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SUBJECT: MATHEMATICS	**MAX. MARKS : 80**
CLASS : X	**DURATION : 3 HRS**

General Instruction:
1. This Question Paper has 5 Sections A-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. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 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 π =22/7 wherever required if not stated.

SECTION – A
Questions 1 to 20 carry 1 mark each.

1. If the coordinates of one end of a diameter of a circle are (2, 3) and the coordinates of its centre are (-2, 5), then the coordinates of the other end of the diameter are
   (a) (0, 8)   (b) (0, 4)   (c) (6, -7)   (d)(-6, 7)

2. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
   (a) 5   (b) 12   (c) 11   (d) 7 + $\sqrt{5}$

3. A bag has 5 white marbles, 8 red marbles and 4 purple marbles. If we take a marble randomly, then what is the probability of not getting purple marble?
   (a) 0.5   (b) 0.66   (c) 0.08   (d) 0.77

4. In what ratio does the x-axis divide the join of A(2, -3) and B(5, 6)?
   (a) 1 : 2   (b) 3 : 5   (c) 2 : 1   (d) 2 : 3

5. The pairs of equations 9x + 3y + 12 = 0 and 18x + 6y + 26 = 0 have
   (a) Unique solution   (b) Exactly two solutions
   (c) Infinitely many solutions   (d) No solution

6. If the distance between the points A(2, -2) and B(-1, x) is equal to 5, then the value of x is:
   (a) 2   (b) -2   (c) 1   (d) -1

7. If PA and PB are tangents to the circle with centre O such that ∠APB = 40°, then ∠OAB is equal to
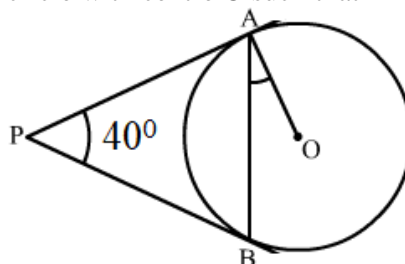
   (a) 40°   (b) 30°   (c) 20°   (d) 25°

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8. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is:
   (a) 10   (b) 100   (c) 504   (d) 2520

9. The mode and mean is given by 7 and 8, respectively. Then the median is:
   (a) 1/13   (b) 13/3   (c) 23/3   (d) 33

10. A sphere of diameter 18 cm is dropped into a cylindrical vessel of diameter 36 cm, partly filled with water. If the sphere is completely submerged then the water level rises by
    (a) 4cm   (b) 5 cm   (c) 3 cm   (d) 6 cm

11. If $P(E) = 0.07$, then what is the probability of 'not E'?
    (a) 0.93   (b) 0.95   (c) 0.89   (d) 0.90

12. The roots of quadratic equation $2x^2 + x + 4 = 0$ are:
    (a) Positive and negative   (b) Both Positive   (c) Both Negative   (d) No real roots

13. If two dice are thrown in the air, the probability of getting sum as 3 will be
    (a) 2/18   (b) 3/18   (c) 1/18   (d) 1/36

14. The value of (sin 30°+cos 60°)-(sin 60° + cos 30°) is equal to:
    (a) 0   (b) 1+2√3   (c) 1-√3   (d) 1+√3

15. The angle of depression of a car, standing on the ground, from the top of a 75 m tower, is 30°. The distance of the car from the base of the tower (in metres) is
    (a) 25√3   (b) 75√3   (c) 150   (d) 50√3

16. If one equation of a pair of dependent linear equations is -3x+5y-2=0. The second equation will be:
    (a) -6x + 10y - 4 = 0   (b) 6x - 10y - 4 = 0   (c) 6x + 10y - 4 = 0   (d) -6x + 10y + 4 = 0

17. HCF of (2^3 x 3^2 x 5), (2^2 x 3^3 x 5^2) and (2^4 x 3 x 5^3 x 7) is
    (a) 60   (b) 48   (c) 30   (d) 105

18. If the equation $9x^2 + 6kx + 4 = 0$ has equal roots then k = ?
    (a) -2 or 0   (b) 0 only   (c) 2 or 0   (d) 2 or -2

Direction : In the question number 19 & 20 , A statement of Assertion (A) is followed by a statement of Reason(R) . Choose the correct option
   (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 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):** If two triangles are similar and have an equal area, then they are congruent.
    Reason (R): Corresponding sides of two triangles are equal, then triangles are congruent.

20. **Assertion :** The HCF of two numbers is 18 and their product is 3072. Then their LCM = 169.
    Reason : If *a*, *b* are two positive integers, then HCF x LCM = *a* x *b*.

SECTION-B
Questions 21 to 25 carry 2M each

21. Find the quadratic polynomial, sum of whose zeroes is 8 and their product is 12. Hence, find the zeroes of the polynomial.

22. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting (i) a red king (ii) a queen or a jack

23. Two concentric circles are of radii 6.5 cm and 2.5 cm. Find the length of the chord of the larger circle which touches the smaller circle.

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

From an external point P, tangents PA and PB are drawn to a circle with center O. If CD is the tangent to the circle at a point E and PA = 14cm, find the perimeter of ΔPCD.

24. Solve for x and y: 71x + 37y = 253, 37x + 71y = 287

25. Find all possible values of y for which the distance between the points A (2, -3) and B (10, y) is 10 units.

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

In what ratio does the point P(2,5) divide the join of A (8,2) and B(-6, 9)?

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## SECTION-C
Questions 26 to 31 carry 3 marks each

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26. Prove that: $\dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \sec\theta + \tan\theta$

27. Prove that √5 is an irrational number.

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

If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$, a and b are a prime number then. Verify LCM(p, q) x HCF (p, q) = p x q

28. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. (Use √3 =1.73)

29. A part of monthly hostel charges in a college are fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 25days, he has to pay Rs. 4550 as hostel charges whereas a student B, who takes food for 30 days, pays Rs. 5200 as hostel charges. Find the fixed charges and the cost of the food per day.

30. In the below figure, LM ∥ AB. If AL = x – 3, AC = 2x, BM = x – 2 and BC = 2x + 3, find the value of x.
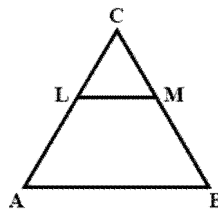
31. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

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

Prove that the tangent drawn at any point of a circle is perpendicular to the radius through the point of contact.

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SECTION-D
Questions 32 to 35 carry 5M each

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32. Out of a group of swans, 7/2 times the square root of the total number of swans are playing on the shore of a tank. Remaining two are playing, with amorous fight, in the water. What is the total number of swans?

OR

A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

33. Prove that "If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio."

In $\triangle ABC$, DE||BC and $\dfrac{AD}{DB} = \dfrac{3}{1}$ if EA = 6.6cm, then find AC using the above theorem.

34. A chord PQ of a circle of radius 10 cm subtends an angle of 60° at the centre of circle. Find the area of major and minor segments of the circle.

OR

In the given figure, a circle is inscribed in an equilateral triangle ABC of side 12 cm. Find the radius of inscribed circle and the area of the shaded region. [Use $\pi = 3.14$ and $\sqrt{3} = 1.73$]
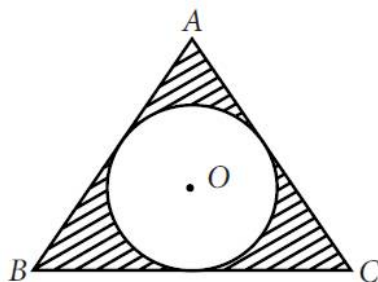

35. The median of the following data is 52.5. Find the values of x and y. if the total frequency is 100

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	2	5	x	12	17	20	y	9	7	4

SECTION-E (Case Study Based Questions)
Questions 36 to 38 carry 4M each

36. A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4 cm.
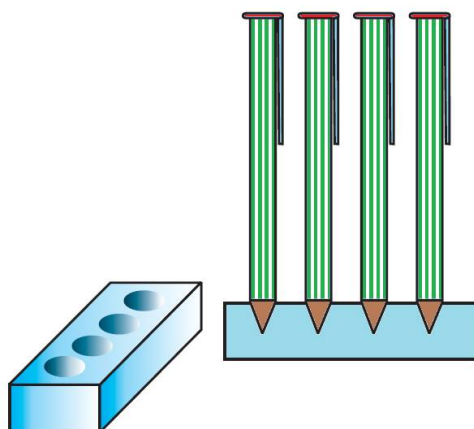
Based on the above information, answer the following questions.
(i) Find the volume of four conical depressions in the entire stand [2]
(ii) Find the volume of wood in the entire stand [2]

OR

(ii) Three cubes each of side 15 cm are joined end to end. Find the total surface area of the resulting cuboid. [2]

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37. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs. 1,18,000 by paying every month starting with the first instalment of Rs. 1000. If he increases the instalment by Rs. 100 every month.
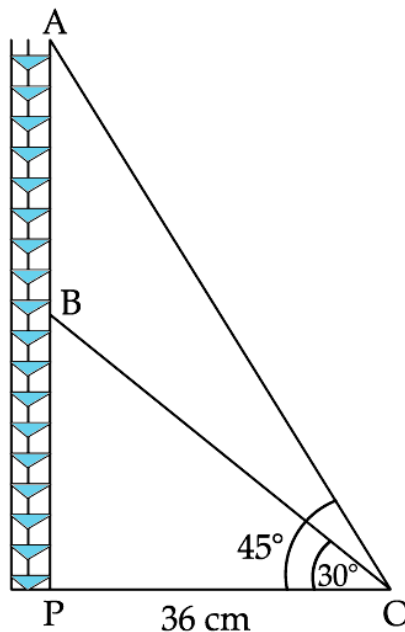

On the basis of above information, answer the following questions.
(i) What is the amount paid by him in 20th instalment?
(ii) What is the amount paid by him in 30th instalments?
(iii) What is the amount paid by him upto 20 instalments?

OR

What is the amount paid by him upto 30 instalments?

38. 37. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O.

Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is 30° and the angle of elevation of the top of Section A is 45°.
Based on the above information, answer the following questions:
(i) Find the length of the wire from the point O to the top of section B.
(ii) Find the distance AB.

OR

Find the area of ΔOPB.
(iii) Find the height of the Section A from the base of the tower.