सन्मार्ग मेधा

मॉक प्रश्न पत्र

विषय : गणित
कक्षा : १०

Class- X | Maximum Marks: 80

Subject: Mathematics | Time Allowed: 3 hrs

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

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

1. If α and β are the zeroes of the quadratic polynomial $p(x) = x^2 - ax - b$, then the value of $\alpha^2 + \beta^2$ is : 1

(A) $a^2 - 2b$ (B) $a^2 + 2b$ (C) $b^2 - 2a$ (D) $b^2 + 2a$

2. The pair of equations $x = -3$ and $y = -4$ graphically represents lines which are : 1

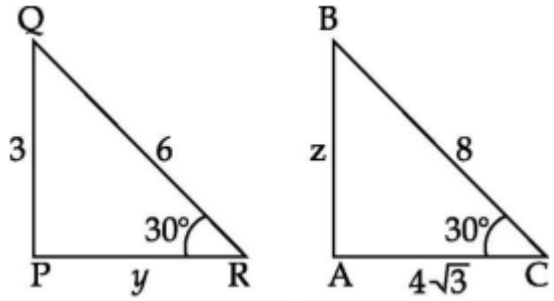
(A) parallel (B) intersecting at $(-4, -3)$

(C) coincident (D) intersecting at $(-3, -4)$

3. The common difference of an AP $\frac{1}{2q}, \frac{1-2q}{2q}, \frac{1-4q}{2q}, \ldots\ldots\ldots$ is 1

(A) -1 (B) 1 (C) q (D) 2q

4. In figure, $\Delta ABC \sim \Delta PQR$, then $y + z$ is : 1



(A) $2 + \sqrt{3}$ (B) $4 + \sqrt{3}$ (C) $4 + 3\sqrt{3}$ (D) $3 + 4\sqrt{3}$

5. If $x^2 + 2kx + 4 = 0$ has a root $x = 2$, then the value of k is : 1

(A) -1 (B) -4 (C) -2 (D) 2

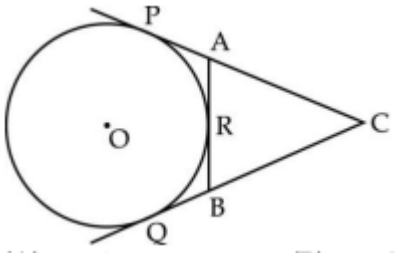
6. If $x = 2\sin^2\theta - 3, y = 2\cos^2\theta + 1$ then the value of $x + y$ is : 1

(A) 2 (B) 3 (C) 0 (D) 1

7. The coordinates of the point A, where AB is the diameter of the circle whose centre is $(3, 2)$ and B $(7, -4)$ is : 1

(A) $(-1, -8)$ (B) $(-1, 8)$ (C) $(1, 8)$ (D) $(1, -8)$

8. In the given fig. , CP and CQ are tangents to a circle with centre O and line segment AB touches the circle at R with $CP = 11$ cm, $AR = 3$ cm, $BC = 7$ cm, then BR is equal to : 1



(A) 4 cm (B) 5 cm

(C) 3 cm (D) 10 cm

9. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is : 1

(A) $60\ \pi\ cm^2$ (B) $68\ \pi\ cm^2$ (C) $120\ \pi\ cm^2$ (D) $136\ \pi\ cm^2$

10. If the mode of some data is 7 and their mean is also 7, then their median is : 1

(A) 10 (B) 7 (C) 8 (D) 9

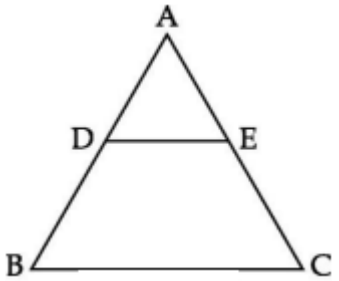
11. AT is a tangent to a circle at A with centre O from an external point T, such that $OT = 8$ cm and $\angle OTA = 30°$. The length of AT (in cm) is : 1

(A) $\sqrt{2}$ (B) $3\sqrt{2}$ (C) $4\sqrt{3}$ (D) 4

12. If $\sqrt{2}\sin(60° - \alpha) = 1$, then α is : 1

(A) $45°$ (B) $15°$ (C) $60°$ (D) $30°$

13. In figure given below, DE ∥ BC, if $AB = 5.6$ cm, $AD = 1.6$ cm, then AE : EC is : 1



(A) 2 : 5 (B) 5 : 2 (C) 2 : 7 (D) 7 : 2

14. If $18, x, y, -3$ are in A. P., then value of $x + y$ is : 1

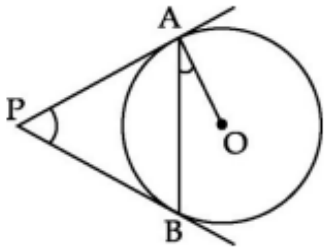
(A) 12 (B) 15 (C) 16 (D) 11

15. A card is selected at random from a well shuffled deck of 52 playing cards. The probability of its being a number card is 1

(A) $\frac{3}{13}$ (B) $\frac{4}{13}$ (C) $\frac{6}{13}$ (D) $\frac{9}{13}$

16. In the given figure, PA and PB are tangents to the circle with centre O. 1

If $\angle OAB = 25°$ then $\angle APB$ is :



(A) $60°$ (B) $50°$ (C) $25°$ (D) $155°$

17. A bag contains 100 cards numbered 1 to 100. A card is drawn at random from the bag. What is the probability that the number on the card is a perfect cube ? 1

(A) $\frac{1}{20}$ (B) $\frac{3}{50}$ (C) $\frac{1}{25}$ (D) $\frac{7}{100}$

18. If the mean of the following frequency distribution is 2.6, then the value of y is 1

Variate(X)	1	2	3	4	5
Frequency(f)	4	5	y	1	1

(A) 3 (B) 8 (C) 14 (D) 24

ASSERTION-REASON BASED QUESTIONS

In the following questions, 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.

19. Assertion: Point $X(0, 3)$ is the point of intersection of $y-$ axis with the line $3x + 2y = 6$. 1

Reasoning: The distance of point $X(0, 3)$ from $x-$ axis is 3 units.

20. Assertion: If product of two number is 5780 and their HCF is 17, then their LCM is 340. 1

Reasoning: LCM is always a factor HCF.

SECTION B

This section comprises of very short answer type $-$ questions (VSA) of 2 marks each

21. A line intersects y axis and $x-$ axis at point M and N, respectively. If $O(5, 7)$ is the midpoint of line segment MN, then find the coordinate of M and N. 2

22. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line $-$ segment joining the points of contact at the centre. 2

23. Check whether 8^n can end with the digit 0 for any natural number n. 2

24. Find the ratio in which the point $(1, k)$ divides the line segment joining the points $(-3, -10)$ and $(6, 8)$. Hence, find the value of k. 2

25. Prove that $4(\sin^4 30° + \cos^4 60°) - 3(\cos^2 45° - \sin^2 90°) = 2$ 2

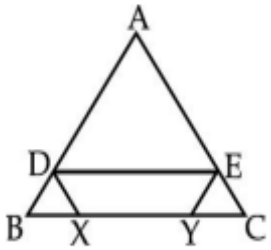
SECTION C

This section comprises of short answer type questions (SA) of 3 marks each

26. In a seminar the number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively. Find the minimum number of rooms required if in each room the same number of participants are to be seated and all of them being in the same subject. 3

27. If the m^{th} term of an AP be $\frac{1}{n}$ and the n^{th} term be $\frac{1}{m}$, then show that its $(mn)^{th}$ term is 1. 3

28. In given figure ΔABC, X and Y are two points lying on the side BC such that $BX = CY$. If DX||AC and YE||AB, then prove that DE||BC. 3



29. A shopkeeper gives books on rent for reading. She takes a fixed charge for the first two days, and an additional charge for each day thereafter. Latika paid Rs 22 for a book kept for six days, while Anand paid Rs 16 for the book kept for four days. Find the fixed charges and the charge for each extra day 3

30. Prove that: $\frac{1}{\text{cosec}A - \cot A} - \frac{1}{\sin A} = \frac{1}{\sin A} - \frac{1}{\text{cosec}A + \cot A}$ 3

31. Find the mean of the following data by Assumed mean method: 3

Class	$2-8$	$8-14$	$14-20$	$20-26$	$26-32$
Frequency	6	3	12	11	8

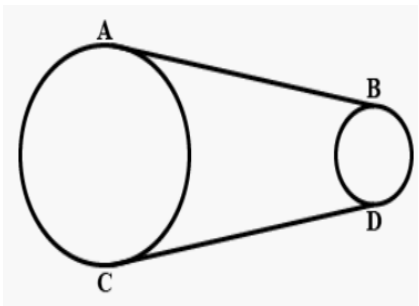
SECTION D

This section comprises of long answer − type questions (LA) of 5 marks each

32. The angle of elevation of the top of a vertical tower from a point on the ground is $60°$. From another point 10 m vertically above the first, its angle of elevation is $45°$. Find the height of the tower. (Use $\sqrt{3} = 1.73$) 5

33. Prove that the lengths of tangents drawn from an external point to a circle are equal. 5

In the figure, AB and CD are common tangents to two circles of unequal radii. Prove that AB = CD.



34. Two pipes running together can fill a cistern in $3\frac{1}{13}$ hours. If one pipe takes 3 hours more than the other to fill it, find the time in which each pipe will fill the cistern. 5

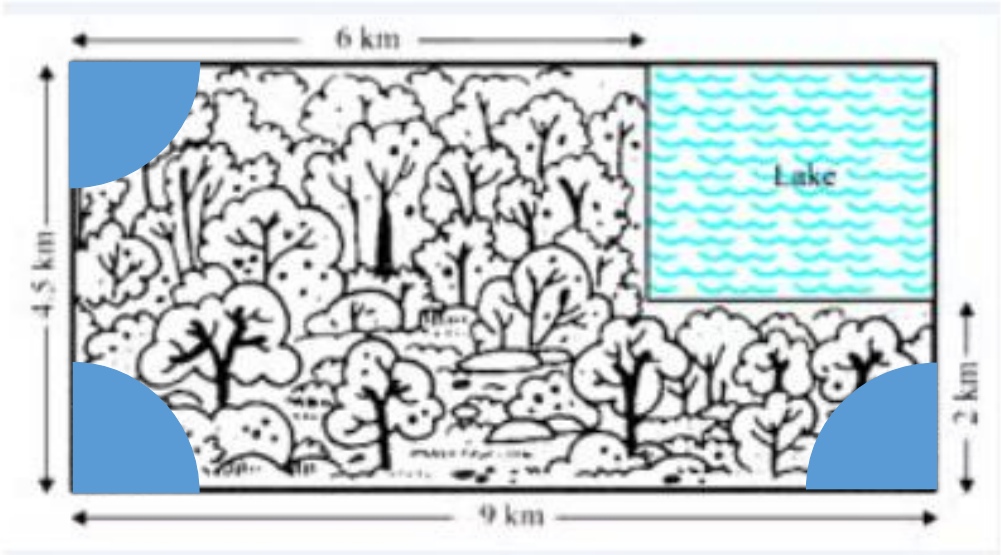
35. A chord of a circle of radius 14 cm subtends an angle 120° at the centre. Find the area of the corresponding minor segment of the circle. Also, find the area of the major segment of the circle. 5

SECTION E

This section comprises of 3 case based questions of 4 marks each with three sub – parts (i), (ii), (iii).

36. A missing helicopter is reported to have creashed in the rectangular region. In the rectangular region there is a lake in one corner and in the remaining corner there are three water bodies in the shape of a quadrant of a circle of radius 700m.

Based on the above information, answer the following questions:

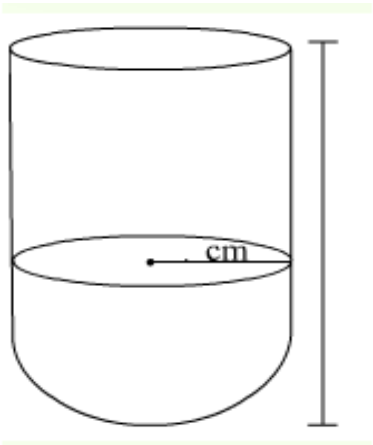


(i) Find the probability that the helicopter crashed inside the lake? 1

(ii) Find the probability that the helicopter crashed in the water body never in the lake? 1

(iii) Find the probability that the helicopter crashed outside all water bodies and lake ? 2

37. A metal smith wants to make a vessel in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the hemispherical part is 42 cm and the total height of the vessel is 63 cm.



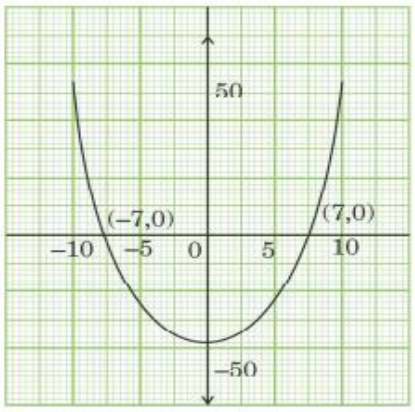
Based on the above, answer the following questions :

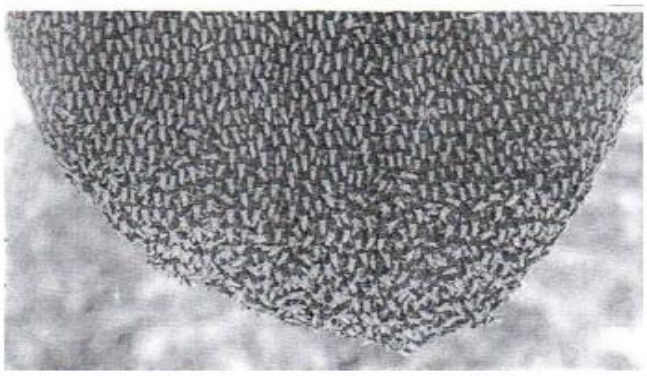
(a) Find the outer surface area of the cylindrical part. 1

(b) Find the volume of the cylindrical part. 1

(c) Find the total surface of the vessel. 2

38. While playing in a garden, Samaira saw a honeycomb and asked her honey bees to store honey. Also, she told her that the shape of the honeycomb formed is a mathematical structure. The mathematical representation of the honeycomb is shown in the graph.





Based on the above information, answer the following questions

(i) How many zeroes are there for the polynomial represented by the graph given ? 1

(ii) Write the zeroes of the polynomial. 1

(iii) If the zeroes of a polynomial $x^2 + (a + 1)x + b$ are 2 and 3, then determine the values of a and b. 2