PRINCE ACADEMY
OF HIGHER EDUCATION
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SAMPLE PAPER (2024-25)

CLASS : X

**Time : 03.00 Hours**   **MATHEMATICS STANDRED (041)**   **M. M. : 80**

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, 2 and 1 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 3 Qs of 5 marks, 2 Qs of 3 marks and 1 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION - A

1. The LCM of two numbers is 2400. Which of the following cannot be their HCF?
   (a) 300   (b) 400   (c) 500   (d) 600

2. Which term of the A.P. : 21, 42, 63, ... is 210?
   (a) 9th   (b) 10th   (c) 11th   (d) 15th

3. If α and β are the roots of a quadratic equation $3x^2 - 8x + 4$, then the value of $\alpha^2 + \beta^2$ is :
   (a) 5   (b) $\dfrac{-40}{3}$ (c) - 21   (d) $\dfrac{40}{9}$

4. If the system of equations $kx + 3y - (k - 3) = 0$ and $12x + ky - k = 0$ has infinitely many solution, then $k = ?$
   (a) 6   (b) - 6   (c) 0   (d) None of these

5. If 2 is a root of the equation $x^2 + bx + 12 = 0$ and the equation $x^2 + bx + q = 0$ has equal roots, then q is :
   (a) 8   (b) 16   (c) - 8   (d) - 16

6. The mean and mode of a set of data are respectively $2n$ and $5n$. The median of the same data is :
   (a) $9n$ (b) $7n$ (c) $5n$ (d) $3n$

7. A number is selected at random from first 50 natural numbers. The probability that the selected nubmer is a multiple of 3 or 4 is :
   (a) $\dfrac{12}{25}$ (b) $\dfrac{14}{25}$ (c) $\dfrac{14}{50}$ (d) $\dfrac{8}{25}$

8. If the heights and radii of a cone and a hemisphere are same then the ratio of their volumes is :
   (a) 1 : 2   (b) 2 : 1   (c) 1 : 3   (d) 1 : 1

9. The radii of two circles are 9 cm and 12 cm. The circumference of a circle whose area is equal to sum of the areas of the two circle is :
   (a) 15 cm   (b) 15π cm   (c) 30π cm   (d) 225 cm

10. If $\tan\theta + \cot\theta = 3,$ then $\tan^2\theta + \cot^2\theta$ is :
    (a) 9   (b) 7   (c) 11   (d) 27

11. If AB, AC, PQ are tangents in the figure and $AB = 5$ cm, then perimeter of $\triangle APQ$ is :

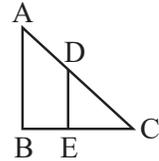   (a) 5 cn   (b) 10 cm

    (c) 12 cm   (d) 15 cm
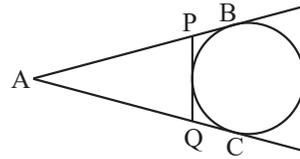
12. On the level ground, the angle of elevation of the top of a tower is 30º. On moving 20 metres nearer to it, the angle of elevation becomes 60º. The height of the tower is :

    (a) 10 m   (b) 15 m   (c) 20 m   (d) $10\sqrt{3}$ m

13. If α and β are the zeroes of $x^2 - 4x + 1$, then $\dfrac{1}{\alpha} + \dfrac{1}{\beta} - \alpha\beta$ is :

    (a) 3   (b) 5   (c) - 5   (d) - 3

14. In $\triangle ABC, DE \parallel AB$. If $AB = a$, $DE = x$, $BE = b$ and $EC = c$.

    (a) $\dfrac{ac}{b}$ (b) $\dfrac{ac}{b+c}$ (c) $\dfrac{ab}{c}$ (d) $\dfrac{ab}{b+c}$

15. The probability that cannot exist among the following :

    (a) $\dfrac{2}{3}$ (b) 15%   (c) - 1.5   (d) 0.7

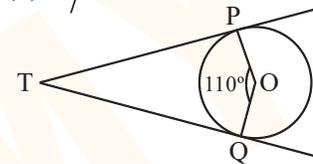16. If the difference of Mode and Median of a data is 24, then the difference of Median and Mean is :

    (a) 8   (b) 12   (c) 24   (d) 36

17. The area of a sector of a circle with radius 6 cm if the angle of the sector is 60º.

    (a) $\dfrac{142}{7}$ (b) $\dfrac{152}{7}$ (c) $\dfrac{122}{7}$ (d) $\dfrac{132}{7}$

18. If TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110º$ then $\angle PTQ$ is :

    (a) 60º   (b) 70º

    (c) 80º   (d) 90º

Q. No. 19 - 20, A statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option out of the following.

(a) Both Assertion (A) and Reason (R) are true; and Reason (R) is the corrct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true; and 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.

19. **Assertion (A)** : The HCF of two numbers is 18 and their product is 3072. Then their LCM 169.

    Reason (R) : If a, b are two positive integers, then HCF $\times$ LCM $= a \times b$

20. **Assertion (A)** : If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$, then $x + y = 3$

    Reason (R) : For any value of $\theta, \sin^2\theta + \cos^2\theta = 1$

SECTION - B

21. One card is drwan from a well - shuffled deck of 52 cards. Find the probadility of getting :

    (i) A face card   (ii) A jack of hearts   (iii) A king of red colour   (iv) A spade

22. Find a quadratic polynomial whose $\alpha + \beta = -\dfrac{1}{4}$ and $\alpha\beta = \dfrac{1}{4}$ (α, β are zeroes of the polynomial).

23. In an A.P., the sum of the first n first n terms is given by $S_n = 6n - n^2$. Find the 30th term.

24. Find the point on the x - axis which is equidistant from (2, -5) and (-2, 9).

                Or

    If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of other, then find the value of k.

25. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of major sector. (use $\pi = 3.14$)

SECTION - C

26. Prove : $\sqrt{\dfrac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$

    Or

    If : $\sin\theta + \cos\theta = \sqrt{2}$, prove that $\tan\theta + \cot\theta = 2$.

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

    Or

    Sides AB and BC and median AD of a $\triangle ABC$ are respectively proportional to sides PQ and QR and medium PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$.

28. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

29. Prove that $3 + 2\sqrt{5}$ is irrational, it is given that $\sqrt{5}$ is irrational.

30. If Median of the distribution given below is 28.5, find the value of x and y.

| Class Interval	Frequency
0 - 10	5
10 - 20	x
20 - 30	20
30 - 40	15
40 - 50	y
50 - 60	5
Total	60

31. A lending library has a fixed charge for the first three days and an additional charge for each day there after. Saritha paid Rs.27 for a book kept for seven days, while Anu Paid Rs.21 for the book she kept for five days. Find the fixed charges and the charge for each extra day.

SECTION - D

32. Prove that the parallelogram circumscribing a circle is a rhombus.

    Or

    In fig. xy and $x'y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting xy at A and $x'y'$ at B. Prove that $\angle AOB = 90°$.
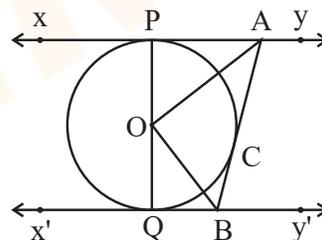
33. An aeroplane when 3000 m high passes above another aeroplane at an instant when their angles of elevation at the same observation point are 60° and 45° respectively. How much higher is the one aeroplane than the other? (use $\sqrt{3} = 1.732$)

    Or

    A straight road leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.

34. State and prove Thales Theorem.

35. A train travels 360 km at a uniform speed. If the speed had been 5 km/hr more, it would have taken 1 hr. less for the same journey. Find the speed of the train.

    Or

    The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.

SECTION - E

36. Read the following passage and answer the following questions :

Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.

After survey, it was decided to build rectangular playground, with a semi-circular arc allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.

Based on the above information, answer the following questions:

(i) What is the total perimeter of the parking area?

(ii) What is the total area of parking and the two quadrants?
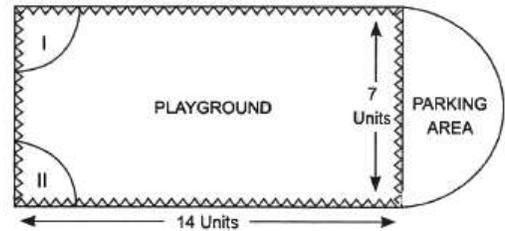
Or

What is the ratio of area of playground to the area of parking area?

(iii) Find the cost of fencing the playground and parking area at the rate of Rs.2 per unit.

37. Read the following passage and answer the following questions :

Tharunya was thrilled to know that the football tournament is fixed with a monthly time frame from 20th July to 20th August 2023 and for the first time in the FIFA Women's World Cup's history, two nations host in 10 venues. Her father felt that the game can be better understood if the position of players is represented as points on a coordinate plane.
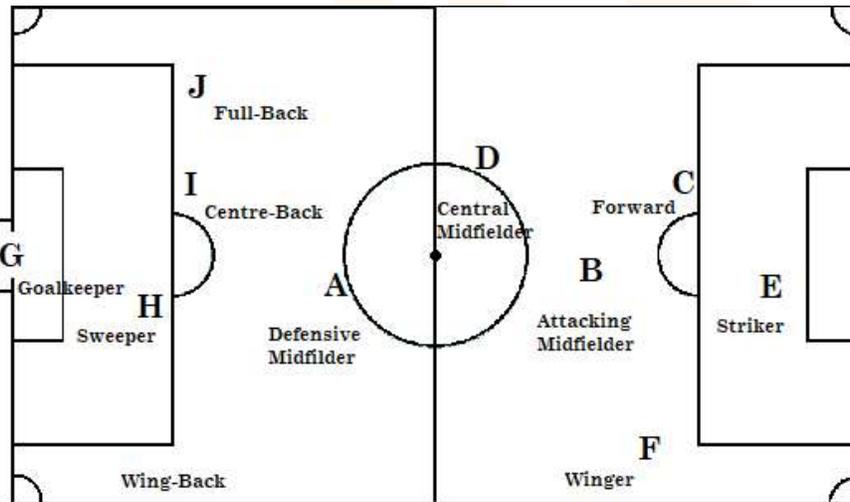
(i) At an instance, the mid-fielders and forward formed a parallelogram. Find the position of the central mid-fielder (D) if the position of other players who formed the parallelogram are: A (1, 2), B (4, 3) and C (6, 6)

(ii) Check if the Goal keeper G (-3, 5), Sweeper H (3, 1) and Wing-back K (0, 3) fall on a same straight line.

Or

Check if the Full-back J (5, -3) and centre-back I (-4, 6) are equidistant from forward C (0, 1) and if C is the mid- point of IJ.

(iii) If Defensive mid-fielder A (1, 4), Attacking mid-fielder B (2, -3) and Striker E (a, b) lie on the same straight line and B is equidistant from A and E, find the position of E.

38. Read the following passage and answer the following questions :

"Eight Ball" is a game played on a pool table with 15 balls numbered 1 to 15 and a "cue ball" that is solid and white. Of the 15 numbered balls, eight are solid (non-white) coloured and numbered 1 to 8 and seven are striped balls numbered 9 to 15.

The 15 numbered pool balls (no cue ball) are placed in a large bowl and mixed, then one ball is drawn out at random.

Based on the above information, answer the following question:

(i) What is the probability that the drawn ball bears number 8?

(ii) What is probability that the drawn ball bears an even number?

Or

What is the probability that the drawn ball bears a number, which is a multiple of 3?

(iii) What is the probability that the drawn ball is a solid coloured and bears an even number?

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