GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

SUBJECT: MATHEMATICS STD : X (2024-2025)

The pattern of assessment for std X for the academic year 2024-2025 is as follows:

1	**INTERNAL ASSESSMENT- INNOVATIVE ACTIVITY**	**20 marks**
2	**FINAL EXAM**	**80 marks**
	TOTAL	**100marks**

The following PDFs are provided:

Sr. No.	**PDFs**
1	Internal Assessment scheme
2	Pattern and design of First Mid Test -Level 1 (Standard Mathematics) -Level 2 (Basic Mathematics)
3	Pattern and design of First Term Exam -Level 1 (Standard Mathematics) -Level 2 (Basic Mathematics)
4	Pattern and design of Final Exam -Level 1 (Standard Mathematics) -Level 2 (Basic Mathematics)
5	Practice Question paper with Answer key -Level 1 (Standard Mathematics) -Level 2 (Basic Mathematics)

MATHEMATICS

INTERNAL ASSESSMENT SCHEME 2024-2025

STD X

:

- A list of **9 activities** for **Internal Assessment** of **20 marks** are given.
- Student may choose **any one** activity based on his/her capacity.
- Guidelines for each activity is provided for students. Teacher is free to give additional guidelines.
- Each activity is allotted maximum 20 marks.
- **Record of the activity (hard/ soft copy) of each student has to be maintained, for scrutiny by the Board.**
- **Assessment criteria for the activities is given below**:

CRITERIA	**MARKS**
1) Model prepared/Data collection (accuracy, neatness, creativity)	4mks.
2) Computation (logarithms may be used for calculations)	4mks
3) Project report (Mathematical content, organisation , presentation, neatness, creativity, diagram if any, resources used)	4mks
4) Oral presentation (clarity, logical sequence, effective communication)	4mks
5) Viva (mathematical reasoning, critical thinking)	4mks
TOTAL	**20 MARKS**

Sr.no.	TITLE OF ACTIVITY
1)	To find the mean, median and mode of data collected and draw its cumulative frequency curves.
2)	Body Mass Index (BMI).
3)	Relationship between volume of a Cylinder and volume of a Cone having equal heights and equal base areas.
4)	To estimate the number of tiles required for the floor of a classroom and cost of painting its walls.
5)	Comparing the volume of Cylinders obtained by folding a rectangular tin/cardboard/thick chart paper sheet along its length and breadth.
6)	To investigate the relationship between the dimensions of a Cuboid, its total surface area and volume.
7)	Fibonacci sequence and Golden rectangle.
8)	Pascal's Triangle.
9)	To measure heights and distances using a Clinometer.

Activity1: To find the mean, median and mode of data collected and draw its cumulative frequency curves.

Aim: To find the mean, median and mode of the data collected and draw its cumulative frequency curves.

Guidelines for students:

- Collect data [for example – marks obtained in mathematics by the SSC students of the previous year.]
- Construct a grouped frequency distribution table.
- Find the mean of the data by direct, assumed and step-deviation methods.
- Find the median and the mode of the data.
- Verify the empirical relationship between the three measures of central tendency.
- Draw cumulative frequency curves of the less than type and the more than type on a graph paper.
- Find the median of the data from the graph.

Learning outcomes:

This activity will help the students to

- gain practical knowledge of collecting data and calculating mean, median and mode of grouped data.
- understand the graphical representation of cumulative frequencies.
- enhance their statistical and graphical skills in analyzing and interpreting data.
- appreciate the practical application of descriptive statistics and graphical methods in summarizing data.

Activity 2: Body Mass Index (BMI)

Aim: To calculate the Body Mass Index (BMI) of school students and its implications on personal health

Guidelines for students:

- Explore the concept of BMI, the BMI categories: underweight, normal weight, overweight and obesity and their implications on health.
- Select minimum ten schoolmates and record their height (in meters) and weight (in kilograms) in the table given below:

Schoolmate	height(m)	weight(kg)	$BMI = \frac{weight}{(height)^2}$	Inference
1.				
2.				
10.				

- Calculate the BMI for each selected schoolmate using the formula:

$$BMI = \frac{weight}{(height)^2} \; ; \; where\ weight\ is\ in\ kg\ and\ height\ is\ in\ meters$$

- Record the calculated BMI values in the above table and draw inference with the help of the table given below:

BMI	**INFERENCE**
below 18.5	underweight
18.5 -24.9	healthy
25 and 29.9	overweight.
30 & above	obesity

- Calculate the average BMI and the percentage of students of the different categories for the selected group of school mates.
- Represent the data using a pie chart.

Note: The BMI of students of the whole school (if number is less) can finally be compiled and represented by a pie chart.

Learning outcomes:

This activity will help the students to

- gain practical experience in calculating BMI and analyzing health data.
- understand the importance of BMI in assessing and maintaining personal health.
- promote awareness of healthy lifestyle choices and provide guidance on maintaining a balanced BMI.

Activity 3: Relationship between volume of a Cylinder and volume of a Cone having equal heights and equal base areas.

Aim : To find the relationship between volume of a Cylinder and volume of a Cone having equal heights and equal base areas.

Guidelines for students:

- Prepare a Cylinder and a Cone having same height and base area using thick chart paper/cardboard.
- Calculate the volume of the Cylinder and the Cone using the formulae.
- Compare the calculated volumes of the Cylinder and the Cone.
- Verify the relationship by filling the Cone with fine sand/salt to its brim and emptying it in the Cylinder until it is completely filled.

Learning outcomes:

This activity will help the student to

- gain practical experience in making geometric shapes (Cylinder and Cone)
- find out and appreciate the relationship between the volume of Cylinder and Cone having equal heights and equal base areas leading to a deeper understanding of the concept of volume of Cylinder and Cone.

Activity 4: To estimate the number of tiles required for the floor of a classroom and cost of painting its walls.

Aim: To draw the floor plan of a classroom and estimate the number of tiles needed for the floor and the amount of paint required for the 4 walls.

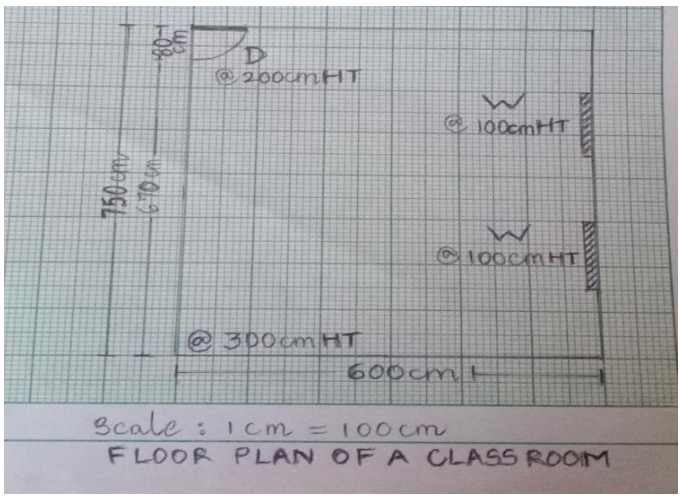
Guidelines for students :

- Measure the length, breadth and height of a classroom.
- Measure the length and breadth of the door and windows of the classroom.
- Draw the plan of the classroom, including doors and windows on a graph paper by choosing an appropriate scale for the above measurements.
- Calculate the total floor area of the classroom.
- Find the dimensions of the tile to be used for the floor and calculate its area.
- Calculate the number of tiles needed to cover the entire floor area.
- Estimate the number of tile boxes required for the entire floor assuming that there are 10 tiles in each box.
- Calculate the total area of the 4 walls.
- Calculate the total area of the door and windows.
- Calculate the area to be painted.
- Find the cost of painting the 4 walls given the cost per square meter and estimate the amount of paint required in litres to paint the 4 walls.

Learning Outcomes:

This activity will help the students to

- gain practical experience in taking measurements, drawing plan, calculating area, and estimating material requirements for tiling and painting.
- enhance their skills in measurement, area calculation and estimation.



Activity 5: Comparing the volume of Cylinders obtained by folding a rectangular tin/cardboard/thick chart paper sheet along its length and breadth.

Aim: To compare the volumes of right circular Cylinders obtained by folding a rectangular tin sheet/cardboard/thick chart paper along its length and breadth.

Guidelines for students:

- Take two congruent rectangular tin/cardboard/ thick chart paper sheets where length is twice the breadth.
- Fold the first rectangular tin/cardboard/thick chart paper sheet along its length to form a hollow cylinder. Fix a circular base, whose circumference is equal to the breadth of the rectangle. Record the radius of the base and height of the resulting Cylinder.
- Similarly create another Cylinder by folding along its breadth. Record the dimensions of this second Cylinder.
- Calculate the volumes V_1 & V_2 of the two Cylinders using the formula : $V = \pi r^2 h$
- Repeat the same procedure for another set of congruent rectangles where length is thrice the breadth.
- Record the observations in the following table

<table>
<tr><td colspan="4">(I) Rectangle Dimensions: L× B; where L= 2B</td></tr>
<tr><td>Case i</td><td>Case ii</td><td colspan="2">Comparison by taking</td></tr>
<tr><td>Cylinder obtained by folding along its length</td><td>Cylinder obtained by folding along its breadth</td><td>Positive Difference</td><td>Ratio</td></tr>
<tr><td>r_1= _____</td><td>r_2= _____</td><td rowspan="3">$V_1 - V_2$</td><td rowspan="3">$\frac{V_1}{V_2}$</td></tr>
<tr><td>h_1= _____</td><td>h_2= _____</td></tr>
<tr><td>V_1= _____</td><td>V_2= _____</td></tr>
<tr><td colspan="4">(II) Rectangle Dimensions: L× B; where L= 3B</td></tr>
<tr><td>Case i</td><td>Case ii</td><td colspan="2">Comparison by taking</td></tr>
<tr><td>Cylinder obtained by folding along its length</td><td>Cylinder obtained by folding along its breadth</td><td>Positive Difference</td><td>Ratio</td></tr>
<tr><td>r_1= _____</td><td>r_2= _____</td><td rowspan="3">$V_1 - V_2$</td><td rowspan="3">$\frac{V_1}{V_2}$</td></tr>
<tr><td>h_1= _____</td><td>h_2= _____</td></tr>
<tr><td>V_1= _____</td><td>V_2= _____</td></tr>
</table>

- Compare the volumes of the two Cylinders formed by folding the rectangular tin/cardboard/ thick chart paper sheet along its length and breadth in both the cases.
- Explain how changes in dimensions impact the volumes of the Cylinders.
- Conclude by summarizing the key observations and inferences.

Learning Outcomes:

This activity will help the students to

- gain a practical understanding of how folding a rectangular tin /cardboard /thick chart paper sheet along its length and breadth affects the volumes of the resulting Cylinders.
- observe the impact of changes in dimensions on the volumes of the cylinders.
- connect geometric concepts with real-life applications and enhance their spatial reasoning skills.

Activity 6: To investigate the relationship between the dimensions of a Cuboid, its total surface area and volume.

Aim: To manipulate the dimensions of a Cuboid while keeping the total surface area fixed and observe how these changes affect the Cuboid's volume, specifically identifying a case where the volume is maximized.

Guidelines for students :

Three Dimensional Manipulations:

Manipulation 1 - Unequal dimensions ($l \neq b \neq h$):

- Prepare a Cuboid with all three dimensions l , b and h different .
- Calculate the Total Surface Area and Volume of the Cuboid.

Manipulation 2 – Any two dimensions equal ($l = b \neq h$):

- Prepare another Cuboid having same total surface area, by choosing any two dimensions equal and calculate the volume of the resulting Cuboid.

Manipulation 3 – Equal dimensions (l = b = h):

- Set all three dimensions equal to create a Cube having same total surface area.
- Calculate the volume of the Cube.

- Record your observations in the table given below:

	Solid	Length	Breadth	Height	TSA	Volume
1	Cuboid					
2	Cuboid					
3	Cube					

- Observe the relationship between the dimensions and the volume when the total surface area is kept constant.
- Identify the manipulation that results in the maximum volume.

Learning Outcomes:

This activity will help the students to

- gain hands-on experience in manipulating dimensions of a Cuboid while keeping the total surface area fixed.
- observe how changes in dimensions impact the volume of the Cuboid.
- enhance their understanding of optimization in geometry.
- appreciate the mathematical concepts involved in achieving specific outcomes, such as maximizing volume while fixing the total surface area.

Activity 7: Fibonacci sequence and Golden rectangle

Aim: To explore patterns in numbers through the Fibonacci sequence and the golden rectangle and to understand their applications in real-life situations.

Guidelines for students:

- Explore the Fibonacci sequence as a series of numbers where each number is the sum of the two preceding ones: 0, 1, 1, 2, 3, 5, 8, 13, 21, ...
- Explore the concept of the golden ratio and the golden rectangle, which arises from the Fibonacci sequence.
- Explore the properties and patterns observed in the Fibonacci sequence, such as the golden ratio (approximately 1.618) and its occurrence in nature, art and architecture.
- Explore the properties and characteristics of the golden rectangle, including its proportions and aesthetic appeal.
- Explore applications of the golden ratio and golden rectangle in art, design, and aesthetics, such as in the compositions of paintings, sculptures, and architecture.
- Investigate examples of the golden ratio and Fibonacci sequence in nature, such as the spiral patterns of sunflowers, pinecones, and seashells.
- Construct a golden rectangle using the golden ratio and discuss the properties and aesthetic appeal of the constructed golden rectangle.

Learning Outcomes:
This activity will help the students to

- gain an understanding of the properties and patterns of the Fibonacci sequence and the golden rectangle.
- appreciate the applications of these mathematical concepts in various disciplines, including art, architecture and nature.
- foster creativity and critical thinking by exploring real-life examples and applications of mathematical patterns.

Activity 8: Pascal's Triangle

Aim: To explore Pascal's Triangle, identify patterns within Pascal's Triangle and understand their applications in real-life situations.

Guidelines for students:

• Explore Pascal's Triangle, its basic properties and its formation, where each number in the triangle is the sum of the two numbers directly above it.

• Explore the patterns within Pascal's Triangle, such as Fibonacci numbers, binomial coefficients and triangular numbers.

• Observe how Pascal's Triangle relates to various mathematical concepts like binomial expansions and probability.

• Create own variations of Pascal's Triangle such as rotating it, skipping rows or using different starting numbers.

• Create visual representations of Pascal's Triangle and its patterns, using diagrams or presentations.

• Prepare a report summarizing the project findings, including explanations of observed patterns and connections to other mathematical concepts.

Learning Outcomes:

This activity will help the students to

- gain an understanding of the properties and patterns of Pascal's Triangle.
- appreciate the applications of Pascal's Triangle in Probability and Algebra.
- foster critical thinking and problem-solving skills by exploring real-life examples and applications of mathematical patterns.

9. To measure Heights and Distances using a Clinometer.

Aim: To enable the students to measure the heights and distances of any object in real life scenarios using a Clinometer.

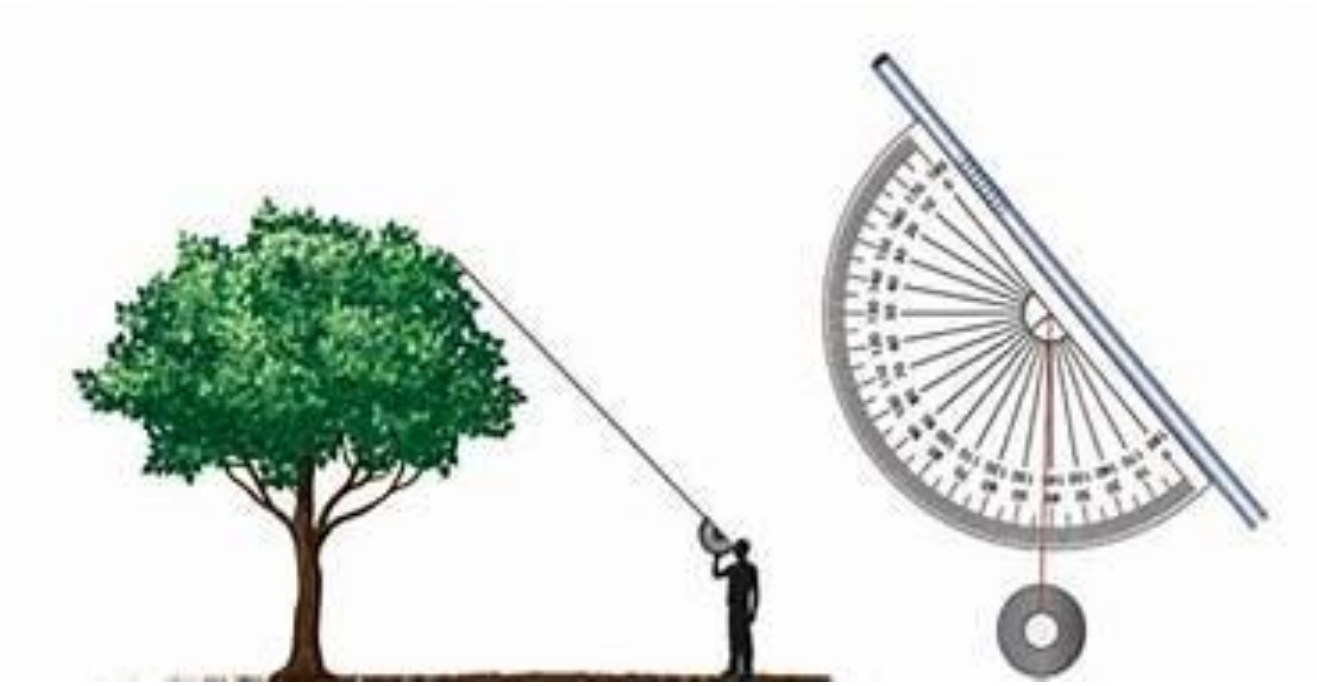
Guidelines for students:

- Explore the importance of measuring heights and distances accurately in various fields such as surveying, engineering and navigation.
- Prepare a clinometer- a tool to measure angles and know its basic working principle. (Video link is given below for reference) https://youtu.be/gHeiueRpX7U?si=-kaiAyxAL4tKc9fK
- Align the clinometer with the line of sight and measure the angle of elevation/depression.
- Calculate the height/distance of the object using trigonometric ratios.
- In case you want only angles of elevation of 30º, 45º or 60º then adjust your distance in front of the object till you obtain the above angles, then take the required measurement and find the height of the object.

Learning Outcomes:

This activity will help the students to

- enhance their understanding of trigonometric concepts and their practical applications in real-life scenarios.
- summarize the practical applications of using a clinometer in measuring heights and distances.



GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO -BETIM GOA 403521

FIRST MID TEST (2024-2025)

Subject: MATHEMATICS(E)- LEVEL 1 (STANDARD MATHEMATICS)

Time: 1Hour STD: X Max. Marks: 20

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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.	Knowledge	2	10%
2.	Understanding	10	50%
3.	Application	5	25%
4	Skill	3	15%
	Total	**20**	100%

2. Weightage to the different areas of Content

Ch.no.	Name of the chapter	Marks
2	Polynomials	**5**
3	Pair of Linear Equations in Two Variables	**9**
6	Triangles	**6**
	Total	**20**

3. Weightage to different form/type of Questions

Sr. No.	Type of Questions	Marks for each question	Number of questions	Total Marks
1	Very Short Answer Type (VSA)	1	4	4
2	Short Answer Type (SA-I)	2	2	4
3	Short Answer Type (SA-II)	3	4	12
	Total		**10**	**20**

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 10 questions

PATTERN OF SSC FIRST MID TEST QUESTION PAPER (2024-2025)

Subject: MATHEMATICS (E) LEVEL - 1 (Standard Mathematics)

Time: 1hr **Std X** **Max. Marks: 20**

INSTRUCTIONS:

i) This question paper consists of 10 questions.

ii) All questions are compulsory.

iii)This question paper is divided into three Sections - A , B and C

iv) Section A has four questions carrying 1 mark each .

v) Section B has two questions carrying 2 marks each .

vi) Section C has four questions carrying 3 marks each .

vii) There is no overall choice. However an internal choice has been provided in one question of 3mks in section C.

Q. No.	Topic	Thrust areas	Type of Question
Section A (1mark each) Select and write the correct alternative from those given below each statement for question 1 and 2**:**			
1	Polynomials	Any Concept from Polynomials	VSA(MCQ)
2	Triangles	Any Concept from Triangles	VSA(MCQ)
3	Polynomials	•Given a graph of a (linear/quadratic) polynomial to identify the zero(es)**/** •To find the zeroes of a quadratic polynomial**/** •To write a quadratic polynomial given sum and product of two zeroes**/** •To write a quadratic polynomial given its two zeroes**/** •To find sum / product of zeroes of a quadratic polynomial	VSA
4	Pair of Linear Equations in Two Variables	• Find the value of k for which the given pair of linear equations will have a unique solution or no solution or infinitely many solutions **/** • Find whether the given pair of linear equations are consistent or inconsistent**/** • If a pair of Linear equations is given by $ax \pm by=m$ and $bx \pm ay=n$, then find the value of x+ y or x-y	VSA
		Section B (2 marks each)	
5	Pair of Linear Equations in Two Variables	Write a pair of Linear equations in two variables for the given word problem.	SA I

6	Triangles	Numerical Application on any one of the 4 theorems on Triangles	SA I
		Section C (3 marks each)	
7	Polynomials	• Divide p(x) by g(x) to find q(x) and r(x) and write in the form $p(x) = g(x) \times q(x) + r(x)$**/** • To find g(x) when p(x) ,q(x) and r(x) are given**/** • To find whether g(x) is a factor of p(x)**/** • Given two zeroes find remaining two zeroes	SA II
8	**#** Pair of Linear Equations in Two Variables	Find the solution of the pair of linear equations by Elimination method **OR** Find the solution of the pair of linear equations by Substitution / Cross multiplication method	SA II
9	Triangles	•To prove a rider on Triangles**/** •Proof of any one theorem. (B.P.T./ Pythagoras Theorem/ converse of Pythagoras theorem)	SA II
10	Pair of Linear Equations in Two Variables	Find solution of a pair of linear equations in two variables by graphical method.	SA II
		# Internal choice to be provided	

FIRST MID TEST (2024-2025)

Subject: MATHEMATICS(E)- LEVEL 2 (Basic Mathematics)

Time: 1Hour **STD: X** **Max. Marks: 20**

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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.	Knowledge	2	10%
2.	Understanding	11	55%
3.	Application	4	20%
4	Skill	3	15%
	Total	**20**	100%

2. Weightage to the different areas of Content

Ch.no.	Name of the chapter	Marks
2	Polynomials	5
3	Pair of Linear Equations in Two variables	9
6	Triangles	6
	Total	**20**

3. Weightage to different form/type of Questions

Sr. No.	Type of Questions	Marks for each question	Number of questions	Total Marks
1	Very Short Answer Type (VSA)	1	4	4
2	Short Answer Type (SA-I)	2	2	4
3	Short Answer Type (SA-II)	3	4	12
		Total	**10**	**20**

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 10 questions

PATTERN OF FIRST MID TEST QUESTION PAPER (2024-2025)

Subject: MATHEMATICS (E) LEVEL - 2 (Basic Mathematics)

Time: 1hr **STD X** **Max. Marks: 20**

INSTRUCTIONS:

i)This question paper consists of 10 questions.

ii)All questions are compulsory.

iii)This question paper is divided into three Sections - A , B and C

iv) Section A has four questions carrying 1 mark each .

v) Section B has two questions carrying 2 marks each .

vi) Section C has four questions carrying 3 marks each .

vii) There is no overall choice. However an internal choice has been provided in one question of 3mks in section C.

Q. No.	Topic	Thrust areas	Type of Question
		Section A (1mark each) Select and write the correct alternative from those given below each statement**:**	
1	Polynomials	Any concept from Polynomials	VSA(MCQ)
2	Triangles	Any concept from Triangles	VSA(MCQ)
3	Polynomials	•Given a graph of a (linear/quadratic) polynomial to identify the zero(es)**/** •To find the zeroes of a quadratic polynomial**/** •To write a quadratic polynomial given sum and product of two zeroes**/** •To write a quadratic polynomial given two zeroes**/** •To find sum / product of zeroes of a quadratic polynomial	VSA
4	Pair of Linear Equations in Two Variables	•Find the value of k, if x=a and y=b is a solution of the given Linear equation in two variables**/** •If a pair of Linear equations is given by $ax \pm by=m$ and $bx \pm ay=n$ then find the value of x+ y or x-y	VSA
		Section B (2marks each)	
5	Pair of Linear Equations in Two Variables	• Write the condition for which the pair of Linear equations in two variables will have a unique solution or no solution or infinitely many solutions and find the value of unknown (k)**/** • Find which pair of Linear equations in two variables are consistent or inconsistent (two pairs of Linear equations in two variables are to be given)	SA I

6	Triangles	Numerical Application on any one of the 4 theorems on Triangles	SA I
		Section C (3marks each)	
7	Polynomials	Divide a cubic polynomial p(x) by a linear polynomial g(x) and write the result in the form $p(x) = q(x) \times g(x) + r(x)$	SA II
8	**#** Pair of Linear Equations in Two Variables	Find the solution of the pair of linear equations by Elimination method **OR** Find the solution of the pair of linear equations by Substitution method	SA II
9	Triangles	Proof of any one theorem. •B.P.T.**/** •Pythagoras Theorem**/** •converse of Pythagoras theorem	SA II
10	Pair of Linear Equations in Two Variables	Finding solution of a pair of linear equations in two variables by graphical method.	SA II
		# Internal choice to be provided	

PORTION FOR STD X - MATHEMATICS (LEVEL2)(Basic Mathematics)

Name of the Chapter	Portion
1)Real Numbers	a) Concept of Real numbers. b) To find the H.C.F of two numbers by Euclid's Division Algorithm c)To find HCF/LCM by prime factorisation method. d) Revisiting Rational Numbers and Their Decimal Expansions.
2)Polynomials	a) Concept of a Polynomial, degree & types. b) Zero(es) of a Linear Polynomial, Quadratic Polynomial ,geometric meaning of the zeroes of a Polynomial, relationship between zeroes and coefficients. c)Finding a Quadratic Polynomial given sum and product of zeroes /zeroes. d)To find the Quotient and remainder when a Cubic Polynomial is divided by a Linear polynomial and to express in the form: Dividend =Divisor x Quotient +Remainder
3)Pair of Linear equations in Two variables	a) General form of a pair of linear equations in two variables b) Conditions for a pair of Linear equations in two variables to have-a unique solution, no solution, infinitely many solutions, (Consistent/Inconsistent), finding the value of the unknown c)Find the solution of a pair of linear equations in two variables by (I) Elimination method (II)Substitution method (one equation should have coefficient of x or y as one) (III)Graphical method (both equations should have one coefficient of x or y as one)

4)Quadratic Equations	a) Concept of a Quadratic equation - standard form b) Finding the Roots of a Quadratic equation by (I)Factorisation method (II)Quadratic formula C)Nature of Roots based on discriminant

5)Arithmetic Progressions	a) Concept of an AP-first term, common difference b) Questions based on nth term, sum of n terms of an AP
6)Triangles	a) Concept of Similarity of Triangles-Tests for similarity of Triangles b) Concept of theorem on Areas of Similar Triangles (Proof not for evaluation) c)B.P.T., Pythagoras theorem and Converse of Pythagoras theorem (Proofs for evaluation) d)Numerical applications of the above 4 theorems
7)Coordinate Geometry	Concepts /Applications of (I) Distance Formula (II)Section Formula (III)Area of Triangle Formula
8)Introduction to Trigonometry	a) Concept of Trigonometry b) Trigonometric ratios and their relationships, k method c) Proving the Basic Trigonometric identities with the help of a figure. I) $Sin^2\theta+Cos^2\theta=1$ II) $1+Tan^2\theta= Sec^2\theta$ III) $1+Cot^2\theta= Cosec^2\theta$ and their simple applications. Alternate method can also be used for proofs of identity (II) and (III). d)To evaluate expressions involving Trigonometric ratios of some specific angles: 0^o, 30^o,45^o,60^o,90^o e) Trigonometric ratios of complementary angles
9)Some Applications of Trigonometry	a) Heights and Distances: Angle of Elevation and Angle of Depression b) Problems on heights and Distances. Problems should have only one right triangle with either angle of elevation or depression.
10)Circles	a) Concept of Tangent, Thm.10.1(proof not for Evaluation) Thm.10.2(with Proof) b) Numerical applications

11)Constructions	a) Construction of Tangents to a Circle from a point outside the circle. b) Construction of Similar Triangles as per given scale factor. Note : Angles can also be drawn using a protractor
12)Areas Related to Circles	a) Perimeter and Area of a Circle b) Areas of Segment, Sector, Quadrant of a Circle and Semicircle c) Applications to find areas of shaded region.
13)Surface Areas and Volumes	Whole topic is included for evaluation
14)Statistics	a) Concept of Mean, Median, Mode and the empirical relationship between them b) To find Mean of grouped data by Direct method c)To find Mode of grouped data.
15)Probability	a) Concept of Theoretical Probability b) Probability of a Sure event and an Impossible event, $0 \leq P(E) \leq 1$, P (not E) c) Problems based on coins, Dice (only 1), playing cards, numbered cards, items in a box.
(PDF) Logarithms Part 2 (Std X)	a) Laws of Logarithms b) Logarithm method and its applications

PORTION FOR STD X - MATHEMATICS (LEVEL 1)(Standard Mathematics)

1) Everything is included from NCERT Mathematics text - Ch.2 to Ch.15.
2) From Ch. 1) Real numbers:
    a) Concept of Real numbers.
    b) To find the H.C.F of two/three numbers by Euclid's Division Algorithm
    c)To Find HCF/LCM by prime factorisation method.
    d)Revisiting Rational Numbers and their Decimal Expansions.
3) PDF for Logarithms Part 2 (class X) is provided.
4) In the topic of Triangles, **Rider and numerical applications** based on the theorems will be tested.
5) In the topic of Constructions, a pair of compasses and ruler to be used to draw specific angles.

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GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

DESIGN OF FIRST TERM EXAM QUESTION PAPER (2024-2025)

Subject: MATHEMATICS (E) - LEVEL 1 (STANDARD MATHEMATICS)

Time : 3 hrs **STD : X** **Max. Marks :80**

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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.	Knowledge	8	10 %
2.	Understanding	41	51.25%
3.	Application	21	26.25%
4.	Skill	10	12.5%
	Total	**80**	**100%**

2. Weightage to the different areas of Content

Chapter No.	Topic	Marks
2.	Polynomials	08
3.	Pair of Linear Equations in Two Variables	10
4.	Quadratic Equations	09
5.	Arithmetic Progressions	08
6.	Triangles	08
7.	Coordinate Geometry	06
8.	Introduction to Trigonometry	09
9.	Some Applications of Trigonometry	03
10.	Circles	06
11.	Constructions	06
PDF	Logarithms	07
	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	8	16
3.	Short Answer Type II (SA-II)	3	12	36
4.	Long Answer Type (LA)	4	2	8
	Total		**42**	**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	8	24
3.	Short Answer Type II (SA-II)	8	12	96
4.	Long Answer Type (LA)	10	02	20
	Total		**42**	**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 **42** questions.

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BLUE PRINT OF SSC FIRST TERM EXAM QUESTION PAPER (2024-2025)

Subject : MATHEMATICS (E) - LEVEL 1 (Standard Mathematics)

Time : 3 hrs **STD : X** **Max. Marks :80**

Ch. no	Objectives	Knowledge				Understanding				Application				Skill				
	Forms of Questions	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	
	Content/marks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	Total
2	Polynomials	1(1)				17(1)		29(3) 30(3)										4(8)
3	Pair of Linear Equations in Two Variables	2(1)				3(1) 18(1)		31(3)									41(4)	5(10)
4	Quadratic Equations	4(1)				5(1)		32(3)					42(4)					4(9)
5	Arithmetic Progressions					7(1) 8(1)		33(3)				34(3)						4(8)
6	Triangles	9(1)				10(1) 19(1)	25(2)					40(3)						5(8)
7	Coordinate Geometry	15(1)				20(1)	26(2) 27(2)											4(6)
8	Introduction to Trigonometry	11(1)				12(1) 13(1)	21(2) 22(2)				23(2)							6(9)
9	Some applications of Trigonometry											39(3)						1(3)
10	Circles	14(1)				6(1)	24(2) 28(2)											4(6)
11	Constructions															37(3) 38(3)		2(6)
PDF	Logarithms	16(1)										35(3) 36(3)						3(7)
	Total	8(8)				12(12)	7(14)	5(15)			1(2)	5(15)	1(4)			2(6)	1(4)	
		8(8)				24(41)				7(21)				3(10)				42(80)

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

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

PATTERN OF SSC FIRST TERM EXAM QUESTION PAPER (2024-2025)

Subject : MATHEMATICS (E) - LEVEL 1 (Standard Mathematics)

Time : 3 hrs **STD : X** **Max. Marks :80**

INSTRUCTIONS:

i) This question paper consists of 42 questions . All questions are compulsory**.**

ii) This question paper is divided into four Sections-**A, B, C** and **D**

iii) In **Section A**, Question Nos. **1 to 16** are multiple choice questions **(MCQs)** and Question Nos. **17 to 20** are very short answer type questions **(VSA)** carrying **1 mark** each.

iv) In **Section B** , Question Nos. **21 to 28** are short answer type I **(SA-I)** questions carrying **2 marks** each.

v) In **Section C**, Question Nos. **29 to 40** are short answer type II **(SA-II)** questions carrying **3 marks** each.

vi) In **Section D,** Question Nos. **41 to 42** are long answer **(LA)** questions carrying **4 marks** each.

vii) There is no overall choice . However an internal choice has been provided in **one question** of **2 marks** in **section B** and **two questions** of **3 marks** each in **section C**.

viii) In questions on Constructions , the drawing should be clear and exactly as per given measurements. The construction lines and arcs should also be maintained.

ix) Graph paper and Logarithm tables will be supplied on request

x) Use of a calculator is not permitted.

Q. No.	TOPIC	THRUST AREAS	Type of Question
Section A (1 mark each) Select and write the correct alternative from those given below each statement for question 1 to 16:			
1	Polynomials	Any concept from Polynomials	VSA (MCQ)
2	Pair of Linear equations in Two variables	Any concept from Pair of Linear equations in Two variables	VSA (MCQ)
3	Pair of Linear equations in Two variables	Any concept from Pair of Linear equations in Two variables	VSA (MCQ)
4	Quadratic Equations	Any concept from Quadratic Equations	VSA (MCQ)
5	Quadratic Equations	Any concept from Quadratic Equations	VSA (MCQ)
6	Circles	Any concept from Circles	VSA (MCQ)
7	Arithmetic Progressions	Any concept from Arithmetic Progression	VSA (MCQ)
8	Arithmetic Progressions	Any concept from Arithmetic Progression	VSA (MCQ)
9	Triangles	Any concept from Triangles	VSA (MCQ)

10	Triangles	Any concept from Triangles	VSA (MCQ)
11	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
12	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
13	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
14	Circles	Any concept from Circles	VSA (MCQ)
15	Co-ordinate Geometry	Any concept from Co-ordinate Geometry.	VSA (MCQ)
16	Logarithms	Any concept from Logarithms	VSA (MCQ)
17	Polynomials	• Find sum or product of zeroes**/** • write a quadratic polynomial, given sum and product of zeroes**/**given two zeroes • Find the zeroes of a quadratic polynomial**/** • Find dividend, given quotient, remainder and divisor**/** • Find the value of unknown coefficient 'k' of a quadratic polynomial , given sum of zeroes/product of zeroes	VSA
18	Pair of Linear equations in Two variables	• Find the value of k for which the given pair of linear equations will have a unique solution or no solution or infinitely many solutions **/** • Find whether the given pair of linear equations are consistent or inconsistent**/** • Write a pair of Linear equations in two variables for the given word problem.	VSA
19	Triangles	Numerical application based on concept of similarity.	VSA
20	Co-ordinate Geometry	Problem based on any concept of co-ordinate geometry	VSA
Section B (2marks each)			
21	Introduction to Trigonometry	Given a trigonometric ratio, to find the value of the other trigonometric ratio using k method	SA I
22	Introduction to Trigonometry	Evaluate trigonometric expression using known trigonometric values of specific angles	SA I
23	Introduction to Trigonometry	To prove a trigonometric identity	SA I
24	Circles	Numerical problem	SA I
25	Triangles	Numerical application on any one of the 4 theorems on Triangles	SA I
26	Co-ordinate Geometry	Problem based on the concept of distance/ Section formula	SA I
27	**#** Co- ordinate Geometry	Using the Area of a triangle formula in Co-ordinate Geometry find • area of a triangle • co-ordinate k of any one vertex • area of a special parallelogram (**Any two to be asked)**	SA I

28	Circles	• Numerical problem	SA I
		Section C (3 marks each)	
29	Polynomials	• Divide p(x) by g(x) and find q(x) and r(x) and write in the form $p(x) = g(x) \times q(x) + r(x)$**/** • Verification of Division Algorithm**/** • To find g(x) when p(x) ,q(x) and r(x) are given**/** • To determine if g(x) is a factor of p(x)	SA II
30	Polynomials	Given two zeroes, find remaining two zeroes	SA II
31	**#** Pair of Linear equations in Two variables	Find the solution of the pair of Linear equations by elimination method **OR** Find the solution of the pair of Linear equations by substitution / cross multiplication method	SA II
32	**#** Quadratic Equations	Find roots of the quadratic equation by factorisation method **OR** Find roots of the quadratic equation by quadratic formula / completing square method	SA II
33	Arithmetic Progressions	Any numerical problem based on a_n / S_n /both	SA II
34	Arithmetic Progressions	Word problem based on a_n / S_n /both	SA II
35	Logarithms	Evaluate using logarithm method $\frac{a^n \times \sqrt[m]{b}}{c}$ or $\frac{\sqrt[n]{a \times b}}{c}$ or $\frac{c}{a^n \times \sqrt[m]{b}}$ or $\frac{c}{\sqrt[n]{a \times b}}$ (where m, n are positive integers ≤ 3)	SA II
36	Logarithms	Evaluate using logarithm method $\sqrt{\frac{a^n \times b^m}{c}}$ or $\sqrt{\frac{c}{a^n \times b^m}}$ or $\sqrt[3]{\frac{a^n \times b^m}{c}}$ or $\sqrt[3]{\frac{c}{a^n \times b^m}}$ (where m , n are positive integers ≤ 3)	SA II
37	Constructions	Construct tangents to a circle from an external point.	SA II
38	Constructions	Construct similar triangles as per given scale factor	SA II
39	Some Applications of Trigonometry	Word problem with figure showing two angles of elevation or two angles of depression or one angle of elevation and one angle of depression.	SA II
40	Triangles	To prove a rider on Triangles	SA II
		Section D (4 marks each)	
41	Pair of Linear equations in Two variables	Find solution of a pair of Linear equations in two variables by graphical method.	LA
42	Quadratic Equations	Word problem	LA
		# Internal choice to be provided	

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DESIGN OF FIRST TERM EXAM QUESTION PAPER (2024 – 2025)

Subject: MATHEMATICS(E)-LEVEL 2 (BASIC MATHEMATICS)

Time: 3 Hours **STD: X** **Max. Marks: 80**

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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	Knowledge	8	10 %
2	Understanding	44	55 %
3	Application	18	22.5 %
4	Skill	10	12.5 %
	Total	**80**	**100 %**

2. **Weightage to the different areas of Content**

Chapter No.	Topic	Marks
2	Polynomials	**08**
3	Pair of Linear Equations in Two Variables	**10**
4	Quadratic Equations	**09**
5	Arithmetic Progressions	**08**
6	Triangles	**08**
7	Coordinate Geometry	**06**
8	Introduction to Trigonometry	**09**
9	Some Applications of Trigonometry	**03**
10	Circles	**06**
11	Constructions	**06**
PDF	Logarithms	**07**
	Total	**80**

3. **Weightage to different form/type of Questions.**

Sr. No.	Types of Questions	Marks for each question	Number of questions	Total Marks
1	Very Short Answer Type (VSA)	01	20	20
2	Short Answer Type I (SA-I)	02	07	14
3	Short Answer Type II (SA II)	03	14	42
4	Long Answer Type (LA)	04	01	04
		Total	**42**	**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) × (n)
1.	Very Short answer Type (VSA)	2	20	40
2.	Short Answer Type I (SA-I)	3	07	21
3.	Short Answer Type II (SA-II)	$7\frac{1}{2}$	14	105
4.	Long Answer Type (LA)	10	01	10
	Total		**42**	**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 42 questions

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GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

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BLUE PRINT OF SSC FIRST TERM EXAM QUESTION PAPER (2024-2025)

Subject: MATHEMATICS (E) - LEVEL 2 (Basic Mathematics)

Time: 3 hrs STD: X Max. Marks :80

Ch. No.	Objectives	Knowledge				Understanding				Application				Skill				
	Forms of Questions	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	
	Content/marks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	Total
2	Polynomials	1(1) 17(1)					27(2)	28(3)		20(1)								5(8)
3	Pair of Linear Equations in Two Variables	2(1)				3(1) 18(1)		30(3)									42(4)	5(10)
4	Quadratic Equations	4(1)				5(1) 6(1)		31(3) 32(3)										5(9)
5	Arithmetic Progressions					7(1) 8(1)		33(3)				34(3)						4(8)
6	Triangles					9(1) 10(1)		39(3)		19(1)	25(2)							5(8)
7	Coordinate Geometry	15(1)	26(2)					29(3)										3(6)
8	Introduction to Trigonometry					11(1)	21(2) 22(2) 23(2)			12(1) 13(1)								6(9)
9	Some Applications of Trigonometry											40(3)						1(3)
10	Circles					14(1)	24(2)	41(3)										3(6)
11	Constructions															37(3) 38(3)		2(6)
PDF	Logarithms	16(1)										35(3) 36(3)						3(7)
	Total	6(6)	1(2)			10(10)	5(10)	8(24)		4(4)	1(2)	4(12)				2(6)	1(4)	
		7(8)				23(44)				9(18)				3(10)				42(80)

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

This is a model Blue Print. Paper setter may make changes in the objectives chapter wise.

PATTERN OF FIRST TERM QUESTION PAPER (2024 – 2025)

SUBJECT: MATHEMATICS (E) LEVEL – 2 (BASIC MATHEMATICS)

TIME: 3 Hrs **STD: X** **MAX. MARKS: 80**

Instructions:

(i) This question paper consists of **42** questions. All questions are **compulsory**.

(ii) This question paper is divided into four sections – **A**, **B**, **C** and **D**

(iii) In **Section A**, Question Nos. **1 to 16** are multiple choice questions (**MCQs**) and Question Nos. **17 to 20** are very short answer type questions (**VSA**) carrying **1 mark** each.

(iv) In **Section B**, Question Nos. **21 to 27** are short answer type I (**SA- I**) questions carrying **2 marks** each.

(v) In **Section C**, Question Nos.**28 to 41** are short answer type II (**SA- II**) questions carrying **3 marks** each

(vi) In **Section D**, Question No. **42** is a long answer (**LA**) type question carrying **4 marks** .

(vii) There is no overall choice. However, an internal choice has been provided in **one question** of **2 marks** in **section B** and **two questions** of **3 marks** each in **section C**.

(viii) In questions on Constructions, the drawing should be clear and exactly as per the given measurements. The construction lines and arcs should also be maintained.

(ix) Graph paper and Logarithm Tables will be supplied on request.

(x) Use of calculator is not permitted.

Q. No.	TOPIC	THRUST AREAS	Type of Question
Section A (1mark each) Select and write the correct alternative from those given below each statement for question 1 to 16 :			
1	Polynomials	Any concept from Polynomials	VSA (MCQ)
2	Pair of Linear Equations in Two Variables	Any concept from Pair of Linear Equations in Two Variables.	VSA (MCQ)
3	Pair of Linear Equations in Two Variables	Any concept from Pair of Linear Equations in Two Variables	VSA (MCQ)
4	Quadratic Equations	Any concept from Quadratic Equations	VSA (MCQ)

5	Quadratic Equations	Any concept from Quadratic Equations	VSA (MCQ)
6	Quadratic Equations	Any concept from Quadratic Equations	VSA (MCQ)
7	Arithmetic Progressions	Any concept from Arithmetic Progression	VSA (MCQ)
8	Arithmetic Progressions	Any concept from Arithmetic Progression	VSA (MCQ)
9	Triangles	Any concept from Triangles	VSA (MCQ)
10	Triangles	Any concept from Triangles	VSA (MCQ)
11	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
12	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
13	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
14	Circles	Any concept from Circles	VSA (MCQ)
15	Coordinate Geometry	Any concept from Coordinate Geometry	VSA (MCQ)
16	Logarithms	Any concept from Logarithms	VSA (MCQ)
17	Polynomials	• Find sum or product of zeroes**/** • Find the zeroes of a quadratic polynomial**/** • Find dividend, given quotient, remainder and divisor.	VSA
18	Pair of Linear Equations in Two Variables	• Problems based on the existence of solutions of a pair of linear equations in two variables (Table 3.4)**/** • Find the value of k for which the given pair of linear equations has unique solution or no solution or infinitely many solutions.	VSA
19	Triangles	Numerical application based on concept of similarity.	VSA
20	Polynomials	• write a quadratic polynomial, given sum and product of zeroes**/**given two zeroes • Find the value of unknown coefficient ‘k’ of a quadratic polynomial , given sum of zeroes/product of zeroes	VSA

Section B (2 marks each)			
21	Introduction to Trigonometry	Given a trigonometric ratio, to find the values of other trigonometric ratios using k method.	SA I
22	Introduction to Trigonometry	Evaluate given expression by substituting the known values of trigonometric ratios.	SA I
23	Introduction to Trigonometry	To prove a trigonometric identity • $\sin^2\theta + \cos^2\theta = 1$ / • $1 + \tan^2\theta = \sec^2\theta$/ • $1 + \cot^2\theta = \text{cosec}^2\theta$	SA I
24	Circle	Numerical example on circle	SA I
25	Triangles	Numerical application based on any one of the four theorems on Triangles.	SA I
26	# Coordinate Geometry	Problem based on the concept of distance formula **OR** Problem based on the concept of section formula	SA I
27	Polynomials	Find the zeroes of a quadratic polynomial and verify the relationship between its zeroes and the coefficients.	SA I
Section C (3marks each)			
28	Polynomials	Divide a cubic polynomial p(x) by a linear polynomial g(x) and write the result in the form $p(x) = q(x) \times g(x) + r(x)$	SA II
29	Coordinate Geometry	Using the Area of a triangle formula in Coordinate Geometry , find area of a special quadrilateral.	SA II
30	**#**Pair of Linear Equations in Two Variables	Find the solution of the pair of linear equations by Elimination Method **OR** Find the solution of the pair of linear equations by Substitution Method	SA II
31	Quadratic Equations	Find roots of a quadratic equation by Factorisation Method.	SA II
32	Quadratic Equations	Find roots of a quadratic equation by using Quadratic Formula.	SA II
33	Arithmetic Progressions	Given an AP, find the common difference, n^{th} term and S_n.	SA II
34	Arithmetic Progressions	• Simple word problem based on a_n, S_n / • Given any two terms of an AP, to find a, d and first three terms of an AP	SA II
35	Logarithms	Evaluate by using the logarithm method $\frac{a^n \times b}{c}$ (where n is a positive integer ≤ 3)	SA II

36	Logarithms	Evaluate by using the logarithm method $\frac{c}{a^n \times b}$ (where n is a positive integer ≤ 3)	SA II
37	Constructions	Construct tangents to a circle from an external point.	SA II
38	Constructions	Construct similar triangles as per given scale factor.	SA II
39	**#**Triangles	Proof of any one theorem • B.P.T./ • Pythagoras Theorem/ • converse of Pythagoras Theorem (**Any two to be asked**)	SA II
40	Some Applications of Trigonometry	Problem with figure showing • an angle of elevation • an angle of depression	SA II
41	Circles	• Proof of Theorem 10.2 / • Numerical applications	SA II
Section D (4marks)			
42	Pair of Linear Equations in Two Variables	Find solution of a pair of linear equations in two variables by graphical method.	LA
		# Internal choice to be provided	

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DESIGN OF SSC FINAL EXAM QUESTION PAPER (2024-2025)

Subject : MATHEMATICS (E) - LEVEL 1 (Standard Mathematics)

Time : 3 hrs **Std : X** **Max. Marks :80**

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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.	Knowledge	8	10%
2.	Understanding	41	51.25%
3.	Application	21	26.25%
4.	Skill	10	12.5%
	Total	**80**	**100%**

2.Weightage to the different areas of Content

Chapter No.	Topic	Marks
1.	Real Numbers	02
2.	Polynomials	05
3.	Pair of Linear Equations in Two Variables	10
4.	Quadratic Equations	07
5	Arithmetic Progressions	04
6.	Triangles	06
7.	Coordinate Geometry	04
8.	Introduction to Trigonometry	07
9.	Some Applications of Trigonometry	03
10.	Circles	04
11.	Constructions	06
12.	Areas Related to Circles	05
13.	Surface Areas and Volumes	05
14.	Statistics	06
15.	Probability	02
PDF	Logarithms	04
	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	9	18
3.	Short Answer Type II (SA-II)	3	10	30
4.	Long Answer Type (LA)	4	3	12
	Total		**42**	**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	9	27
3.	Short Answer Type II (SA-II)	8	10	80
4.	Long Answer Type(LA)	11	03	33
	Total		**42**	**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 **42** questions

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BLUE PRINT OF SSC FINAL EXAM QUESTION PAPER (2024-2025)

Subject : MATHEMATICS (E) - LEVEL 1 (Standard Mathematics)

Time: 3 hrs **Std: X** **Max. Marks :80**

Chapter No.	Objectives	Knowledge				Understanding				Application				Skill				Total
	Forms of Questions	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	
	Content / Marks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
1	Real Numbers						21(2)											1(2)
2	Polynomials	1(1)				2(1)		30(3)										3(5)
3	Pair of Linear Equations in Two Variables	3(1)				4(1), 17(1)		31(3)	*40(4)								*40(4)	5(10)
4	Quadratic Equations							32(3)					41(4)					2(7)
5	Arithmetic Progressions	5(1)						33(3)										2(4)
6	Triangles					6(1)	23(2)					34(3)						3(6)
7	Coordinate Geometry		24(2)				25(2)											2(4)
8	Introduction to Trigonometry	7(1)				8(1)	26(2)			9(1)	27(2)							5(7)
9	Some Applications of Trigonometry											35(3)						1(3)
10	Circles					10(1),18(1)	28(2)											3(4)
11	Constructions															36(3), 37(3)		2(6)
12	Areas Related to Circles	11(1)				12(1), 19(1)					22(2)							4(5)
13	Surface Areas and Volumes					13(1), 14(1)						38(3)						3(5)
14	Statistics						29(2)		*42(4)								*42(4)	2(6)
15	Probability					15(1),20(1)												2(2)
PDF	Logarithms	16(1)										39(3)						2(4)
	TOTAL	6(6)	1(2)			13(13)	6(12)	4(12)	*2(8)	1(1)	2(4)	4(12)	1(4)			2(6)	*2(8)	
		7(8)				24(41)				8(21)				3(10)				42(80)

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

***Indicates any one will be tested from that chapter

NOTE: Questions on Skill

i)If Solution by Graphical method is tested then Mean will be tested.

ii)If Ogive is tested then Word Problem on Pair of Linear Equations will be tested.

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

PATTERN OF SSC FINAL EXAM QUESTION PAPER (2024-2025)

Subject : MATHEMATICS (E) - LEVEL 1 (Standard Mathematics)

Time: 3 hrs **Std : X** **Max. Marks :80**

Instructions:

i) This question paper consists of 42 questions . All questions are compulsory**.**

ii) This question paper is divided into four Sections-**A, B, C** and **D**

iii) In **Section A**, Question Nos. **1 to 16** are multiple choice questions **(MCQs)** and Question Nos. **17 to 20** are very short answer type questions **(VSA)** carrying **1 mark** each.

iv) In **Section B** , Question Nos. **21 to 29** are short answer type I **(SA-I)** questions carrying **2 marks** each.

v) In **Section C**, Question Nos. **30 to 39** are short answer type II **(SA-II)** questions carrying **3 marks** each.

vi) In **Section D,** Question Nos. **40 to 42** 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 questions on Constructions , the drawing should be clear and exactly as per given measurements. The construction lines and arcs should also be maintained.

ix) Graph paper is provided on the answer booklet.

x) Logarithm and Antilogarithm tables are printed on the last pages of the question paper.

xi) Use of calculators is not permitted.

Q.NO	TOPIC	THRUST AREA	TYPE OF QUESTION
Section A (1 mark each) Select and write the correct alternative from those given below each statement for question 1 to 16 :			
1	Polynomials	Any concept from Polynomials	VSA (MCQ)
2	Polynomials	Any concept from Polynomials	VSA (MCQ)
3	Pair of Linear Equations in Two Variables	Any concept from Pair of Linear Equations in Two Variables	VSA (MCQ)
4	Pair of Linear Equations in Two Variables	Any concept from Pair of Linear Equations in Two Variables	VSA (MCQ)
5	Arithmetic Progressions	Any concept from Arithmetic Progressions	VSA (MCQ)
6	Triangles	Any concept from Triangles	VSA (MCQ)
7	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
8	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)

9	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
10	Circles	Any concept from Circles	VSA (MCQ)
11	Areas Related to Circles	Any concept from Areas Related to Circles	VSA (MCQ)
12	Areas Related to Circles	Any concept from Areas Related to Circles	VSA (MCQ)
13	Surface Areas and Volumes	Any question on Surface Areas	VSA (MCQ)
14	Surface Areas and Volumes	Any question on Surface areas	VSA (MCQ)
15	Probability	Any concept from Probability	VSA (MCQ)
16	Logarithm	Any concept from Logarithm	VSA (MCQ)
17	Pair of Linear Equations in Two Variables	• Find the value of k for which the given pair of linear equations has a unique solution or no solution or infinitely many solutions **/** • Find whether the given pair of linear equations are consistent or inconsistent**/** • Write a pair of Linear equations in two variables for a simple word problem.	VSA
18	Circle	Numerical problem	VSA
19	Areas related to Circles	• Find length of the arc of a circle**/** • Find the area of a sector of a circle (figure may be provided) **(Do not substitute for π)**	VSA
20	Probability	Find the probability of an event	VSA
		Section B (2 marks each)	
21	Real Numbers	• Find HCF of two numbers using Euclid's Division Algorithm**/** • Find the HCF/LCM by prime factorisation method**/** • Without performing long division method find whether the given rational number is terminating or nonterminating and hence write its decimal expansion.	SA-I
22	Areas Related to Circles	Find the area of shaded region	SA-I
23	Triangles	Numerical application based on any one of the four theorems on Triangles	SA-I
24	Coordinate Geometry	• Problem based on distance formula **/** • Problem based on section formula	SA-I
25	**#**Coordinate Geometry	Using the area of a triangle formula in Co-ordinate Geometry find • area of a triangle **OR** • unknown co-ordinate 'k' of any one vertex of the triangle **OR** • area of a special parallelogram **(Any two to be asked)**	SA-I

26	#Introduction to Trigonometry	• Given a trigonometric ratio, find the value of another trigonometric ratio using k method **OR** • Evaluate trigonometric expression using known trigonometric values of specific angles.	SA-I
27	Introduction to Trigonometry	Prove a trigonometric identity **N.B. (Proof of Basic identities** • $\sin^2A+ \cos^2A=1$ • $1 +\tan^2A= \sec^2A$ • $1+ \cot^2A = \text{cosec}^2A$ **NOT to be asked**)	SA-I
28	Circle	Numerical problem	SA-I
29	Statistics	• Find the mode of grouped data **/** • Find the median of grouped data	SA-I
		Section C (3 marks each)	
30	Polynomials	• Find q(x) and r(x) when p(x) is divided by g(x) and hence express result in the form p(x) = g(x) × q(x) + r(x)**/** • Verification of Division Algorithm**/** • To find g(x) when p(x), q(x) and r(x) are given**/** • Given two zeroes of a polynomial find its remaining two zeroes.	SA-II
31	#Pair of Linear Equations in Two Variables	• Find the solution of the pair of linear equations by Elimination method **OR** • Find the solution of the pair of linear equations by Substitution /Cross multiplication method	SA-II
32	#Quadratic Equations	• Find roots of the quadratic equation by Factorisation method **OR** • Find roots of the quadratic equation by using Quadratic formula /Completing square method	SA-II
33	Arithmetic Progression	• Numerical problem**/** • Word problem based on a_n/ S_n /both	SA-II
34	Triangles	Prove a rider on Triangles	SA-II
35	Some Applications of Trigonometry	Word problem with figure showing • two angles of elevation **/** • two angles of depression **/** • one angle of elevation and one angle of depression.	SA-II
36	Construction	Construct tangents to a circle from an external point.	SA-II
37	Construction	Construct similar triangles as per given scale factor	SA-II
38	Surface Area and Volume	Word problem on concept of volume of combination of two or more solids	SA-II

39	Logarithm	Evaluate by using logarithm method: • $\frac{a^n \times \sqrt[m]{b}}{c}$ **/** • $\frac{\sqrt[n]{a \times b}}{c}$ **/** • $\frac{c}{a^n \times \sqrt[m]{b}}$ / • $\frac{c}{\sqrt[n]{a \times b}}$ Where m, n are positive integers ≤ 3	SA-II
		Section D (4 marks each)	
40	Pair of Linear Equations in Two Variables	• Word problem **/** • Find solution of a pair of linear equations in two variables graphically	LA
41	Quadratic Equations	Word problem	LA
42	Statistics	Find mean • by assumed mean method **/** • step deviation method **/** • Cumulative frequency curve (given 6 class intervals)	LA
		# internal choice to be provided	

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GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO – BETIM GOA 403521

DESIGN OF SSC FINAL EXAM QUESTION PAPER (2024 – 2025)

Subject: MATHEMATICS(E)-LEVEL 2 (BASIC MATHEMATICS)

Time: 3 Hours **STD : X** **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	Knowledge	8	10 %
2	Understanding	44	55 %
3	Application	18	22.5 %
4	Skill	10	12.5 %
	Total	**80**	**100 %**

2. Weightage to the different areas of Content

Chapter No.	Topic	Marks
1	Real Numbers	**02**
2	Polynomials	**05**
3	Pair of Linear Equations in two Variables	**10**
4	Quadratic Equations	**07**
5	Arithmetic Progression	**04**
6	Triangles	**06**
7	Coordinate Geometry	**04**
8	Introduction to Trigonometry	**07**
9	Some Applications of Trigonometry	**03**
10	Circles	**04**
11	Constructions	**06**
12	Areas Related to Circles	**05**
13	Surface Areas and Volumes	**05**
14	Statistics	**06**
15	Probability	**02**
PDF	Logarithms	**04**
	Total	**80**

3.Weightage to different form/type of Questions

Sr. No.	Types of Questions	Marks for each question	Number of questions	Total Marks
1	Very Short Answer Type (VSA)	01	20	20
2	Short Answer Type I (SA-I)	02	08	16
3	Short Answer Type II (SA II)	03	12	36
4	Long Answer Type (LA)	04	02	08
		Total	**42**	**80**

3. 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) × (n)
1.	Very Short answer Type (VSA)	2	20	40
2.	Short Answer Type I (SA-I)	3	08	24
3.	Short Answer Type II (SA-II)	8	12	96
4.	Long Answer Type (LA)	10	02	20
	Total		**42**	**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 42 questions

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GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

BLUE PRINT OF SSC FINAL EXAM QUESTION PAPER (2024-2025)

Subject : MATHEMATICS (E) - LEVEL 2 (Basic Mathematics)

Time : 3 hrs **Std : X** **Max. Marks :80**

Sr No	Objectives	Knowledge				Understanding				Application				Skill				
	Forms of Questions	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	VSA	SA I	SA II	LA	
	Content/marks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	Total
1	Real Numbers						21(2)											1(2)
2	Polynomials	1(1)				17(1)		29(3)										3(5)
3	Pair of Linear Equations in Two Variables	2(1)				3(1) 18(1)		30(3)									42(4)	5(10)
4	Quadratic Equations	4(1)						31(3) 32(3)										3(7)
5	Arithmetic Progressions					5(1)		33(3)										2(4)
6	Triangles							37(3)		6(1)	26(2)							3(6)
7	Coordinate Geometry		27(2)								28(2)							2(4)
8	Introduction to Trigonometry					7(1) 8(1)	24(2) 25(2)			9(1)								5(7)
9	Some applications of Trigonometry							38(3)										1(3)
10	Circles					10(1)						39(3)						2(4)
11	Constructions															35(3) 36(3)		2(6)
12	Areas related to Circles	11(1)				12(1)	22(2)			19(1)								4(5)
13	Surface Areas and Volumes					14(1)				13(1)		40(3)						3(5)
14	Statistics						23(2)		41(4)									2(6)
15	Probability	15(1)								20(1)								2(2)
PDF	Logarithms	16(1)										34(3)						2(4)
		6(6)	1(2)			9(9)	5(10)	7(21)	1(4)	5(5)	2(4)	3(9)				2(6)	1(4)	
	Total	7(8)				22(44)				10(18)				3(10)				42(80)

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

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

PATTERN OF SSC FINAL EXAM QUESTION PAPER (2024 – 2025)

SUBJECT: MATHEMATICS (E) LEVEL – 2 (BASIC MATHEMATICS)

TIME: 3 Hrs **STD : X** **MAX. MARKS: 80**

INSTRUCTIONS:

(i) This question paper consists of **42** questions. All questions are **compulsory**.

(ii) This question paper is divided into four sections – **A**, **B**, **C** and **D**

(iii) In **Section A**, questions Nos. **1 to 16** are multiple choice questions (**MCQs**) and questions Nos. **17 to 20** are very short answer type questions (**VSA**) carrying **1 mark** each.

(iv) In **Section B**, Questions Nos. **21 to 28** are short answer type I (**SA- I**) questions carrying **2 marks** each.

(v) In **Section C**, Questions Nos. **29 to 40** are short answer type II (**SA- II**) questions carrying **3 marks** each

(vi) In **Section D**, Questions Nos. **41 and 42** 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 questions on constructions, the drawing should be clear and exactly as per the given measurements. The construction lines and arcs should also be maintained.

(ix) Graph paper is provided on the answer booklet.

(x) Logarithm and Antilogarithm tables are printed on the last pages of the question paper.

(xi) Use of calculator is not permitted.

Q. No.	TOPIC	THRUST AREAS	Type of Question
Section A (1 mark each) **Select and write the correct alternative from those given below each statement for question 1 to 16:**			
1	Polynomials	Any concept from Polynomials	VSA (MCQ)
2	Pair of Linear Equations in Two Variables	Any concept from Pair of Linear Equations in Two Variables	VSA (MCQ)
3	Pair of Linear Equations in Two variables	Any concept from Pair of Linear Equations in Two Variables	VSA (MCQ)
4	Quadratic Equations	Any concept from Quadratic Equations	VSA (MCQ)
5	Arithmetic Progressions	Any concept from Arithmetic Progression	VSA (MCQ)
6	Triangles	Any concept from Triangles	VSA

			(MCQ)
7	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
8	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
9	Introduction to Trigonometry	Any concept from Introduction to Trigonometry	VSA (MCQ)
10	Circles	Any concept from Circles	VSA (MCQ)
11	Areas Related to Circles	Any concept from Areas Related to Circles	VSA (MCQ)
12	Areas Related to circles	Any concept from Areas Related to Circles	VSA (MCQ)
13	Surface areas and Volumes	Any concept from Surface Areas	VSA (MCQ)
14	Surface Areas and Volumes	Any concept from Surface Areas	VSA (MCQ)
15	Probability	Any concept from Probability	VSA (MCQ)
16	Logarithms	Any concept from Logarithms	VSA (MCQ)
17	Polynomials	• Find sum or product of zeroes**/** • write a quadratic polynomial, given sum and product of zeroes/given two zeroes**/** • Given the sum/product of zeroes of a quadratic polynomial, to find the unknown coefficient**/** • Find the zeroes of a quadratic polynomial**/** • Find dividend, given quotient, remainder and divisor.	VSA
18	Pair of Linear Equations in Two Variables	• Problems based on the existence of solutions of a pair of linear equations in two variables (Table 3.4)**/** • Find the value of k for which the given pair of linear equations has unique solution or no solution or infinitely many solutions.	VSA
19	Areas Related to Circles	• Find length of arc of a circle**/** • area of sector of a circle. (figure may be provided) (**Do not substitute for π**)	VSA
20	Probability	Find probability of given events.	VSA
		Section B (2 marks each)	
21	**#**Real Numbers	• a) Find HCF of two numbers using Euclid's Division Algorithm. / b) Find HCF/LCM by prime factorisation method. **(anyone from a and b to be asked)** **OR** • Without performing 'long division' method, to find whether the given rational number is terminating or non-terminating and to write its decimal expansion.	SA I
22	Areas Related to Circles	Find area of shaded region.	SA I
23	Statistics	Find mode of grouped data.	SA I
24	Introduction to Trigonometry	Given a trigonometric ratio, to find the value of other trigonometric ratio using k method.	SA I
25	Introduction to Trigonometry	Evaluate given expression by substituting the known values of trigonometric ratios.	SA I

26	Triangles	Numerical application based on any one of the four theorems on Triangles.	SA I
27	**#**Coordinate Geometry	• Problem based on the concept of distance formula. **OR** • Problem based on the section formula.	SA I
28	Coordinate Geometry	Problem based on the concept of area of a triangle.	SA I
		Section C (3 marks each)	
29	Polynomials	Divide a cubic polynomial p(x) by a linear polynomial g(x) and write the result in the form p(x) = q(x) × g(x) + r(x)	SA II
30	**#** Pair of Linear Equations in Two Variables	• Find the solution of the pair of linear equations by Elimination method. **OR** • Find the solution of the pair of linear equation by substitution method.	SA II
31	Quadratic Equations	Find roots of a quadratic equation by Factorisation method.	SA II
32	Quadratic Equations	Find roots of a quadratic equation by using quadratic formula.	SA II
33	Arithmetic Progressions	Given an AP, to find common difference, n^{th} term, sum of n terms.	SA II
34	Logarithms	Evaluate by using the logarithm method $\frac{a^n \times b}{c}$ or $\frac{c}{a^n \times b}$ (where n is a positive integer ≤ 3)	SA II
35	Constructions	Construct tangents to a circle from an external point.	SA II
36	Constructions	Construct similar triangles as per given scale factor.	SA II
37	**#**Triangles	Proof of any one theorem • B.P.T./ • Pythagoras Theorem/ • converse of Pythagoras theorem (**Any two to be asked**)	SA II
38	Some Applications of Trigonometry	Problem with figure showing • an angle of elevation • an angle of depression	SA II
39	Circles	• Proof of Theorem 10.2 **/** • Numerical applications	SA II
40	Surface Areas and Volumes	Word problem on concept of volume of combination of two solids.	SA II
		Section D (4 marks each)	
41	Statistics	Find Mean by Direct method. (Given six class intervals)	LA
42	Pair of Linear Equations in Two Variables	Find solution of a pair of linear equations in two variables by graphical method.	LA
		# Internal choice to be provided	

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GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

SSC FINAL EXAM -PRACTICE QUESTION PAPER (2024 – 2025)

Subject : MATHEMATICS (E) – LEVEL 1 (Standard Mathematics)

Time : 3 hrs Std : X Max. Marks : 80

INSTRUCTIONS:

i) This question paper consists of **42** questions . All questions are compulsory.

ii) This question paper is divided into four **Sections-A, B, C and D**

iii) In **Section A,** Question Nos.**1 to 16** are multiple choice questions **(MCQs)** and Question Nos. **17 to 20** are very short answer type questions **(VSA) of 1 mark each**.

iv) In **Section B**, Question Nos. **21 to 29** are short answer type I (**SA-I**) questions carrying **2 marks each.**

v) In **Section C**, Question Nos. **30 to 39** are short answer type II (**SA-II**) questions carrying **3marks each.**

vi) In **Section D**, Question Nos.**40 to 42** are long answer (**LA**) questions carrying **4marks each**.

vii) There is no overall choice. However an **internal choice** has been provided in **two questions of 2marks each in Section B** and **two questions of 3marks each in Section C.**

viii) In questions on Constructions, the drawing should be clear and exactly as per given measurements. The construction lines and arcs should also be maintained.

ix) Graph page is provided on the answer booklet.

x) Logarithm and Antilogarithm tables are printed on the last page of the question paper.

xi) Use of calculators is not permitted.

Section A (1 mark each)

Select and write the correct alternative from those given below each statement for question 1to16 :

1 The quadratic polynomial in x , whose zeroes are –7 and 4, is:
- $x^2 + 3x – 28$ • $x^2 - 3x – 28$ • $x^2 + 3x + 28$ • $x^2 - 3x - 28$

2 If one of the zeroes of the quadratic polynomial $(k–1)x^2 + kx+1$ is –3, then the value of k is:
- (-4)/3 • (-2)/3 • 2/3 • 4/3

3 The pair of linear equations $5x – 15y = 8$ and $3x – 9y = 24/5$ have
•No solution •Unique solution •Exactly two solutions • Infinitely many solutions

4 Father's age is six times his son's age. Four years hence, the age of the father will be four times his son's age. The present ages, in years, of the son and the father are respectively
- 4 and 24 • 5 and 30 • 6 and 36 • 7 and 42

5 The 11th term of the AP : 25, 50, 75, 100…….is
- 225 • 250 • 275 • 300

6 If △ABC ∼△ DEF and AB=4 cm, DE=6 cm, EF=9 cm and FD=12 cm, then the perimeter of △ ABC is:
- 18 cm • 20 cm • 21 cm • 22 cm

7 If $1 + \tan^2 36° = \sec^2 3A$ where 3A is an acute angle, then the value of A is:
- 12° • 18° • 36° • 54°

8 The simplified form of (cosecA- cotA) (1+cosA) is :
• sinA • cosA • cosecA • secA

9 If sinA – cosA = 0 then the value of $\sin^4 A - \sin^2 A$ is :
• -3/ 4 • - 1/4 • 1/4 • 3/4

10 If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to :
• √3 cm •6 cm •3 cm •3√3 cm

11 The circumference of a circle that can be inscribed in a square of side 10cm is:
• 10π cm • 20π cm • 25π cm • 100π cm

12 A wire can be bent in the form of a circle of radius 56 cm. If it is bent in the form of a square, then its area will be: (Take $\pi = \frac{22}{7}$)
• 3520 cm^2 • 6400 cm^2 • 7744 cm^2 • 8800 cm^2

13 A piece of paper is in the shape of a semicircular region of radius 10 cm. It is rolled to form a right circular cone. The slant height of the cone is:
• 5 cm • 10 cm •15 cm •20 cm

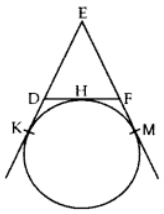
14 When two same solid hemispheres of equal base radius r cm are attached together along with their bases, the total surface area of the combination is:
• $6\pi r^2$ • $4\pi r^2$ • $3\pi r^2$ • $2\pi r^2$

15 3 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from the remaining pack. The probability of getting a black card is:
• 23/52 • 22/52 • 22/45 • 23/45

16 The value of log 800 – log 8 is :
• 1 • 2 • 100 • 792

17 Find whether the following pair of linear equations is consistent or inconsistent:
4x + 3y – 1 = 5 and 12x + 9y = -18

18 In the given figure, a circle touches the side DF of △EDF at H and touches ED and EF produced at K & M respectively.
If EK = 9 cm, calculate the perimeter of △EDF



19 Find the area of a sector of a circle with radius 6 cm if the angle of the sector is 60°.
(Do not substitute for π)

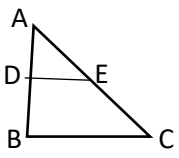
20 Amita calculates that the probability of her winning a lottery is 0.08 . If 6000 tickets were sold find the number of tickets she bought.

Section B (2 marks each)

21 Find the HCF of 145 and 325 using Euclid's Division Algorithm.

22 A race track is in the form of a circular ring whose outer and inner circumference are 396m and 352m respectively. Find the width of the track.

23 In ΔABC,DE∥BC. If AD=4 , AE=8 ,
DB = x-2 and EC = 3x-19, then find the value of x



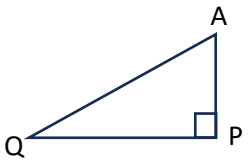
24 If the distance between the points A(2, -2) and B(-1, x) is equal to 5,then find the value of x

25 If P(-3, 2), Q(7, 6) and R(-1, 4) are the vertices of △PQR and QS is its median find the area of △PQS

OR

Find the value of k for which the area of the triangle formed by the points A (1, k), B (4, -3) and C (-9, 7) is 15 square units.

26 In ΔAPQ , ∠ APQ = 90°
and cos Q = $\frac{15}{17}$
Find the length of AP and value of cot A

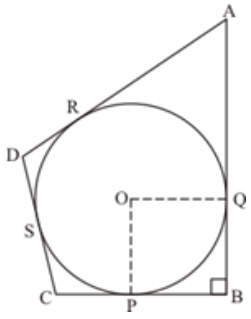


OR

Evaluate the following trigonometric expression using known trigonometric values:
4 cos ^{2} 60°+ cosec^{2}45° - 6 cot^{2}30°

27 Prove the trigonometric identity: $\frac{\sin A\,.\,tanA}{1-cosA}$ = secA+1

28 In the given figure, a circle is inscribed in a quadrilateral ABCD in which ∠B = 90°.
If AD = 23 cm, AB = 29 cm and DS = 5 cm,
find the radius of the circle.



29 Find the median of the following data:

CI	0 - 10	10 -20	20 -30	30 -40	40- 50
Frequency	5	15	30	8	2

(Write your answer correct up to one place of decimal)

Section C (3 mark each)

30 On dividing the polynomial $6x^3 + 8x^2 - 3x + 8$ by the polynomial g(x), the quotient and the remainder are 3x + 4 and 6x + 20 respectively . Find g(x)

31 Find the solution of the pair of linear equations:
11x - 7y = 57 and 14x + 5y = 3 by elimination method

OR

Find the solution of the pair of linear equations:
7x – 3y = 15 and 5x + 11y - 37 = 0 by cross multiplication method

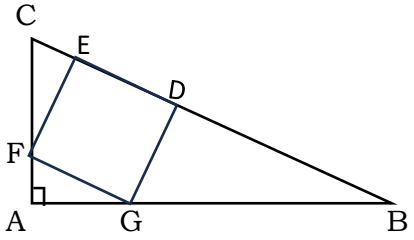
32 Find the roots of the quadratic equation:
$15x^2 - 4x - 3 = 0$ by factorisation method.

OR

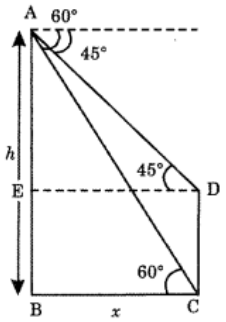
Find the roots of the quadratic equation:
$2x^2 - 3x - 5 = 0$ by completing the square method.

33 From 15th January, Sheena decided to save her pocket money daily. The amount of saving is equal to the date of the month. On 31st January, she decided to give a gift to her mother worth ` 200 from her savings. What is the amount left with Sheena at the end of the month?

34 In the given figure, □DEFG is a square and ∠BAC = 90°. Show that $FG^2 = BD \times EC$.



35 The angles of depression of the top and bottom of a 50 m high building DC from the top of a tower AB are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building, (take √3 = 1.73)



36 Draw a circle with centre O and radius 3.5cm Take a point R at a distance of 7.7cm from O. Construct tangents RS and RP from external point R. Measure and state the length of the tangent segments.

37 Using a pair of compasses and ruler construct △PQR with PQ =8.1cm ,QR = 7.5cm and ∠PQR= 75°. Then construct △P'Q'R whose sides are 5/2 of the corresponding sides of △PQR.

38 A tent consists of a frustum of a cone, surmounted by a cone. If the diameter of the upper and lower circular ends of the frustum be 14 m and 26 m respectively, the height of the frustum be 8 m and the slant height of the surmounted conical portion be 12 m, find the area of canvas required to make the tent. (Assume that the radii of the upper circular end of the frustum and the base of surmounted conical portion are equal). (take $\pi = \frac{22}{7}$)

39 Evaluate the following expression by using the logarithm method:

$$\frac{(6.782)^3 \times \sqrt{0.0043}}{35.29}$$

Section D (4 mark each)

40 Find the solution of the following pair of linear equations graphically.
3x + 2y = - 4 and 2x – 3y = 19
Rewrite and complete the following tables:

3x + 2y = - 4

x			
y			

2x – 3y = 19

x			
y			

41 Abdul takes 6 days less than the time taken by Ramesh to finish a piece of work. If both Abdul and Ramesh together can finish that work in 4 days, find the time taken by Ramesh to finish the work independently.

42 The following table shows the data regarding the height in cms of students of class X . Find the mean height of students of the class taking 'a' as assumed mean of the interval 162-168 using assumed mean method.

Heights	fi	xi	di	fidi
150-156	4			
156-162	7			
162-168	12			
168-174	8			
174-180	6			
180-186	3			
	Σ fi=			Σ fidi=

SSC PRACTICE PAPER

Mathematics (E) Level 1 – Standard Mathematics

Model Answers and Marking Scheme

Note: Any alternative method unless otherwise specified should be considered for full credit

	Section A (1 mark each)	
1	$x^2 + 3x - 28$	1
2	4/3	1
3	Infinitely many solutions	1
4	6 and 36	1
5	40	1
6	18	1
7	12°	1
8	Sin A	1
9	-1/4	1
10	$3\sqrt{3}$	1
11	10π cm	1
12	$7744 cm^2$	1
13	10cm	1
14	$4 \pi r^2$	1
15	22/45	1
16	2	1
17	$\frac{a1}{a2} = \frac{4}{12} = \frac{1}{3}$, $\frac{b1}{b2} = \frac{3}{9} = \frac{1}{3}$, $\frac{c1}{c2} = \frac{-6}{18} = \frac{-1}{3}$ ½ $\frac{a1}{a2} = \frac{b1}{b2} \neq \frac{c1}{c2}$ ∴ No solution hence inconsistent ½	1
18	Perimeter of △EDF=ED+DF+EF =ED+DH+HF+EF =ED+DK+FM+EF ½ = EK+EM=2(EK) =2 x 9 =18cm ½	1
19	Area of the sector = $\frac{\theta}{360}$ x $\pi r^2 = \frac{60}{360}$ x π x 6^2 ½ = 6π cm^2 ½	1
20	Let the number of tickets she bought be x P(she wins the lottery) = $\frac{x}{6000}$ =0.08 ½ x = 0.08 x 6000 = 480 ½	1
21	145 ⟌ 325 (2) ½ 290 35 ⟌ 145 (4) ½ 140 5 ⟌ 35 (7) ½ 35 00 HCF (145, 325) = 5 ½	2

22	Let the radius of the outer track and inner track be R and r respectively $2\pi R = 396$ and $2\pi r = 352$ ½ $R = \frac{396 \times 7}{2 \times 22}$ $r = \frac{352 \times 7}{2 \times 22}$ ½ $R = 63$ $= 56$ ½ Width of the track = 63 – 56 = 7cm ½	2
23	$\frac{AD}{DB} = \frac{AE}{EC}$ (DE ‖BC) $\frac{4}{x-2} = \frac{8}{3x-19}$ ½ $4(3x-19) = 8(x-2)$ ½ $12x-76 = 8x - 16$ ½ $4x = 60$ $x = 15$ ½	2
24	$AB = \sqrt{(-1-2)^2 + (x+2)^2} = 5$ ½ $9 + x^2 + 4x + 4 = 25$ ½ $x^2 + 4x - 12 = 0$ ½ $(x + 6)(x-2) = 0$ $x = -6$ or $x = 2$ ½	2
25	S is the midpoint of PR ∴ $S(\frac{-3-1}{2}, \frac{2+4}{2}) = S(-2, 3)$ ½ ar (△PQS) $= \frac{1}{2}[-3(6-3) +7(3-2) -2(2-6)]$ ½ $= \frac{1}{2}[-9 +7 +8]$ ½ $= \frac{1}{2}[6] = 3$ sq units ½ **OR** ar (△ABC) $= \frac{1}{2}[1(-3-7) +4(7-k) -9(k+3)] = 15$ ½ $[-10 +28 -4k -9k -27] = 30$ ½ $-9 -13k = 30$ ½ $-13k = 39$ $k = -3$ ½	2
26	cos Q = 15/17 , Let QP =15k , QA =17k (8, 15 , 17) is a Pythagorean triplet ∴ AP = 8k ½ +½ Cot A = $\frac{8k}{15k} = \frac{8}{15}$ ½ +½ **OR** $4\cos^2 60° + \text{cosec}^2 45° - 6\cot^2 30°$ $4(\frac{1}{2})^2 + (\sqrt{2})^2 - 6(\sqrt{3})^2$ ½ +½+½ $1 + 2 - 18 = -15$ ½	2
27	$\frac{\text{Sin A.tan A}}{(1-\cos A)} = \sec A + 1$ LHS $= \frac{\text{Sin A.tan A}}{(1-\cos A)} = \frac{\sin^2 A}{\cos A(1-\cos A)}$ ½ $= \frac{1-\cos^2 A}{\cos A(1-\cos A)} = \frac{(1-\cos A)(1+\cos A)}{\cos A(1-\cos A)}$ ½ $= \frac{(1+\cos A)}{\cos A} = \frac{1}{\cos A} + \frac{\cos A}{\cos A}$ ½ $= \sec A + 1 = RHS$ ½	2

28

DS =DR = 5cm ½

AR= AD-DR = 23-5= 18 ½

AQ=AR= 18

BQ= AB-AQ = 29- 18 = 11 ½

radius = OQ= BQ = 11cm ½

2

29

CI	Frequency	Cumulative Freq
0 - 10	5	5
10 -20	15	5+15=20
20 -30	30	20 + 30 = 50
30 -40	8	50 + 8 = 58
40- 50	2	58+2 =60

n = 60, n/2 = 30

Median class 20 – 30 l =20

Median = $l + [\frac{\frac{n}{2} - cf}{f}] \times h$ ½

= 20 + $[\frac{30 - 20}{30}] \times 10$ ½+½

= 20 + $\frac{10}{3}$

= 23. 3 ½

2

30

p (x) = g(x) x q(x) + r(x)

$6x^3 + 8x^2 - 3x + 8 = g(x) \times (3x + 4) + (6x + 20)$ ½

$\frac{6x3 + 8x2 - 3x + 8 - 6x - 20}{3x + 4} = g(x)$ ½

$2x^2 - 3$ ½

$3x + 4 \overline{)\ 6x^3 + 8x^2 - 9x - 12}$

$6x^3 + 8x^2$ ½

$- \quad -$

$- 9x - 12$

$- 9x - 12$ ½

$+ \quad +$

$g(x) = 2x^2 - 3$ ½

3

31

11x - 7y = 57 ----------(i) x 5

14x + 5y = 3 ----------(ii) x 7

55x - 35y = 285 ½

98x + 35y = 21

153x = 306 ½

$x = \frac{306}{153} = 2$ ½

substitute x = 2 in 11x - 7y = 57

11(2) – 7y = 57 ½

22 -7y = 57

-7y = 57 -22

$y = \frac{35}{-7}$

y = - 5 ½

The solution is x = 2 and y = - 5 ½

OR

7x - 3 y – 15 = 0 and 5x + 11y - 37 = 0

b	c	a	b
-3	-15	7	-3
11	-37	5	11

½

$\frac{x}{111-(-165)} = \frac{y}{-75-(-259)} \quad \frac{1}{77-(-15)}$ ½+½

$\frac{x}{276} = \frac{y}{184} = \frac{1}{92}$ ½

$x = \frac{276}{92} = 3$ and $y = \frac{184}{92} = 2$ ½

The solution is x=3 and y = 2 ½

3

32	$15x^2 - 4x - 3 = 0$ $15x^2 + 5x - 9x - 3 = 0$ ½ $5x(3x + 1) - 3(3x + 1) = 0$ ½ $(3x + 1)(5x - 3) = 0$ ½ $(3x + 1) = 0$ or $(5x - 3) = 0$ ½ $x = -1/3$ or $x = 3/5$ ½ The roots of the equation are $-1/3$ and $3/5$ ½ **OR** $2x^2 - 3x - 5 = 0$ $2x^2 - 3x = 5$ $x^2 - \frac{3}{2}x = \frac{5}{2}$ ½ $x^2 - \frac{3}{2}x + \frac{9}{16} = \frac{5}{2} + \frac{9}{16}$ ½ $(x - \frac{3}{4})^2 = \frac{49}{16}$ ½ $x - \frac{3}{4} = \mp \frac{7}{4}$ ½ $x = \frac{3}{4} \mp \frac{7}{4}$ $x = \frac{3}{4} + \frac{7}{4}$ or $x = \frac{3}{4} - \frac{7}{4}$ $x = \frac{10}{4} = \frac{5}{2}$ or $x = \frac{-4}{4} = -1$ ½ The roots of the equation are $5/2$ and -1 ½	3
33	AP : 15,16,17,18,.....31 ½ a =15, d = 1, l = 31 n = 31-14 = 17 ½ $S_n = \frac{n}{2}[a + l]$ ½ $S_{17} = \frac{17}{2}[15 + 31]$ ½ $= \frac{17}{2}[46] = 391$ ½ Amount left with Sheena at the end of the month is ` (391 – 200) = ` 191 ½	3
34	In △CEF and △BGD, ∠CEF = ∠BDG = 90----------1 ½ In △CEF , ∠CFE + ∠FCE =90----------2 In △ABC, ∠ABC + ∠ACB =90 ∠GBD + ∠FCE =90----------3 From 2 & 3, ∠CFE = ∠GBD----------4 ½ From 1 & 4, △CEF ~ △GDB ½ $\frac{CE}{GD} = \frac{EF}{DB} = \frac{CF}{GB}$ ½ CE X DB = GD X EF CE X DB = FG X FG (□ DEFG is a square) ½ FG^2 = CE X DB ½	3

35	In $\triangle$AB)C, $\frac{x}{h}$ = cot 60° x = h x cot 60° = h x $\frac{1}{\sqrt{3}}$ ----------1 In $\triangle$AED , $\frac{x}{h-50}$ = cot 45° x = (h-50) x cot 45° = (h-50) x 1 = h-50----------2 From 1 & 2 , h x $\frac{1}{\sqrt{3}}$ = h-50 h - h x $\frac{1}{\sqrt{3}}$ = 50 h(1 - $\frac{1}{\sqrt{3}}$)= 50 h($\frac{\sqrt{3}-1}{\sqrt{3}}$)= 50 h = 50 x $\frac{\sqrt{3}}{\sqrt{3}-1}$x $\frac{\sqrt{3}+1}{\sqrt{3}+1}$ h = 50 x $\frac{3+\sqrt{3}}{2}$ h = 25 x (3 + $\sqrt{3}$) = 25 x 4.73 Height of tower = 118.25m Distance between tower and building = 118.25m -50 = 68.25m	½ ½ ½ ½ ½ ½ ½ ½	3
36	To draw a circle with centre O and radius 3.5 cm To draw a line segment OR = 7.7 cm To construct the perpendicular bisector of line segment OR To mark the points P and Q on the circle To draw the tangent segments RP and RQ To measure the tangent segments RP = RQ = (6.8$\pm$0.1)cm	½ ½ ½ ½ ½ ½	3
37	To construct Δ PQR with the given data To draw a ray making an acute angle with side QR. To locate 5 points on the ray using a pair of compasses To join R_5 Q' ‖ R_2 Q and Q'P' ‖ QP ΔP'Q'R is the required triangle.	1 ½ ½ ½+½	3
38	Frustum of the cone d =14m r = 7 ; D=26m , R=13m h=8m Slant height of Frustum of the cone L = $\sqrt{(R-r)^2 + h^2}$ $\sqrt{(13-7)^2 + 8^2}$ = $\sqrt{36 + 64}$ = $\sqrt{100}$ =10m Cone l = 12m Area of canvas required = CSA(frustum of the cone) + CSA (cone) = π (R+r)L + π r l = π { (13 + 7)x10 + 7x12 } = π(200 + 84) = $\frac{22}{7}$ x 284 = $\frac{6248}{7}$ = 892.57m^2	½ ½ ½+½ ½ ½	3

39

Let $x = \frac{(6.782)^3 \times \sqrt{0.0043}}{35.29}$

$\log x = 3 \log 6.782 + \frac{1}{2} \log 0.0043 - \log 35.29$ ½

$= 3 \times 0.8313 + \frac{1}{2} \times \overline{3}.6335 - 1.5476$ ½+½+½

$= 2.4939 + \overline{2}.8168 - 1.5476$

$= 1.3107 - 1.5476$

$= \overline{1}.7631$ ½

$x = \text{antilog } \overline{1}.7631$

$= 0.5795$ ½ — 3

40

For completing the table1	½	
For completing the table2	½	
Plotting the points and drawing the line for equation 1	1	
Plotting the points and drawing the line for equation 2	1	
The solution is x = 2 and y = -5	1	4

41

Let Ramesh alone take x days to finish the work

Abdul alone will take x-6 days to finish the work ½

Ramesh's one days work = $\frac{1}{x}$

Abdul's one days work = $\frac{1}{x-6}$

Together they finish the work in 4 days ∴ Their one days work = $\frac{1}{4}$ ½

$\frac{1}{x} + \frac{1}{x-6} = \frac{1}{4}$ ½

$4(x-6) + 4x = x(x-6)$

$4x - 24 + 4x = x^2 - 6x$ ½

$x^2 - 14x + 24 = 0$ ½

$x = 2$ or $x = 12$ ½

x=2 is discarded since x has to be greater than 6 ½

∴ x = 12

Ramesh alone take 12 days to finish the work. ½ — 4

42

Heights	fi	xi	di	fidi
150-156	4	153	-12	-48
156-162	7	159	-6	-42
162-168	12	165	0	0
168-174	8	171	6	48
174-180	6	177	12	72
180-186	3	183	18	54
	$\Sigma f_i = 40$			$\Sigma f_i d_i = 84$

(½ mk for 3 correct entries in each of the 3 columns)

$\text{Mean} = a + \frac{\Sigma fidi}{\Sigma fi}$

$= 165 + \frac{84}{40}$ ½

$= 165 + 2.1$

Mean height is = 167.1cm ½ — 4

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GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM GOA 403521

SSC FINAL EXAM -PRACTICE QUESTION PAPER (2024 – 2025)

Subject : MATHEMATICS (E) – LEVEL 2 (Basic Mathematics)

Time : 3 hrs Std : X Max. Marks : 80

INSTRUCTIONS:

i) This question paper consists of **42** questions. All questions are compulsory.

ii) This question paper is divided into four Sections.-**A , B , C** and **D**.

iii) In **Section A**, Question Nos. **1 to 16** are multiple choice questions **(MCQs)** and Question Nos. **17 to 20** are very short answer type questions **(VSA)** carrying **1 mark** each.

iv) In **Section B**, Question Nos. **21 to 28** are short answer type I **(SA-I)** questions carrying **2 marks** each.

v) In **Section C**, Question Nos. **29 to 40** are short answer type II **(SA-II)** questions carrying **3 marks** each.

vi) In **Section D**, Question Nos. **41 and 42** 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 questions on constructions, the drawing should be clear and exactly as per given measurements. The construction lines and arcs should also be maintained.

ix) Graph page is provided on the answer booklet.

x) Logarithm and Antilogarithm tables are printed on the last pages of the question paper.

xi) 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 16:

1. The product of the zeroes of the quadratic polynomial $2x^2 - 6x - 9$ is:
   - $\frac{-9}{2}$
   - -3
   - 3
   - $\frac{9}{2}$

2. A pair of linear equations $a_1x + b_1y + c_1 = 0$; $a_2x + b_2y + c_2 = 0$ is said to be inconsistent, if:
   - $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
   - $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
   - $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
   - $\frac{a_1}{a_2} \neq \frac{c_1}{c_2}$

3.The solution of a pair of linear equations $2x + 3y = 1$ and $x - 3y = 5$ is:
   - $x = 2, y = -1$
   - $x = -2, y = 1$
   - $x = 1, y = -2$
   - $x = -1, y = 2$

4. The roots of the quadratic equation $3x^2 - 2x + 6 = 0$ are :

- rational and unequal
- irrational and unequal
- rational and equal
- non real

5. In an AP, if a = 17, d = -5 and a_n = -13 then the value of n is:

- 5
- 6
- 7
- 8

6. A 15m high tower casts a shadow 24m long at a certain time and at the same time , a telephone pole casts a shadow 16m long. Therefore the height of the telephone pole is:

- 10m
- 12m
- 22.5m
- 25.6m

7.If sin $2\theta = \frac{\sqrt{3}}{2}$, then the value of θ is :

- 30°
- 45°
- 60°
- 90°

8. The value of $\frac{sin^2 72^\circ}{cos^2 18}$ is:

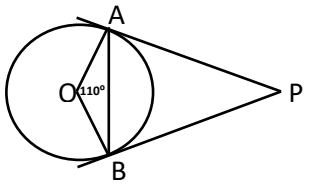
- 0
- 1
- 4
- 90

9. The simplified form of $\sqrt{1 - cos^2 B}$ is:

- sin B
- cos B
- $sin^2 B$
- $cos^2 B$

10. PA and PB are tangents from an external point P to a circle with centre O. If ∠AOB = 110°, then ∠PAB is:

- 35°
- 55°
- 70°
- 110°



11. The area of the sector of a circle of radius 9 cm that subtends an angle of 120° at the centre is:

- 3π cm²
- 9π cm²
- 27π cm²
- 54π cm²

12. The area of the circle that can be inscribed in a square of side 8 cm is:

- 4π cm²
- 8π cm²
- 16π cm²
- 64π cm²

13. If the lateral surface area of a cube is 324 cm², then its total surface area is:

- 9 cm^2
- 81 cm^2
- 405 cm^2
- 486 cm^2

14. The curved surface area of a hemispherical bowl of radius 3.5 cm is: (Take $\pi = \frac{22}{7}$)

- 22 cm^2
- 33 cm^2
- 44 cm^2
- 77 cm^2

15. If a dice is thrown once then probability of getting an odd number on it's top face is:

- $\frac{1}{3}$
- $\frac{1}{2}$
- $\frac{2}{3}$
- 1

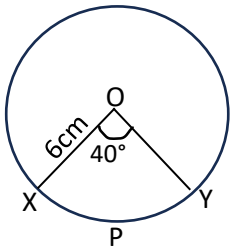
16. The value of $\log_3 729$ is:

- 3
- 6
- 9
- 27

17. Find the zeroes of the quadratic polynomial x^2 - 9

18. If $3x$ + 2y = 16 and $2x$ + 3y = 19, then find the value of x + y.

19. In the figure given below, XPY is an arc of a circle with centre O and radius 6 cm. If $\angle$ XOY = 40° and point P lies on arc XY, then Find the length of arc XPY.
(Do not substitute for π)



20. Cards numbered from 1 to 30 are put in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the number on the card drawn is a multiple of 3 or 5.

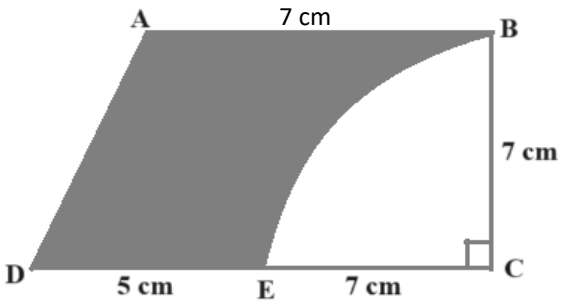
Section B (2 marks each)

21. Without actually performing the long division, show that the rational number $\frac{23}{250}$ has terminating decimal expansion. Also find its decimal expansion.

OR

Find the LCM of 294 and 420 by prime factorisation method.

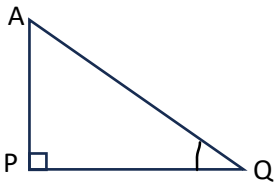
22. In the trapezium ABCD, AB ‖ CD, AB = 7 cm, CD = 12 cm, DE = 5 cm, $\angle$C = 90°. A quadrant BCE is cut from it.
Find the area of the remaining shaded part.
(Take $\pi = \frac{22}{7}$)



23. Find the mode of the following distribution table:

Class interval	Frequency
10 - 14	3
14 - 18	6
18 - 22	8
22 - 26	14
26 - 30	4

24. In ΔAPQ, ∠ APQ = 90° and tan Q = $\frac{7}{24}$
Find the length of AQ and the value of cosec A.



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

$$3\sin^2 30° + \frac{2}{1+sec^2 45°}$$

26. If ΔABC ~ ΔPQR, ar (ABC) = 144 cm², ar (PQR) = 81 cm² and QR = 27 cm, then find the length of BC.

27. Find the distance between the points A (-2, 5) and B (7, -1).

OR

Find the coordinates of the midpoint of the join of the points P (7, -3) and Q (-5, -1)

28. If the area of a ΔPNG formed by points P (6, 2), N (k, 4) and G (4, -3) is 24.5 sq. units, then find the value of k.

. **Section C (3 marks each)**

29. Divide the polynomial $2x^3 - 7x^2 + 7x$ - 9 by the polynomial $2x - 1$ and find the quotient and remainder. Hence write the result in the form: Dividend = Divisor × Quotient + Remainder.

30. Find the solution of the pair of linear equations $7x$ - 2y = 20 and $4x$ + 3y = -1 by elimination method.

OR

Find the solution of the pair of linear equations $5x$ + y = 14 and $3x - 7$y = 16 by substitution method.

31. Find the roots of the quadratic equation $4x^2$ - $17x + 15 = 0$ by factorisation Method.

32. Find the roots of the quadratic equation $6x^2$ - $11x$ - 7 = 0 by using the quadratic Formula.

33. Find the 15^{th} term and the sum of first 51 terms of the AP : -30, -23, -16, -9, -2, …

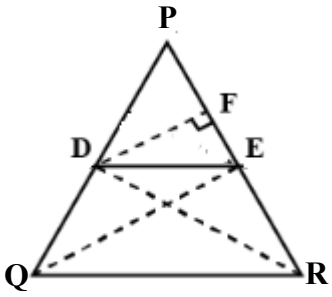
34. Evaluate the following expression by using the logarithm method.

$$\frac{(17.64)^2 \times 0.0486}{0.9642}$$

35. Draw line segment RS of length 6.7cm. Taking R as centre and radius 2.5 cm draw a circle. Using a pair of compasses and ruler, construct two tangents SP and SQ to the circle. Measure and state the length of the tangent segments.

36. Using a pair of compasses and ruler, construct ΔXYZ with sides YZ = 6.8cm, XY = 7cm and XZ = 5.5 cm. Then construct ΔX′YZ′ whose sides are $\frac{4}{3}$ of the corresponding sides of ΔXYZ.

37. With reference to the given figure and the given conditions, write only the proof with reasons of the following theorem :

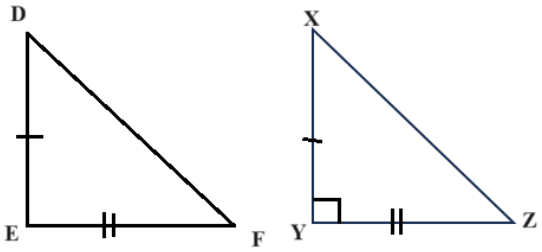


Given: In ΔPQR , DE ∥ QR where the points D and E lie on PQ and PR respectively and DF ⊥ PR.

Prove that : $\frac{PD}{DQ} = \frac{PE}{ER}$

OR

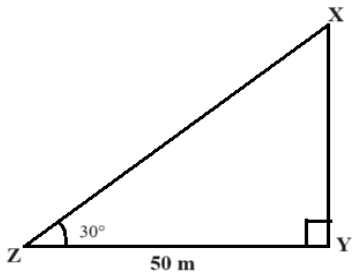
With reference to the given figure and the given conditions, write only the proof with reasons of the following theorem :



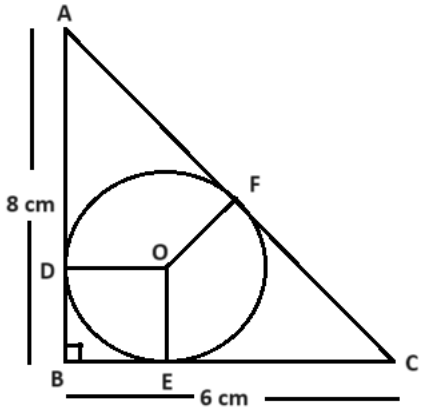
Given : In ΔDEF, $DE^2 + EF^2 = DF^2$ and ΔXYZ is constructed such that DE = XY and EF = YZ, ∠Y = 90°

Prove that : ΔDEF is a right triangle.

38. The angle of elevation of the top 'X' of a building 'XY' from a point Z at a distance of 50 m from its foot on a horizontal plane is 30°. Find the height of the building. (Take $\sqrt{3} = 1.73$)



39. ABC is a right triangle, right angled at B. A circle is inscribed in it. The lengths of the two sides containing the right angle are 6 cm and 8 cm. find the radius of the circle



40. A solid metallic right circular cone of height 50 cm and radius of the base 21 cm is melted and recast into solid cylinders each of height 10 cm and radius 3.5 cm. Find the number of such cylinders formed.

Section D (4 marks each)

41. The following table shows the weekly pocket money of 80 students of a class.

Weekly pocket money (in ₹) (C.I)	Number of workers (f_i)	x_i	$f_i\, x_i$
15 - 25	12	_____	_____
25 - 35	14	_____	_____
35 - 45	21	_____	_____
45 - 55	16	_____	_____
55 - 65	9	_____	_____
65 - 75	8	_____	_____
Total	$\Sigma f_i = 80$		$\Sigma f_i x_i$ = ___

Rewrite and complete the table and find the mean weekly pocket money by the Direct Method.

42. Find the solution of the following pair of linear equations graphically:

$2x - y = 10$ and $x + 3y = -2$

$2x - y = 10$

x			
y			

$x + 3y = -2$

x			
y			

(Plot at least 3 points for each line on a graph paper.)

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SSC PRACTICE PAPER

Mathematics (E) Level 2 – Basic Mathematics

Model Answers and Marking Scheme

Note: Any alternative method unless otherwise specified should be considered for full credit

	Section A	
1	$\frac{-9}{2}$	1
2	$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	1
3	x = 2, y = - 1	1
4	Non real	1
5	7	1
6	10m	1
7	30°	1
8	1	1
9	sin B	1
10	55°	1
11	27π cm²	1
12	16π cm²	1
13	486 cm²	1
14	77 cm²	1
15	$\frac{1}{2}$	1
16	6	1
17	$x^2 - 9$ $= (x - 3)(x + 3)$ The value of the polynomial $x^2 - 9$ is zero when $(x - 3) = 0$ or $(x + 3) = 0$ $\therefore x = 3$ or $x = -3$ $\therefore$ the zeroes are 3 and -3	½ ½ 1
18	$3x + 2y = 16$ $2x + 3y = 19$ $5x + 5y = 35$ $\therefore\ x + y = 7$	 ½ ½ 1
19	Length of arc $= \frac{\theta}{360} \times 2\pi r$ $= \frac{40}{360} \times 2\pi \times 6$ $= \frac{4\pi}{3}$ cm	 ½ ½ 1
20	P(E) $= \frac{14}{30}$ $= \frac{7}{15}$	½ ½ 1

	Section B	
21	$\begin{array}{r\|l} 2 & 250 \\ \hline 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$ $\frac{23}{250} = \frac{23}{2 \times 5^3}$ $\therefore \frac{23}{250}$ has a terminating decimal expansion $\frac{23}{250} = \frac{23}{2 \times 5^3}$ $= \frac{23 \times 2^2}{2^3 \times 5^3}$ $= \frac{92}{1000}$ $= 0.092$ **OR** $\begin{array}{r\|l} 2 & 294 \\ \hline 3 & 147 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$ $\begin{array}{r\|l} 2 & 420 \\ \hline 2 & 210 \\ \hline 3 & 105 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$ $294 = 2 \times 3 \times 7^2$ $420 = 2^2 \times 3 \times 5 \times 7$ LCM $= 2^2 \times 3 \times 5 \times 7^2$ $= 2940$	½ ½ ½ ½ 2 ½ ½ ½ ½ 2
22	Area of trapezium $= \frac{1}{2} \times$ (sum of parallel sides) $\times$ height $= \frac{1}{2} \times (12 + 7) \times 7$ $= \frac{1}{2} \times 19 \times 7$ $= 66.5 \text{ cm}^2$ Area of quadrant $= \frac{1}{4} \pi r^2$ $= \frac{1}{4} \times \frac{22}{7} \times 7 \times 7$ $= 38.5 \text{ cm}^2$ Area of the shaded region $= 66.5 - 38.5$ $= 28 \text{ cm}^2$	½ ½ ½ ½ 2

23	$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ $= 22 + \left(\frac{14-8}{2(14)-8-4}\right) \times 4$ $= 22 + \frac{6}{16} \times 4$ $= 23.5$	½ ½ + ½ ½ 2
24	$AQ^2 = (7k)^2 + (24k)^2$ $= 49k^2 + 576k^2$ $= 625k^2$ $AQ = 25k$ $\text{cosec } A = \frac{25k}{24k} = \frac{25}{24}$	½ ½ ½ +½ 2
25	$3\sin^2 30° + \frac{2}{1+sec^2 45°}$ $= 3\left(\frac{1}{2}\right)^2 + \frac{2}{1+(\sqrt{2})^2}$ $= \frac{3}{4} + \frac{2}{3}$ $= \frac{17}{12}$	½ + ½ ½ ½ 2
26	$\frac{ar(ABC)}{ar(PQR)} = \left(\frac{BC}{QR}\right)^2$ $\frac{144}{81} = \left(\frac{BC}{27}\right)^2$ $\frac{12}{9} = \frac{BC}{27}$ $BC = \frac{27 \times 12}{9}$ $BC = 36$ cm	½ ½ ½ ½ 2
27	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(7-(-2))^2 + (-1-5)^2}$ $= \sqrt{81 + 36}$ $= \sqrt{117}$ $= 3\sqrt{13}$ units **OR** $x = \frac{7-5}{2}$ $y = \frac{-3-1}{2}$ $x = 1$ $y = -2$ ∴ The coordinates of the midpoint are (1, -2)	½ ½ ½ ½ 2 ½ + ½ ½ ½ 2
28	$½[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)] = 24.5$ ∴ $[6(4 + 3) + k(-3 - 2) + 4(2 - 4) = 24.5 \times 2$ ∴ $42 - 5k - 8 = 49$ ∴ $-5k + 34 = 49$ ∴ $-5k = 15$ ∴ $k = -3$	½ ½ ½ ½ 2

	Section C	
29	$x^2 - 3x + 2$ $2x - 1 \overline{)\ 2x^3 - 7x^2 + 7x - 9}$ $2x^3 - x^2$ ½ $- \quad +$ $- 6x^2 + 7x - 9$ $- 6x^2 + 3x$ ½ $+ \quad -$ $4x - 9$ $4x - 2$ ½ $- \quad +$ $- 7$ Q = $x^2 - 3x + 2$ ½ R = - 7 ½ $2x^3 - 7x^2 + 7x - 9 = (2x - 1)(x^2 - 3x + 2) + (-7)$ ½	3
30	$7x - 2y = 20$----------(1) $4x + 3y = -1$----------(2) $28x - 8y = 80$----------(3) ½ $28x + 21y = -7$----------(4) ½ $- \quad - \quad +$ $- 29y = 87$ $y = -3$ ½ substituting the value of y in equation (1) we get $7x - 2(-3) = 20$ ½ $\therefore 7x + 6 = 20$ $\therefore 7x = 14$ $\therefore x = 2$ ½ The solution is $x = 2$ and y = -3 ½ OR y = 14 - 5x----------(1) ½ Substituting the value of y in equation (2) we get $3x - 7y = 16$----------(2) $3x - 7(14 - 5x) = 16$ ½ $3x - 98 + 35x = 16$ $3x + 35x = 16 + 98$ $38x = 114$ $x = 3$ ½ From (1) y = 14 -5(3) ½ y = 14 – 15 y = -1 ½ $\therefore$ The solution is $x = 3$, y = -1 ½	3 3

31	$4x^2 - 17x + 15 = 0$ $4x^2 - 12x - 5x + 15 = 0$ $4x(x-3) - 5(x-3) = 0$ $(x-3)(4x-5) = 0$ $(x-3) = 0$ or $(4x-5) = 0$ $x = 3$ or $x = \frac{5}{4}$ ∴ The roots are 3 and $\frac{5}{4}$	½ ½ ½ ½ ½ ½ 3
32	$D = b^2 - 4ac$ $= (-11)^2 - 4 \times 6 \times -7$ $= 121 + 168$ $= 289$ $x = \frac{-b \pm \sqrt{D}}{2a}$ $= \frac{11 \pm \sqrt{289}}{2\times6}$ $= \frac{11 \pm 17}{12}$ $x = \frac{11+17}{12}$ *or* $x = \frac{11-17}{12}$ $x = \frac{28}{12}$ or $x = \frac{-6}{12}$ $x = \frac{7}{3}$ *or* $x = \frac{-1}{2}$ ∴ The roots are $\frac{7}{3}$ *and* $\frac{-1}{2}$	½ ½ ½ ½ ½ ½ 3
33	$a = -30$ $d = -23 - (-30) = 7$ $a_{15} = -30 + (15-1) \times 7$ $= -30 + 98$ $= 68$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $= \frac{51}{2}[2(-30) + (51-1) \times 7]$ $= \frac{51}{2}[-60 + 350]$ $= \frac{51}{2} \times 290$ $= 7395$	½ ½ ½ ½ ½ ½ 3
34	Let $x = \frac{(17.64)^2 \times 0.0486}{0.9642}$ $\log x = 2\log 17.64 + \log 0.0486 - \log 0.9642$ $= 2 \times 1.2465 + \bar{2}.6866 - \bar{1}.9842$ $= 2.4930 + \bar{2}.6866 - \bar{1}.9842$ $= 1.1954$ x = antilog 1.1954 $= 15.68$	½ ½+½+½ ½ ½ 3

35	To draw a line segment RS = 6.7 cm To draw a circle with centre R and radius 2.5 cm To construct the perpendicular bisector of line segment RS To mark the points P and Q on the circle To draw the tangent segments from the point S To measure and write the length of the tangent segments. SP = SQ = 6.2 $\pm$ 0.1	½ ½ ½ ½ ½ ½ 3
36	To construct Δ XYZ with the given data To draw a ray making an acute angle with side YZ. To locate 4 points on the ray using a pair of compasses To join $Y_4Z' \parallel Y_3Z$ and $Z'X' \parallel ZX$ Δ X'YZ' is the required triangle.	1 ½ ½ ½ + ½ 3
37	(i) $\frac{Ar(\Delta PDE)}{Ar(\Delta RDE)} = \frac{½ \times PE \times DF}{½ \times ER \times DF}$ Area of $\Delta = ½ \times b \times h$ (ii) $\frac{Ar(\Delta PDE)}{Ar(\Delta RDE)} = \frac{PE}{ER}$ (iii) Similarly $\frac{Ar(\Delta PDE)}{Ar(\Delta QDE)} = \frac{PD}{DQ}$ (iv) Ar(ΔRDE) = Ar(ΔQDE) Triangles having same base DE and lying between the same parallels DE and QR (v) $\frac{Ar(\Delta PDE)}{Ar(\Delta RDE)} = \frac{Ar(\Delta PDE)}{Ar(\Delta QDE)}$ from (ii), (iii) and (iv) (vi) $\frac{PE}{ER} = \frac{PD}{DQ}$ OR (i) $XY^2 + YZ^2 = XZ^2$ Pythagoras theorem (ii) $DE^2 + EF^2 = DF^2$ Given (iii) $XY^2 + YZ^2 = DF^2$ DE = XY and EF = YZ (iv) $XZ^2 = DF^2$ from(i) and(iii) (v) XZ = DF (vi) DE = XY and EF = YZ Given (vii) XZ = DF Step (v) (viii) ΔDEF ≅ ΔXYZ SSS congruence rule (ix) ∠E = ∠Y CPCT (x) ∠Y = 90° Given (xi) ∠E = 90° (xii) ΔDEF is a right triangle.	½ ½ ½ ½ + ½ ½ 3 ½ ½ ½ ½ ½ 3
38	$\tan 30° = \frac{XY}{YZ}$ $\frac{1}{\sqrt{3}} = \frac{XY}{50}$ $\sqrt{3}$ XY = 50 XY = $\frac{50}{\sqrt{3}}$ XY = $\frac{50\sqrt{3}}{3}$	½ ½ ½

	$XY = \frac{50 \times 1.73}{3}$ $XY = 28.83$ ∴ the height of the building is 28.83 m	½ ½ ½ 3
39	Let OD = OE = OF = r Since the tangents to a circle from an external point are equal AF = AD = (8 – r) cm and CF = CE = (6 – r) cm ∴ AC = AF + CF = (8 – r) + (6 – r) = 14 – 2r $AC^2 = AB^2 + BC^2$ $AC^2 = 8^2 + 6^2$ $AC^2 = 64 + 36$ $AC^2 = 100$ ∴ AC = 10 ∴ $14 - 2r = 10$ 2r = 4 r = 2 ∴ The radius of the circle is 2 cm	½ ½ ½ ½ ½ ½ 3
40	Let the number of cylindrical pieces be n $n = \frac{Volume\ of\ Cone}{Volume\ of\ each\ Cylinder}$ $= \frac{\frac{1}{3}\pi R^2 H}{\pi r^2 h}$ $= \frac{\frac{1}{3} \times 21 \times 21 \times 50}{3.5 \times 3.5 \times 10}$ = 60 ∴ the number of cylinders formed is 60	½ ½ + ½ ½ + ½ ½ 3
	Section D	
41		

Weekly pocket money (in ₹) C. I.	Number of students f_i	x_i	$f_i x_i$
15 – 25	12	20	240
25 - 35	14	30	420
35 - 45	21	40	840
45 - 55	16	50	800
55 - 65	9	60	540
65 - 75	8	70	560
	$\Sigma f_i = 80$		$\Sigma f_i x_i = 3400$

½ each for x_i and $f_i x_i$ columns

Mean = $\frac{3400}{80}$ ½

= 42.5 ½

4

42	For completing both tables For plotting the points of each line correctly Drawing lines for each equation Solution is $x = 4$, y = -2	½ + ½ ½ + ½ ½ + ½ 1 4
	THE END	