INDIAN SCHOOL MUSCAT
FIRST PRE-BOARD EXAMINATION 2023
MATHEMATICS BASIC (241)

CLASS: X
DATE: 09-01-2023

TIME ALLOTED : 3 HRS.
MAXIMUM MARKS:80

GENERAL INSTRUCTIONS:
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.
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. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =
   (a) 1   (b) 2   (c) 3   (d) 4

2. When 2120 is expressed as the product of its prime factors we get
   (a) $2 \times 5^3 \times 53$ (b) $2^3 \times 5 \times 53$ (c) $5 \times 7^2 \times 31$ (d) $5^2 \times 7 \times 33$

3. Two dice are thrown simultaneously. What is the probability of getting doublets?
   (a) $\frac{1}{36}$ (b) $\frac{1}{6}$ (c) $\frac{5}{6}$ (d) $\frac{11}{36}$

4. If p and q are the zeroes of the quadratic polynomial $f(x) = 2x^2 - 7x + 3$, find the value of p + q – pq is
   (a) 1   (b) 2   (c) 3   (d) None of these

5. The pair of linear equations $2x + 3y = 5$ and $4x + 6y = 10$ is
   (a) inconsistent   (b) consistent   (c) dependent consistent   (d) none of these

6. What is the positive real root of $64x^2 - 1 = 0$?
   (a) $\frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{6}$

7. In the figure, if $\dfrac{OA}{OD} = \dfrac{OC}{OB}$, then which pair of angles are equal?

    (a) ∠A = ∠C, ∠B = ∠D   (b) ∠A = ∠B, ∠C = ∠D

    (c) ∠C = ∠B, ∠A = ∠D   (d) None of these
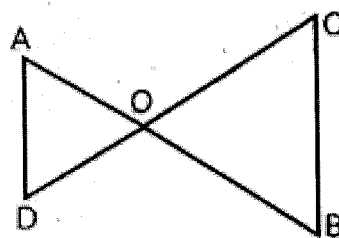
8. The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is:

    (a) 2 : 1   (b) 1 : 2   (c) 1 : 3   (d) 3 : 1

9. The line segment joining the points A (5, 3) and B (-3, 11) is divided by the point C (3,5) in the ratio

    (a) 1:3   (b) 3:1   (c) 2:3   (d) 3:2

10. The point which lies on the perpendicular bisector of the line segment joining point A (–2, –5) and B (2, 5) is:

    (a) (0, 0)   (b) (0, –1)   (c) (–1, 0)   (d) (1, 0)

11. If $\cos\theta + \cos^2\theta = 1$, the value of $\sin^2\theta + \sin^4\theta$ is :

    (a) –1   (b) 0   (c) 1   (d) 2

12. If for some angle θ, $\cot 2\theta = \dfrac{1}{\sqrt{3}}$, then the value of $\cos 3\theta$, where $3\theta \le 90°$, is

    (a) $\dfrac{1}{\sqrt{2}}$ (b) 1   (c) 0   (d) $\dfrac{\sqrt{3}}{2}$

13. If cosec A = 13/12, then the value of $\dfrac{2\sin A - 3\cos A}{4\sin A - 9\cos A}$

    (a) 4   (b) 5   (c) 6   (d) 3

14. If the angle between two radii of a circle is 140°, then the angle between the tangents at the ends of the radii is

    (a) 90°   (b) 50°   (c) 70°   (d) 40°

15. 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

16. 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

17. The median class of the following data is:

| Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of students	8	10	12	22	30	18

    (a) 20 – 30   (b) 30 – 40   (c) 40 – 50   (d) 50 – 60

18. The mean and mode of a frequency distribution are 28 and 16 respectively. The median is

    (a) 22   (b) 23.5   (c) 24   (d) 24.5

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

    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 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):* **The point (3, 0) lies on x -axis.**
    Reason (R): **The x co-ordinate on the point on y -axis is zero.**
    (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. In figure, ABCD is a rectangle. Find the values of x and y.
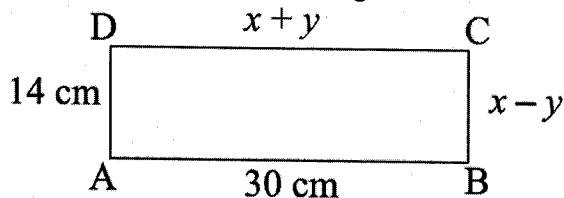
22. In Figure, PQ is parallel to MN. If $\dfrac{KP}{PM} = \dfrac{4}{13}$ and KN = 20.4 cm. Find KQ.
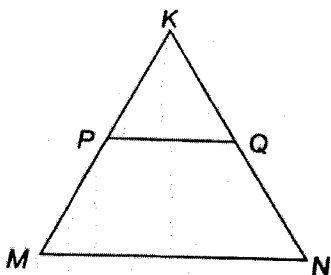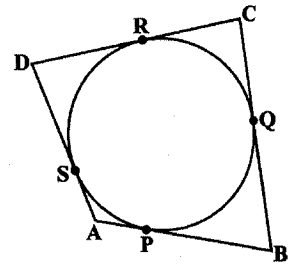

23. If $\tan (A + B) = \sqrt{3}$ and $\tan (A - B) = \dfrac{1}{\sqrt{3}}$; $0° < A+B \leq 90°$; $A > B$, find A and B.

    OR

   If $(1 + \cos A) (1 - \cos A) = 3/4$, $0° < A \leq 90°$, find the value of tan A.

24. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB + CD = AD + BC.

25. A rope by which a cow is tethered is increased from 16m to 23m. How much additional ground does it have now to graze? (Take π = 22/7)

OR

In the below figure, OACB is a quadrant of a circle with Centre O and radius 3.5 cm. If OD = 2 cm, find the area of the
(i) quadrant OACB,
(ii) shaded region. (Take π = 22/7)
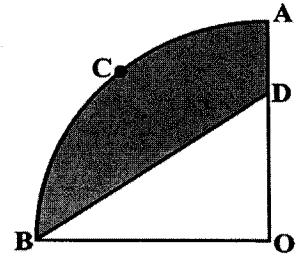
SECTION – C
Questions 26 to 31 carry 3 marks each

26. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. Find the minimum distance each should walk so that each can cover the same distance in complete steps.

27. Find the zeroes of the polynomial $6x^2 - 7x - 3$ and verify the relation between the coefficients and the zeroes of the polynomial.

28. 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.
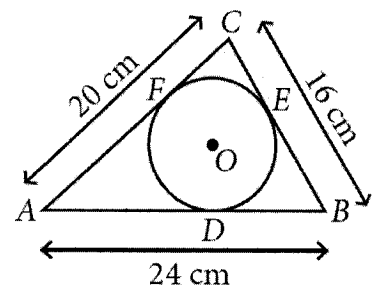
OR

Father's age is three times the sum of ages of his two children. After 5 years his age will be twice the sum of ages of two children. Find the age of father.

29. Prove that $(\sin A + \csc A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

OR

Prove that $\dfrac{\cos A}{1+\sin A} + \dfrac{1+\sin A}{\cos A} = 2\sec A$

30. A circle is inscribed in a ΔABC having sides 16 cm, 20 cm and 24 cm as shown in figure. Find AD, BE and CF.

31. From a pack of 52 playing cards, jacks, queens, kings and aces of red colour are removed. From the remaining cards, a card is drawn at random. Find the probability that the card drawn is

(i) a black queen   (ii) a red card   (iii) a face card.

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. State and Prove Basic Proportionality Theorem.

34. If the median of the distribution given below is 28.5, find the values of x and y.

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

35. 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 m². (Note that the base of the tent will not be covered with canvas.)

OR

A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)

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

36. Parth's mother started a new shoe shop. To display the shoes, she put 3 pairs of shoes in 1st row, 5 pairs in 2nd row, 7 pairs in 3rd row and so on.

On the basis of above information, answer the following questions.
   (i)   How many pairs of shoes are there in the 10th row?
   (ii) What is the difference in number of pairs of shoes in 17th row and 10th row?
   (iii) If she puts a total of 120 pairs of shoes, then find the number of rows required.
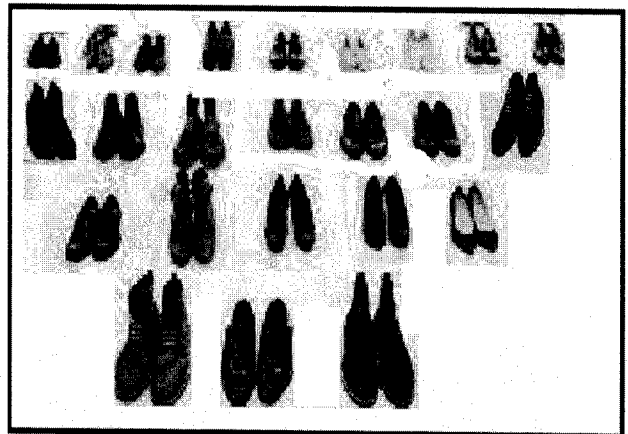
37. In a GPS, the lines that run east-west are known as lines of latitude, and the lines running north-south are known as lines of longitude. The latitude and the longitude of a place are its coordinates, and the distance formula is used to find the distance between two places. The distance between two 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.
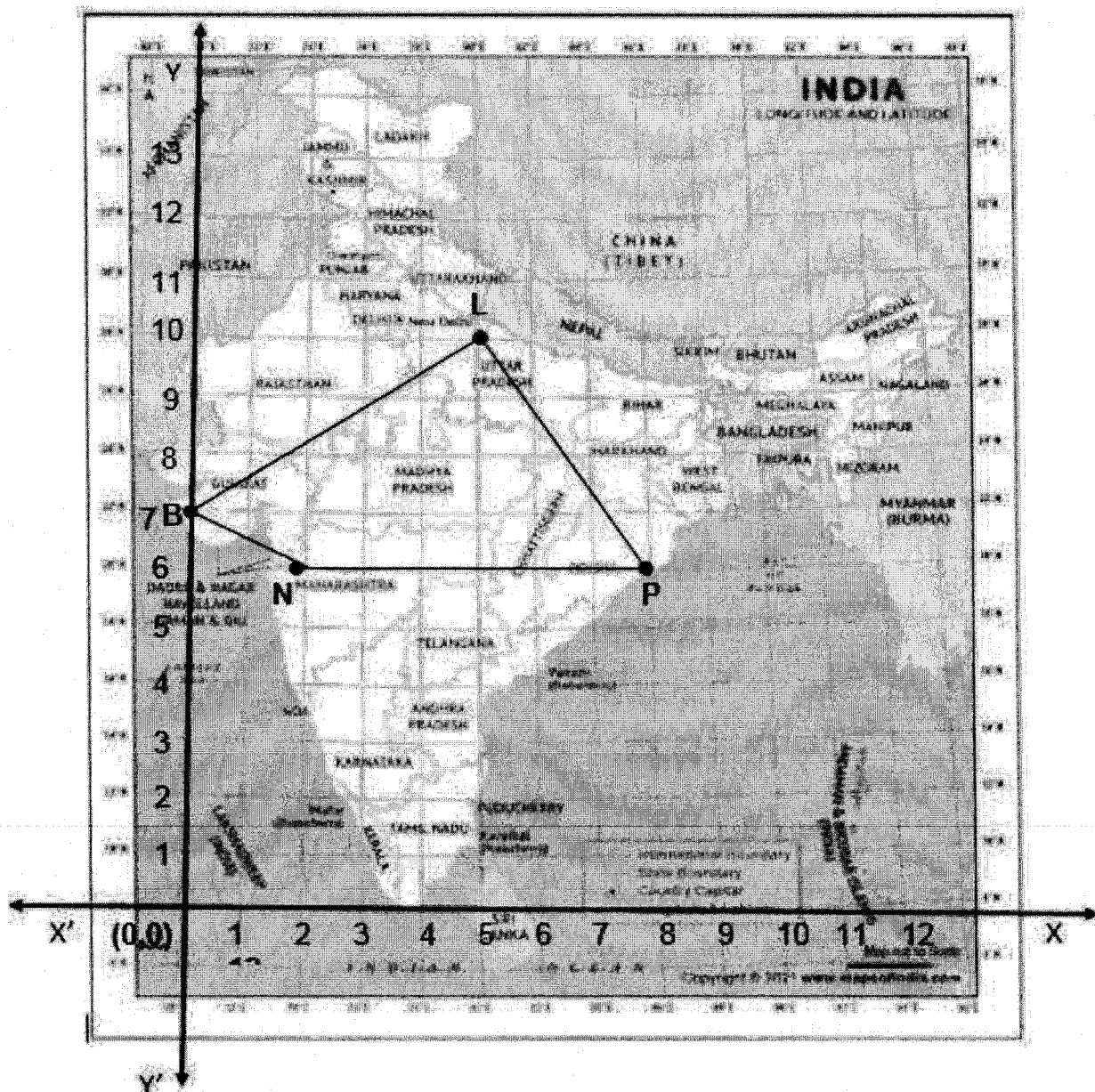
Based on the above information answer the following questions using the coordinate geometry.

(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).

38. 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, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. 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 m. From point O, the angle of elevation of the top of section B is 30° and the angle of elevation of the top of section A is 45°.
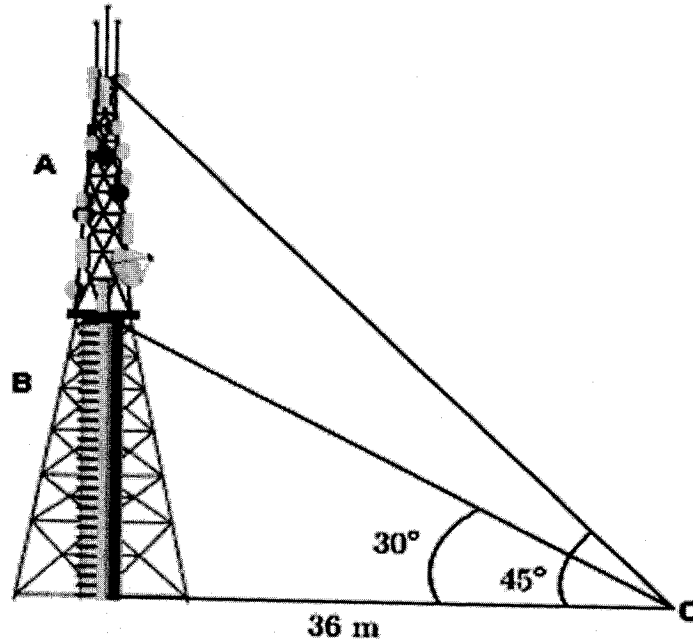
(i) What is the height of the section B?
(ii) What is the height of the section A?
(iii) What is the length of the wire structure from the point O to the top of section A?

OR

What is the length of the wire structure from the point O to the top of section B?

****END OF THE QUESTION PAPER****