. Section **E** has 3 case based integrated units of assessment (4 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.

7. All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of section E.

8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section-A

Section A consists of 20 questions of 1 mark each.

1. A rational number $\frac{5}{7}$ is equivalent to :

(a) $\frac{15}{17}$ (b) $\frac{25}{27}$

(c) $\frac{10}{14}$ (d) $\frac{10}{27}$

2. The zero of the polynomial $p(x) = 2x + 5$ is :

(a) 2 (b) $\frac{2}{5}$

(c) 5 (d) $\frac{-5}{2}$

3. The polynomial of type $ax^2 + bx + c$ when $a = 0$

(a) Linear (b) Quadratic

(c) Cubic (d) Bi-quadratic

4. Through which of the following point the graph of $y = -x$ passes?

(a) (1, 1) (b) (0, 1)

(c) (–1, 1) (d) (0, 0)

5. The graph of which equation is parallel to x-axis?

(a) $y = x + 1$ (b) $y = 2$

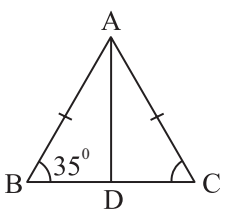
(c) $x = 3$ (d) $x = 2y$

6. What is the measure of an angle whose measure is 32 less than its supplement?

(a) 148° (b) 60°

(c) 74° (d) 55°

7. In the given figure AD is the median then ∠BAD is



(a) 70º (b) 55º

(c) 110º (d) 35º

8. The radius of hemisphere is "r" then its total surface area is –

(a) $\frac{2}{3}\pi r^3$ (b) $3\pi r^2$

(c) $2\pi r^2$ (d) $\frac{4}{3}\pi r^2$

9. The sides of a triangle are in the ratio 3 : 4 : 5. If its perimeter is 36 cm, then what is its area?

(a) 72 cm^2 (b) 67 cm^2

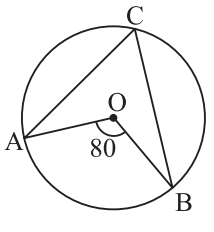
(c) 32 cm^2 (d) 54 cm^2

10. The mean of 5 numbers is 30. If one number is excluded their mean becomes 28. What is excluded number?

(a) 38 (b) 35

(c) 32 (d) 36

11. In the given figure if O is the centre of a circle, then measure of ∠ACB is :



(a) 80° (b) 40°

(c) 160° (d) 35°

12. $\sqrt[4]{\sqrt[3]{2^2}}$

(a) $2^{-1/6}$ (b) 2^{-6}

(c) $2^{1/6}$ (d) 2^{6}

13. The angle of the semicircle is :

(a) 120° (b) 60°

(c) 180° (d) 90°

14. The class mark of the class interval 90 – 120 is :

(a) 90 (b) 105

(c) 115 (d) 120

15. Which of the following is the formula for the volume of the sphere?

(a) $\frac{1}{3}\pi r^3$ (b) $\frac{2}{3}\pi r^3$

(c) πr^3 (d) $\frac{4}{3}\pi r^3$

16. The number of line segments formed by three collinear points is.....

(a) Only one (b) two

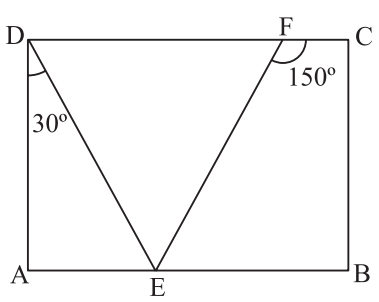
(c) three (d) none of the these

17. If two consecutive sides of a rhombus are represented by 3 $x - 6$ and $x + 14$ then the perimeter of the rhombus is

(a) 10 (b) 24

(c) 70 (d) 96

18. In the given figure ABCD is a rectangle m ∠ADE = 30º and m ∠CFE = 150º. What is m ∠DEF ?



(a) 90º (b) 75º

(c) 110º (d) 85º

19. Direction : In the question no. 19 and 20 a statement of assertion (A) is followed by a statement o reason (A) choose the correct option.

Statement A (Assertion): There can be infinite number of lines that can be drawn through a single point.

Statement R (Reason): From this point we can draw only two lines.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false

(d) Assertion (A) is false but reason (R) is true

20. Statement A (Assertion):The degree of a non-zero constant polynomial is zero.

Statement R (Reason): Polynomials having two terms are called binomials.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false

(d) Assertion (A) is false but reason (R) is true

Section-B

Section B consists of 5 questions of 2 marks each.

21. Find the value of x if $(\sqrt{3})^x = 3^7$

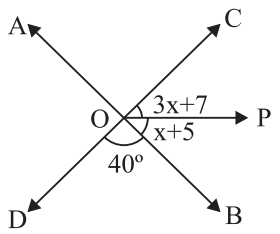
OR

Add : $\sqrt{125} + 2\sqrt{27}$ and $-5\sqrt{5} - \sqrt{3}$

22. Find the value of P if $x = 2$, $y = 3$ is a solution of equation $5x + 3Py = 4a$

23. Write the coordinates of the point where the graph of the equation $5x + 2y = 10$ intersects both the axes.

24. In the given figure AB and CD are two straight lines intersecting at O and OP is a ray. What is the measure of $\angle AOD$? Also find the value of x.



OR

Find the angle which is four times more than its complement.

25. Find the area of an equilateral triangle whose sides are 4 cm each.

Section-C

Section C consists of 6 questions of 3 marks each.

26. Evaluate: $\dfrac{2^{38} + 2^{37} + 2^{36}}{2^{39} + 2^{38} + 2^{37}}$

27. Find the value of a if $\dfrac{6}{3\sqrt{2} - 2\sqrt{3}} = 3\sqrt{2} - a\sqrt{3}$

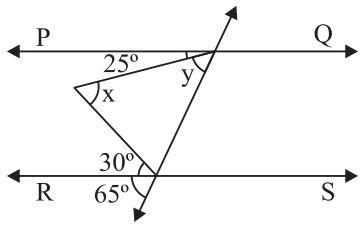
28. Factorize : $64a^2 + 96ab + 36b^2$

OR

If $x^2 + y^2 = 49$ and $x - y = 3$, then find the value of $x^3 - y^3$.

29. Find the product of $\left(p - \dfrac{1}{p}\right)\left(p + \dfrac{1}{p}\right)\left(p^2 + \dfrac{1}{p^2}\right)\left(p^4 + \dfrac{1}{p^4}\right)$

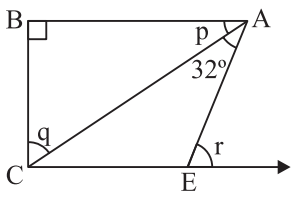
30. In the adjoining figure PQ || RS, find x and y.



OR

In the figure,

If $p : q = 11 : 19$, AB || CE then find the values of p, q and r.



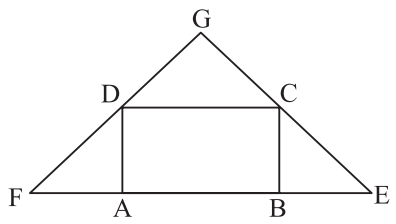
31. The perimeter of a triangle is 50 cm. One side of a triangle is 4 cm longer than the smaller side and the third side is 6 cm less than twice the smaller side. Find the area of the triangle.

Section-D

Section D consists of 4 questions of 5 marks each.

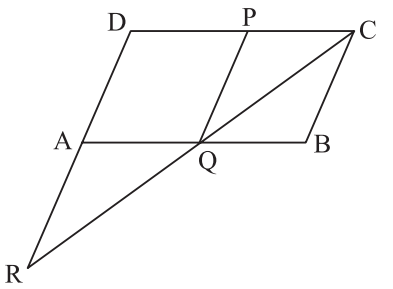
32. Find the factor of the polynomial $x^2 - 5x + 6$ and values of p(x) at $x = 10$, 20 and 50.

33. ABCD is a parallelogram. Side AB is produced on both sides to E and F as in figure such that BE = BC and AF = AD. Show that EC and FD when produced meets at right angle.



OR

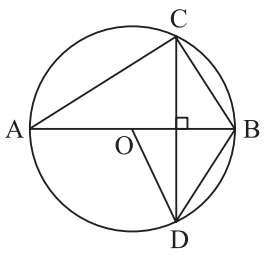
P is mid point of side CD of a parallelogram ABCD. A line through C parallel to PA intersects AB at Q and DA produced to R. Prove that DA = AR and CQ = QR.



34. Prove that the angle subtended by an arc of a circle at the centre is double the angle subtended by it at any point on the remaining part of the circle.

OR

In figure, O is the centre of the circle, BD = OD and CD ⊥ AB. Find ∠CAB.



35. A hemispherical bowl is to be painted from inside at the rate ₹ of 20 per 100 m^2. The total cost of painting is ₹ 30.80. Find

(i) Inner surface area of the bowl.

(ii) Volume of air inside the bowl.

Section-E

Section E consists of 3 case study based questions of 4 marks each.

36. During a Van Mahotsava week, 50 trees were planted by each school. After one month, the following number of trees survived in the 25 schools.

30	27	26	32	40
32	26	25	30	20
38	30	29	15	21
25	27	21	20	29
42	40	37	16	22

i) Draw frequency table using class size 5.

OR

Find the range of the given data.

ii) In how many schools plants survived between 35 and 40.

iii) Which class size has minimum frequency?

37. Ritesh opened the door at an angle of 43° to enter the class. In the recess, he came out of the class by opening the door at an angle of 72°. After the recess, he again opened the door at 43° and entered the class. The door length is 80 cm.

Fig. 1

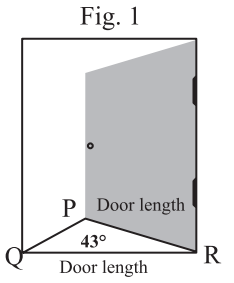


Fig. 2

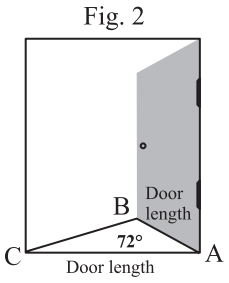
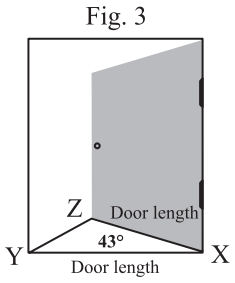


Fig. 3



i) The types of the triangle formed by opening the door is ..... .

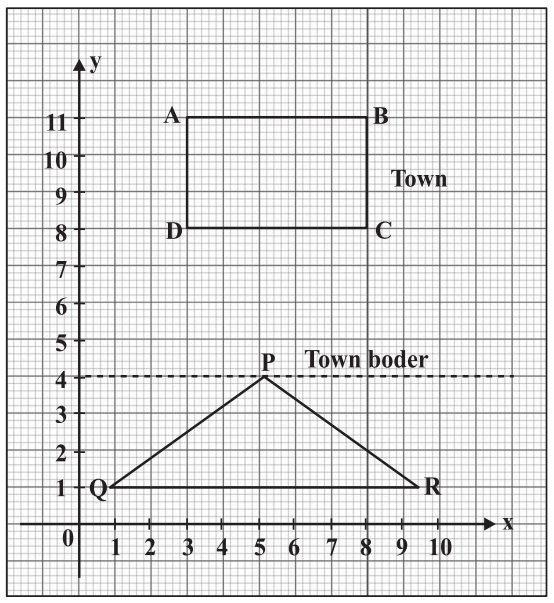
ii) Which of the triangles are congruent?

iii) What is the measure of ∠P?

OR

In △ABC, which is the longest side?

38. MNQ school provides free education to underprivileged children. Municipal corporation of a city wants to open a school in the town on a rectangular plot ABCD as shown in figure. But this plot belongs to Amar Singh who has agreed to exchange it with a triangular plot PQR out of the town as shown in figure. Based on the above information, answer the following questions:



i) What are the coordinates of vertex C of rectangular plot?

ii) What is the perpendicular distance of point C form x-axis?

iii) What will be the coordinates of foot of perpendicular drawn from D, on y-axis.

OR

What is the length of BC?

ANSWERS

1. (c) 10/14

2. (d) –5/2

3. (a) Linear

4. (c) (–1, 1)

5. (b) $y = 2$

6. (c) 74°

7. (b) 55°

8. (b) $3\pi r^2$

9. (d) 54 cm^2

10. (a) 38°

11. (b) 40°

12. (c) 2^{-6}

13. (d) 90^0

14. (b) 105

15. (d) $\frac{4}{3}\pi r^3$

16. (a) Only one

17. (d) 96

18. (a) 90°

19. (c)

20. (b)

21. $x = 14$ OR $5\sqrt{3}$

22. $P = \frac{4a-10}{9}$

23. (0, 5) and (2, 0)

24. $x = 32,\ \angle AOD = 140^0$

OR

72°

25. $4\sqrt{3}\ cm^2$

26. $\frac{1}{2}$

27. $a = -2$

28. $(8a + 6b)^2$

OR

207

29. $P^8 - \frac{1}{q^8}$

30. $x = 55°, y = 40°$

OR

33°, 57°, 65°

31. 13, 17, 20, 109.6 cm^2

32. $(x - 3)(x - 2), p(10) = 56, p(20) = 306, p(50) = 2256$

34. 30°

35. 154 m^2, 251.5 m^3

36. (i) Draw table OR 27

(ii) 2

(iii) (15-20) & (35-40)

37. (i) Isosceles

(ii) ΔPQR and ΔXYZ

(iii) $68\frac{1}{2}°$ OR BC

38. (i) (8, 8)

(ii) 8 units

(iii) (0, 8)

OR

3 units