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Series RMT–DS1

Code No. RSPL/2

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Candidates must write the Code on the title page of the answer-book.

- Please check that this question paper contains **12** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **38** questions.
- **Please write down the Serial Number of the question before attempting it.**

MATHEMATICS (STANDARD)

Time Allowed : 3 Hrs *Maximum Marks : 80*

General Instructions :

1. *This Question Paper has 5 Sections A, B, C, D and 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 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.*
8. *Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.*

SECTION – A

Section A consists of 20 questions of 1 mark each.

1. The product of prime factors of 1479 is

(a) $3 \times 29 \times 13$ (b) $29 \times 11 \times 3$

(c) $29 \times 17 \times 3$ (d) $19 \times 11 \times 3$

2. The zeroes of a quadratic polynomial $x^2 - 7x + 10$ are

(a) –2 and 5 (b) 2 and 5

(c) 2 and –5 (d) –2 and –5

3. The linear equation $2x + 3y - 6 = 0$ interest $y = 0$ at

(a) (6, 0) (b) (2, 0)

(c) (0, 0) (d) (3, 0)

4. The sum of two zeroes is –1 and their product is –12, then the quadratic equation satisfy the above condition is

(a) $x^2 - x - 12 = 0$ (b) $x^2 - x + 12 = 0$

(c) $2x^2 - 12x - 1 = 0$ (d) $x^2 + x - 12 = 0$

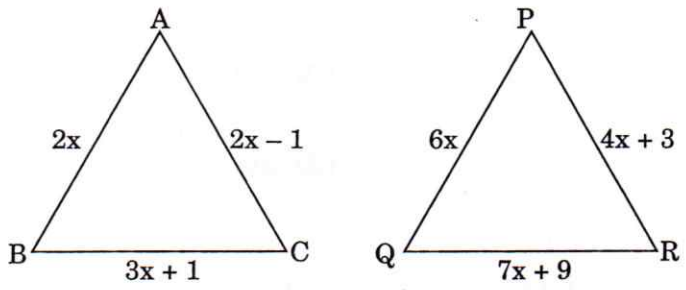
5. First negative term of the A.P. 148, 141, 134, 127, ... is

(a) –6 (b) –1 (c) –5 (d) –2

6. The ratio in which (8, 6) divides the line segment joining the points (5, 3) and (10, 8)

(a) 3 : 2 (b) 4 : 1 (c) 2 : 3 (d) 1 : 4

7. In figure $\Delta ABC \sim \Delta PQR$, then find the value of x



(a) 3 (b) $\frac{1}{3}$

(c) Any Natural Number other than 3 (d) 0

8. The mid point of A(2x, 5y) and B(4x, 3y) is (5, 2), then values of x and y are

(a) $x = \frac{-5}{2}, y = -\frac{1}{2}$ (b) $x = \frac{5}{3}, y = \frac{1}{2}$

(c) $x = 6, y = 8$ (d) $x = \frac{-5}{3}, y = \frac{1}{2}$

9. Value of θ, for which $3 \tan \theta = \sqrt{3}$, is

(a) 60° (b) 30° (c) 45° (d) 90°

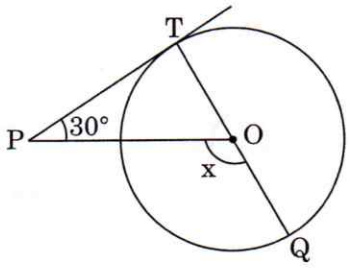
10. Value of $\frac{\sin 30° \times \cot 45°}{\sec 30°}$

(a) $\frac{4}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{2}{\sqrt{3}}$ (d) $\frac{\sqrt{3}}{4}$

11. Two towers stand on a horizontal plane of different heights h_1 and h_2. If the angles of elevation 60° and 30° respectively from the mid-point of the line joining base of the towers. then $h_1 : h_2$ is

(a) 3 : 1 (b) $\sqrt{3} : 1$ (c) $1 : \sqrt{3}$ (d) 1 : 1

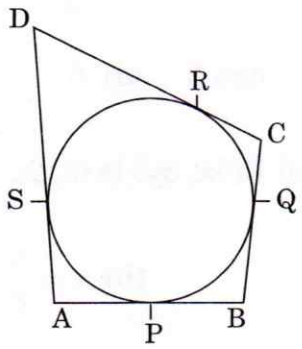
12. In figure, if PT is a tangent to the circle with centre O. Where $\angle TPO = 30°$, then x is



(a) 60° (b) 120°

(c) 30° (d) 90°

13. In figure, Quadrilateral ABCD circumscribe a circle, if AD = 10 cm, DC = 9 cm and BC = 5 cm, then AB is

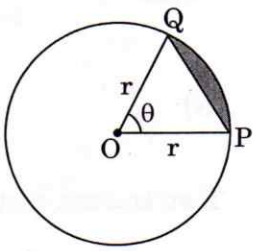


(a) 6 cm (b) 10 cm (c) 9 cm (d) 5 cm

14. Area of a sector is $\frac{1}{6}$ of the area of circle, then the sector angle is

(a) 45° (b) 90° (c) 30° (d) 60°

15. Area of shaded region is



(a) $\frac{\pi r^2\theta}{360°}$ (b) $\frac{r^2}{2}\left[\frac{\pi\theta}{180°} - \sin\theta\right]$

(c) $\frac{r}{2}\left[\frac{\pi\theta}{180°} - \sin\theta\right]$ (d) $\frac{\pi r\theta}{180°} - \frac{1}{2}r^2\sin\theta$

16. A number is selected from numbers 2 to 22. The probability that number selected is multiple of 3

(a) $\frac{7}{22}$ (b) $\frac{1}{3}$ (c) $\frac{7}{20}$ (d) $\frac{3}{11}$

17. Which of the following cannot be the probability of an event?

(a) $\frac{4}{9}$ (b) $\frac{12}{7}$ (c) 27% (d) 0.36

18. For a data Mean: Median = 5 : 4, then Mode : Median is equal to

(a) 1 : 2 (b) 2 : 1

(c) 4 : 5 (d) 3 : 2

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. **Statement A (Assertion):** A right cylindrical container of base radius 7 cm and height 10 cm contain 1540 cm^3 of ice-cream.

Statement R (Reason): The ice-cream of above container distributed to 10 children in equal cones, that each child get 154 cm^3 of ice-cream.

(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. **Statement A (Assertion):** $5K - 1$, $3K + 7$ and $4K + 8$ are 3 consecutive terms of an A.P. Series, then value of K is $\frac{7}{3}$.

Statement R (Reason): Common difference (d) of an A.P. = $a_2 - a_1$.

(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.

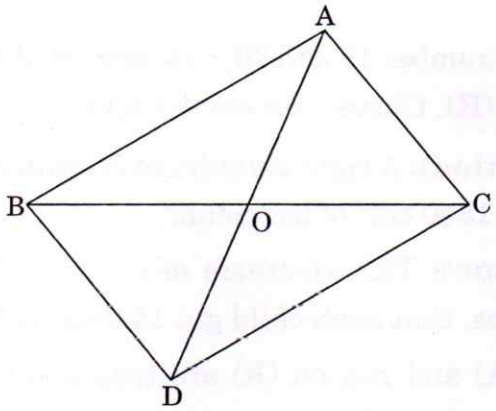
(d) Assertion (A) is false but reason (R) is true.

SECTION – B

Section B consists of 5 questions of 2 marks each.

21. If $\sqrt{3}$ is an irrational number then show that $2 + 3\sqrt{3}$ is also an irrational.

22. In the given figure, ΔABC and ΔDBC are on same base BC. If AD intersects BC at O. Show that $\frac{\text{ar } \Delta ABC}{\text{ar } \Delta DBC} = \frac{AO}{DO}$



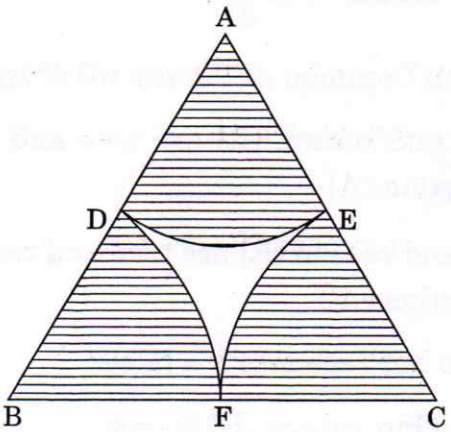
23. Prove that $\sin^2 \theta \cot^2 \theta = 1 - \cos^2 \theta \tan^2 \theta$

OR

If $\sin \theta = \frac{4}{5}$, then find $\sec \theta$, $\tan \theta$ and $\cot \theta$.

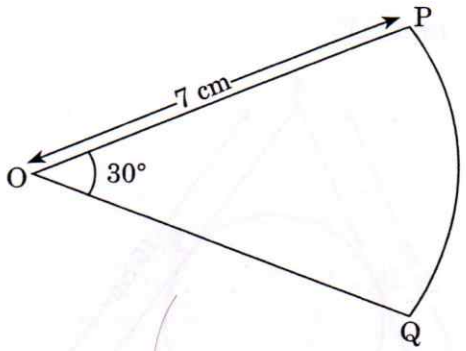
24. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

25. ΔABC is an equilateral triangle with sides 6 cm and D, E and F are mid-points of sides AB, AC and BC respectively. Find the area of shaded Region.



OR

In the given figure, radius of the sector of a circle is 7 cm with central angle 30°. Find perimeter of OPQ.



SECTION – C

Section C consists of 6 questions of 3 marks each.

26. A Carton Box contains 100 mangoes. The distribution of masses of the mangoes is given in the table.

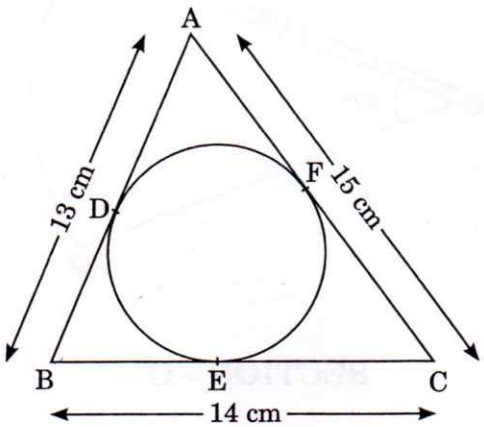
Mass of Mangoes (in gm)	Number of Mangoes
120 – 160	16
160 – 200	18
200 – 240	20
240 – 280	x
280 – 320	14
320 – 360	7
360 – 400	6
	100

Find the value of x, also find mode mass of mangoes.

27. Prove that tangent to a circle is perpendicular to the radius through the point of contact.

OR

A ΔABC is circumscribe a circle having sides 13 cm, 14 cm and 15 cm as shown in figure. Find BD, EC and AF.



28. Solve the following pair of linear equations $x = 4$, $y = 2$ graphically. Also find area enclosed by these lines, with x-axis and y-axis.

OR

The sum of the digits of a two digit number is 11. The number obtained by interchanging the two digits exceeds the given number by 45. Find two digit number.

29. Prove that

$$\frac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} - \frac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta} = 2$$

30. In a school activity, 3 friends start running together in the same direction and measurements of their each step is 72 cm, 80 cm and 84 cm respectively.What is the minimum distance each should run, so that they can cover the distance in complete steps?

31. Find the zeroes of the quadratic polynomial $x^2 - 3\sqrt{3}x + 6$ and verify the relationship between zeroes and their coefficients.

SECTION – D

Section D consists of 4 questions of 5 marks each.

32. Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC at L and AD produced to E, prove that EL = 2BL.

33. Show that the following quadratic equation have real roots.

$4x^2 - 4a^3x + (a^6 - b^6) = 0.$

If real roots exist find them.

OR

If the roots of the quadratic equation $(a - b)x^2 + (b - c)x + (c - a) = 0$ are equal, prove that $2a = b + c$. Also, find roots of the above quadratic equation.

34. Find the mean and median of the following frequency distribution.

Length of leaves (in cm)	**No. of leaves**
0 – 3	12
3 – 6	6
6 – 9	10
9 – 12	13
12 – 15	9
Total	50

35. 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 $\pi = 3.14$)

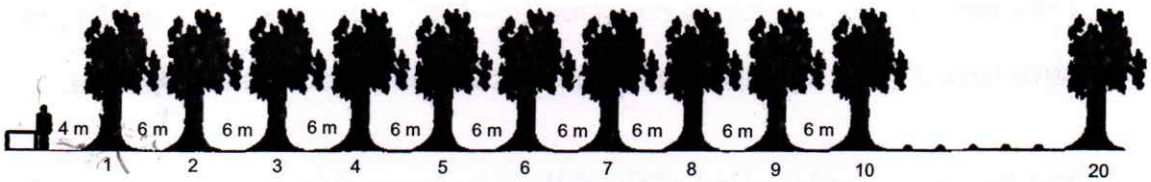
OR

A solid cylindrical article is of height 12 cm and radius 3.5 cm. A hemispherical depression of radius equal to the base radius of cylinder is scooped out from each end of the cylindrical article. Find the total surface area of the remaining solid.

SECTION – E

Case study based questions are compulsory.

36. In Dev's daily routine, he pours 1 litre water to 20 trees in a straight line in the park in a morning. Each tree is 6 metres away from the previous one and Dev has kept his 25 litre bucket 4 metres away from the first tree. He waters one tree at a time and goes back to bucket.



If he starts from the bucket, then answer the following.

(i) Find the total distance covered by Dev watering 2nd tree and coming back to the bucket.

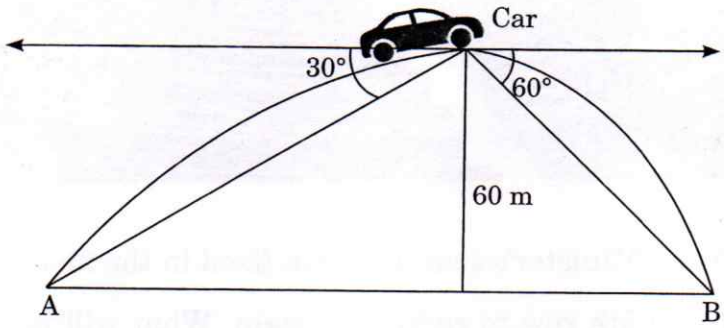
(ii) Are the numbers obtained from the information given in the question forming an A.P.?

(iii) How much distance will be covered after watering the 7th tree and coming back?

OR

What is the total distance covered by him watering all the trees?

37. Pravesh left his home for Bengaluru to visit during the summer holidays. His car was passing a river through flyover and at the same time a boat was crossing the river in a straight line from point A to point B. Pravesh stopped the car on flyover. He observes that the boat is at an angle of depression of 30° when boat is at point A. After 15 minutes the boat reaches point B and the angle of depression from his eye is 60°.



(i) Find the distance of Pravesh and boat when it is at Point A.

(ii) Find the distance of Pravesh and boat when it is at Point B.

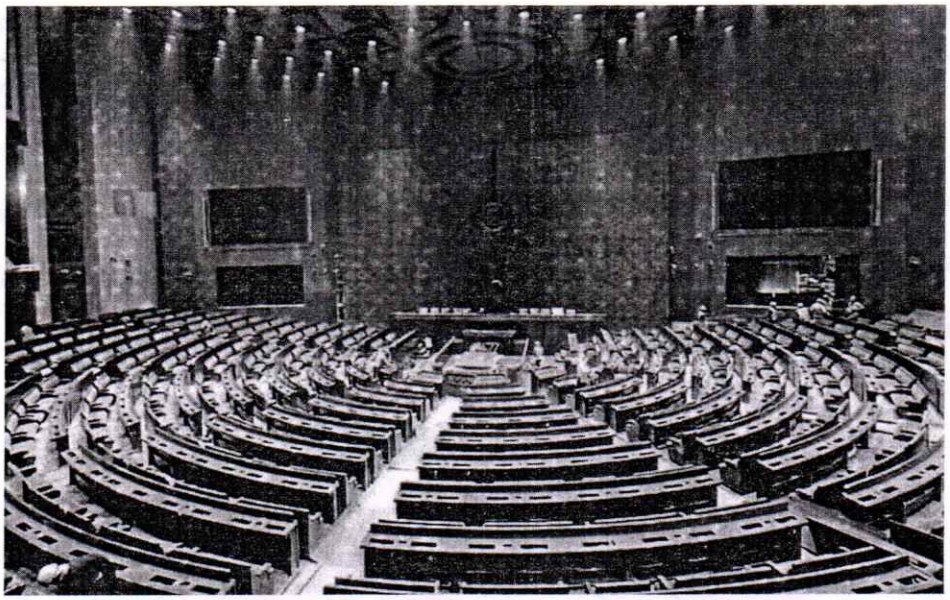
(iii) Find the width of the River.

OR

What is the speed of boat?

38. Class X students are taken by their maths teacher to visit Central Vista for educational excursion. The maths teacher told the students to observe the seats of the member of parliament. All the seats in the Central Vista have been placed in rows and columns.

The teacher asked to consider a point in the middle of the house as the origin. Give the answers on this base.



(i) The Prime Minister's seat has been fixed in the 2nd row above the origin and in the 5th row to right the origin. What will be the co-ordinates of Prime Minister's seat?

(ii) The opposition minister's seat is kept on the left 5th row from the origin and in the 7th row above the origin. What will be the co-ordinates of the opposition minister's seat?

(iii) Find the distance between Prime Minister's seat and opposition Minister's seat.

OR

Find the distance between origin and Prime Minister's seat and origin and opposition Minister's seat.

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