aglasem.com

FOR GOA CLASS 9 PREPARATION

Goa Board Class 9 Sample Paper 2027 Mathematics

EXAM	YEAR	TYPE	SUBJECT
Goa Class 9	2027	Sample Paper	Maths

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

Grade 9 **Subject: MATHEMATICS (E)** **(2026 – 2027)**

SEMESTER - I

PORTION AND MARKS DISTRIBUTION (2026-2027)

MONTH	Chapter No.	Topic	Marks	Hours
April	1	Number systems	12	8
JUNE	2	Polynomials	18	15
JULY	5	Introduction to Euclid's Geometry	3	2
	6	Lines and Angles	14	10
	7	Triangles	15	9
AUGUST	PDF	Trigonometry	8	8
	8	Quadrilaterals	10	8
SEPTEMBER		Quadrilaterals contd.....		2
		Revision		8
		Total	**80 marks**	
INTERNAL ASSESSMENT		**Assignment on Financial Education**	**10 marks**	3
		Lab Activities (Any two)	**10 marks**	2
		Total	**100 marks**	**75**

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

Grade 9 **Subject: MATHEMATICS (E)** **(2026 – 2027)**

SEMESTER – II

PORTION AND MARKS DISTRIBUTION (2026-2027)

MONTH	Chapter No.	Topic	Marks	Hours
OCTOBER	PDF	Logarithms	10	8
NOVEMBER	3	Coordinate Geometry	3	3
	4	Linear Equations in 2 variables	8	9
DECEMBER	10	Circles	14	10
JANUARY	12	Heron's Formula	14	10
	14	Statistics	15	11
FEBRUARY	13	Surface Areas and Volumes	16	12
MARCH		Revision		8
		Total	**80 marks**	
INTERNAL ASSESSMENT		**Assignment on Experimental verification of properties / theorems on circles using Geoboard**	**10 marks**	3
		Lab Activities (Any two)	**10 marks**	2
		Total	**100 marks**	**75**

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

Rationalised syllabus 2026 – 2027

Grade 9 **Subject : Mathematics**

Chapter	Units Included	Units Deleted
1. Number systems	1.1 Introduction 1.2 Irrational Numbers 1.3 Real Numbers and their Decimal Expansions 1.5 Operations on Real Numbers 1.6 Laws of Exponents for Real Numbers	1.4 Representing Real Numbers on the Number Line
2. Polynomials	2.1 Introduction 2.2 Polynomials in One Variable 2.3 Zeroes of a Polynomial 2.4 Remainder Theorem 2.5 Factorisation of Polynomials 2.6 Algebraic Identities	____
3. Co - ordinate geometry	3.1 Introduction 3.2 Cartesian System 3.3 Plotting a Point in the Plane if its Coordinates are given	____
4. Linear equations in two variables	4.1 Introduction 4.2 Linear Equations 4.3 Solution of a Linear Equation 4.4 Graph of a Linear Equation in Two Variables 4.5 Equations of Lines Parallel to x-axis and y-axis	____
5. Introduction to Euclid's geometry	5.1 Introduction 5.2 Euclid's Definitions, Axioms and Postulates	5.3 Equivalent Versions of Euclid's Fifth Postulate
6. Lines and Angles	6.1 Introduction 6.2 Basic Terms and Definitions 6.3 Intersecting Lines and Non-intersecting Lines 6.4 Pairs of Angles **Theorem (to prove): Thm 6.1** 6.5 Parallel Lines and a Transversal 6.6 Lines Parallel to the same Line 6.7 Angle Sum Property of a Triangle **Theorem (to prove): Thm 6.7**	____

	Theorems (Motivate – without proof): Thm 6.2, Thm 6.3, Thm 6.4, Thm 6.5, Thm 6.6, Thm 6.8	
7. Triangles	7.1 Introduction 7.2 Congruence of Triangles 7.3 Criteria for Congruence of Triangles 7.4 Some Properties of a Triangle **Theorems (to prove): Thm 7.2 , Thm 7.3** 7.5 Some More Criteria for Congruence of Triangles Theorems (Motivate – without proof): Thm 7.1, Thm 7.4, Thm 7.5	7.6 Inequalities in a Triangle
8. Quadrilaterals	8.1 Introduction 8.2 Angle Sum Property of a Quadrilateral 8.3 Types of Quadrilaterals 8.4 Properties of a Parallelogram **Theorem (to prove): Thm 8.1** 8.5 Another Condition for a Quadrilateral to be a Parallelogram 8.6 The Midpoint Theorem Theorems (Motivate – without proof): Thm 8.2, Thm 8.3, Thm 8.4, Thm 8.5, Thm 8.6, Thm 8.7, Thm 8.8	
9. Areas of Parallelograms		**FULL CHAPTER**
10. Circles	10.1 Introduction 10.2 Circles and its Related Terms 10.3 Angle Subtended by a Chord at a Point **Theorems (to prove): Thm 10.1 , Thm 10.2** 10.4 Perpendicular from the Centre to a Chord **Theorems (to prove): Thm 10.3 , Thm 10.4** 10.5 Circle through three Points 10.6 Equal Chords and their Distances from the Centre 10.7 Angle Subtended by an Arc of a Circle 10.8 Cyclic Quadrilaterals Theorems (Motivate – without proof): Thms: 10.5, 10.6 , 10.7 , 10.8 , 10.9 , 10.10 , 10.11	Ex 10.3 Ex 10.5 from sum no. 7 onwards
11. Constructions		**FULL CHAPTER**
12.Heron's Formula	12.1 Introduction 12.2 Area of a Triangle – by Heron's Formula 12.3 Application of Heron's Formula in finding Areas of Quadrilaterals	____

13. Surface Areas and Volumes	13.1 Introduction 13.3 Surface Area of a Right Circular Cylinder 13.4 Surface Area of a Right Circular Cone 13.5 Surface Area of a Sphere & Hemisphere 13.7 Volume of a Right Circular Cylinder 13.8 Volume of a Right Circular Cone 13.9 Volume of a Sphere & Hemisphere	13.2 Surface Area of a Cuboid and a Cube 13.6 Volume of a Cuboid and a Cube
14. Statistics	14.1 Introduction 14.2 Collection of Data 14.3 Presentation of Data 14.4 Graphical Representation of Data- 14.5 Measures of Central Tendency	14.4 (A) Bar Graphs
15. Probability		**FULL CHAPTER**
* Trigonometry (PDF)	Full PDF	___
* Logarithms (PDF)	Full PDF	___

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

Mapping Syllabus with Curricular Goals and Competencies

2026 – 2027

Grade 9 **Sub: Mathematics (E)**

Sr. No	Chapter	Curricular Goals	Competencies
1.	Number Systems	CG-1 CG-2	C-1.1 C-2.1
2.	Polynomials	CG-3	C-3.1 C-3.2
3.	Introduction to Euclid's Geometry	CG-4	C-4.1
		CG-7	C-7.1
		CG-10	C-10.1 C-10.2
4.	Lines and Angles	CG-4	C-4.1 C-4.2
			C-7.3
5.	Triangles	CG-4	C-4.1 C-4.2
		CG-7	C-7.3
6.	Quadrilaterals	CG-4	C-4.1 C-4.2
		CG-7	C-7.3
7.	Trigonometry	CG-4	C-4.6
8.	Logarithms	CG-9	C-9.1 C-9.3
9.	Coordinate Geometry	CG-4	C-4.5
		CG-10	C-10.1
10.	Linear Equations in two variables	CG-3	C-3.2
		CG-8	C-8.1
11.	Circles	CG-4	C-4.1 C-4.3
12.	Heron's Formula	CG-5	C-5.1
		CG-10	C-10.1
13.	Surface Areas and Volumes	CG-5	C-5.2
		CG-8	C-8.2 C-8.3
14.	Statistics	CG-6	C-6.1
		CG-8	C-8.1
		CG-11	C-11.1

Competency Based Learning Outcomes (2026-2027)

Grade 9 **Sub: Mathematics (E)**

Chapter Name and Serial No.	Learning Outcomes
1. Number Systems	The learner • Applies logical reasoning in classifying real numbers, proving their properties and using them in different situations. • Differentiates rational and irrational numbers based on decimal representation. • Understands the operations on irrational numbers and applies to solve the numericals. • Represents real numbers on the number line. • Rationalises the denominator of real numbers. • Extends the understanding of powers(radical powers) and exponents to real numbers. • Applies the extended laws of exponents to simplify expressions.
2. Polynomials	The learner • Identifies/Classifies polynomials among algebraic expressions . • Understands the concept of degree of polynomials. • Understands the concept of zeros of a polynomial and applies it to find zeros of any given polynomial. • Applies the remainder theorem to find the remainder when a polynomial is divided by a linear polynomial. • Finds the factors of a polynomial using factor theorem. Factorises polynomials by applying appropriate algebraic identities.
3.Introduction to Euclid's Geometry	The learner • Understands Euclid's contribution in Plane Geometry. Defines axioms , postulates theorems with reference to Euclidean Geometry
4.Lines and Angles	The learner • Develops understanding of basic terms and definitions related to lines and angles. • States various axioms and theorems of parallel and intersecting lines and applies them to solve geometric problems. States and applies angle sum property and exterior angle property to various geometrical situations.
5.Triangles	The learner • Derives proofs of mathematical statements particularly related to geometrical concepts , like triangles by

	applying axiomatic approach and solves problems using them. • Understands the criteria of congruency of triangles. Applies various criteria of congruency of triangles to solve related problems
6. Quadrilaterals	The learner • Identifies various types of quadrilaterals. • Analyses and applies properties of parallelogram to prove various relationships. Applies midpoint theorem to solve problems.
7. Trigonometry	The learner • Demonstrates an understanding of the relationship between the sides of a triangle and the trigonometric ratios :sine ,cosine and tangent. • Evaluates trigonometric expressions using values of trigonometric ratios for standard angles. • Derives the relationship between $\sin\theta$ and $\cos\theta$. Applies the relationship for solving problems.
8. Logarithms	The learner • Understands the concepts of logarithm. • Writes given number using scientific notations. • Find characteristic of a number using scientific form. • Finds logarithm and antilogarithm of numbers using log tables. • Understands and applies laws of logarithms to simplify algebraic expressions Applies logarithms to solve real life problems
9. Coordinate Geometry	The learner • Understands the concept of Cartesian system of coordinates. • Develops strategies to locate points in a Cartesian plane. • Finds abscissa and ordinate of a point in a Cartesian plane. Plots the given points in a Cartesian plane
10.Linear Equations in two variables	The learner • Identifies and models real life situations into a linear equation in two variables. • Develops the understanding of infinitely many solutions of a linear equation in two variables. • Relates the algebraic and graphical representations of a linear equation in two variables. Represents the linear equation in one and two variables as a straight line in the Cartesian plane.

11.Circles	The learner • Recollects the knowledge of different terms related to circles. • Derives proofs of theorems related to circles by applying axiomatic approach. Applies theorems to solve problems.
12.Heron's Formula	The learner • Computes area of a triangle using Heron's formula. • Applies The concept of Heron's formula in real life situations.
13. Surface Areas and Volumes	The learner • Derives formulae for surface areas and volumes of different solid objects like cubes , cuboids , right circular cylinders , cones spheres and hemispheres. • Applies formulae to solve problems. Applies the formulae to find surface areas and volumes of the objects found in surrounding areas.
14. Statistics	The learner • Represents the data as frequency distribution table (grouped or ungrouped) and graphically as bar graphs , histograms and frequency polygons. • Analyses and interprets the data represented using various forms. • Computes mean , median and mode for ungrouped data. Applies the concepts in real life situations.

3.6.1 Pedagogy for Mathematics

3.6.1.1 Instructional practices

c.
d.
e.
f.
g.
h.

3.6.1.2 Some suggested methods of teaching

b.
c.
d.
e.

3.6.1.3 Integrating Mathematics with other Curricular Areas

a.
b.
c.

Revised Bloom's Taxonomy :

The revised Bloom's taxonomy includes the following levels:

- **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.
- **Applying** ; Solve problems to new situations by applying acquired knowledge , facts , techniques and rules in a different way.
- **Analysing** : Examine and break information into parts by identifying motives and causes. Make inferences and find evidence to support generalization.
- **Evaluating** : Present and defend opinions by making judgements about information , validity of ideas, or quality of work based on asset of criteria.
- **Creating** : Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

Grade 9 MATHEMATICS LABORATORY ACTIVITIES (2026-2027)

ROLE OF MATHEMATICS LABORATORY IN TEACHING - LEARNING

The Mathematics Laboratory allows and encourages the students to think, discuss with each other and the teacher, and assimilate the concepts in a more effective manner.

It enables the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures etc

There is no second opinion that for effective teaching and learning. 'Learning by Doing' is of great importance as the experiences gained remain permanently affixed in the mind of the child.

This PDF has 8 activities for STD IX which can be done in the class and some are selected from the LABORATORY MANUAL IN MATHEMATICS AT SECONDARY STAGE.

It is based on the National Education policy (NEP)2020.

Activities for the two terms are as follows:

	Activities
FIRST TERM	**1, 2, 3, 4 (any two)**
SECOND TERM	**5, 6, 7, 8 (any two)**

Students should maintain a file of the activity done.

NOTE: High-achieving students or students with keen interest in the subject can be motivated and encouraged to complete as many activities as per their interest with teacher's guidance by referring to the laboratory manual online as follows:

1.Visit ncert.nic.in

2.Publications

3.Laboratory Manual

4.Standardwise Maths activities

Grade 9 : MATHEMATICS LABORATORY ACTIVITIES

Sr. No.	List of Activities
1	To make a square root spiral by paper folding
2	To verify the algebraic identity: $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
3	To verify experimentally the different criteria for congruency of triangles using triangle cut outs
4	To verify the midpoint theorem using paper cutting and pasting
5	To plot a set of points on the Cartesian plane to create an artistic picture
6	Drawing Histogram and Frequency Polygon for a real life situation (Eg. Heights of a Group of Students)
7	Exploring Pythagoras Theorem using regular polygons and semicircle
8	Exploring Volume of an Open-Top Box Made from a Square Sheet.

ACTIVITY 1

OBJECTIVE

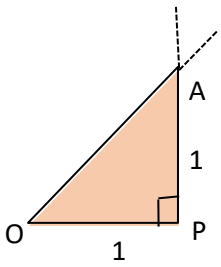
To make a square root spiral by paper folding.

MATERIALS REQUIRED

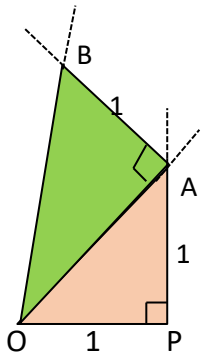
Rectangular blank sheet of paper , geometry box , coloured pencils etc

METHOD OF CONSTRUCTION:

1. Take a rectangular blank sheet of paper and mark a point O on it.
2. Draw a horizontal line OP = 1 unit using a ruler and a pencil.
3. Fold and press the paper along OP in such a way that the crease OP is formed.
4. Form a crease perpendicular to OP. Unfold and draw PA = 1 unit on the new crease formed.
5. Form a crease joining OA so that right - angled triangle OPA is formed.
   See Fig. 1 (a)
6. Form a crease perpendicular to OA , unfold and draw BA = 1 unit on the crease formed.
7. Join OB so that right - angled triangle OAB is formed .



(a)



(b)

Fig. 1

8. In the same way , unfold and draw BC = 1 unit perpendicular to OB and so on .

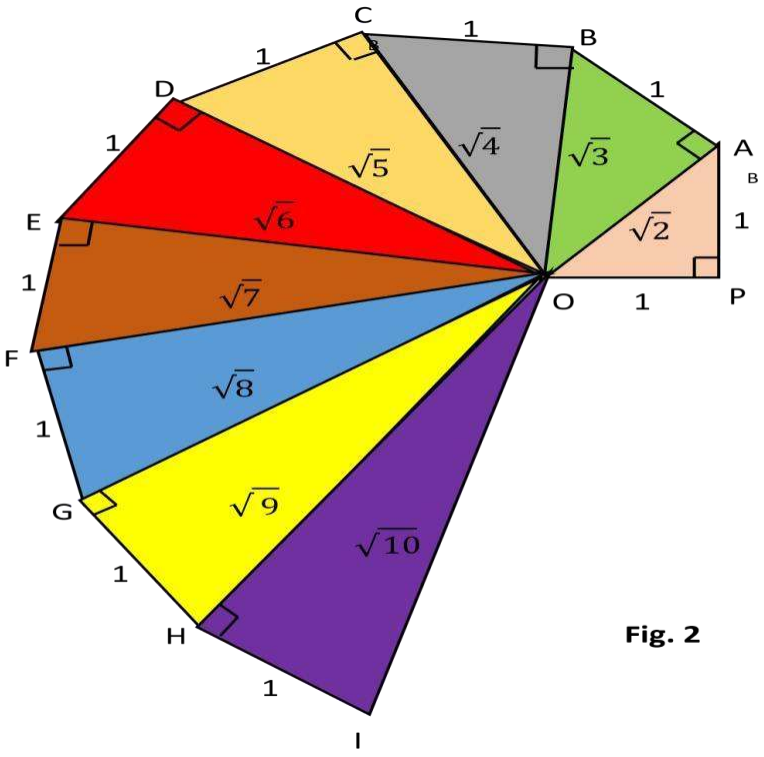


Fig. 2

DEMONSTRATION :

In right - angled triangle OPA ,

$$OA^2 = OP^2 + PA^2$$

$$OA = \sqrt{1^2 + 1^2}$$

$$OA = \sqrt{2}\ units$$

OBSERVATION :

1. In right - angled triangle OAB ,

$$OB = \sqrt{OA^2 + OB^2}$$

= _____ = _____

2. In right - angled triangle OBC ,

$$OC = \sqrt{OB^2 + BC^2}$$

= _____ = _____

Continuing like this , we observe that lengths of hypotenuses OA, OB , OC , OD ,… are

$\sqrt{2}$, $\sqrt{3}$, $\sqrt{4}$, $\sqrt{5}$, …respectively.

APPLICATION :

The shape so formed by performing the activity is a square root spiral. Through this activity, existence of irrational numbers can be illustrated.

Alternate method: https://youtu.be/i_MNzAJFK0c?si=8fhUGjqBtjS-6nEO

ACTIVITY 2

OBJECTIVE

To verify the algebraic identity :

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

MATERIALS REQUIRED

Coloured papers , adhesive, scissors ,geometry box etc.

METHOD OF CONSTRUCTION

1. Cut out a square of side a units from a coloured paper (see Fig. 1)
2. Cut out a square of side b units from a coloured paper (see Fig. 2)
3. Cut out a square of side c units from a coloured paper (see Fig. 3)
4. Cut out two rectangles of dimensions $a \times b$, two rectangles of dimensions $b \times c$ and two rectangles of dimensions $c \times a$ square units from a coloured paper (see Fig. 4)

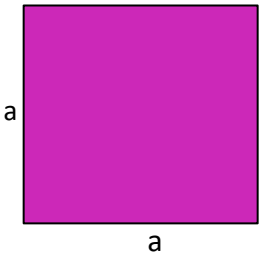


Fig.1

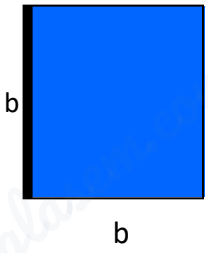


Fig. 2

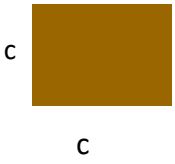


Fig. 3

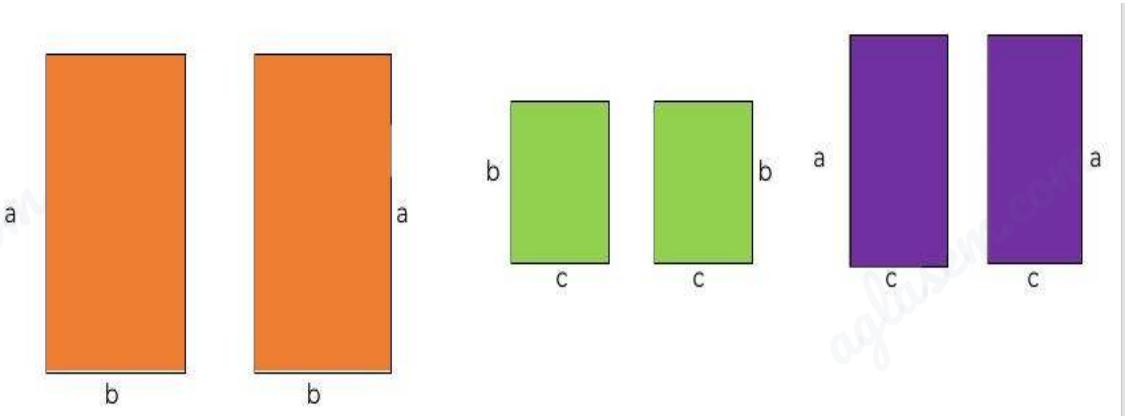


Fig. 4

5. Arrange the squares and rectangles on the blank page as shown in Fig. 5

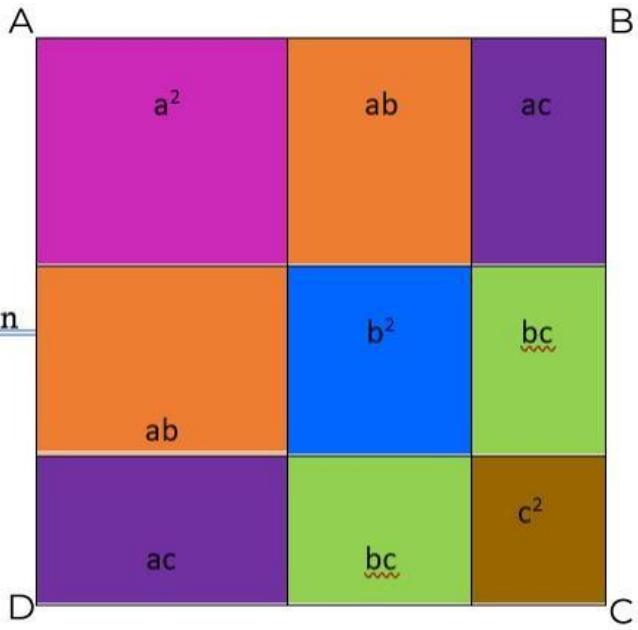


Fig. 5

DEMONSTRATION

From the arrangement of squares and rectangles in Fig. 5 , a square ABCD is obtained whose side is (a + b + c) units.

Area of square ABCD = $(a + b + c)^2$

Therefore , $(a + b + c)^2$ = sum of the areas of all the squares and rectangles shown in Fig. 1 to Fig. 4

$= a^2 + ab + ac + ab + b^2 + bc + ac + bc + c^2$

$= a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

Here , area is in square units.

On actual measurement :

a = ……., b = ……., c = ……. ,

So , a^2 = ……., b^2 = ……., c^2 =……. ,

ab = ……., bc = ……., ca = ……. ,

2ab = ……., 2bc = ……., 2ca = ……., a + b + c =

……., $(a + b + c)^2$ =……. ,

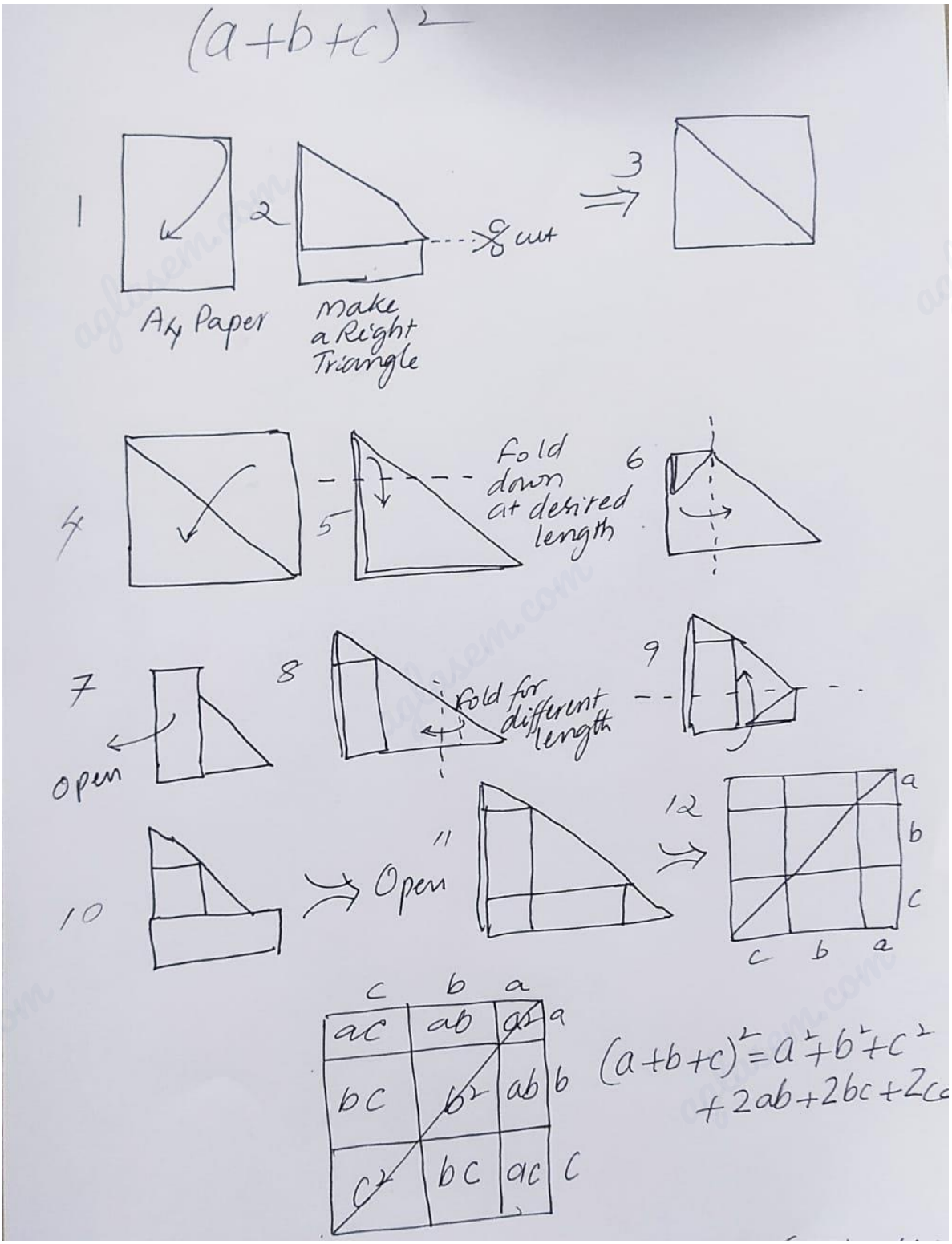
Therefore , $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

APPLICATION: The identity may be used for

1. simplification/factorisation of algebraic expressions

2. calculating the square of a number expressed as a sum of three convenient numbers.

Alternate method - paper folding activity
(by Prof. V.S.S.Sastry Kolar)



ACTIVITY 3

OBJECTIVE

To verify experimentally the different criteria for congruency of triangles using triangle cut-outs

MATERIALS REQUIRED

Chart paper , scissors , cutter , geometry box , pencil / sketch pens , coloured glazed papers etc

METHOD OF CONSTRUCTION

Take a chart paper of a convenient size.

1. Make a pair of triangles ABC and DEF in which AB = DE, BC = EF, AC = DF on a glazed paper and cut them out . (see Fig. 1)
2. Make a pair of triangles GHI and JKL in which GH = JK , GI = JL, $\angle G = \angle J$ on a glazed paper and cut them out . (see Fig.2)
3. Make a pair of triangles PQR and STU in which QR = TU , $\angle Q = \angle T$, $\angle R = \angle U$ on a glazed paper and cut them out. (see Fig. 3)
4. Make two right triangles XYZ and LMN in which hypotenuse YZ= hypotenuse MN and XZ = LN on a glazed paper and cut them out . (see Fig. 4)

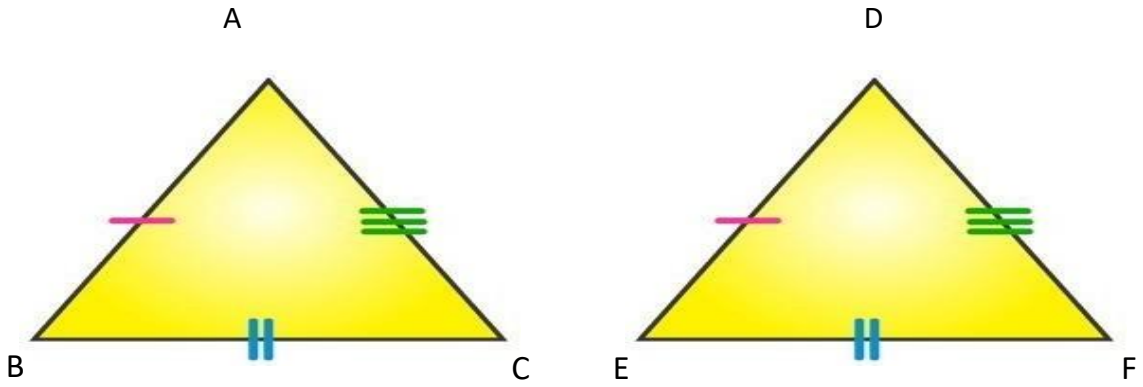


Fig.1

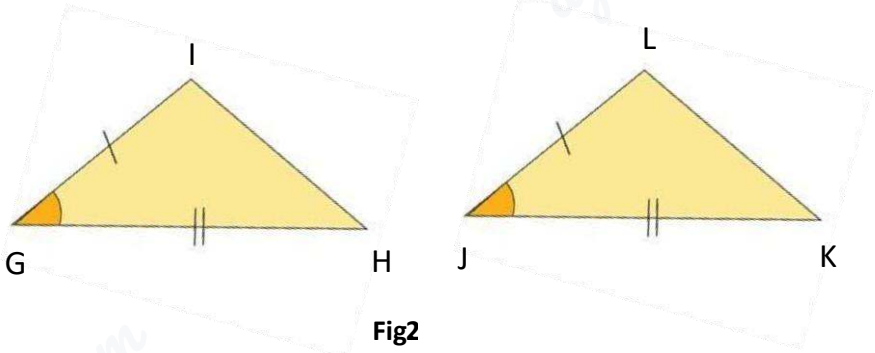


Fig2

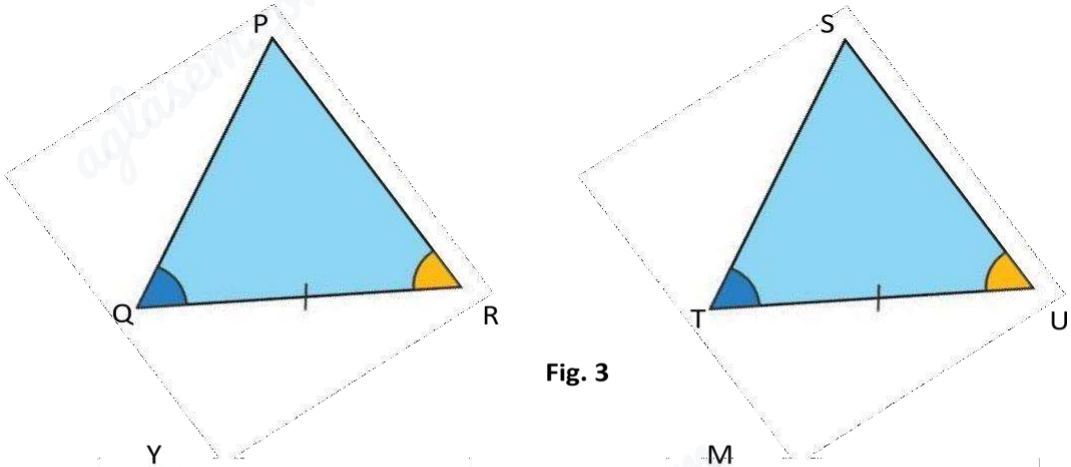


Fig. 3

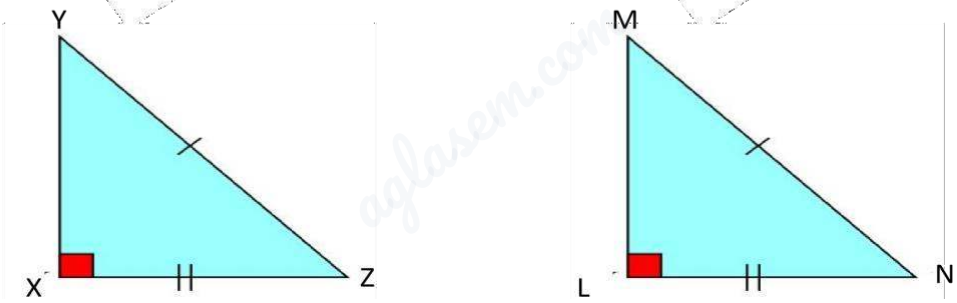


Fig. 4

DEMONSTRATION

1. Superimpose ΔABC on ΔDEF and see whether one triangle covers the other triangle or not by suitable arrangement . See that ΔABC covers ΔDEF completely only under the correspondence A ↔ D , B ↔ E , C ↔ F.

So , ΔABC ≅ ΔDEF , if AB = DE , BC= EF and AC = DF.

This is SSS criterion for congruency.

2. Similarly , establish ΔGHI ≅ ΔJKL , if GH =JK , $\angle G$ = ∠ J and GI = JL . This is SAS criterion for congruency.

3. Establish ΔPQR ≅ ΔSTU , if QR = TU , ∠Q = ∠T and ∠R = ∠U. This is ASA criterion for congruency.

4. In the same way , ΔXYZ ≅ ΔLMN , if hypotenuse YZ = hypotenuse MN and XZ = LN. This is RHS criterion for right triangles.

OBSERVATION

1. In ΔABC and ΔDEF

AB = DE = ……, BC = EF =……, AC = DF = ……,

On actual measurement

∠A = ……., ∠D =……,

∠B = ……., ∠E =……,

∠C = ……., ∠F =……,

Therefore , ΔABC ≅ ΔDEF

2. In ΔGHI and ΔJKL

GH = JK = ……..,GI = JL = ……,∠G = ∠J = ……. ,

On actual measurement

HI = ……., KL =……. ,

∠I = ……., ∠L =……. ,

∠H = ……., ∠K =……. ,

Therefore , ΔGHI ≅ ΔJKL

3. In ΔPQR and ΔSTU

QR = TU = ……, ∠Q = ∠T = ……,∠R = ∠U = ……. ,

On actual measurement

PQ = ……,ST = ……., PR = .. ……, SU =……,

∠P =……., ∠S = ……. ,

Therefore , ΔPQR ≅ ΔSTU

4. In ΔXYZ and ΔLMN , $\angle X = \angle L = 90^0$

hypotenuse YZ = hypotenuse MN = ……, XZ = LN = ……. ,

On actual measurement

LM = ……., XY = ……., ∠Y=……,∠M =……. ,

∠N = ……., ∠Z = ……. ,

Therefore , ΔXYZ ≅ ΔLMN.

Note: Students should find out why the SSA congruence rule is not possible, as the sides can be located in two different parts of the triangles and not corresponding sides of the two triangles.

APPLICATION

These criteria are useful in solving a number of problems in geometry.

These criteria are also useful in solving some practical problems such as finding width of a river without crossing it .

ACTIVITY 4

OBJECTIVE

To verify the mid-point theorem for a triangle using paper cutting and pasting

Midpoint theorem

A straight line joining the mid-points of any two sides of a triangle is parallel to the third side and is equal to half of it.

MATERIALS REQUIRED

Coloured sheet , tracing paper, geometry box, a pair of scissors, adhesive or fevicol etc.

METHOD OF CONSTRUCTION

1. Draw ΔABC on a sheet of paper and obtain the mid-points P , Q and R of sides AB , AC and BC respectively by paper folding

2. Join P and Q by folding and making a crease PQ (see Fig. 1)

3. Make a replica of ΔAPQ and cut it out.

DEMONSTRATION

Superimpose AQ over QC , so that QP falls along CB (see Fig. 2)

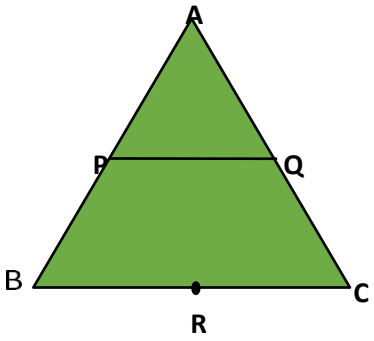


Fig. 1

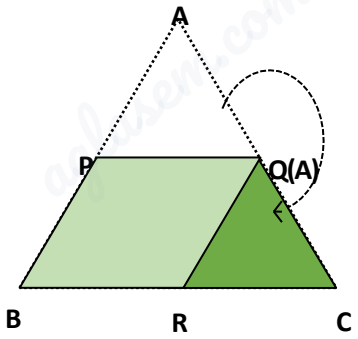


Fig. 2

OBSERVATION

1. ∠AQP covers or superimposes ∠ _____ exactly .
2. They form _____ angles on PQ and BC , AC being a transversal.
3. Thus , _____ is parallel to BC.
4. Also , P coincides with R.

$\Rightarrow$ _____ $= \frac{1}{2}$ BC

APPLICATION

Mid-point theorem is verified and it is useful in solving a number of geometrical problems.

ACTIVITY 5

OBJECTIVE

To create a hidden picture by plotting and joining points with given coordinates on the Cartesian plane.

MATERIALS REQUIRED

• Cardboard, White paper, scissor, Pencil, Adhesive, Graph paper (squared paper), Geometry box

METHOD OF CONSTRUCTION

1. Take a cardboard of a suitable size and paste a white sheet on it.
   2. Paste a graph paper neatly on the white sheet.
   3. Draw two perpendicular axes, X'OX (horizontal) and Y'OY (vertical), representing the Cartesian plane.
   4. Plot the given points A, B, C, ... with coordinates such as (a, b), (c, d), (e, f), etc.
   5. Join the points in the specified order: A → B → C → D → ... → A, to form a closed figure.
   6. The figure will reveal a hidden image.

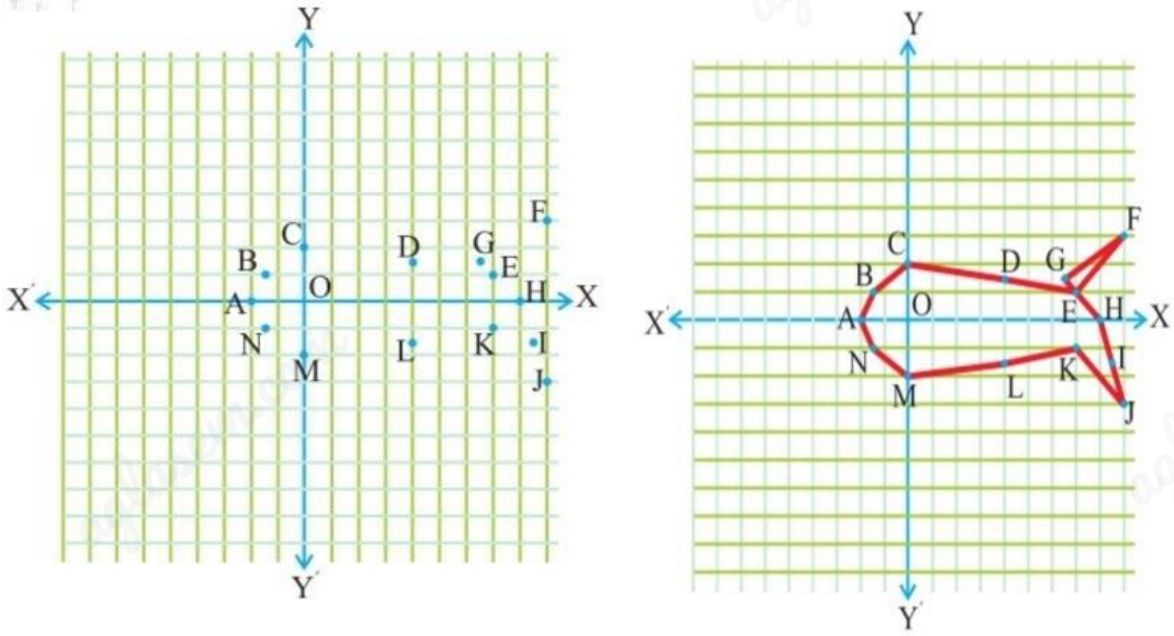
DEMONSTRATION

By plotting and joining the points as instructed, a hidden image of a '_____' (e.g., kite, house, tree) appears on the graph.

OBSERVATION

• Coordinates of the points:
A = (____, ____), B = (____, ____), C = (____, ____),= (____, ____), …

• Hidden picture formed: _____



APPLICATION

This activity enhances understanding of:

- Cartesian coordinates and plotting of points
- Shapes formed by connecting coordinates
- Practical uses such as road maps, classroom layouts, and blueprint design.

N.B : Teachers are requested to provide coordinates for hidden pictures, or students may create their own sets of coordinates that form a picture (e.g., a house, bird, animal, fish, vase, etc.) when joined.

**********###**********

ACTIVITY 6

OBJECTIVE

To draw a Histogram and Frequency Polygon for the heights of a group of students.

MATERIALS REQUIRED

Graph paper, pencil, ruler, eraser, notebook.

METHOD OF CONSTRUCTION

1. Data Collection:

   - Measure and record the heights of 30 students in your class (in cm).

2. Organize Data into Class Intervals:

   - Form suitable class intervals, e.g., 140–145 cm, 145–150 cm, etc.

3. Prepare a Frequency Table:

   - Count how many students fall into each height group.

4. Draw the Histogram:

   - Draw class intervals on the x-axis and frequencies on the y-axis.
   - Draw rectangles (bars) without gaps. The height of each bar should represent the frequency of the corresponding class interval.

5. Draw the Frequency Polygon:

   - Find the midpoints of each class interval.
   - Plot points as (midpoint, frequency).
   - Connect the points using straight lines.
   - Extend the polygon by joining the first and last points to the x-axis at height 0.

DEMONSTRATION

Class Interval (Height in cm)	Frequency (No. of Students)
140 – 145	3
145 – 150	6
150 – 155	10
155 – 160	7
160 – 165	4

Graph Work:

1. Histogram:

- Draw bars for each class interval with heights equal to their frequencies.
- Note: There should be no gaps between the bars.

2. Frequency Polygon:

- Midpoints: 142.5, 147.5, 152.5, 157.5, 162.5
- Plot the points: (142.5, 3), (147.5, 6), (152.5, 10), (157.5, 7), (162.5, 4)
- Connect the points with straight lines.
- Join the first and last points to the x-axis at height 0.

N.B : The above activity is just an example using mock data. Teachers are requested to help students use real data such as their weights, heights, marks in Semester -1 Mathematics, etc. for statistics activities.

**********###**********

ACTIVITY 7

OBJECTIVE

To explore the Pythagoras Theorem using areas of regular polygons (such as equilateral triangles, squares, hexagons) and semicircles constructed on the sides of a right-angled triangle.

MATERIALS REQUIRED

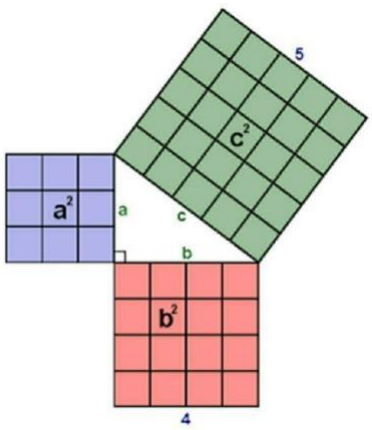
- Cardboard, White paper, Coloured paper Compass, Protractor, Ruler, Pencil, Scissors, Glue

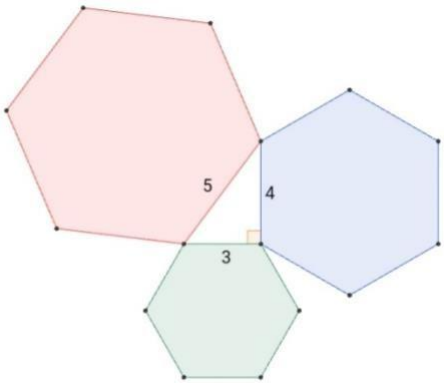
METHOD OF CONSTRUCTION

1. Draw a right-angled triangle ABC (right-angled at B) on cardboard.
2. Construct regular shapes (square, equilateral triangle, hexagon, or semicircle) on each side AB, BC, and AC.
3. Ensure the shapes are constructed such that each shares a side with the triangle.
4. Calculate or cut and paste shapes on each side showing the area.
5. Demonstrate that:

   Area on AB + Area on BC = Area on AC
   (i.e., sum of areas on the legs = area on the hypotenuse).

6. Repeat for different regular polygons and semicircles.





DEMONSTRATION

By constructing the same regular polygon (e.g., squares or semicircles) on each side of a right triangle, it can be visually shown that the area on the hypotenuse equals the sum of areas on the other two sides—thus proving the Pythagoras Theorem in a geometric and visual way.

OBSERVATION

After constructing the regular polygons (e.g., squares, equilateral triangles, hexagons, and semicircles) on each side of the right-angled triangle, the following observations were made:

- The combined area of the shapes on the two shorter sides (legs) is equal to the area of the shape on the hypotenuse, regardless of the type of regular polygon or semicircle used.
- This visual and area-based approach confirms the Pythagoras Theorem:
  (Area on side AB) + (Area on side BC) = (Area on side AC)
- The result holds true consistently across different shapes, reinforcing the geometric truth of the theorem.

APPLICATION

- Enhances visual understanding of the Pythagoras Theorem.
- Helps understand the concept of area in regular polygons.
- Useful in architectural design, geometry-based problem solving, and spatial understanding.
- Encourages creativity and application of mathematics in real-world geometry.

********** ### **********

ACTIVITY 8

OBJECTIVE:

To explore how the volume of an open-top box changes when squares of different sizes are cut from each corner of a square sheet and the sides are folded up to form the box.

MATERIALS REQUIRED:

- Square sheets of paper or card (12 inches × 12 inches)
- Ruler, Pencil, Scissors

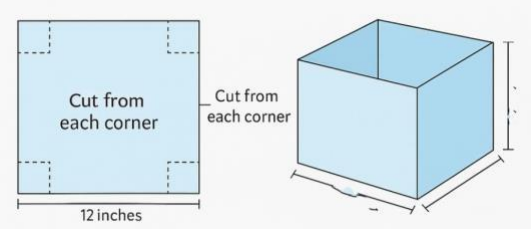
METHOD OF CONSTRUCTION:

6. Take a square sheet of size 12 inches × 12 inches.
7. Cut equal squares from each corner. Try cutting squares of side 1 inch, 2 inches, 3 inches, etc.
8. Fold up the flaps formed by the remaining edges to form an open-top box.
9. The height of the box will be equal to the side of the square cut from each corner.
10. Use the formula to calculate the volume of the box:

    Volume = length × breadth × height

    where,

    - height = x (cut size)
    - length = $12 - 2x$
    - breadth = $12 - 2x$



DEMONSTRATION:

Construct several boxes by cutting squares of side:

- 1 inch
- 2 inches
- 3 inches
- 4 inches
- …

Calculate volume for each case using the formula above.

OBSERVATION:

Cut Size (inches)	Length (in)	Breadth (in)	Height (in)	Volume (cubic in)
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	—	—	—	—
...				

APPLICATION:

This activity demonstrates a practical optimization problem. It shows how changing one dimension affects the others and the overall volume. This concept is useful in packaging design, waste reduction and engineering solutions where material usage and space optimization are important.

Conclusion: (To be written by students) :

Through this activity, I observed that .....

**********###**********

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO- BETIM , GOA 403521

Grade 9 **Subject: MATHEMATICS** **Yr: 2026 - 2027**

SEMESTER I : ASSIGNMENT (*FINANCIAL EDUCATION*) Max.Marks: 10

Topic: BANKING

INSTRUCTIONS:

1) Prepare a portfolio with the help of the guidelines given below.

2) Visit a Bank and obtain the following information required for the assignment.

Sr. No.	Banking	Marks
1.	Cover page design of the **LOGO** and **SLOGAN** of the Bank visited.	1
2.	Index	½
3.	Functions of a Bank and Importance of Saving.	½
4.	Types of Bank accounts and their advantages.	1
5.	Type of Bank Loans. Find the eligibility criteria and documents required for taking an educational loan.	1
6.	Documents required for opening a Bank Account.	½
7.	**Calculation of maturity amount on a Recurring Deposit**. For eg: You deposited ₹200 per month in Bank A for 2 years under the Recurring Deposit Scheme. Find the maturity value at the end of 2 years. (Write the formula and show the calculations)	½
8.	**Calculation of maturity amount on a Fixed Deposit.** For eg: You deposited ₹ 5000 in Bank A for 2 years under the fixed deposit scheme. Find the Maturity value at the end of 2 years. (Write the formula and show the calculations).	1½
9.	Fill up a withdrawal slip, deposit slip and a xerox of a cheque.	1½
10.	Acknowledgement.	½
11.	Bibliography.	½
	TOTAL	**10**

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO- BETIM , GOA 403521

Grade 9 **Subject: MATHEMATICS** **Yr : 2026 - 2027**

SEMESTER II : **ASSIGNMENT (*GEOBOARD*)** **Max.Marks: 10**

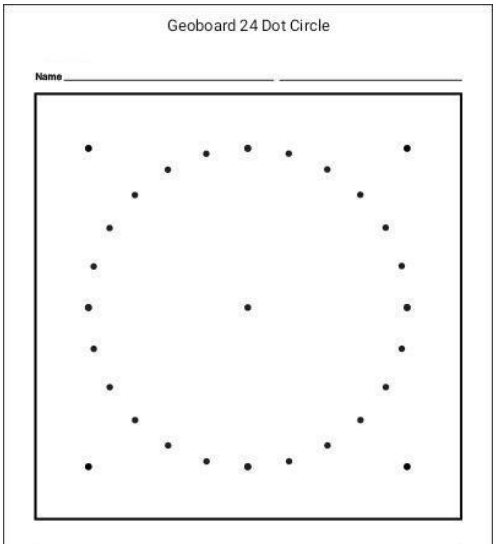
Topic : Exploring circle theorems using Geoboard

Objective:

- To explore and illustrate basic circle theorems using a self-made circular Geoboard.
- To develop conceptual understanding through hands-on activity.

Materials Required:

- Wooden board/cardboard (20cm×20cm or 25cm×25cm)
- Small nails or push pins
- Protractor, ruler, compass, pencil/Markers
- Rubber bands or coloured threads
- Chart/notebook for observations



Steps to Make the Geoboard:

i. Find a central point on the board and using a compass draw a circle with centre O .
ii. Mark evenly spaced points around the circle's circumference .
(e.g. every 15° for 24 points)
iii. Insert small nails or push pins at each marked point.
iv. Use rubber bands or coloured threads to create chords and other shapes to demonstrate circle properties.

Concepts & Theorems to Demonstrate/Investigate/Explain Using Geoboard:

1. Equal chords of a circle are equidistant from the centre

- Make two chords AB and CD of equal length.
- Verify that perpendiculars from the centre of the circle to both the chords are equal.

2. The perpendicular from the centre of a circle to a chord bisects the chord.

- Make a chord XY.
- Verify that the perpendicular from the centre of the circle bisects the chord.

3.1 Alternate segment Theorem (Inscribed Angle Theorem)

- Make an arc PB subtending ∠POB at the centre O and ∠PQB at point Q on the remaining part of the circle.
- Measure inscribed ∠PQB and central ∠POB
- Verify that the inscribed angle is half of the central angle .

3.2. Angle in a Semicircle theorem

- Make a diameter EF.
- Choose a point D on the circle and measure ∠EDF
- Verify that ∠EDF = 90°

4. Angles in the same segment are equal.

- Make a chord MN .
- Choose two more points S and T on the circle.
- Measure ∠MSN and ∠MTN .
- Check that both angles are equal.

5. Opposite angles of a cyclic quadrilateral sum to 180°.

- Take four points A , B , C and D on the circle .
- Connect them in order : A-B , B-C , C-D , D-A to form a quadrilateral.
- Find the measure of each pair of opposite angles .
- Verify that ; ∠ABC + ∠CDA = 180° and ∠BCD + ∠DAB= 180°

Conclusion: (to be written by the student): .....

****

NOTE:

- ***Use the Geoboard to illustrate each theorem with rubber bands/ coloured threads and measure/observe relationships using a scale.***
- ***Draw diagrams of each, showing the measured data and label them neatly.***
- ***# Teachers can guide students to measure angles using paper folding techniques and record their findings in a tabular form.***

INSTRUCTIONS:

1) Prepare a Geoboard with the help of the guidelines given above .

2) Explain the Concepts & Theorems Using Geoboard.

Sr. No.	Criteria	Marks
1.	Geoboard Construction	5
2.	Presentation / Explanation of concepts on circles using Geoboard	5
	Total	10

****

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

DESIGN OF THE QUESTION PAPER (2026-2027)

SEMESTER-I

Subject : MATHEMATICS (E)

Time : 3 hrs **Grade : 9** **Max. Marks : 80**

****

The weightage or the distribution of marks over different dimensions of the question paper shall be as follows:

1. Weightage to the Learning objectives :

Sr. No.	Learning Objectives	Marks	Percentage of Marks
1.	Remembering and Understanding	50	62.5%
2.	Applying	20	25%
3.	Analysing , Evaluating and Creating	10	12.5%
	Total	**80**	**100%**

2. Weightage to the different areas of Content :

Chapter No.	Topic	Marks
1	Number systems	12
2	Polynomials	17
5	Introduction to Euclid's Geometry	03
6	Lines and Angles	14
7	Triangles	15
8	Quadrilaterals	10
PDF	Trigonometry	09
	Total	**80**

3. Weightage to different form/type of Questions :

Sr. No.	Form of Questions	Marks for each question	Number of questions	Total Marks
1.	Very Short Answer Type (VSA)	1	20	20
2.	Short Answer Type I (SA-I)	2	11	22
3.	Short Answer Type II (SA-II)	3	10	30
4.	Long Answer Type (LA)	4	2	08
	Total		**43**	**80**

4. The expected time for different type of questions would be as fo follows:

Sr. No.	Form of Questions	Approx. time for each question in mins (t)	Number of questions (n)	Approx. time for each form of questions in mins (t) x (n)
1.	Very Short Answer Type (VSA)	2	20	40
2.	Short Answer Type I (SA-I)	3	11	33
3.	Short Answer Type II (SA-II)	8.5	10	85
4.	Long Answer Type(LA)	11	02	22
	Total		**43**	**180**

4. Weightage to difficulty level of questions:

Sr. No.	Estimated difficulty level of questions	Percentage
1.	Easy	20%
2.	Average	60%
3.	Difficult	20%
	Total	**100%**

5. Number of Questions:

There will be **43** questions

BLUE PRINT OF SEMESTER-I EXAM MATH QUESTION PAPER ; 2026-2027
Grade 9

Sr. No.	Topic	Objectives												Total
		Remembering & Understanding				Applying				Analysing , Evaluating & Creating				
		VSA	SAI	SAII	LA	VSA	SAI	SAII	LA	VSA	SAI	SAII	LA	
		1mk	2mk	3mk	4mk	1mk	2mk	3mk	4mk	1mk	2mk	3mk	4mk	
1	Number systems	1(1) 2(1)	22(2) 24(2)	32(3)		12(1)					21(2)			**7(12)**
2	Polynomials	3(1) 4(1)	*23(2) 25(2) *27(2)	33(3)		13(1)				19(1)			42(4)	**9(17)**
5	Introduction to Euclid's Geometry	5(1)	28(2)											**2(3)**
6	Lines and Angles	6(1) 7(1)	26(2)	*34(3)		14(1) 15(1)		39(3)			31(2)			**8(14)**
7	Triangles	8(1)		35(3) *36(3)				40(3)	43(4)	20(1)				**6(15)**
8	Quadrilaterals	9(1)	29 (2)	37(3)		16(1)		41(3)						**5(10)**
PDF	Trigonometry	10(1) 11(1)	30(2)	38(3)		17(1) 18(1)								**6(9)**
	Total	**11(11)**	**9(18)**	**7(21)**	**0(0)**	**7(7)**	**0(0)**	**3(9)**	**1(4)**	**2(2)**	**2(4)**	**0(0)**	**1(4)**	
		27(50)				**11(20)**				**5(10)**				**43(80)**

NOTE: Figures outside the bracket indicate the question number and figures within the bracket indicate marks .

*Indicates internal choice to be provided.

This is a model Blueprint, paper setter may make changes in the objectives chapter wise.

****

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION
ALTO – BETIM GOA 403521
MODEL QUESTION PAPER (2026-2027)
SEMESTER I
SUBJECT: MATHEMATICS (E)

TIME : 3 Hrs **GRADE 9** **MAX. MARKS : 80**

INSTRUCTIONS:

i. This question paper consists of **43** questions. All questions are compulsory.
ii. This question paper is divided into four Sections.- **A , B , C** and **D**.
iii. In **Section A** , question numbers **1 to 20** are multiple choice questions **(MCQs)** and question numbers **19 and 20** are Assertion – Reason based questions of 1 mark each.
iv. In **Section B** , question numbers **21 to 31** are short answer type I **(SA-I)** questions carrying **2 marks** each.
v. In **Section C** , question numbers **32 to 41** are short answer type II **(SA-II)** questions carrying **3 marks** each.
vi. In **Section D** , question numbers **42 and 43** are long answer **(LA)** questions carrying **4 marks** each.
vii. There is no overall choice . However , an internal choice has been provided in **two questions** of **2 marks** each in **Section B** and **two questions** of **3 marks** each in **Section C**.
viii. In the question on construction, the drawing should be clear and exactly as per given measurement. The construction lines and arcs should also be maintained.
ix. Use of calculator is NOT permitted.

Section A (1 mark each)

Select and write the correct alternative from those given below each statement for question 1 to 20:

1. The decimal representation of a rational number is :
   - always terminating
   - either terminating or repeating
   - either terminating or nonrepeating
   - neither terminating nor repeating

2. Which of the following is an irrational number
   - $\frac{\sqrt{24}}{\sqrt{6}}$
   - $\sqrt{\frac{4}{9}}$
   - $\sqrt{5} \times \sqrt{5}$
   - $\sqrt{5} \times \sqrt{3}$

3. The degree of the polynomial $5x^3 - 7x^2 + 9$ is :
   - 0
   - 1
   - 2
   - 3

4. When $x^3 - 5x + 4$ is divided by $x + 1$ the remainder is :
   - 0
   - 8
   - 9
   - 10

5. How many dimensions does a plane surface have ?
   - 0
   - 1
   - 2
   - 3

6. The sum of the angles formed on the same of a straight line at a point is :
   - 90°
   - 180°
   - 270°
   - 360°

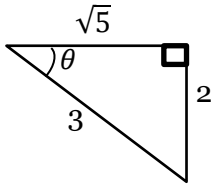
7. Which of the following statements is true ?
   - all adjacent angles are supplementary.
   - vertically opposite angles are always supplementary.
   - if two lines intersect , adjacent angles are always equal.
   - vertically opposite angles are always equal.

8. In ΔPQR ,if QP = QR , S is the midpoint of PR and ∠PRQ = 35°, then ∠PQS is :
   - 35°
   - 55°
   - 70°
   - 110°

9. If the diagonals of a quadrilateral bisect at right angles , the figure is a :
   - trapezium
   - parallelogram
   - rectangle
   - rhombus

10. The value of tan 30° is :
    - 0
    - $\frac{1}{\sqrt{3}}$
    - 1
    - $\sqrt{3}$

11. In the figure , the value of $\cos\theta$ is :
    - $\frac{2}{3}$
    - $\frac{3}{2}$
    - $\frac{\sqrt{5}}{2}$
    - $\frac{\sqrt{5}}{3}$



12. The real number that lies between 2 and 3 on the number line is :
    - $\sqrt{3}$
    - $\sqrt{4}$
    - $\sqrt{7}$
    - $\sqrt{10}$

13. If x+y =5 and x^2+y^2=111 then the value of x^3+y^3 is :
    - 115
    - 220
    - 555
    - 770

14. If the difference between two supplementary angles is 60° , then the smaller angle is :
    - 30°
    - 60°
    - 90°
    - 110°

15. If two exterior angles of a triangle are 110° and 120° , then the measure of the third exterior angle is :
- 110°
- 120°
- 130°
- 230°

16. One side of the parallelogram is 2.4cm and the other side is $\frac{3}{2}$ times of the first side , then the perimeter of the parallelogram is :
- 7.8 cm
- 10.8 cm
- 12 cm
- 14.4 cm

17. If A is an acute angle and sin^2A + $sin^2$65° = 1 , then the value of A is :
- 0
- 25
- 65
- 1

18. The value of $\frac{1-tan^2 45°}{1+tan^2 45°}$ is same as the value of :
- sin 0°
- cos 0°
- tan 45°
- tan 90°

Directions :
In Q. No. 19 and 20, a statement of Assertion (As) is followed by a statement of Reason (R). Select the correct option from the following :
- Both, Assertion (As) and Reason (R) are true. Reason (R) explains Assertion (As) completely.
- Both , Assertion (As) and Reason (R) are true . Reason (R) does not explain Assertion (As).
- Assertion (As) is true but Reason (R) is false.
- Assertion (As) is false but Reason (R) is true.

19. Assertion (As) : The remainder when p(x) = $x^3 - 2x^2 + 3x$ is divided by by $2x+1$ is $\frac{9}{8}$.
Reason (R) : If a polynomial p(x) is divided by ax − b , the remainder is the value of p(x) at $x = \frac{b}{a}$

20. Assertion (As): In ΔABC and ΔPQR , If AB = PQ , AC = PR and ∠ BAC = ∠PQR then , ΔABC ≅ ΔPQR
Reason (R) : Both triangles are congruent by SSS congruence rule

Section B (2 marks each)

21. Represent $\sqrt{7.3}$ on the number line.

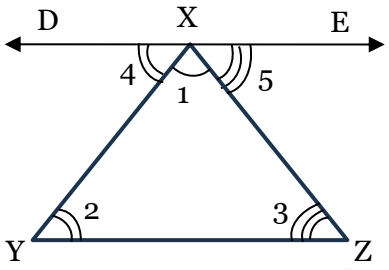
22. Express $0.\overline{54}$ in the form $\frac{p}{q}$, where p and q are integers and q≠ 0.

23. Factorise the following quadratic polynomial by splitting the middle term .
$4x^2 - 11x + 6$
OR
$6x^2 + 7x - 5$

24. Simplify : $5^{\frac{3}{4}} \times 25^{\frac{-1}{2}} \div 125^{\frac{3}{4}}$

25. Find the value of k , if $x + \sqrt{2}$ is a factor of p(x) = $3\sqrt{2}x^2+5x+\sqrt{2}$

26. Given : In ΔXYZ , a line DE is drawn through the point X and parallel to side YZ to form the angles ∠ 4 and ∠ 5 as shown in the figure.
Prove that : ∠ 1 + ∠ 2 + ∠3 = 180°

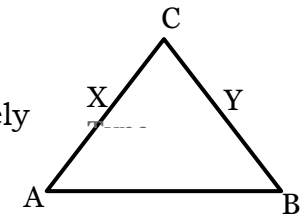


27. Expand using a suitable identity : (5a − 7b + 3c)^2

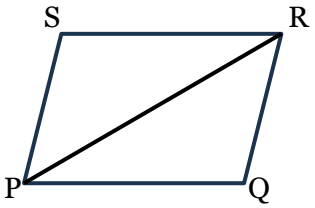
OR

27. Evaluate using a suitable identity : 103 × 105

28. Given : In the adjoining figure ,
X and Y are the midpoints of AC and BC respectively and AX = CY.
Prove that : AC = BC



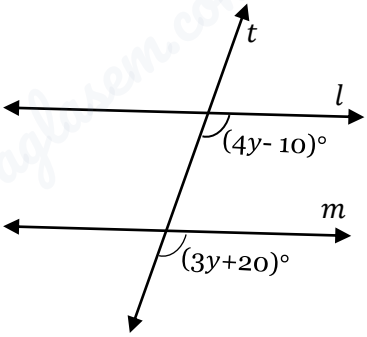
29. Given : In the adjoining figure ,
PR is a diagonal of parallelogram PQRS.
Prove that : ΔPQR ≅ ΔRSP



30. Evaluate the following trigonometric expression using known numerical values of trigonometric ratios :

$7sin^2 45° + 2cos^2 60°$

31. Given : In the adjoining figure ,
Line t is a transversal of lines l and m.
Find the value of y for which lines l and m will be parallel to each other.



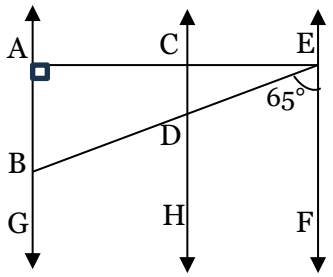
Section C (3 marks each)

32. Simplify :

$$\frac{4+\sqrt{13}}{4-\sqrt{13}} + \frac{4-\sqrt{13}}{4+\sqrt{13}}$$

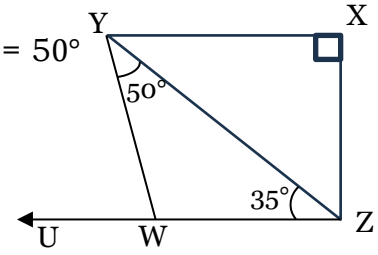
33. Divide the polynomial $p(x) = x^3 + 7x - 12$ by the polynomial $g(x) = x - 1$ and find the quotient and remainder.

34. Given : In the adjoining figure ,
AG ∥ CH ∥ EF, ∠ EAB = 90° and ∠ BEF = 65°.
Find :
i) ∠ CED
ii) ∠ EDC
iii) ∠ DBG

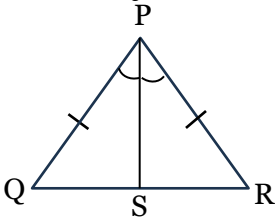


OR

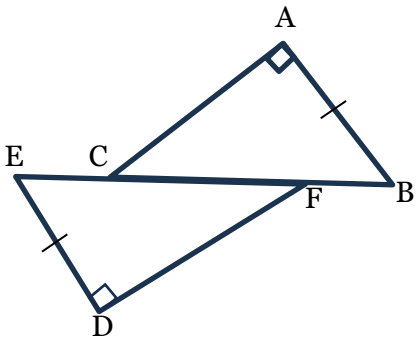
34. Given : In the adjoining figure ,
XY ∥ ZW , ∠ ZXY = 90°, ∠ YZW = 35° and ∠ WYZ = 50°
Find :
i) ∠ XZY
ii) ∠ XYZ
iii) ∠ YWU



35. Given : Δ PQR is an isosceles triangle such that PQ = PR and ray PS is the bisector of ∠ QPR.
Prove that : ∠ Q = ∠ R



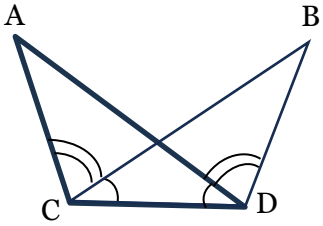
36. Given : In the adjoining figure , BA ⊥ AC and ED ⊥ DF such that AB = DE and BF = EC
Prove that : DF = AC



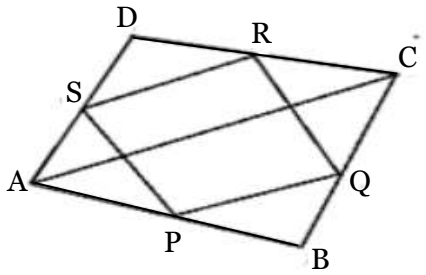
OR

36. Given : In the adjoining figure ,
∠ BCD = ∠ ADC and ∠ ACB = ∠ BDA

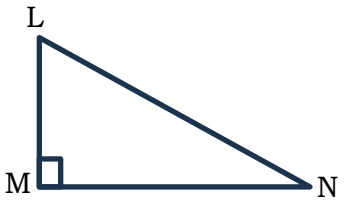
Prove that : AD = BC



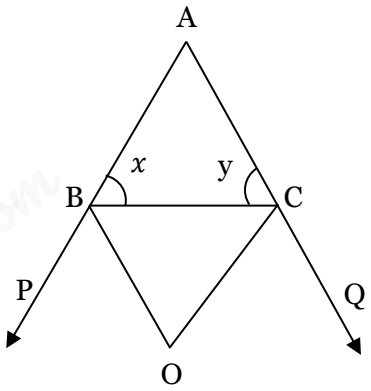
37. Given : ABCD is a quadrilateral in which P , Q , R and S are the midpoints of the sides AB , BC , CD and DA respectively.
AC is a diagonal.
If SR =5.2cm and QR = 6.4 cm,
then find the lengths of AC , PQ and PS.



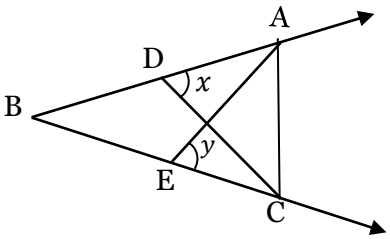
38. In Δ LMN , ∠ M = 90° , LM = 8cm and MN =15cm.
Find :
i) length of LN
ii) value of sin N
iii) value of tan L



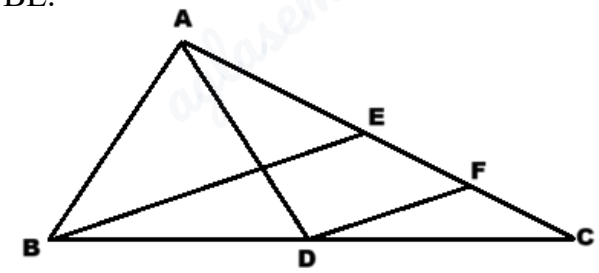
39. Given : In the adjoining figure ,
the sides AB and AC of ΔABC are produced to points P and Q respectively.
If bisectors BO and CO of ∠CBP and ∠BCQ respectively, meet at O , then
Prove that : $\angle BOC = \frac{1}{2}(x + y)$



40. Given : In the adjoining figure ,
$\angle x = \angle y$ and AB = CB.
Prove that : AE = CD



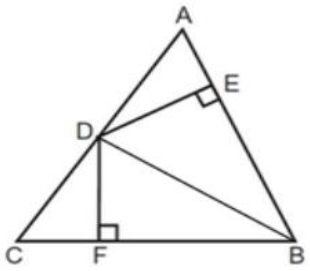
41. In the figure given below,
AD and BE are the medians of ΔABC and DF ∥ BE.
Prove that : $CF = \frac{1}{4}AC$.



Section D (4 marks each)

42. Factorise the polynomial : $a^3 + 13a^2 + 32a + 20$

43. Given : In the adjoining figure ,
In Δ ABC , D is a point on side AC such
DE = DF , AD = CD ,
DE⊥AB at E and DF⊥CB at F.
Prove that : AB = BC



****

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

DESIGN OF THE QUESTION PAPER (2026-2027)

SEMESTER II

Subject : MATHEMATICS (E)

Time : 3 hrs **Grade 9** **Max. Marks :80**

****

The weightage or the distribution of marks over different dimensions of the question paper shall be as follows:

1. Weightage to the Learning objectives :

Sr. No.	Learning Objectives	Marks	Percentage of Marks
1.	Remembering and Understanding	50	62.5%
2.	Applying	18	22.5%
3.	Analysing , Evaluating and Creating	12	15%
	Total	**80**	**100%**

2. Weightage to the different areas of Content :

Chapter No.	Topic	Marks
PDF	Logarithms	10
3	Coordinate Geometry	03
4	Linear Equations in Two Variables	08
10	Circles	14
12	Heron's Formula	14
13	Surface Areas and Volumes	16
14	Statistics	15
	Total	**80**

3. Weightage to different form/type of Questions :

Sr. No.	Form of Questions	Marks for each question	Number of questions	Total Marks
1.	Very Short Answer Type (VSA)	1	20	20
2.	Short Answer Type I (SA-I)	2	11	22
3.	Short Answer Type II (SA-II)	3	10	30
4.	Long Answer Type (LA)	4	2	08
	Total		**43**	**80**

4. The expected time for different type of questions would be as follows:

Sr. No.	Form of Questions	Approx. time for each question in mins (t)	Number of questions (n)	Approx. time for each form of questions in mins (t) x (n)
1.	Very Short Answer Type (VSA)	2	20	40
2.	Short Answer Type I (SA-I)	3	11	33
3.	Short Answer Type II (SA-II)	8.5	10	85
4.	Long Answer Type(LA)	11	02	22
	Total		**43**	**180**

5. Weightage to difficulty level of questions:

Sr. No.	Estimated difficulty level of questions	Percentage
1.	Easy	20%
2.	Average	60%
3.	Difficult	20%
	Total	**100%**

6. Number of Questions:

There will be **43** questions

BLUE PRINT OF SEMESTER II EXAM MATH QUESTION PAPER ; 2026-2027
GRADE 9

Chp. No.	Topic	Objectives												Total
		Remembering & Understanding				Applying				Analysing , Evaluating & Creating				
		VSA	SAI	SAII	LA	VSA	SAI	SAII	LA	VSA	SAI	SAII	LA	
		1mk	2mk	3mk	4mk	1mk	2mk	3mk	4mk	1mk	2mk	3mk	4mk	
PDF	Logarithms	1(1) 2(1) 3(1)	25(2) 26(2)					39(3)						**6(10)**
3	Coordinate Geometry	4(1)	24(2)											**2(3)**
4	Linear Equations in two variables	5(1) 6(1)	28(2)			14(1)						32(3)		**5(8)**
10	Circles	7(1) 8(1)	21(2) 27(2)	*33(3)		15(1)		40(3)		19(1)				**8(14)**
12	Heron's Formula	9(1)	29(2) *31(2)	34(3)		16(1)			43(4)	20(1)				**7(14)**
13	Surface areas and Volumes	10(1)	22 (2) *23(2)	*35(3)		17(1) 18(1)		41(3)				36(3)		**8(16)**
14	Statistics	11(1) 12(1) 13(1)	30(2)	37(3) 38(3)									42(4)	**7(15)**
	Total	**13(13)**	**11(22)**	**5(15)**	**0(0)**	**5(5)**	**0(0)**	**3(9)**	**1(4)**	**2(2)**	**0(0)**	**2(6)**	**1(4)**	
		29(50)				**9(18)**				**5(12)**				**43(80)**

NOTE: Figures outside the bracket indicate the question number and figures within the bracket indicate marks .

***Indicates internal choice to be provided.

This is a model Blueprint, paper setter may make changes in the objectives chapter wise.

****

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO – BETIM GOA 403521

MODEL QUESTION PAPER (2026-2027)

SEMESTER II

SUBJECT: MATHEMATICS (E)

TIME : 3 Hrs **GRADE 9** **MAX. MARKS : 80**

INSTRUCTIONS:

i. This question paper consists of **43** questions. All questions are compulsory.
ii. This question paper is divided into four Sections.- **A , B , C** and **D**.
iii. In **Section A** , question numbers **1 to 20** are multiple choice questions **(MCQs)** and question numbers **19 and 20** are Assertion – Reason based questions of 1 mark each.
iv. In **Section B** , question numbers **21 to 31** are short answer type I **(SA-I)** questions carrying **2 marks** each.
v. In **Section C** , question numbers **32 to 41** are short answer type II **(SA-II)** questions carrying **3 marks** each.
vi. In **Section D** , question numbers **42 and 43** are long answer **(LA)** questions carrying **4 marks** each.
vii. There is no overall choice . However , an internal choice has been provided in **two questions** of **2 marks** each in **Section B** and **two questions** of **3 marks** each in **Section C**.
viii. Graph paper will be supplied on request.
ix. Logarithm and Antilogarithm tables are printed on the last pages of the question paper.
x. Use of calculator is NOT permitted.

Section A (1 mark each)

Select and write the correct alternative from those given below each statement for question 1 to 20:

1. If $a^x = n$, then :
   - $a = log_x n$
   - $x = \log_n a$
   - $n = log_a x$
   - $x = log_a n$

2. The value of $log_3 81$ *is* :
   - 9
   - 4
   - 18
   - 27

3. The value of $\log_2 2^2$ is :
   - 1
   - 2
   - 4
   - 8

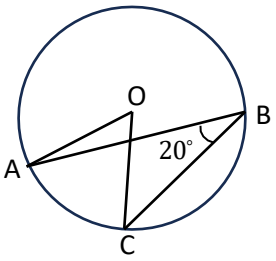
4. If y-coordinate of a point is zero, then this point always lies :
   - in 1st quadrant
   - on the x - axis
   - at the origin
   - on the y - axis

5. Which of the following equations represent a linear equation in two variables?
   - $x^2 + y = 5$
   - $x + 2y = 5$
   - $x + y^2 = 5$
   - $xy = 5$

6. The value of k , if $x = 2$ and $y = -1$ is a solution of the equation $2x - y = k$ is :
   - 1
   - -2
   - 3
   - 5

7. If two chords AB and CD are equidistant from the centre then :
   - AB < CD
   - AB = CD
   - AB > CD
   - AB = ½ CD

8. In the figure , O is the centre of the circle. If $\angle ABC = 20°$, then the measure of $\angle AOC$ is :
   - 10°
   - 40°
   - 20°
   - 60°



9. The semi-perimeter of a triangle with sides of length 20 cm, 15cm, and 9 cm is :
   - 88cm
   - 22cm
   - 44 cm
   - 15 cm

10. In a right circular cylinder , if the radius is doubled and the height is halved , then the curved surface area will be :
   - halved
   - same
   - doubled
   - 4 times

11. The mean of first five natural numbers is :
   - 1
   - 5
   - 3
   - 15

12. The class mark of the class 90 – 120 :
   - 90
   - 105
   - 100
   - 115

13. The range of the data 18 , 17 , 20 , 29 , 6 , 12 , 35 is :

- 20
- 29
- 35
- 41

14. The entry fee to a historical monument is ₹30 for adults and children are charged half the entry fee. If on a particular day 20 adults visited the monument and the total revenue generated was ₹720, then the number of children who visited the monument on that day is :

- 6
- 8
- 10
- 12

15. In ΔABC , $\angle B$ is a right angle , AC = 13cm and AB = 5cm . A circle is drawn with A as centre and AC as radius. The length of the chord of this circle passing through C and B is :

- 5cm
- 12cm
- 13cm
- 24cm

16. An isosceles right triangle has an area of 8 cm^2. The length of its hypotenuse is:

- $2\sqrt{6}$ cm
- 4cm
- $4\sqrt{2}$ cm
- $4\sqrt{3}$cm

17. If the volume and the base area of a right circular cone are 48 cm^3 and 12cm^2 respectively , then the height of the cone is :

- 3cm
- 6cm
- 12cm
- 9cm

18. If radii of the two spheres are in the ratio 4:3 and the sum of their radii is 7 then the difference of their surface areas is :

- 88cm^2
- 44cm^2
- 22cm^2
- 28cm^2

Directions :

In Q. No. 19 and 20, a statement of Assertion (As) is followed by a statement of Reason (R). Select the correct option from the following :

- Both, Assertion (As) and Reason (R) are true. Reason (R) explains Assertion (As) completely.
- Both , Assertion (As) and Reason (R) are true . Reason (R) does not explain Assertion (As).
- Assertion (As) is true but Reason (R) is false.
- Assertion (As) is false but Reason (R) is true.

19. Assertion (As) : Two diameters of a circle intersect each other at right angles . Then the quadrilateral formed by joining their end-points is a square.
Reason (R) : Equal chords subtend equal angles at the centre.

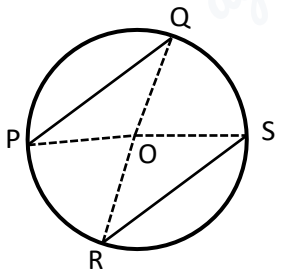
20. Assertion (As): The side of an equilateral triangle is 6 cm , then the height of the triangle is 9cm.

Reason (R) : The height of an equilateral triangle is $\frac{\sqrt{3}}{2}$ × side.

Section B (2 marks each)

21. Given : PQ and RS are equal chords of a circle with centre O.

Prove that : ∠POQ = ∠ROS



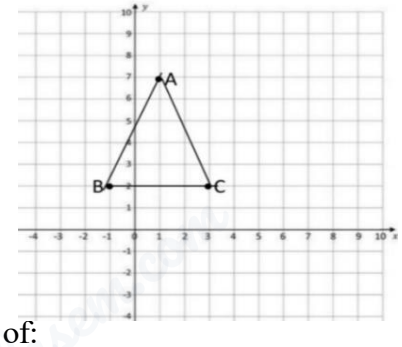
22. A cylindrical tube, open at both ends is made of metal. The internal diameter of the tube is 10.4 cm and its length is 25 cm. The thickness of the tube is 8 mm. Find the volume of the metal used in making the tube.

23. Find the volume of a sphere whose surface area is 154cm².

OR

The total surface area of a solid hemisphere is 5940 cm². Find the diameter of the hemisphere .

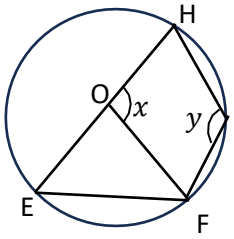
24. In the adjoining figure , ΔABC is an isosceles triangle. Find the coordinates of its vertices and the distance between points B and C.



25. If log 49.83 = 1.6975 and antilog 2.6528 = 449.5, then find the value of:
i) antilog $\overline{3}$. 6975 ii) log 0.4495

26. Using the logarithmic table find the value of :
i) log 3.258 ii) antilog 2.2792

27. In the adjoining figure , points E , F , G and H lie on the circle with centre O.
If EH is a diameter and Δ OEF is an equilateral triangle then find the values of x and y
.



28. The cost of 3 pens and 2 pencils together is ₹76.
Answer the following questions based on the above situation.
i. Represent this situation as a linear equation in two variables, where x is the cost of a pen and y is the cost of a pencil.
ii. If the cost of a pen is ₹20, find the cost of a pencil.

29. A table runner is made by stitching 18 congruent triangular pieces of cloth of two different colours, each piece measuring 10cm , 25cm and 25cm. How much cloth of each colour is required for the table runner?

30. The following observations are arranged in ascending order :

6 , 8 ,9 , 15 , x , x+2 , x+6, 22 , 25 , 29 .
If the median is 17 , find the value of x.

31. Find the cost of levelling the ground which is in the form of a triangle having sides 51m , 37m and 20m at the rate of ₹10 per m^2 .

OR

Find the cost of painting a triangular sheet having sides 12cm ,16cm and 20cm at the rate of ` ₹1.5 per cm^2 .

Section C (3 marks each)

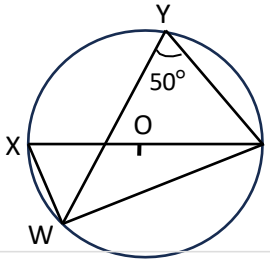
32. Draw the graph of the linear equation $3x - y = 5$

Rewrite and complete the following table.
(Plot at least 3 points for this line on a graph paper)

$3x - y = 5$

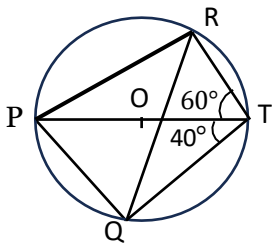
x			
y			

33. In the adjoining figure , points X , Y , Z and W lie on the circle with centre O.
If XZ is a diameter and ∠ ZYW = 50° then ,
Find : i) ∠WXZ
i) ∠XWZ
ii) ∠XZW



OR

In the adjoining figure , points P , R , Q and T lie on the circle. O is the centre of the circle and PQ is a diameter.
If ∠PQR = 60° and ∠ PQT = 40° then ,
Find : i) ∠ PRQ
ii) ∠ QPR
iii) ∠ *PRT*



34.The perimeter of an isosceles triangle is 32 cm. The ratio of equal side to the base is 3:2. Using Heron's formula, find the area of the triangle.

35.The height of a cone is 16cm and its base radius is 12cm . Find the curved surface area and the total surface area of the cone (take $\pi = 3.14$)

OR

How many litres of milk can a hemispherical bowl of diameter 10.5cm hold ?

36. A corn cob shaped some what like a cone , has the radius of its broadest end as 3.5 cm and length (height) as 24cm . If each 1cm² of the surface of the cob carries an average of 3 grains, find the number of grains you would find on the entire cob.

37.The weekly savings (in rupees) of 30 students of class IX are as follows:
38 , 42 , 40 , 35 , 72 ,32 , 57 , 62 ,59 , 80 , 84 , 73 , 65 , 40 , 76 ,
40 , 38 , 60 , 58 , 38 , 54 ,39 ,50 , 44 , 71 , 83 , 45 , 38 , 80 , 77.
Represent the data given above using tally marks in a grouped frequency distribution table taking class intervals as 30-40 , 40-50 ...

38. The following table shows the ages of the patients admitted in a hospital during the year 2024.
Rewrite and complete the table given below and find the mean age of the patients.

Age in years x_i	Number of patients f_i	$f_i x_i$
10	06	
20	11	
30	21	
40	23	
50	14	
60	05	
	$\sum f_i =$ _____	$\sum f_i x_i =$ _____

39. Evaluate the following expression by using the logarithm method.

256.7×0.5091

40. Two chords of lengths 6cm and 8cm of a circle are parallel to each other and are on the same side of its centre . If the distance between the chords is 1cm , find the radius of the circle.

41. A cone with a radius of 5cm is completely filled with water. If this water is poured into a cylindrical container of radius 10cm , the water level in the cylinder rises by 2cm. Find the height of the cone.

Section D (4 marks each)

42. The following table gives the monthly consumption of electricity of 50 consumers of a locality.
Draw a histogram and a frequency polygon to represent the given data.

Monthly consumption (in units)	No of consumers *fi*
150- 160	10
160-170	16
170-180	12
180-190	8
190-200	4

43. The sides of a triangular park are 18 m, 24 m, and 30 m. Inside the park, a triangular flower bed is constructed such that its sides are half the length of the park's sides.

Calculate:

(i) The area of the park using Heron's formula.

(ii) The area of the flower bed.

(iii) Find the ratio between the two areas.

****