Class X (2024-25)

PREBOARD

Subject- Mathematics

Time Allowed: 3 Hrs.   M.M : 80

General Instructions:

- This Question Paper has 5 Sections A-E.
- Section A has 20 MCQs carrying 01 mark each.
- Section B has 5 questions carrying 02 marks each.
- Section C has 6 questions carrying 03 marks each.
- Section D has 4 questions carrying 05 marks each.
- 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.
- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 questions of 2 marks has been provided.
- Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION A

1. 7 x 11 x 13 + 13 is a

   (a) composite no   (b) a prime no.

   (c) an odd no   (d) Neither prime nor composite.

2. A box of 600 bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. Then

   the probability that it is non-defective bulb is:

   (a) 143/150   (b) 147/150   (c) 1/25   (d) 1/50

3. If $\sin\theta = \frac{1}{2}$ and θ is a acute angle, then $(3\cos\theta - 4\cos^3\theta)$ is equal to

   (a) 0   (b) $\frac{1}{2}$ (c) $\frac{1}{6}$ (d) -1

4. The value of x for which 3x, x + 8 and 5x + 2 are three consecutive terms of an A.P

   (a) $\frac{7}{3}$ (b) $\frac{8}{3}$ (c) $\frac{14}{13}$ (d) $\frac{5}{3}$

5. If $\triangle ABC$ is right angled at C, then the value of sec (A+B)

   (a) 0   (b) 1   (c) $\frac{2}{\sqrt{3}}$ (d) not defined.

6. If the median and mode of the data 61.6 and 65 respectively then find the mean of the data is

   (a) 29.1   (b) 58.2   (c) 34.2   (d) 59.9

7. The mean of 5 numbers is 10. If each number is decreased by 3, mean of new number is

   (a) 13   (b) 10   (c) 7   (d) None of these

8. Find the area of a sector of a circle with radius 6 cm whose angle of sector is 60^0.

   (a) 18.85cm   (b) 12.5cm   (c) 16.5cm   (d) 15cm

9. Find the median class for the following distribution table

1

Class intervals	0 - 5	5 – 10	10 - 15	15 – 20	20 - 25
frequency	10	15	12	20	9

(a) 5 – 10   (b) 10 - 15   (c) 15 - 20   (d) 20 - 25

10. 2 cubes each of volume 125 cm^3 are joined end to end. Find the total surface area of the resulting cuboid

(a) 125cm^2 (b) 175cm^2 (c) 350 cm^2 (d) 250cm^2

11. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80^0, then $\angle POA$ is equal to

(a) 50^0 (b) 80^0 (c) 100^0 (d) 40^0

12. If a, b, c are in A.P. then $\frac{(a-b)}{(b-c)}$ is equal to

(a) 1   (b) $\frac{b}{a}$ (c) $\frac{a}{c}$ (d) $\frac{c}{a}$

13. If 7 times the 7th term of an A.P. is equal to 11 times its 11th term, then 18th term is

(a) 18   (b) 9   (c) 77   (d) 0

14. If $\tan \theta = 12/13$, then the value of $\frac{2\sin\theta\cos\theta}{\cos^2\theta - \sin^2\theta}$

(a) 312/25   (b) 25/312   (c) 312/15   (d) 153/12

15. Find the roots of the given quadratic equation, $6x^2 - x - 2 = 0$

(a) $\frac{-2}{3}, \frac{1}{3}$ (b) $\frac{-2}{3}, \frac{1}{2}$ (c) $\frac{-2}{3}, \frac{-1}{2}$ (d) $\frac{2}{3}, \frac{-1}{2}$
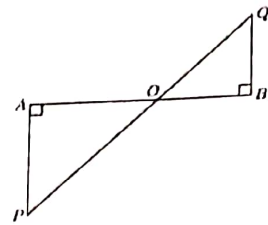
16. The value of k, for which the system of equations $x + (k + 1)y = 5$ and $(k + 1)x + 9y = 8k - 1$ has infinitely many solutions is

(a) 2   (b) 3   (c) 4   (d)5

17. The zeroes of the quadratic polynomial $x^2 + (a + 1) x + b$ are 2 and -3, then

(a) a = -7, b = -1   (b) a = 5, b = -1   (c) a = 2, b = -6   (d) a = 0, b = -6

18. In the given figure, if $\angle A = 90°$, $\angle B = 90°$, OB=4.5 cm OA=6cm and AP = 4cm then find QB.

2

(a) 3 cm   (b) 6 cm   (c) 4.5 cm   (d) 3.5 cm

19. Assertion (A): The area enclosed by a chord and the major arc is a major segment.
    Reason (R): If a circle is divided into three equal arcs, then each is a major arc.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.

20. Assertion (A) $5x^2 + 14x + 10 = 0$ has no real roots.
    Reason (R) $ax^2 + bx + c = 0$ has no real roots if $b^2 < 4ac$
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A)
(c) Assertion (A) is true but Reason (R) is false
(d) Assertion (A) is false but Reason (R) is true

SECTION B

21. If $\tan (A + B) = 1$ and $\tan (A - B) = \frac{1}{\sqrt{3}}$, $0^0 < A + B < 90^0$, A > B, then find the values of A and B.

22. If α, β are the zeros of quadratic polynomial $3x^2 - 6x + 4$. Find the value of $\alpha^2 + \beta^2$.

OR

Find the zeroes of the quadratic polynomial $6x^2 - 7x - 3$ and verify the relationship between the zeroes and its coefficients of the polynomial.

23. A class teacher has the following absentee record of 40 students of a class for the whole term. Find the mean number of days a student was absent.

Number of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40
Number of students	11	10	7	4	4	3	1

OR

For the following frequency distribution, find the mode:

Class	25-30	30-35	35-40	40-45	45-50
Frequency	12	5	14	8	9

3

24. Find that non-zero value of k, for which the quadratic equation $kx^2 + 1 - 2(k-1)x + x^2 = 0$ has equal roots.

25. An aeroplane is a vehicle with wings and one or more engines that enable it to fly through the air and is flying at a height of 300 meters observes the angles of depression of opposite points on the two banks of river are to be 45° and 60°. ($\sqrt{3} = 1.73$). Find the width AB of the river.
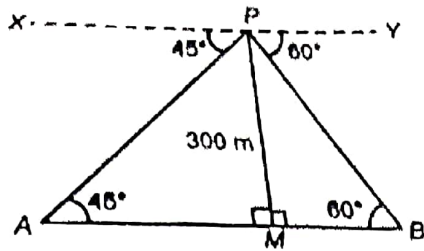
SECTION-C

26. Prove that $\sqrt{5}$ is an irrational number.

27. A two-digit number is seven times the sum of its digits. The number formed by reversing the digits is 18 less than the given number. Find the given number.

OR

Solve for x and y :

$$\frac{x}{a} = \frac{y}{b}$$

$$ax + by = a^2 + b^2$$

28. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that

$\angle PTQ = 2\angle OPQ$.

OR

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

29. Find the ratio in which the point $(\frac{8}{5}, y)$ divides the line segments joining the points (1, 2) and (2, 3). Also find the value of y.

30. Prove that: $(\operatorname{cosec}A - \sin A)(\sec A - \cos A)(\tan A + \cot A) = 1$

OR

Prove that : $\frac{cosA}{1+sinA} + \frac{1+sinA}{cosA} = 2 \sec A$

31. 20 cards, numbered 1 to 20 are mixed throughly and then a card is drawn at random. Find the probability that the number on the drawn card is a multiple of 3 or 5.

SECTION-D

32. If the median of the following frequency distribution is 32.5. Find the values of f_1 and f_2.

| Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

4

33. A vessel in the form of hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14cm and the total height of the vessel 13cm. Find the inner curved surface area and volume of the vessel.

34. The angles of elevation and depression of the top and the bottom of a tower from the top of a building, 60 m high, are 30° and 60° respectively. Find the difference between the heights of the building and the tower and the distance between them.

35. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of triangle PQR. Show that ΔABC~ΔPQR.

OR

Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting diagonal AC in L and AD produced in E. Prove that EL = 2 BL.

SECTION-E

36. An officer explains his army men the route they need to follow to reach their target.
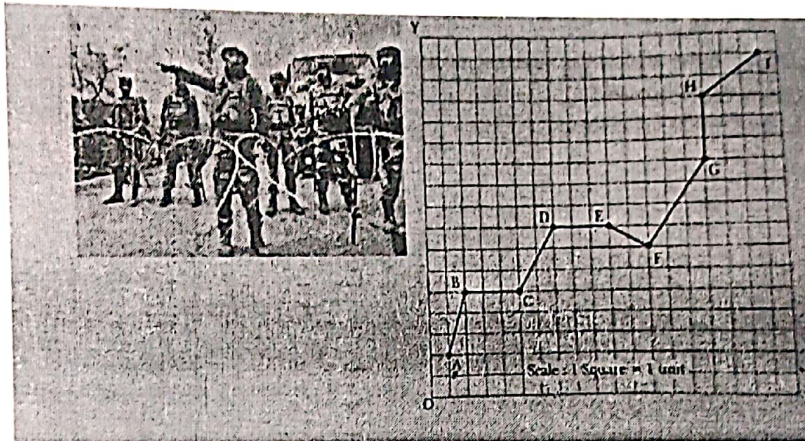

Answer the following questions based on the above data

(a) Find the distance of the point B from the x-axis.(1)

(b) Find the coordinates of mid-point between the points D and E   (1)

(c) Find the coordinates of the point which divides the line segment joining the points F (12,7) and G (15,11) in the ratio 1: 2 internally   (2)

OR

Find a relation between x and y such that the point (x, y) is equidistant from the points B and C

37.

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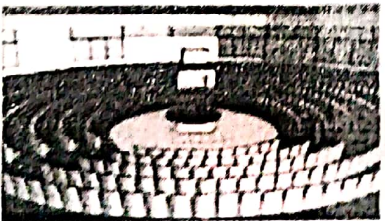
The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that the each succeeding circular row has 10 seats more than the previous one.

(a) If the first circular row has 30 seats, how many seats will be there in the 10th row?
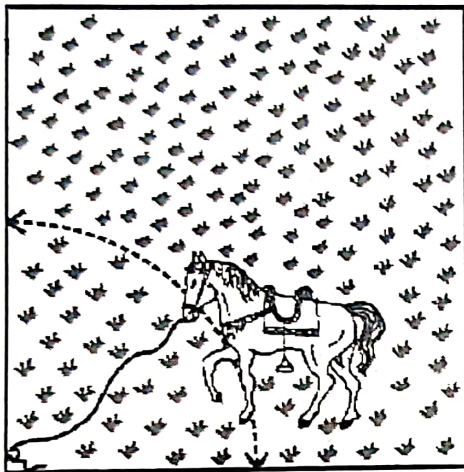
(b) For 1500 seats in the auditorium, how many rows need to be there?

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

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row?

(c) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

38.

A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find

(a) the area of the square grass field.
(b) the area of that part of the field in which the horse can graze.
(c) the increase in the grazing area if the rope were 10 m long instead of 5 m.
(Use $\pi \approx 3.14$)