

SUBJECT: MATHEMATICS
CLASS : X

MAX. MARKS : 80
DURATION : 3 HRS

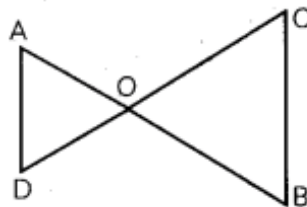
General Instruction:

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 $\pi = 22/7$ wherever required if not stated.

SECTION – A

Questions 1 to 20 carry 1 mark each.

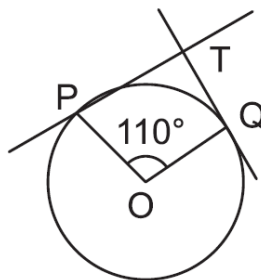
1. The solution of the following pair of equation is:
 $x - 3y = 2, 3x - y = 14$
(a) $x = 5, y = 1$ (b) $x = 2, y = 3$ (c) $x = 1, y = 2$ (d) $x = 1, y = 4$
2. What is the positive real root of $64x^2 - 1 = 0$?
(a) $1/8$ (b) $1/4$ (c) $1/2$ (d) $1/6$
3. In $\triangle ABC$ and $\triangle DEF$, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$. Then, the two triangles are
(a) congruent but not similar (b) similar but not congruent
(c) neither congruent nor similar (d) congruent as well as similar
4. The LCM of smallest two-digit composite number and smallest composite number is:
(a) 12 (b) 4 (c) 20 (d) 44
5. If $\operatorname{cosec} A = 13/12$, then the value of $\frac{2 \sin A - 3 \cos A}{4 \sin A - 9 \cos A}$
(a) 4 (b) 5 (c) 6 (d) 3
6. In the figure, if $\frac{OA}{OD} = \frac{OC}{OB}$, then



Which pair of angles are equal?

- (a) $\angle A = \angle C, \angle B = \angle D$
- (b) $\angle A = \angle B, \angle C = \angle D$
- (c) $\angle C = \angle B, \angle A = \angle D$
- (d) None of these

7. The value of 'a', if HCF (a, 18) = 2 and LCM (a, 18) = 36, is: (1)
 (a) 2 (b) 5 (c) 7 (d) 4
8. If $r = 3$ is a root of quadratic equation $kr^2 - kr - 3 = 0$, then the value of k is:
 (a) $1/2$ (b) 3 (c) $1/3$ (d) $1/4$
9. The ratio in which x-axis divides the join of (2, -3) and (5, 6) is:
 (a) 1: 2 (b) 3 : 4 (c) 1: 3 (d) 1: 5
10. If $\tan \theta = 1$, then the value of $\sec \theta + \operatorname{cosec} \theta$ is:
 (a) $3\sqrt{2}$ (b) $4\sqrt{2}$ (c) $2\sqrt{2}$ (d) $\sqrt{2}$
11. If the area of circle is numerically equal to twice its circumference, then the diameter of the circle is
 (a) 4 units (b) 6 units (c) 8 units (d) 12 units
12. In the given figure, if TP and TQ are tangents to a circle with centre O, so that $\angle POQ = 110^\circ$, then $\angle PTQ$ is



- (a) 110° (b) 90° (c) 80° (d) 70°
13. If the angle of elevation of the top of a tower from a point of observation at a distance of 100 m from its base is 45° , then the height of the tower is:
 (a) 160 m (b) 100 m (c) 200 m (d) 150 m
14. If the perimeter of a circle is equal to that of a square, then the ratio of the area of circle to the area of the square is
 (a) 14: 11 (b) 12: 13 (c) 11:14 (d) 13:12
15. For the following distribution:
- | | | | | | |
|------------------|-----|------|-------|-------|-------|
| Class | 0-5 | 6-11 | 12-17 | 18-23 | 24-29 |
| Frequency | 13 | 10 | 15 | 8 | 11 |
- the upper limit of the median class is
 (a) 18.5 (b) 20.5 (c) 25.5 (d) 17.5
16. If the mean of the following distribution is 2.6, then the value of y is
- | | | | | | |
|---------------------|---|---|---|---|---|
| Variable (x) | 1 | 2 | 3 | 4 | 5 |
| Frequency | 4 | 5 | y | 1 | 2 |
- (a) 3 (b) 8 (c) 13 (d) 24
17. Two different dice are thrown together. The probability of getting the sum of the two numbers less than 7 is:
 (a) $5/12$ (b) $7/12$ (c) $12/5$ (d) $3/11$
18. The radii of 2 cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Then, the ratio of their volumes is:
 (a) 19 : 20 (b) 20 : 27 (c) 18:25 (d) 17:23

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:

- (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.

19. Assertion (A): The value of y is 3, if the distance between the points P(2, -3) and Q(10, y) is 10.

Reason (R): Distance between two points is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

20. Assertion: The HCF of two numbers is 9 and their LCM is 2016. If the one number is 54, then the other number is 336.

Reason: Relation between numbers and their HCF and LCM is product of two numbers a, b = HCF (a, b) \times LCM (a, b).

SECTION – B

Questions 21 to 25 carry 2 marks each.

21. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

22. Evaluate: $3 \cos^2 60^\circ \sec^2 30^\circ - 2 \sin^2 30^\circ \tan^2 60^\circ$.

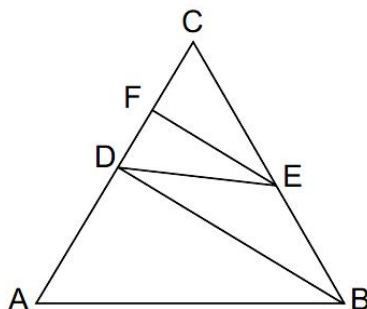
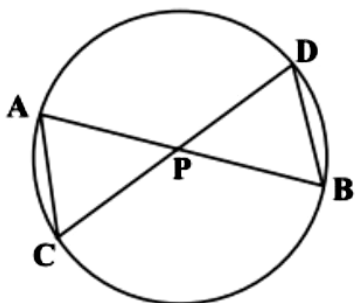
23. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

OR

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 the area of that part of the field in which the horse can graze (use $\pi = 3.14$)

24. For what value of k for which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7$, $(k - 1)x + (k + 2)y = 3k$ is

25. In the below left figure, two chords AB and CD intersect each other at the point P. Prove that (i) $\Delta APC \sim \Delta DPB$ (ii) $AP \cdot PB = CP \cdot DP$



OR

If in the given above right sided figure, $AB \parallel DE$ and $BD \parallel EF$, then prove that $DC^2 = CF \times AC$

SECTION – C

Questions 26 to 31 carry 3 marks each.

26. A part of monthly hostel charges in a college is fixed and the remaining depends on the number of days one has taken food in the mess. When a student 'A' takes food for 22 days, he has to

pay Rs. 1380 as hostel charges; whereas a student 'B', who takes food for 28 days, pays Rs. 1680 as hostel charges. Find the fixed charges and the cost of food per day.

OR

Meena went to a bank to withdraw Rs 2,000. She asked the cashier to give her Rs. 50 and Rs. 100 notes only. Meena got 25 notes in all. How many notes of Rs. 50 and Rs. 100 she received?

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

28. What number should be added to the polynomial $x^2 - 5x + 4$ so that 3 is the zero of the polynomial?

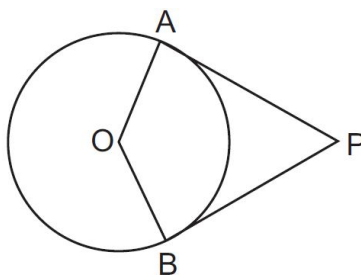
29. Prove that: $\frac{\cos^2 \theta}{1 - \tan \theta} + \frac{\sin^2 \theta}{1 - \cot \theta} = 1 + \sin \theta \cos \theta$

OR

If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.

30. All the black face cards are removed from a pack of 52 playing cards. The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting (i) face card (ii) red card (iii) black card.

31. In the given figure, OP is equal to diameter of the circle. Prove that ABP is an equilateral triangle.



SECTION – D

Questions 32 to 35 carry 5 marks each.

32. Some students planned a picnic. The total budget for food was Rs. 2,000. But 5 students failed to attend the picnic and thus the cost of food for each member increased by Rs. 20. How many students attended the picnic and how much did each student pay for the food?

OR

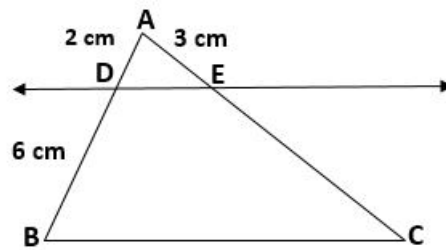
If Zeba was younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now?

33. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs. 500 per m^2 .

OR

A rectangular metal block has length 15 cm, breadth 10 cm and height 5 cm. From this block, a circular hole of diameter 7 cm is drilled out. Find: (i) the volume of the remaining solid (ii) the surface area of the remaining solid.

34. 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 the figure, find EC if $AD/DB = AE/EC$ using the above theorem.



35. The distribution below gives the marks of 100 students of a class, if the median marks are 24, find the frequencies f_1 and f_2

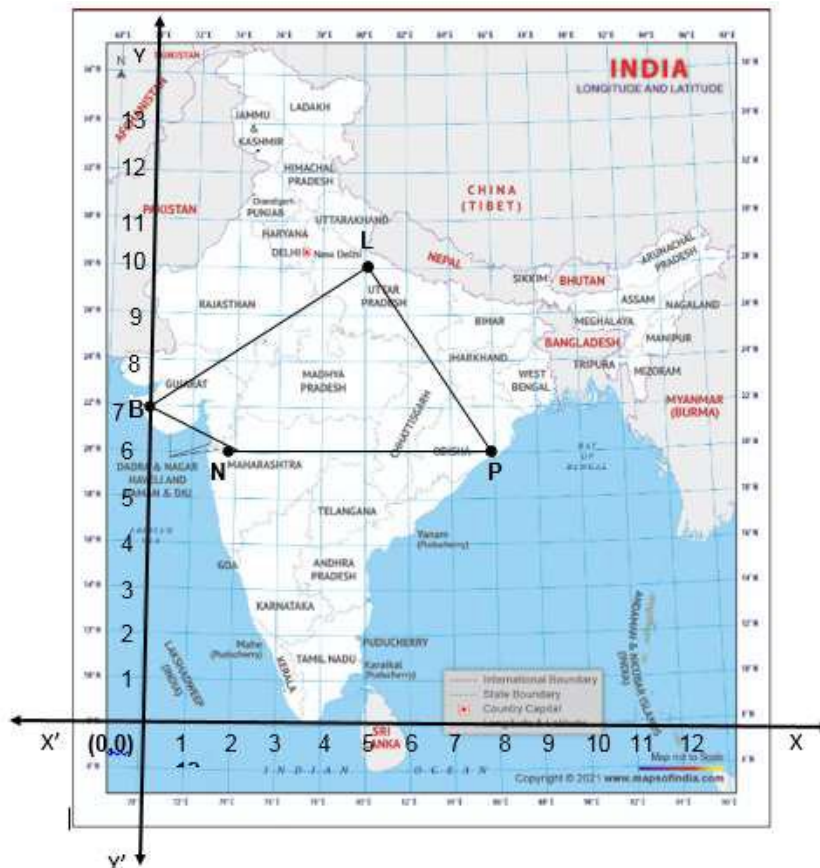
Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
No. of students	4	6	10	f_1	25	f_2	18	5

SECTION – E(Case Study Based Questions)

Questions 36 to 38 carry 4 marks each.

36. Case Study – 1

In a GPS, The lines that run east-west are known as lines of latitude, and the lines running north-south are known as lines of longitude. The latitude and the longitude of a place are its coordinates and the distance formula is used to find the distance between two places. The distance between two parallel lines is approximately 150 km. A family from Uttar Pradesh planned a round trip from Lucknow (L) to Puri (P) via Bhuj (B) and Nashik (N) as shown in the given figure below.



Based on the above information answer the following questions using the coordinate geometry.

- (i) Find the distance between Lucknow (L) to Bhuj(B).
- (ii) If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) into 3 : 2 then find the coordinate of Kota (K).
- (iii) Name the type of triangle formed by the places Lucknow (L), Nashik (N) and Puri (P)

OR

Find a place (point) on the longitude (y-axis) which is equidistant from the points Lucknow (L) and Puri (P).

37. Case Study – 2

Saving money is a good habit and it should be inculcated in children from the beginning. A father brought a piggy bank for his son Aditya. He puts one five-rupee coin of his savings in the piggy bank on the first day. He increases his savings by one five-rupee coin daily.



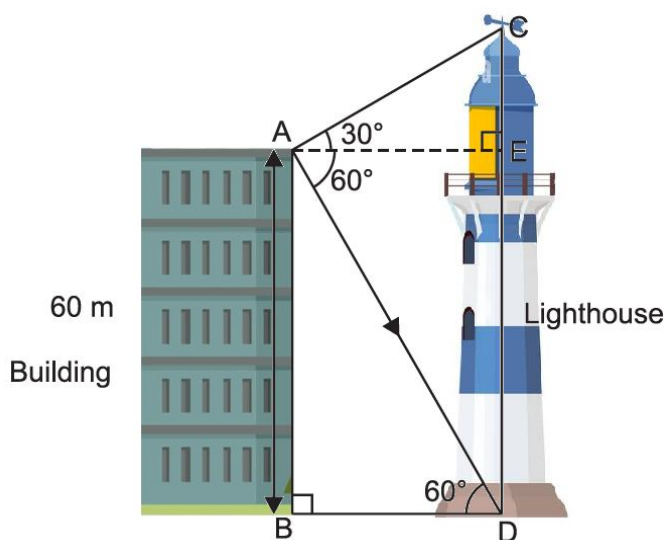
- (i) If the piggy bank can hold 190 coins of five rupees in all, find the number of days he can contribute to put the five-rupee coins into it. (2)
- (ii) Find the total money he saved. (2)

OR

If 6 times the 6th term of an A.P., is equal to 9 times the 9th term, find its 15th term. (2)

38. Case Study – 3

Ram is watching the top and bottom of a lighthouse from the top of the building. The angles of elevation and depression of the top and bottom of a lighthouse from the top of a 60 m high building are 30° and 60° respectively.



- Find (i) the difference between the heights of the lighthouse and the building. (2)
- (ii) the distance between the lighthouse and the building. (2)

OR

The ratio of the height of a light house and the length of its shadow on the ground is $\sqrt{3} : 1$ What is the angle of elevation? (2)