

Model Question Paper
Mathematics(2026-27)
Class10+2

Time:3Hrs

MM:80

Special Instructions:-

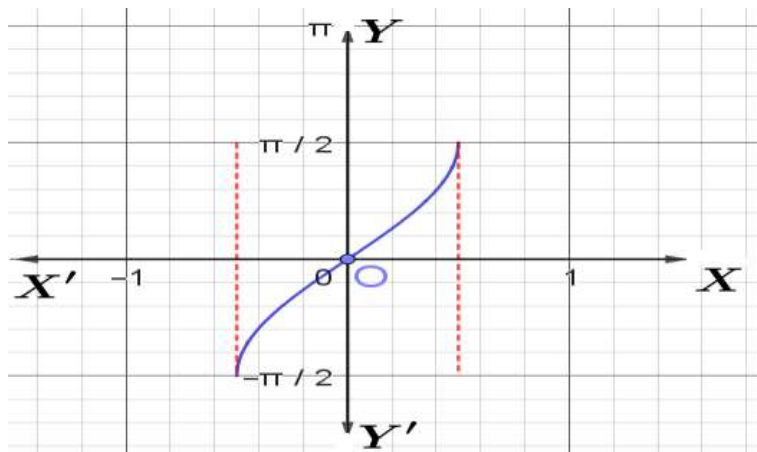
1. This Question Paper contains 5 sections A,B,C,D & E .Each section compulsory.
2. Section A has16 MCQ's of 1 marks each.
3. Section B has 2 Assertion/Reason based questions of 2 marks each i.e.Q.17 to Q. 18 and 6 Very Short answer questions of 3 marks each i.e.Q.19 to Q. 24.
4. Section C has1shortanswerquestionsof 2marks sub parts each and 3 short answer questions of 4 marks each i.e.Q.25 to Q.28.
5. Section D has 4 Long answer questions of 5marks each i.e.Q.29 to Q.32.
6. Section E has 1 short answer questions of 6 marks of case based study i.e.Q.33.

Note: - Question no. 17, 18 are Assertion/Reason based questions and
 Question no. 33 is Case based Study question.

Section–A

- Q1. Let $A = \{1,2,3\}$. Then number of relations containing (1,2) &(1,3) which are reflexive is symmetric but not transitive is
 (a) 1 (b) 2 (c) 3 (d) 4 1
- Q2. Principal value of $\cos^{-1}(-1/2)$ is(a) $\pi/4$ (b) $-\pi/4$ (c) $3\pi/4$ (d) $-3\pi/4$ 1
- Q3. Assume X,Y,Z,W and P are the matrices of order $2 \times n$, $3 \times k$, $2 \times p$, $n \times 3$ and $p \times k$ respectively. The restriction on n,k and p so that $PY + WY$ will be define are :
 (a) $K=3, p=n$ (b) K is arbitrary $n=2$
 (c) P is arbitrary , $k=3$ (d) $K=2, p=3$ 1
- Q4. Matrices A & B will be inverse of each other only if
 (a) $AB=BA$ (b) $AB=BA=0$ (c) $AB \neq BA$ (d) $AB=BA = I$ 1
- Q5. $\frac{d}{dx} (\text{Cosec}^{-1} x) = ?$, for $|X| > 1$
 (a) $\frac{1}{\sqrt{1+x^2}}$ (b) $\frac{-1}{|x|\sqrt{x^2-1}}$ (c) $\frac{-1}{|x|\sqrt{1+x^2}}$ (d) None of these. 1
- Q6. If I be the interval contained in the domain of a real valued function 'f' .Then f is said to be strictly increasing on I if $x_1 < x_2$ for all $x_1, x_2 \in I$
 (a) $f(x_1) < f(x_2)$ (b) $f(x_1) > f(x_2)$ (c) $f(x_1) \leq f(x_2)$ (d) $f(x_1) \geq f(x_2)$. 1
- Q7. $\int \frac{1}{(x^2-9)} dx =$
 (a) $\frac{1}{3} \tan^{-1}(\frac{x}{3}) + c$ (b) $\frac{1}{6} \log \left| \frac{x-3}{x+3} \right| + c$ (c) $\frac{1}{6} \log \left| \frac{x+3}{x-3} \right| + c$ (d) $\sin^{-1}(\frac{x}{3}) + c$. 1
- Q8. Degree of the differential equation $(\frac{d^2y}{dx^2})^2 + (\frac{dy}{dx})^3 + \sin(\frac{dy}{dx}) + 1 = 0$
 (a) 3 (b) 6 (c) 0 (d) not defined. 1

- Q9. The number of arbitrary constants in the general solution of differential equation of Fourth order are
 (a) 0 (b) 2 (c) 3 (d) 4 1
- Q10. Function $f(x) = x^2 + 2x - 5$ is increasing on interval.
 (a) $(1, \infty)$ (b) $(-1, \infty)$ (c) $(0, \infty)$ (d) $(-\infty, 0)$. 1
- Q11. Projection of the vector $i - j$ on the vector $i + j$ is
 (a) 0 (b) 1 (c) -1 (d) 2. 1
- Q12. . The direction cosines of the line joining the points $(-2, 3, 0)$ & $(3, 2, 1)$
 (a) $(1/\sqrt{3}, 1/\sqrt{3}, 1/\sqrt{3})$ (b) $(5/\sqrt{3}, (-1)/\sqrt{3}, 1/\sqrt{3})$
 (c) $(1/\sqrt{3}, (-1)/\sqrt{3}, 1/\sqrt{3})$ (d) $(1/6, 1/\sqrt{3}, 1/6)$ 1
- Q.13 Identify the function shown in the graph



- (A) $\sin^{-1}x$ (B) $\cos^{-1}x$ (C) $\tan^{-1}x$ (D) $\cot^{-1}x$ 1
- Q.14 Find the vector product of the vectors $a = 2\hat{i} + 4\hat{j}$ and $b = 3\hat{i} - \hat{j} + 2\hat{k}$
 a) $\hat{i} - 19\hat{j} - 4\hat{k}$ b) $3\hat{i} + 19\hat{j} - 14\hat{k}$
 c) $3\hat{i} - 19\hat{j} - 14\hat{k}$ d) $3\hat{i} + 5\hat{j} + 4\hat{k}$ 1
- Q. 15 Two events A and B are said to be independent , if :
 a) A and B are mutually exclusive. b) $P(A'B') = (1 - P(A))(1 - P(B))$
 c) $P(A) = P(B)$ d) $P(A) + P(B) = 1$ 1
- Q.16 If $P(A) = 0.8$, $P(B) = 0.5$ and $P(B|A) = 0.4$, what is the value of $P(A \cap B)$?
 a) . 0.32 b). 0.25 c). 0.1 d) . 0.5 1

SECTION –B

Choose the correct answer out of the following from Q.17 - Q18.

- (a) Both Assertion (a) & Reason (R) are correct, & R is the correct explanation of A.
- (b) Both A & R are correct, but R is not correct explanation of A.
- (c) A is correct, but R is incorrect.
- (d) A is incorrect, but R is correct.

Q.17 Assertion (A): The vector equation of the line passing through the points $(6, -4, 5)$ and $(3, 4, 1)$ is $\vec{r} = (6\hat{i} - 4\hat{j} + 5\hat{k}) + \lambda(-3\hat{i} + 8\hat{j} + 4\hat{k})$

Reason (R): The vector equation of the line passing through the points $\vec{a}$ and $\vec{b}$ is $\vec{r} = \vec{a} + \lambda(\vec{b} - \vec{a})$

Q.18 Assertion: $\int_{-\pi/2}^{\pi/2} \sin^3 x \, dx = 0$

Reason: $\sin^3 x$ is an odd function.

Q.19 Let L be the set of all lines in a plane and R be the relation in L defined as $R = \{(L_1, L_2) : L_1 \text{ is perpendicular to } L_2\}$. Show that R is symmetric but neither reflexive nor transitive.

Q.20 Check whether the following points are collinear $(a, b+c)$, $(b, c+a)$, $(c, a+b)$ if $a=1, b=2$ and $c=3$.

Q.21 Find dy/dx in the following:

$$y = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right), 0 < x < 1$$

OR

Find the value of 'k' so that the function f is continuous at indicated points

$$f(x) = \begin{cases} kx + 1, & x \leq \pi \\ \cos x, & x > \pi \end{cases} \quad \text{at } x = \pi$$

Q.22 Show that the given differential equation is homogeneous and solve it.

$$(x^2 - y^2) \, dx + 2xy \, dy = 0$$

Or

Find the general solution $\frac{dy}{dx} + 3y = e^{-2x}$

Q.23 Draw the graph of the curve and find the area of the region bounded by the ellipse

$$\frac{x^2}{16} + \frac{y^2}{9} = 1$$

Q.24 Evaluate the integral using properties of definite integrals

$$\int_0^{\pi/2} \frac{\cos^5 x}{\sin^5 x + \cos^5 x} \, dx$$

OR

Evaluate $\int_{-1}^1 \sin^5 x \cos^4 x \, dx$

Section –C

Q.25 Show that $\sin^{-1}(2x\sqrt{1-x^2}) = 2 \sin^{-1}x$, $-\frac{1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$.

Or

$$3\cos^{-1}x = \cos^{-1}(4x^3 - 3x), x \in \left[\frac{1}{2}, 1\right]$$

Q.26 A) If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} + 3\hat{k}$, $\vec{c} = \hat{i} - 2\hat{j} + \hat{k}$. Find $2\vec{a} - \vec{b} + 3\vec{c}$.

B) Find the interval for which the function is increasing or decreasing

$$F(x) = 10 - 6x - 2x^2$$

Q.27 Differentiate w.r.t. x $x = a \cos \theta$, $y = b \cos \theta$

Or

$$y = \log(\csc e^x)$$

Q.28 There are three coins. One is a two headed coin; another is a biased coin that comes up heads 75% of the time & third is an unbiased coin. One of the three coins is chosen at random & Tossed, it shows heads. what is the probability that it was the two headed coin?

Section – D

Q 29. The sum of three numbers is 2. If we multiply the first number by 2 and add the second number to it, we get 3. By adding the first and third numbers and then subtracting the second number we get 4. Represent it algebraically and find the numbers using matrix method.

Q30. Show that of all the rectangles inscribed in a given fixed circle, the square has the maximum area.

OR

A wire of length 28 m is to be cut into two pieces. One of the piece is to be made into square & the other into a circle. Where should be the wire be cut so that combined area is minimum.

Q31. Find the shortest distance between the pair of lines

$$\vec{r} = (\hat{i} + 2\hat{j} + \hat{k}) + \lambda(\hat{i} - \hat{j} + \hat{k})$$

$$\vec{r} = (2\hat{i} - \hat{j} - \hat{k}) + \mu(2\hat{i} + \hat{j} + 2\hat{k})$$

OR

Find the value of “k” so that the lines $\frac{(x-1)}{-3} = \frac{(y-2)}{2k} = \frac{(z-3)}{2}$

& $\frac{(x-1)}{3k} = \frac{(y-1)}{1} = \frac{(z-6)}{-5}$ are at right angle.

Q.32 Solve the LPP graphically:-

Maximize $z = 3x + 2y$

Subject to constraints

$$x + 2y \leq 10$$

$$3x + y \leq 15$$

$$x, y \geq 0.$$

SECTION – E (CASE BASED STUDY QUESTION)

Q.33 A coach is training 3 players. He observes that the player A can hit a target 4 times in 5 shots, player B can hit 3 times in 4 shots and the player C can hit 2 times in 3 shots

From this situation answer the following:

- Let the target is hit by A, B: the target is hit by B and, C: the target is hit by A and C. Then, the probability that A, B and, C all will hit, is
a. $\frac{4}{5}$ b. $\frac{3}{5}$ c. $\frac{2}{5}$ d. $\frac{1}{5}$ 2.
- Referring to (i), what is the probability that B, C will hit and A will lose?
a. $\frac{1}{10}$ b. $\frac{3}{10}$ c. $\frac{7}{10}$ d. $\frac{4}{10}$ 3.
- With reference to the events mentioned in (i), what is the probability that ‘any two of A, B and C will hit’?
a. $\frac{1}{30}$ b. $\frac{11}{30}$ c. $\frac{17}{30}$ d. $\frac{13}{30}$
- What is the probability that ‘none of them will hit the target’?
a. $\frac{1}{30}$ b. $\frac{1}{60}$ c. $\frac{1}{15}$ d. $\frac{2}{15}$
- What is the probability that at least one of A, B or C will hit the target?
a. $\frac{59}{60}$ b. $\frac{2}{5}$ c. $\frac{3}{5}$ d. $\frac{1}{60}$

Or

Two farmers Ram kishan and Gurcharan Singh cultivates only three varieties of rice namely Basmati, Permal and Naura. The sale (in Rupees) of these varieties of rice by both the farmers in the month of September and October are given by the following matrices A and B.

(September sales in Rupees)

$$A = \begin{bmatrix} \text{BASMATI} & \text{PERMAL} & \text{NAURA} \\ 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{bmatrix} \begin{cases} \text{RAMKRISHAN} \\ \text{GURCHARAN SINGH} \end{cases}$$

(October sales in Rupees)

$$B = \begin{bmatrix} \text{BASMATI} & \text{PERMAL} & \text{NAURA} \\ 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix} \begin{cases} \text{RAMKRISHAN} \\ \text{GURCHARAN SINGH} \end{cases}$$

- Find the combined sales in September and October for each farmer in each variety.
- Find the decrease in sales from September to October.
- If both farmers receive 2% profit on gross sales, compute the profit for each farmer and for each variety sold in October.

Distribution of Marks 10+2 Mathematics (Session 2026-27)

Chapter-1:	Relation and Functions	(1+3=4)
Chapter-2:	Inverse Trigonometric functions	(1+1+4(c)=6)
Chapter-3:	Matrices	(1+1+6=8)
Chapter-4:	Determinants	(3+5=8)
Chapter-5:	Continuity and Differentiability	(1+3©+4©=8)
Chapter-6:	Application of Derivatives	(1+1+2+5© =9)
Chapter-7:	Integrals	(1+2+ 3©=6)
Chapter-8:	Applications of Integrals	(3)
Chapter-9:	Differential Equations	(1+1+3©=5)
Chapter-10:	Vector Algebra	(1+1+2=4)
Chapter-11:	Three Dimensional Geometry	(1+2+5© =8)
Chapter-12:	Linear Programming	(5)
Chapter-13:	Probability	(1+1+4© =6)

Format of Design (Subject other than language)

Question Paper /Test

Subject: MATHEMATICS
Unit/Paper: Model Question Paper
Class: 10+2
Time: 3hours
Marks: 80 (MM)

Weightage to Objective

Objective	Knowledge	Understand	Application	Analyse	Evaluation	Creation	Total
Percentage of Marks	13.75	33.75	13.75	7.50	6.25	25	100
Marks	11	27	11	6	5	20	80

Weightage to form of question:

Forms of Questions	E/LA	SA	VSA	O (MCQ)	Total
No. Of Questions	4	10	4	16	33 (2 SUB PARTS OF 1 QUESTION)
Marks allotted	20	35	9	16	80
Estimated time	48 min.	70 min.	14 min.	48 min.	180 min.

Weightage to Major Content Areas:

S. No.	Unit/Sub-Units	Marks
1.	RELATIONS AND FUNCTIONS	9
2.	ALGEBRA	16
3.	CALCULUS	31
4.	VECTORS AND THREE DIMENSIONAL GEOMETRY	12
5.	LINEAR PROGRAMMING	05
6.	PROBABILITY	06

I Schemes of Sections Section A, Section B, Section C, Section D, Section E.

Pattern of Options Internal choices ('OR' questions) provided within specific items across Sections A, B, C, D, and E. Single choice option matching must be strictly followed.

Estimated difficulty level:	Difficult	28.8 % (23 MARKS)
	Average	40 % (32 MARKS)
	Easy	31.2 % (25 MARKS)

Index of Abbreviations:

(E/LA: Essay/Long Answer; SA: Short Answer; VSA: Very Short Answer; O: Objective

Proforma for Analysing Question Papers

Part I: General Information

- | | |
|---------------------------|----------------------|
| 1. Name of Examination: | Model Question Paper |
| 2. Year of Examination: | 2026-27 |
| 3. Class: | 10+2 |
| 4. Subject: | MATHEMATICS |
| 5. Question Paper Number: | |
| 6. Maximum Marks: | 80 |
| 7. Time Allotted: | 3 Hours |
| 8. Sections, if any: | A, B, C, D, E |

Part -II (A): General Item General Analysis of Question of a Question Paper.

S. no	Objective	Specification	Content	Unit/ Sub- Unit No.	Form of Question	Marks Allotted	Estimated time (min)	Estimated Difficulty Level
1	Understanding	Chp.1	Relation and Function	1	MCQ	1	3	Easy
2	Knowledge	Chp.2	Inverse trigonometric function	1	MCQ	1	3	Easy
3	Application	Chp.3	Matrices	2	MCQ	1	3	Medium
4	Knowledge	Chp.3	Matrices	2	MCQ	1	3	Easy
5	Knowledge	Chp.4	Continuity and Differentiability	3	MCQ	1	3	Easy
6	Knowledge	Chp.6	Application of Derivatives	3	MCQ	1	3	Medium
7	Application	Chp.7	Integrals	3	MCQ	1	3	Medium
8	Knowledge	Chp.9	Differential Equations	3	MCQ	1	3	Easy
9	Knowledge	Chp.9	Differential Equations	3	MCQ	1	3	Easy
10	Knowledge	Chp.6	Application of Derivatives	3	MCQ	1	3	Easy
11	Knowledge	Chp.10	Vector Algebra	4	MCQ	1	3	Easy
12	Knowledge	Chp.11	Three Dimensional Geometry	4	MCQ	1	3	Easy
13	Knowledge/ Analysis	Chp. 2 Graphical	Inverse trigonometric function	1	MCQ	1	3	Difficult

14	Understanding	Chp.10	Vector Algebra	4	MCQ	1	3	Easy
15	Knowledge	Chp.13	Probability	6	MCQ	1	3	Medium
16	Application	Chp.13	Probability	6	MCQ	1	3	Medium
17	Creation	Chp.10 (Assertion/ Reason)	Vector Algebra	4	Very Short Answer	2	4	Medium
18	Evaluation	Chp.7 (Assertion/ Reason)	Integrals	3	Very Short Answer	2	4	Medium
19	Understanding	Chp.1	Relation and Function	1	Short Answer	3	7	Medium
20	Understanding	Chp.4	Determinants	2	Short Answer	3	7	Medium
21	Application	Chp.5	Continuity and Differentiability	3	Very Short Answer	3	4	Medium
22	Application	Chp.9	Differential Equations	3	Short Answer	3	7	Medium
23	Creation	Chp.8	Applications of Integrals	3	Short Answer	3	7	Difficult
24	Evaluation	Chp.7	Integrals	3	Short Answer	3	7	Medium
25	Understanding	Chp.2	Inverse trigonometric function	1	Short Answer	4	7	Easy
26 (A)	Understanding	Chp.10 Sub part	Vector Algebra	4	Very Short Answer	2	2	Easy
26 (B)	Application	Chp.6 Sub part	Application of Derivatives	3	Short Answer	2	7	Medium
27	Understanding	Chp.5	Continuity and Differentiability	3	Short Answer	4	7	Easy
28	understanding	Chp.13	Probability	6	Short Answer	4	7	Difficult
29	Creation	Chp.4	Determinants	2	Long Answer	5	12	Difficult
30	Creation	Chp.6	Application of Derivatives	3	Long Answer	5	12	Difficult
31	Understanding	Chp.11	Three Dimensional Geometry	4	Long Answer	5	12	Easy
32	Creation	Chp.12	Linear Programming	5	Long Answer	5	12	Difficult
33	Analysis	Chp.3 (case based study) (3 sub parts)	Matrices	2	Short Answer	6	7	Medium

S.No	Objective	Knowledge				Understanding				Application				Analysis				Evaluation				Creation				Total Row W
	Form of Questions																									
	Content Unit/ Sub Unit	E/LA	SA	VSA	O	E/LA	SA	VS A	O	E/ LA	SA	VSA	O	E/LA	SA	VSA	O	E/LA	SA	VSA	O					
1	Unit – I Relations and Functions	0	0	0	2	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	(5) 9				
2	Unit – II Algebra	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	(5) 16				
3	Unit – III Calculus	0	0	0	5	0	1	0	0	0	2	1	1	0	0	1	0	1	1	0	0	(14) 31				
4	Unit – IV Vectors and Three Dimensional Geometry	0	0	0	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	(6) 12				
5	Unit – V Linear Programming Problems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(1) 5				
6	Unit – VI Probability	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	(3) 6				
	Sub Total	0	0	0	11	1	5	1	2	0	2	1	3	0	1	0	0	1	1	0	0	(2) SUB PAR (1) QUESTIC				
	Total Column	0(0)	0(0)	0(0)	11(11)	5(1)	18(5)	2(1)	2(2)	0(0)	5(2)	3(1)	3(3)	0(0)	6(1)	0(0)	0(0)	0(0)	3(1)	2(1)	0(0)	(2) SUB PAR (1) QUESTIC				
	Wise	11(Marks Total)				27(Marks Total)				11(Marks Total)				6(Marks Total)				5(Marks Total)				20(Marks Total)				80 (Marks Tot

Notes: Figures within brackets to indicate the number of questions and figures outside the brackets to indicate marks.

Denotes that marks have been combined to form one question.

Summary: Essay (E)

No. 4

Marks 20

Pattern of Options

Internal Choice, Sub Parts

Short Answer (SA)

No. 7

Marks 24

Very Short Answer (VSA)

No. 2

Marks 4

Scheme of Sections

A, B, C, D, E

Objective (O)

No. 12

Marks 12

Steps:

A) , 3)