Practice Paper - 2

(Mathematics Standard)

Max.Marks- 80 **Max.Time - 3 hrs**

General Instructions :

Read the following instructions very carefully and strictly follow them :

(i) *This question paper contains **38** questions. **All** questions are **compulsory**.*

(ii) *This question paper is divided into **five** Sections – **A**, **B, C, D** and **E**.*

(iii) *In **Section A,** Questions no. **1** to **18** are multiple choice questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of **1** mark each.*

(iv) *In **Section B,** Questions no. **21** to **25** are very short answer (VSA) type questions, carrying **2** marks each.*

(v) *In **Section C,** Questions no. **26** to **31** are short answer (SA) type questions, carrying **3** marks each.*

(vi) *In **Section D,** Questions no. **32** to **35** are long answer (LA) type questions carrying **5** marks each.*

(vii) *In **Section E,** Questions no. **36** to **38** are case study based questions carrying **4** marks each. Internal choice is provided in **2** marks questions in each case study.*

(viii) *There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.*

(ix) *Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.*

(x) *Use of calculator is **not** allowed.*

SECTION A

*This section has **20** Multiple Choice Questions (MCQs) carrying **1** mark each.* $20\times1=20$

1. The quadratic equation whose sum and product of roots are 'a' and '$\frac{1}{a}$' respectively is :

(A) $ax^2 - ax + 1 = 0$ (B) $ax^2 - a^2x + 1 = 0$

(C) $ax^2 + ax + 1 = 0$ (D) $ax^2 + a^2x - 1 = 0$

2. The 9^{th} term from the end (towards first term) of the AP 7, 11, 15, 19, …., 147 is :

(A) 135 (B) 125

(C) 115 (D) 39

3. The perimeter of the triangle formed by the vertices (0, 0), (2, 0) and (0, 2) is :

(A) 4 units (B) 6 units

(C) $6\sqrt{2}$ units (D) $(4 + 2\sqrt{2})$ units

4. The line represented by the equation $x - y = 0$ is :

(A) parallel to x-axis

(B) parallel to y-axis

(C) passing through the origin

(D) passing through the point (3, 2)

5. If -4 is a zero of the polynomial $p(x) = x^2 - x - (2 + 2k)$, then the value of k is :

(A) 3 (B) 9

(C) 6 (D) -9

6. The HCF of 40, 110 and 360 is :

(A) 40 (B) 110

(C) 360 (D) 10

7. If a large circular pizza is divided into 5 equal sectors, then the central angle of each sector will be :

(A) 60°

(B) 90°

(C) 45°

(D) 72°

8. The least number which is a perfect square and is divisible by each of 16, 20 and 50, is :

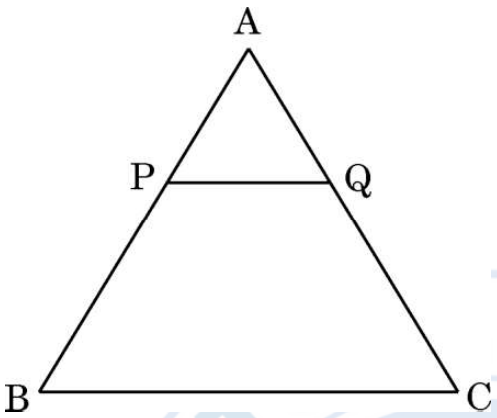
(A) 1200

(B) 100

(C) 3600

(D) 2400

9. In the given figure, PQ || BC. If $\frac{AP}{PB} = \frac{4}{13}$ and AC = 20·4 cm, then the length of AQ is :



(A) 2·8 cm (B) 5·8 cm

(C) 3·8 cm (D) 4·8 cm

10. The coordinates of the end points of a diameter of a circle are (5, – 2) and (5, 2). The length of the radius of the circle is :

(A) ± 2 (B) ± 4

(C) 4 (D) 2

11. If $\sin(\alpha + \beta) = 1$, then the value of $\sin\left(\frac{\alpha + \beta}{2}\right)$ is :

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{2}$

(C) 0 (D) 1

12. If $1080 = 2^p \times 3^q \times 5$, then $(p - q)$ is equal to :

(A) 6 (B) –1

(C) 1 (D) 0

13. If all the red face cards are removed from the deck of 52 playing cards, then the probability of getting a black jack from the remaining cards is :

(A) $\frac{2}{46}$ (B) $\frac{2}{52}$

(C) $\frac{4}{48}$ (D) $\frac{2}{23}$

14. The equation of a line parallel to the x-axis and at a distance of 3 units below x-axis is :

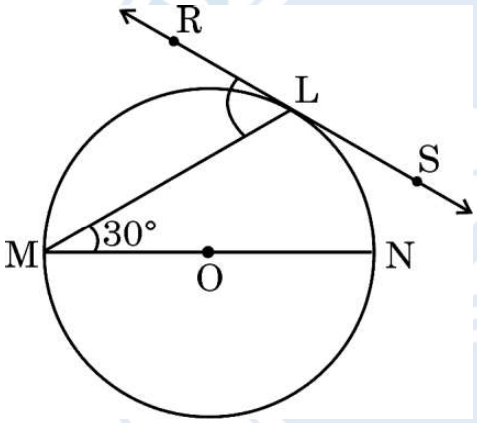
(A) $x = 3$

(B) $x = -3$

(C) $y = -3$

(D) $y = 3$

15. In the given figure, RS is the tangent to the circle at the point L and MN is the diameter. If $\angle NML = 30°$, then $\angle RLM$ is :



(A) 30° (B) 60°

(C) 90° (D) 120°

16. In a cricket match, a batsman hits the boundary 7 times out of the 42 balls he plays. The probability of his ***not*** hitting a boundary is :

(A) $\frac{1}{7}$

(B) $\frac{2}{7}$

(C) $\frac{5}{6}$

(D) $\frac{1}{6}$

17. Which of the following statements is ***incorrect*** ?

(A) Two congruent figures are always similar.

(B) A square and a rhombus of the same area are always similar.

(C) Two equilateral triangles are always similar.

(D) Two similar triangles need not be congruent.

18. If $\sin 30° \tan 45° = \frac{\sec 60°}{k}$, then the value of k is :

(A) 4

(B) 3

(C) 2

(D) 1

*Questions number **19** and **20** are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.*

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of the 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 pair of linear equations $px + 3y + 59 = 0$ and $2x + 6y + 118 = 0$ will have infinitely many solutions if $p = 1$.

Reason (R): If the pair of linear equations $px + 3y + 19 = 0$ and $2x + 6y + 157 = 0$ has a unique solution, then $p \neq 1$.

20. *Assertion (A) :* Common difference of the AP : 5, 1, – 3, – 7, … is 4.

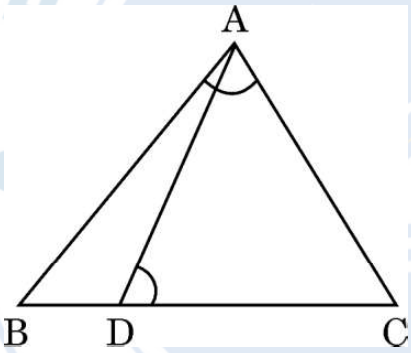
Reason (R): Common difference of the AP : $a_1, a_2, a_3, \ldots, a_n$ is obtained by $d = a_n - a_{n-1}$.

SECTION B

*This section has **5** Very Short Answer (VSA) type questions carrying **2** marks each.* *5×2=10*

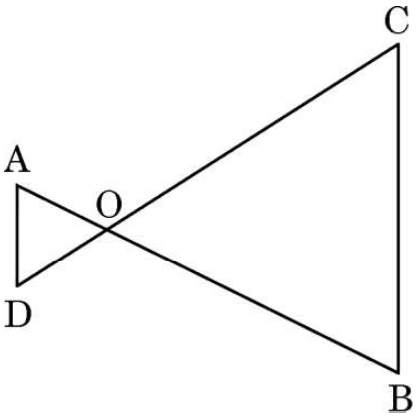
21. Find a quadratic polynomial whose zeroes are 2 and $-\frac{7}{5}$.

22. (a) In the given figure, D is a point on the side BC of Δ ABC such that ∠ ADC = ∠ BAC. Show that CA^2 = CD . CB.

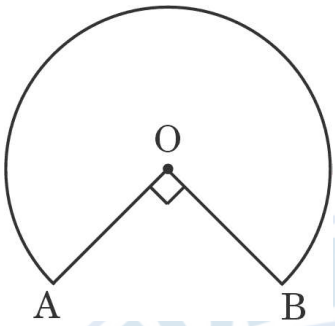


OR

(b) In the given figure, OA . OB = OC . OD. Show that ∠ A = ∠ C and ∠ B = ∠ D.

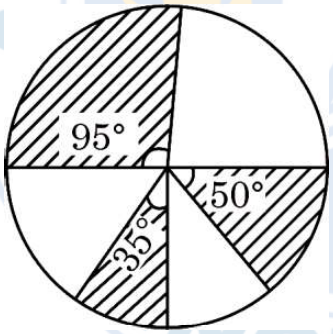


23. (a) In the given figure, the shape of the top of a table is that of a sector of a circle with centre O and $\angle AOB = 90°$. If AO = OB = 42 cm, then find the perimeter of the top of the table.

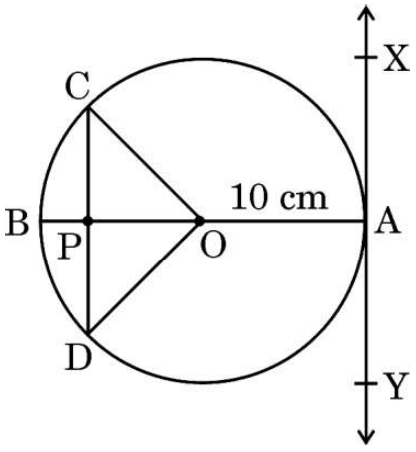


OR

(b) In the given figure, three sectors of a circle of radius 5 cm, making angles 35°, 50° and 95° at the centre are shaded. Find the area of the shaded region. [Use $\pi = \frac{22}{7}$]



24. At point A on the diameter AB of a circle of radius 10 cm, tangent XAY is drawn to the circle. Find the length of the chord CD parallel to XY at a distance of 16 cm from A.



25. If $\tan A = \sqrt{3}$; where A is an acute angle, then find the value of $\frac{\sin^2 A}{1+\cos^2 A}$.

SECTION C

*This section has **6** Short Answer (SA) type questions carrying **3** marks each.* $6\times3=18$

26. (a) If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then prove that $m^2 - n^2 = 4\sqrt{mn}$.

OR

(b) Prove that : $\frac{\cot A - 1}{2 - \sec^2 A} = \frac{\cot A}{1 + \tan A}$

27. If (a, b) is the mid-point of the line segment joining the points A(10, – 6) and B(k, 4) and a – 2b = 18, then find the value of k.

28. A sum of ₹ 2,000 is invested at 7% per annum simple interest. Calculate the interests at the end of 1^{st}, 2^{nd} and 3^{rd} year. Do these interests form an AP ? If so, find the interest at the end of the 27^{th} year.

29. Prove that $\sqrt{3}$ is an irrational number.

30. The length of the hour hand of a clock is 10 cm. Find the area of the minor sector swept by the hour hand of the clock between 5 a.m. to 8 a.m. Also, find the area of the major sector.

31. (a) Prove that the parallelogram circumscribing a circle is a rhombus.

OR

(b) Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

SECTION D

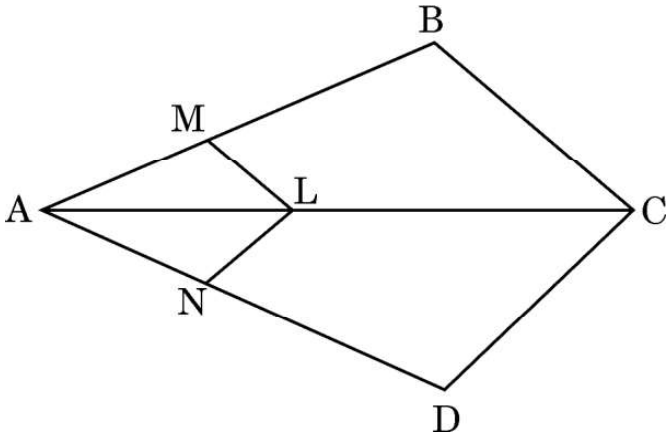
*This section has **4** Long Answer (LA) type questions carrying **5** marks each.* $4\times5=20$

32. (a) The sum of the areas of two squares is 52 cm^2 and difference of their perimeters is 8 cm. Find the lengths of the sides of the two squares.

OR

(b) The time taken by a person to travel an upward distance of 150 km was $2\frac{1}{2}$ hours more than the time taken in the downward return journey. If he returned at a speed of 10 km/h more than the speed while going up, find the speeds in each direction.

33. Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points divides the other two sides in the same ratio. Hence, in the figure given below, prove that $\frac{AM}{MB} = \frac{AN}{ND}$ where LM || CB and LN || CD.



34. Find the mean and median for the following data :

Classes	*Frequency*
5 – 15	2
15 – 25	3
25 – 35	5
35 – 45	7
45 – 55	4
55 – 65	2
65 – 75	2

35. (a) The angle of elevation of an airborne helicopter from a point A on the ground is 45°. After a flight of 15 seconds, the angle of elevation of the helicopter changes to 30°. If the helicopter is flying at a constant height of 2000 m, find the speed of the helicopter. (Take $\sqrt{3}$ = 1·732)

OR

(b) A girl 1·5 m tall is standing at some distance from a 30 m high tower. The angle of elevation from her eye to the top of the tower increases from 30° to 60° as she walks towards the tower. Find the distance she walked towards the tower.

SECTION E

*This section has **3** case study based questions carrying **4** marks each.* *3×4=12*

Case Study – 1

36. Rahul is a lucky charm for his cricket team. He has a jar of cards with numbers from 10 to 74. Before each match, he draws a card from the jar. If the card bears an even number, the team wins. If the number is even and divisible by 5, they win by a big margin. If the number is an odd number less than 30, they win by a small margin. And if the number is a prime number between 50 and 74, they lose.

Answer the following questions if Rahul draws a card today :

(i) What is the probability that Rahul draws a card with an even number ? *1*

(ii) What is the probability that Rahul draws a card with an odd number less than 30 ? *1*

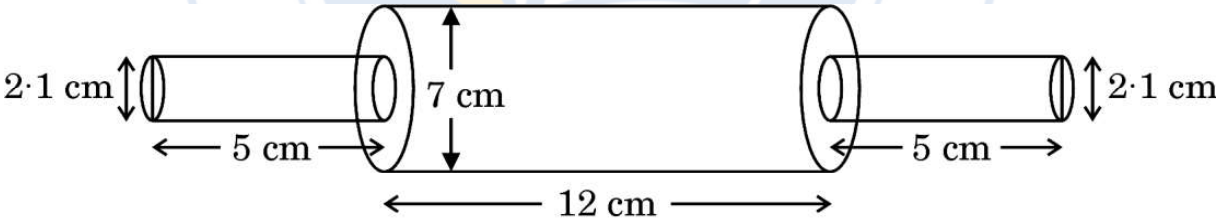
(iii) (a) What is the probability that Rahul draws a card with a prime number between 50 and 74 ? *2*

OR

(b) What is the probability that Rahul draws a card with an even number divisible by 5 ? *2*

Case Study – 2

37. A skilled carpenter decided to craft a special rolling pin for the local baker. He carefully joined three cylindrical pieces of wood – two small ones on the ends and one larger in the centre to create a perfect tool. The baker loved the rolling pin, as it rolled out the smoothest dough for breads and pastries.



The length of the bigger cylindrical part is 12 cm and diameter is 7 cm and the length of each smaller cylindrical part is 5 cm and diameter is 2·1 cm.

Based on the above information, answer the following questions :

(i) Find the volume of the bigger cylindrical part. *1*

(ii) Find the curved surface area of the bigger cylindrical part. *1*

(iii) (a) Find the ratio of the volume of the bigger cylindrical part to the total volume of the two smaller (identical) cylindrical parts. *2*

OR

(b) Find the sum of the curved surface areas of the two identical smaller cylindrical parts. *2*

Case Study – 3

38. A school is organizing a grand cultural event to show the talent of its students. To accommodate the guests, the school plans to rent chairs and tables from a local supplier. It finds that rent for each chair is ₹ 50 and for each table is ₹ 200. The school spends ₹ 30,000 for renting the chairs and tables. Also, the total number of items (chairs and tables) rented are 300.

If the school rents 'x' chairs and 'y' tables, answer the following questions :

(i) Write down the pair of linear equations representing the given information. *1*

(ii) (a) Find the number of chairs and number of tables rented by the school. *2*

OR

(b) If the school wants to spend a maximum of ₹ 27,000 on 300 items (tables and chairs), then find the number of chairs and tables it can rent. *2*

(iii) What is maximum number of tables that can be rented in ₹ 30,000 if no chairs are rented ? *1*