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 LCM(x, 18) = 36 and HCF(x, 18) = 2, then x is:
   (a) 2   (b) 3   (c) 4   (d) 5   1

2. In $\triangle ABC$ right angled at B, if $\tan A = \sqrt{3}$, then then $\cos A \cos C - \sin A \sin C =$
   (a) –1   (b) 0   (c) 1   (d) $\sqrt{3} / 2$

3. If $2\sin^2 \beta - \cos^2 \beta = 2$, then β is:
   (a) 0°   (b) 90°   (c) 45°   (d) 30°   1

4. The ratio of LCM and HCF of the least composite and the least prime numbers is:
   (a) 1: 2   (b) 2: 1   (c) 1: 1   (d) 1: 3   1

5. The value of k for which the lines $5x + 7y = 3$ and $15x + 21y = k$ coincide is:
   (a) 9   (b) 5   (c) 7   (d) 18

6. Write a quadratic polynomial whose sum of zeroes is $\dfrac{-1}{4}$ and product of zeroes is $\dfrac{1}{4}$.
   (a) $4x^2 + x + 1$ (b) $x^2 + 4x - 1$
   (c) $2x^2 + 3x - 1$ (d) $x^2 - 2x + 1$

7. The vertices of a parallelogram in order are A(1, 2), B(4, y), C(x, 6) and D(3, 5). Then (x, y) is:
   (a) (6, 3)   (b) (3, 6)   (c) (5, 6)   (d) (1, 4)

8. A horse is tied to a pole with 28 m long rope. The perimeter of the field where the horse can graze is (Take $\pi = 22/7$)
   (a) 60 cm   (b) 85 cm   (c) 124 cm   (d) 176 cm

9. Two dice are thrown at the same time. The probability of getting not doublet is
   (a) 1/3   (b) 1/6   (c) 1/5   (d) 5/6

10. $\triangle ABC \sim \triangle PQR$. If AM and PN are altitudes of $\triangle ABC$ and $\triangle PQR$ respectively and $AB^2 : PQ^2 = 4: 9$, then $AM: PN =$
    (a) 16: 81   (b) 4: 9   (c) 3: 2   (d) 2: 3

**11.** In the given figure, PA and PB are tangents to the circle with centre O. If ∠APB = 60°, then ∠OAB is
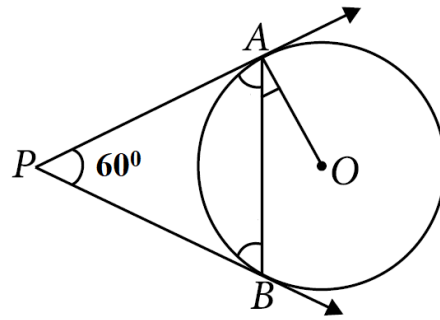
(a) 30°   (b) 60°   (c) 90°   (d) 15°

12. 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

13. For the following distribution:

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

the sum of lower limits of the median class and modal class is
(a) 15   (b) 25   (c) 30   (d) 35

14. If $5 \tan \theta = 4$, then the value of $\dfrac{5 \sin \theta - 3 \cos \theta}{5 \sin \theta + 2 \cos \theta}$ is

(a) 1/6   (b) 1/7   (c) 1/4   (d) 1/5

15. The ratio of the volumes of two spheres is 8 : 27. The ratio between their surface areas is
(a) 2 : 3   (b) 4 : 27   (c) 8 : 9   (d) 4 : 9

16. The area of the circle that can be inscribed in a square of 6cm is
(a) 36π cm^2 (b) 18π cm^2 (c) 12π cm^2 (d) 9π cm^2

17. In the figure, if DE ∥ BC, AD = 3 cm, BD = 4 cm and BC = 14 cm, then DE equals :
(a) 7 cm   (b) 6 cm   (c) 4 cm   (d) 3 cm
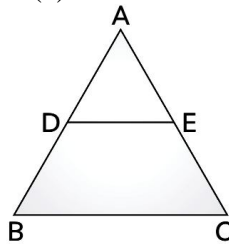
18. ABCD is a trapezium with AD ∥ BC and AD = 4cm. If the diagonals AC and BD intersect each other at O such that AO/OC = DO/OB =1/2, then BC =
(a) 6cm   (b) 7cm   (c) 8cm   (d) 9cm

DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.
Choose the correct option

19. Assertion (A): The number 6^n, n being a natural number, ends with the digit 5.
Reason (R): The number 9^n cannot end with digit 0 for any natural number n.
(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.

20. **Assertion (A):** The point (–1, 6) divides the line segment joining the points (–3, 10) and (6, –8) in the ratio 2 : 7 internally.

Reason (R): Given three points, i.e. A, B, C form an equilateral triangle, then AB = BC = AC.

(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.

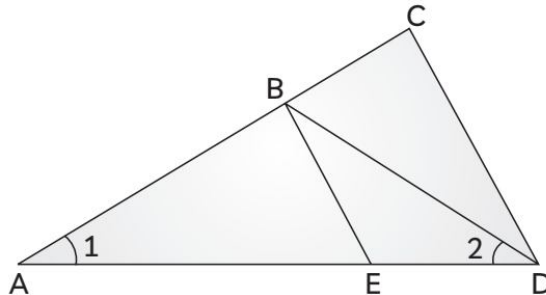(d) Assertion (A) is false but reason (R) is true.

SECTION – B
Questions 21 to 25 carry 2 marks each.

21. If $\sin(A + B) = 1$ and $\cos(A – B) = \sqrt{3}/2$, $0° < A + B \leq 90°$ and $A > B$, then find the measures of angles A and B.

OR
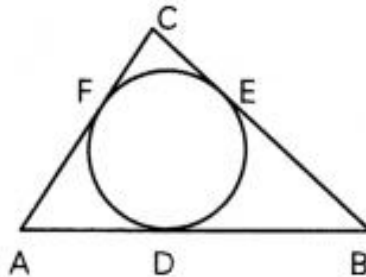
Find an acute angle θ when $\dfrac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \dfrac{1 - \sqrt{3}}{1 + \sqrt{3}}$

22. In the given figure below, AD/AE=AC/BD and $\angle 1 = \angle 2$. Show that Δ BAE~ ΔCAD .

23. If $217x + 131y = 913$, $131x + 217y = 827$, then find the value of x and y

24. A circle is inscribed in a ΔABC having AB= 10cm, BC = 12cm and CA = 8cm and touching these sides at D, E, F respectively. Find the lengths of AD, BE and CF

25. The length of the minute hand of a clock is 6cm. Find the area swept by it when it moves from 5:25 pm to 6:00 pm.

OR

In the given figure, the shape of the top of a table is that of a sector of a circle with centre O and $\angle AOB = 90°$. If AO = OB = 42 cm, then find the perimeter of the top of the table is [Take $\pi = 22/7$]
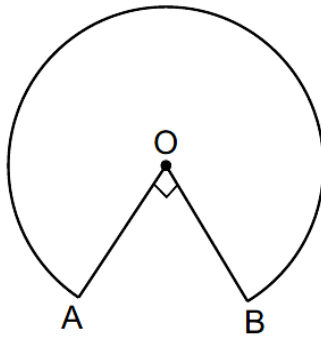
SECTION – C

Questions 26 to 31 carry 3 marks each.

26. A train covered a certain distance at a uniform speed. If the train would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6 km/hr; it would have taken 6 hours more than the scheduled time. Find the length of the journey.

OR

Anuj had some chocolates, and he divided them into two lots A and B. He sold the first lot at the rate of ₹2 for 3 chocolates and the second lot at the rate of ₹1 per chocolate, and got a total of ₹400. If he had sold the first lot at the rate of ₹1 per chocolate, and the second lot at the rate of ₹4 for 5 chocolates, his total collection would have been ₹460. Find the total number of chocolates he had.

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

**28.** Given that √5 is irrational, prove that $2 + 3\sqrt{5}$ is irrational.

29. Find the zeroes of the polynomial $x^2 + \dfrac{1}{6}x - 2$, and verify the relation between the coefficients and the zeroes of the polynomial.

30. Two coins are tossed simultaneously. What is the probability of getting
(i) At least one head?   (ii) At most one tail?   (iii) A head and a tail?

31. Prove that a parallelogram circumscribing a circle is a rhombus

OR

In the figure XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C interesting XY at A and X'Y' at B, what is the measure of ∠AOB.
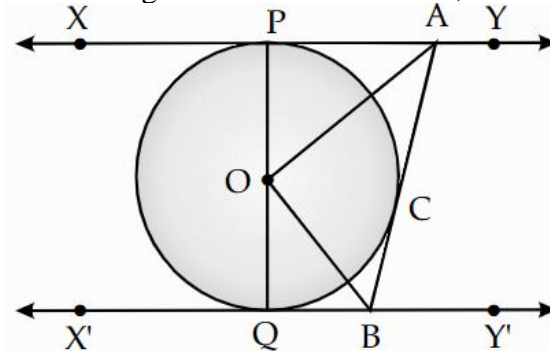
SECTION – D
Questions 32 to 35 carry 5 marks each.

32. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.
In the figure, find EC if AD/DB = AE/EC using the above theorem.
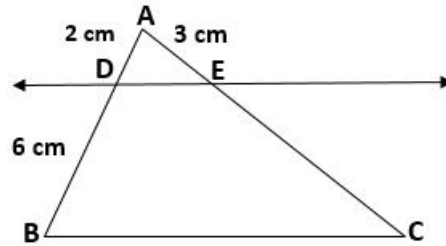
33. A cubical block of side 10 cm is surmounted by a hemisphere. What is the largest diameter that the hemisphere can have? Find the cost of painting the total surface area of the solid so formed, at the rate of Rs. 5 per 100 sq. cm. [Use π = 3.14]

OR

Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively decided to provide place and the canvas for 1500 tents and share the whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m², find the amount shared by each school to set up the tents.

34. The median of the following data is 868. Find the values of x and y, if the total frequency is 100

Class	Frequency
800 – 820	7
820 – 840	14
840 – 860	x
860 – 880	25
880 – 900	y
900 – 920	10
920 – 940	5

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

OR

In a flight of 600km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr from its usual speed and the time of the flight increased by 30 min. Find the scheduled duration of the flight.

SECTION – E(Case Study Based Questions)
Questions 36 to 38 carry 4 marks each.

36. Case Study – 1
Anita purchased a new building for her business. Being in the prime location, she decided to make some more money by putting up an advertisement sign for a rental ad income on the roof of the building.

From a point P on the ground level, the angle of elevation of the roof of the building is 30° and the angle of elevation of the top of the sign board is 45°. The point P is at a distance of 24 m from the base of the building.
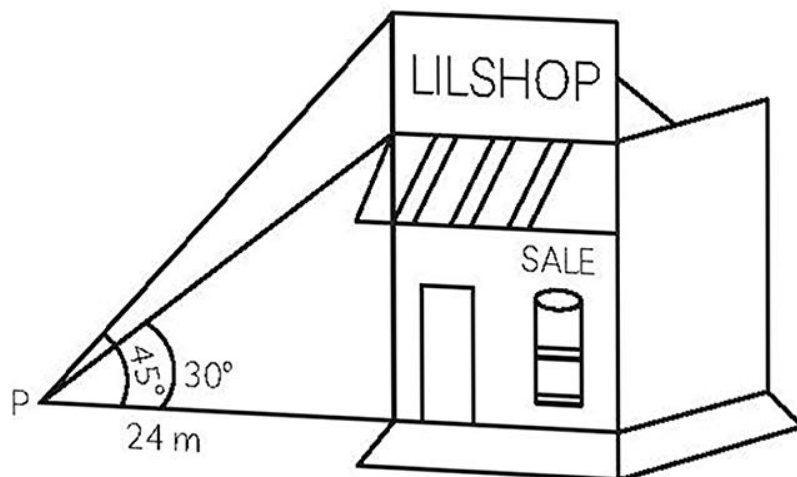
On the basis of the above information, answer the following questions:

(i) Find the height of the building (without the sign board).   (2)

OR

Find the height of the building (with the sign board)   (2)

(ii) Find the height of the sign board.   (1)

(iii) Find the distance of the point P from the top of the sign board.   (1)

37. Case Study-2

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 each succeeding circular row has 10 seats more than the previous one.

(i) If the first circular row has 30 seats, how many seats will be there in the 10th row? (1)
(ii) For 1500 seats in the auditorium, how many rows need to be there? (2)

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row? (2)
(iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?(1)

38. Case Study-3

The diagrams show the plans for a sun room. It will be built onto the wall of a house. The four walls of the sunroom are square clear glass panels. The roof is made using
• Four clear glass panels, trapezium in shape, all the same size
• One tinted glass panel, half a regular octagon in shape
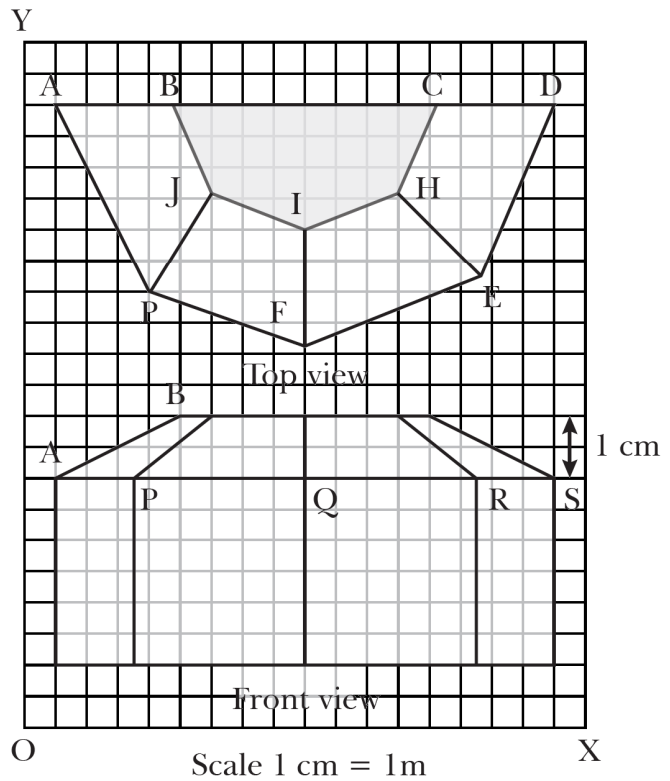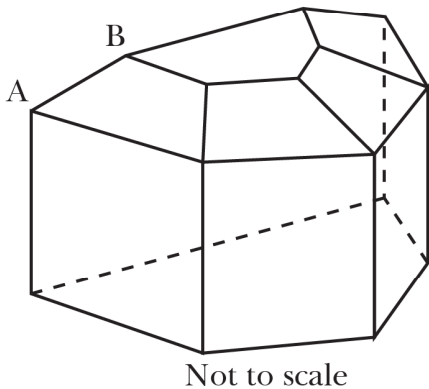
(i) Find the mid-point of the segment joining the points J (6, 17) and I (9, 16).   (1)
(ii) Find the distance between the points A and S.   (1)
(iii) Find the co-ordinates of the point which divides the line segment joining the points A and B in the ratio 1:3 internally.   (2)

OR

(iii) If a point (x,y) is equidistant from the Q(9,8) and S(17,8),then find the relation between x and y.   (2)