

Sample Question Paper - Class - X

MATHEMATICS

Time: 2.30 Hrs.]

[Maximum Marks: 100

General Instructions:

- (i) This question paper consists of four sections. Read the note carefully under each Section before answering them.
- (ii) The roughwork should be shown at the bottom of the pages of the Answer book.
- (iii) Use of Calculator and electronic devices not permitted.

SECTION – A

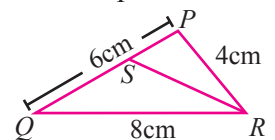
Note: (i) Answer all the 15 questions

(ii) Choose the correct answer in each question. Each of these questions contains four options with just one correct option

(iii) Each question carries One mark

15 × 1 = 15

1. Let $A = \{ 1, 3, 4, 7, 11 \}$, $B = \{-1, 1, 2, 5, 7, 9\}$ and $f : A \rightarrow B$ be given by $f = \{ (1, -1), (3, 2), (4, 1), (7, 5), (11, 9) \}$. Then f is
(A) one-one (B) onto (C) bijective (D) not a function
2. The common ratio of the G.P $\frac{2}{5}, \frac{6}{25}, \frac{18}{125}, \frac{54}{625}, \dots$ is
(A) $\frac{2}{5}$ (B) 5 (C) $\frac{3}{5}$ (D) $\frac{4}{5}$
3. If a_1, a_2, a_3, \dots are in A.P. such that $\frac{a_4}{a_7} = \frac{3}{2}$, then the 13th term of the A.P. is
(A) $\frac{3}{2}$ (B) 0 (C) $12a_1$ (D) $14a_1$
4. The LCM of $6x^2y, 9x^2yz, 12x^2y^2z$ is
(A) $36x^2y^2z$ (B) $48xy^2z^2$ (C) $96x^2y^2z^2$ (D) $72xy^2z$
5. If $b = a + c$, then the equation $ax^2 + bx + c = 0$ has
(A) real roots (B) no roots (C) equal roots (D) no real roots
6. If $A \times \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 2 \end{pmatrix}$ then the order of A is
(A) 2×1 (B) 2×2 (C) 1×2 (D) 3×2
7. The slope of the straight line $7y - 2x = 11$ is equal to
(A) $-\frac{7}{2}$ (B) $\frac{7}{2}$ (C) $\frac{2}{7}$ (D) $-\frac{2}{7}$
8. The perimeter of a triangle formed by the points $(0, 0), (1, 0), (0, 1)$ is
(A) $\sqrt{2}$ (B) 2 (C) $2 + \sqrt{2}$ (D) $2 - \sqrt{2}$
9. In $\triangle PQR$, RS is the bisector of $\angle R$. If $PQ = 6$ cm, $QR = 8$ cm, $RP = 4$ cm then PS is equal to
(A) 2 cm (B) 4 cm
(C) 3 cm (D) 6 cm



10. Chords AB and CD cut at P inside the circle; If $AB = 7$, $AP = 4$, $CP = 2$, then $CD =$
 (A) 4 (B) 8 (C) 6 (D) 10
11. A man is 28.5 m away from a tower. His eye level above the ground is 1.5 m. The angle of elevation of the tower from his eyes is 45° . Then the height of the tower is
 (A) 30 m (B) 27.5 m (C) 28.5 m (D) 27 m
12. $\frac{1}{\tan \theta + \cot \theta} =$
 (A) $\sin \theta + \cos \theta$ (B) $\sin \theta \cos \theta$ (C) $\sin \theta - \cos \theta$ (D) $\operatorname{cosec} \theta + \cot \theta$
13. If the total surface area of a solid hemisphere is $12\pi \text{ cm}^2$ then its curved surface area is equal to
 (A) $6\pi \text{ cm}^2$ (B) $24\pi \text{ cm}^2$ (C) $36\pi \text{ cm}^2$ (D) $8\pi \text{ cm}^2$
14. Mean and standard deviation of a data are 48 and 12 respectively. The coefficient of variation is
 (A) 42 (B) 25 (C) 28 (D) 48
15. If A and B are mutually exclusive events and S is the sample space such that $P(A) = \frac{1}{3}P(B)$ and $S = A \cup B$, then $P(A) =$
 (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) $\frac{3}{8}$

SECTION – B

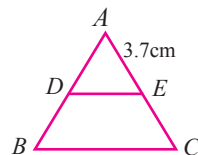
Note: (i) Answer 10 questions

(ii) Answer any 9 questions from the first 14 questions. Question No. 30 is Compulsory.

(iii) Each question carries Two marks

$10 \times 2 = 20$

16. If $A = \{4, 6, 7, 8, 9\}$, $B = \{2, 4, 6\}$ and $C = \{1, 2, 3, 4, 5, 6\}$, then find $A \cup (B \cap C)$.
17. Let $X = \{1, 2, 3, 4\}$. Examine whether the relation $g = \{(3, 1), (4, 2), (2, 1)\}$ is a function from X to X or not. Explain.
18. Three numbers are in the ratio $2 : 5 : 7$. If 7 is subtracted from the second, the resulting numbers form an arithmetic sequence. Determine the numbers.
19. If α and β are the roots of the equation $2x^2 - 3x - 1 = 0$, find the value of $\alpha - \beta$ if $\alpha > \beta$
20. If $A = \begin{pmatrix} 2 & 3 \\ -9 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 5 \\ 7 & -1 \end{pmatrix}$, then find the additive inverse of A.
21. Find the product of the matrices, if exists $\begin{pmatrix} 2 & 9 & -3 \\ 4 & -1 & 0 \end{pmatrix} \begin{pmatrix} 4 & 2 \\ -6 & 7 \\ -2 & 1 \end{pmatrix}$
22. The centre of a circle is at $(-6, 4)$. If one end of a diameter of the circle is at the origin, then find the other end.
23. In $\triangle ABC$, $DE \parallel BC$ and $\frac{AD}{DB} = \frac{2}{3}$. If $AE = 3.7 \text{ cm}$, find EC .



24. A ladder leaning against a vertical wall, makes an angle of 60° with the ground. The foot of the ladder is 3.5 m away from the wall. Find the length of the ladder.
25. Prove the identity $\frac{\sin \theta}{\operatorname{cosec} \theta} + \frac{\cos \theta}{\sec \theta} = 1$
26. A right circular cylinder has radius of 14 cm and height of 8 cm. Find its curved surface area.
27. The circumference of the base of a 12 m high wooden solid cone is 44 m. Find the volume.
28. Calculate the standard deviation of the first 13 natural numbers.
29. Two coins are tossed together. What is the probability of getting at most one head.
30. (a) Simplify. $\frac{6x^2 - 54}{x^2 + 7x + 12}$

[OR]

(b) Show that the lines $2y = 4x + 3$ and $x + 2y = 10$ are perpendicular.

SECTION – C

Note: (i) Answer 9 questions

(ii) Answer any 8 questions from the first 14 questions. **Question No. 45 is Compulsory.**

(iii) Each question carries Five marks

$9 \times 5 = 45$

31. Use Venn diagrams to verify De Morgan's law for set difference $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$.

32. A function $f: [-7, 6) \Rightarrow \mathbb{R}$ is defined as follows $f(x) = \begin{cases} x^2 + 2x + 1 & -7 \leq x < -5 \\ x + 5 & -5 \leq x \leq 2 \\ x - 1 & 2 < x < 6 \end{cases}$.

Find (i) $2f(-4) + 3f(2)$ (ii) $f(-7) - f(-3)$ (iii) $\frac{4f(-3) + 2f(4)}{f(-6) - 3f(1)}$.

33. Find the sum of the first $2n$ terms of the series $1^2 - 2^2 + 3^2 - 4^2 + \dots$

34. Factorize the polynomial $x^3 - 5x^2 - 2x + 24$

35. If $m - nx + 28x^2 + 12x^3 + 9x^4$ is a perfect square, then find the values of m and n .

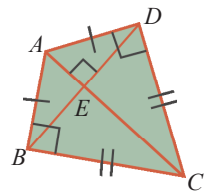
36. The speed of a boat in still water is 15 km/hr. It goes 30 km upstream and return downstream to the original point in 4 hrs 30 minutes. Find the speed of the stream.

37. If $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.

38. Find the area of the quadrilateral formed by the points $(-4, -2)$, $(-3, -5)$, $(3, -2)$ and $(2, 3)$.

39. The vertices of $\triangle ABC$ are $A(2, 1)$, $B(6, -1)$ and $C(4, 11)$. Find the equation of the straight line along the altitude from the vertex A .

40. A boy is designing a diamond shaped kite, as shown in the figure where $AE = 16$ cm, $EC = 81$ cm. He wants to use a straight cross bar BD . How long should it be?



41. A vertical tree is broken by the wind. The top of the tree touches the ground and makes an angle 30° with it. If the top of the tree touches the ground 30 m away from its foot, then find the actual height of the tree.
42. Using clay, a student made a right circular cone of height 48 cm and base radius 12 cm. Another student reshapes it in the form of a sphere. Find the radius of the sphere.
43. Calculate the standard deviation of the following data.

x	3	8	13	18	23
f	7	10	15	10	8

44. The probability that a new car will get an award for its design is 0.25, the probability that it will get an award for efficient use of fuel is 0.35 and the probability that it will get both the awards is 0.15. Find the probability that
- (i) it will get atleast one of the two awards (ii) it will get only one of the awards.
45. (a) The sum of three consecutive term in an A.P. is -6 and their product is 90. Find the three numbers.
[OR]
- (b) A Cylindrical jar of diameter 14cm and depth 20cm is half-full of water . 300 leadshots of same size are dropped into the jar and the level of water raises by 2.8cm. Find the diameter of each leadshots.

SECTION – D

Note: (i) *This section contains Two questions, each with two alternatives.*

(ii) *Answer both the questions choosing either of the alternatives.*

(iii) *Each question carries Ten marks*

2 × 10 = 20

46. (a) Draw the two tangents from a point which is 10cm away from the centre of a circle of radius 6cm. Also, measure the lengths of the tangents.
[OR]
- (b) Construct a ΔABC in which the base $BC = 5$ cm, $\angle BAC = 40^\circ$ and the median from A to BC is 6 cm. Also measure the length of the altitude from A.
47. (a) Draw the graph of $y = x^2 - x - 8$ and hence find the roots of $x^2 - 2x - 15 = 0$.
[OR]
- (b) A cyclist travels from a place A to a place B along the same route at a uniform speed on different days. The following table gives the speed of his travel and the corresponding time he took to cover the distance.

Speed in km / hr x	2	4	6	10	12
Time in hrs	60	30	20	12	10

Draw the speed-time graph and use it to find

- (i) the number of hours he will take if he travels at a speed of 5 km / hr
(ii) the speed with which he should travel if he has to cover the distance in 40 hrs.