SAMPLE QUESTION PAPER

CLASS XI (2025-26)

MATHEMATICS

Time Allowed: 3 hours   Maximum marks: 80

General Instructions:

• The Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
• Section A has 18 MCQ's and 2 Assertion-Reason based questions of 1 mark each.
• Section B has 5 Very Short Answer (VSA) type questions of 2 marks each.
• Section C has 6 Short (SA) type questions of 3 marks each.
• Section D has 4 Long Answer (LA) type questions of 5 marks each.
• Section E has 3 Source Based/Case Based questions of 4 marks each with sub parts.

SECTION- A
(Multiple Choice Questions)
Each question carries 1 mark

Q1   The number of non-empty subsets of the set $\{1,2,3\}$ is
(A)8   (B)9   (C)6   (D)7

Q2   The value of $\frac{\cos 15^\circ + \sin 15^\circ}{\cos 15^\circ - \sin 15^\circ}$ is

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{2}$ (D) 2

Q3   If $A = \{4,5,6\}$ and $B = \{6,7,8\}$,then which of these is not an element of $A \times B$?
(A)(4,6)   (B) (6,6)   (C) (4,4)   (D)(6,7)

Q4   Multiplicative Inverse of $\sqrt{-16}$ is

(A)$-i$ (B)i (C)$\frac{i}{4}$ (D)$\frac{-i}{4}$

Q5   If $^nC_3 = {}^nC_7$, then $^nP_2 =$
(A)45   (B)72   (C) 80   (D) 90

Q6   If the sum to infinity of the geometric progression
$1, \frac{1}{p}, \frac{1}{P^2} --- $ is $\frac{25}{4}$, then value of p is

(A)$\frac{25}{21}$ (B)$\frac{21}{25}$ (C)$\frac{4}{25}$ (D)$\frac{25}{4}$

Q7   If $A = (-1,3)$ and $B = (3,5)$,then $A \cap B$ is
(A) $(-1,5)$ (B) $(3,5)$ (C) $\{3\}$ (D) $\emptyset$

Q8   The number of terms in the expansion of $(x + 1)^n (x - 1)^n$ is
(A)n^2 (B)$2n + 2$ (C)$2n$ (D)$n + 1$

Q9   The number of words which can be formed from the letters of the word **MAXIMUM**, such that no two consonants occur together are
(A) 120   (B) 18   (C) 24   (D) 144

Q10   The inclination of a line $x + y - \sqrt{3} = 0$ with the positive direction of y- axis is :
(A)135°   (B) 45°   (C) 60°   (D) 120°

Q11   The length of a pendulum is 75 cm and its tip describes an arc of length 15 cm. The angle (in radian) through which the pendulum swings is

(A) $\frac{2}{15}$ (B) $\frac{1}{5}$ (C) $\frac{7}{25}$ (D)5

Q12   Seven persons are to be seated in a row. The probability that two particular persons sit next to each other is:

A) $\frac{1}{3}$ (B) $\frac{1}{6}$ (C) $\frac{2}{7}$ (D) $\frac{1}{2}$

Q13   If $\frac{x-3}{x-5} > 0$, then x belongs to

(A) $(-\infty, 3) \cup (5, \infty)$ (B) $(-\infty, 3] \cup [5, \infty)$
(C) $(-\infty, -3) \cup (-5, \infty)$ (D) $(3,5)$

Q14   If x and y be two positive real numbers , then $\left(x + \frac{1}{x}\right)\left(y + \frac{1}{y}\right)$ is greater than or equal to

A) 2   (B) 3   (C) 4   (D) 5

Q15   The image of the point (1,-2, 3) in the XZ plane is
          (A) (1, 2, 3)   (B) (-1, -2, 3)
          (C) (-1, 2, 3)   (D) (1, -2, -3)

Q16   Which of the following is a function from {1,2,3,4} to {a,b,c,d}?
(A){(1, a), (3, b), (4, c)}
(B) {(1, d), (2, c), (3, b), (4, b)}
(C) {(1, a), (2, b), (2, c), (4, d)}
(D) {(1, a), (2, b), (2, c), (4, e)}

Q17   The equation $2x^2 + 2y^2 - x = 0$ represents a circle with:
          (A) Centre $\left(-\frac{1}{4}, 0\right)$, Radius $= \frac{1}{4}$
          (B) Centre $\left(\frac{1}{4}, 0\right)$, Radius $= \frac{1}{4}$
          (C) Centre $\left(0, -\frac{1}{4}\right)$, Radius $= \frac{1}{4}$
          (D) Centre $\left(0, \frac{1}{4}\right)$, Radius $= \frac{1}{4}$

Q18   The mean of 100 observations is 50 and their standard deviation is 5. The sum of the squares of all the observations is:
          (A) 250500   (B) 250000
          (C) 252500   (D) 255000

Assertion-Reason Based Questions
In Q 19 and Q 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(A) Both (A) and (R) are true and (R) is the correct explanation of (A).
(B) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(C) (A) is true but (R) is false.
(D) (A) is false but (R) is true.

Q19   **Assertion (A)**: If $z_1 = 6 + 8i$ and $z_2 = -3 - 4i$ are two complex numbers, then
                    $|z_1 + z_2| = 5$.
          Reason (R): If z_1 and z_2 are any two complex numbers, then $|z_1 + z_2| = |z_1| + |z_2|$.

Q20   **Assertion (A)**: $\lim\limits_{x \to 0} \frac{\sin 2x^0}{2x}$ is equal to 1.

          Reason (R): $\lim \frac{\sin x}{x}$ is equal to 1.
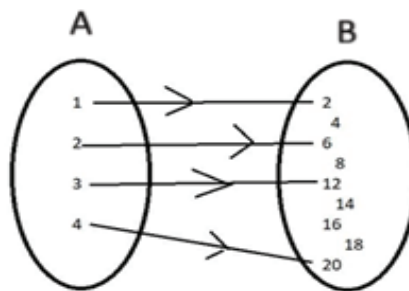
SECTION - B

This section comprises of Very Short Answer (VSA) type questions of 2 marks each.

Q21   Draw the graph of $f(x) = |x - 2|$.

<div align="center">OR</div>

From the given arrow diagram, write the relation in set-builder form.
Also find the range of the relation.

Q22   Solve for $x : |3 - x| \leq 4$

Q23   If $f(x) = \dfrac{x^2}{x \cos x - \sin x}$, then find $f'(x)$.

Q24   Find the coordinates of point(s) on y-axis which are at a distance of $5\sqrt{2}$ units from the point P(3, -2, 5).

Q25   If A and B are mutually exclusive events such that $P(A) = 0.37$ and $P(B) = 0.45$ then find $P(A^c \cap B^c)$.

<div align="center">OR</div>

Two students Riya and Diya appeared in a test. The probability that Riya will qualify the test is 0.17 and that Diya will qualify the test is 0.12. The probability that both will qualify the test is 0.09. Find the probability that at least one of them won't qualify the test.

SECTION - C

This section comprises of Short Answer (SA) type questions of 3 marks each.

Q26   Find the domain and range of the function $f(x) = \sqrt{x^2 - 1}$

<div align="center">OR</div>

Let T be a relation from R to R defined by $T = \{(a, b): a, b \in R$ such that $a \leqslant b^3\}$
Are the following statements true? Justify your answer in each case.
(i) $(a, b) \in T$ implies $(b, a) \in T$
(ii) $(a, b) \in T, (b, c) \in T$ implies $(a, c) \in T$

Q27   (a)Find the value of $\tan \frac{\pi}{8}$.

<div align="center">OR</div>

(b)Prove that:
$$\sin 3x + \sin 2x - \sin x = 4 \sin x \cos \frac{x}{2} \cos \frac{3x}{2}$$

Q28   On a football field, a player kicks the ball. The ball follows a parabolic path, eventually scoring a goal. The highest point of the ball's trajectory is taken as the origin (0, 0) and the final position of the ball as (8, -4).
       (i)   Draw the parabolic path and find its equation.
       (ii)   Determine the coordinates of the focus of the parabola.

Q29 If the ratios of 2nd term to 3rd term in the expansion of $(a + b)^n$ and 3rd term to 4th term in the expansion of $(a + b)^{n+3}$ are equal, then find the value of n.

Q30 Find the real values of θ , $\theta \in [0, 2\pi]$ for which $z = \dfrac{1 - i\sin\theta}{1 + i\sin\theta}$ is purely imaginary.

OR

If $\dfrac{(1+i)^2}{2-i} = x + iy$, find the value $2x + y$.

Q31 A bag contains 4 white, 3 black and 2 green marbles. If 3 marbles are selected at random then find the probability of getting
      (i)   All the marbles are of same colour.
      (ii)   All the marbles are of different colour.

SECTION - D
This section comprises of long answer (LA) type questions of 5 marks each.

Q32 If $\sin x = -\dfrac{2\sqrt{2}}{3}$, x lies in the third quadrant, then find the value of $\sin\dfrac{x}{2}$, $\cos\dfrac{x}{2}$ and $\tan\dfrac{x}{2}$

Q33 Using First Principle find the derivative of $\sqrt{\tan(3x - 5)}$.

OR

Let us consider the function

$$f(x) = \begin{cases} \dfrac{\sin(a+1)x + \sin x}{x} & ; & for\ x < 0 \\ c & ; & for\ x = 0 \\ \dfrac{\sqrt{x + bx^2} - \sqrt{x}}{bx^{3/2}} & ; & for\ x > 0 \end{cases}$$

Determine the values of a, b and c if $\displaystyle\lim_{x \to 0^-} f(x) = \lim_{x \to 0^+} f(x) = f(0)$.

Q34 If x, 2y, 3z are in A.P., where the distinct numbers x, y, z are in G.P. , then find the common ratio(s) of G.P.

Q35 Calculate the mean deviation about median for the following data:

Class interval	0 - 60	60 - 120	120 - 180	180 - 240	240 - 300
Frequency	4	5	3	6	2

OR

Calculate Mean, Standard Deviation and Variance for following data:

Class interval	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
Frequency	3	7	12	15	8	5

SECTION – E
This section comprises of 3 case-study/passage-based questions of 4 marks each with sub-parts. First two case study questions have three sub parts (i), (ii), (iii) of marks 1,1,2 respectively. The third case study question has two sub-parts (i) and (ii) of marks 2 each.

Q36 The map below represents a part of Karol Bagh, a commercial area in Delhi. Key locations like Karol Bagh Metro Station, Jessa Ram Hospital, and Hotel Vishal Heritage can be seen.

The above network is shown in the form of a diagram (not to the scale) given below. Taking position of Connaught place as origin, roads are marked along straight lines. Here lines AB, CD and EF are parallel to y-axis and coordinates of points C and F are $(3, \sqrt{3})$ and $(6, -3)$ respectively.
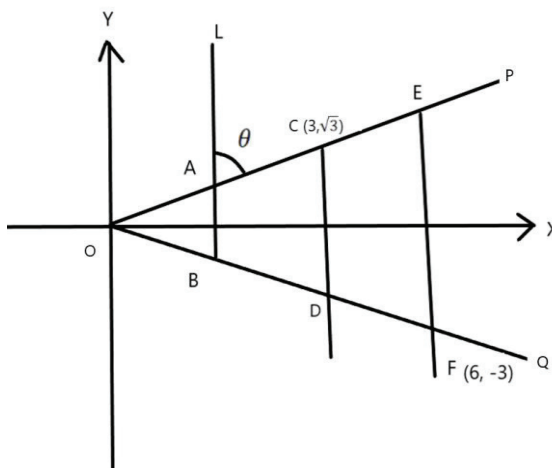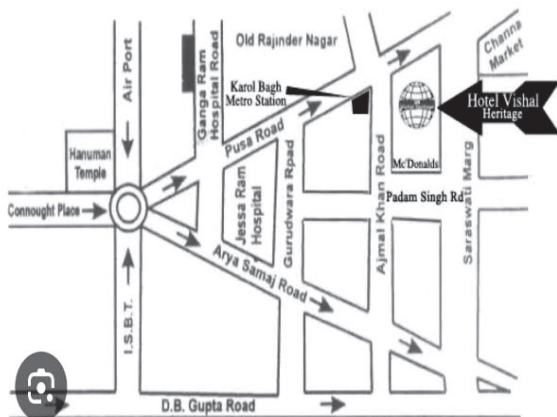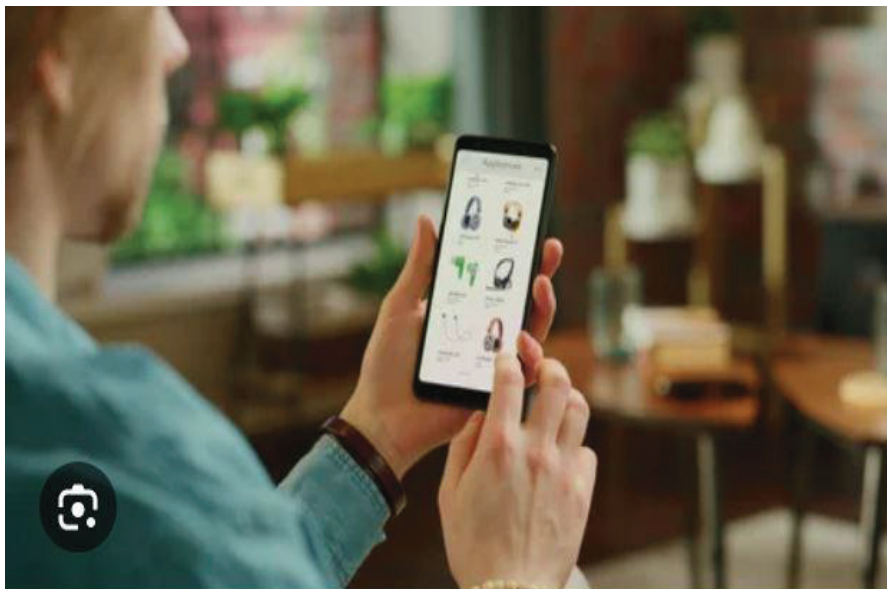

Based on the above information, answer the following:

(i) Find the slope of line OF . (1)

(ii) Find equation of OP. (1)

(iii) (a) If $\angle LAC = \theta$, then find the value of θ.

OR

(b) Find the equation of EF. Also find distance of point F from OP. (2)

Q37 On the occasion of Diwali, Rahul decided to do online shopping from a shopping app which offers a diverse range of products. He added a few products to his wish list across three categories: Electronics, Accessories and Men Fashion. Some products available in these categories are given below

- Electronics (set E) contains: smartphone (s_1), smartwatch (w_1), headphones (h), laptop (l), power bank (p), Tablets (t_1), camera (c_1)
- Accessories (set A) contains: smartwatch (w_1), sunglasses (g), wallet (w_2), headphones (h), belt (b_1), ring (r), bracelet (b_2), cap (c_2), socks (s_2)
- Men Fashion (set M) contains: wallet (w_2), belt (b_1), sunglasses (g), t-shirt (t_2), jeans (j), smartwatch (w_1), footwear (f), ethnic wear (e)

Based on the above information, answer the following:
(i) Write sets E, A and M in roster form. (1)
(ii) Write the set $(M - A)$. (1)
(iii) (a) Taking universal set as $(E \cup A \cup M)$, find $(E \cap A)'$

             OR (2)

   (b) Find $(A \cup M) - (E \cap A \cap M)$

Q38   To promote healthy eating habits, creativity and teamwork among students an Inter- House Salad Making Competition was organised for the students of Classes 8 and 9. Participants were provided with the following set of ingredients to prepare their salads

Base	Toppings	Dressing
Lettuce	Tomato	Olive Oil
	Cucumber	Vinegar
	Onion	Honey
	Carrot	Maple Syrup
	Broccoli	
	Avocado	
	Corn	

Based on the above information answer the following questions:

(i) If all the toppings are to be arranged in a single row for aesthetic presentation and Corn cannot be the first topping, how many such arrangements are possible? (2)

(ii) If the salad must include Corn as one of the toppings, how many different combinations are possible using given base,4 toppings and 2dressings? (2)