Series RMT-DS1

Code No. **RSPL/3**

Roll No. ☐☐☐☐☐☐☐

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 Hours   *Maximum Marks : 80*

General Instructions :

1. *The question paper contains 5 Sections A, B, C, D, and E.*

2. *Section **A** has 20 MCQ's carrying 01 mark each.*

3. *Section **B** has 5 questions of carrying 02 mark 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 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 $\pi = \frac{22}{7}$ wherever required if not stated.*

Section A consists of 20 questions of 1 mark each.

1. A and B are two positive integers such that $A = p^3q^2$ and $B = p^2q^4$, where p and q are prime numbers. Then LCM of A and B is

   (a) pq (b) p^3q^3 (c) p^2q^2 (d) p^3q^4

2. If α and β are the zeroes of quadratic polynomial $x^2 - 7x + 10$, then value of $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2}$ is

   (a) $\dfrac{29}{100}$ (b) $\dfrac{29}{10}$ (c) $\dfrac{49}{10}$ (d) $\dfrac{49}{100}$

3. The line represented by linear equation x = a, where a is some integer other than zero is

   (a) Parallel to x-axis   (b) Parallel to y-axis

   (c) Passing through origin   (d) Intersect x-axis and y-axis at point a

4. The discriminant of the quadratic equation $(2x - 7)^2 = 2x + 3$ is

   (a) 56   (b) – 56   (c) 41   (d) – 41

5. 14th term of the AP $\sqrt{3}, 3\sqrt{3}, 5\sqrt{3}, 7\sqrt{3} \ldots$ is

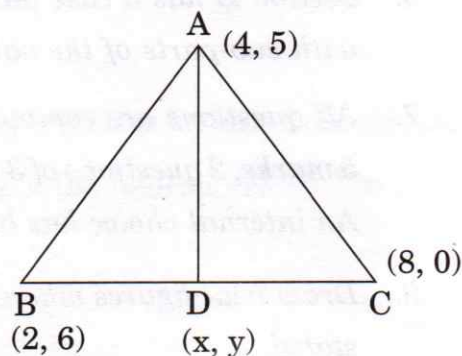   (a) $27\sqrt{3}$ (b) $13\sqrt{3}$ (c) $28\sqrt{3}$ (d) $14\sqrt{3}$

6. The co-ordinates of point D, where AD is a median of $\triangle ABC$

   (a) (5, –3)

   (b) (5, 3)

   (c) (–5, –3)

   (d) (–5, 3)

   A (4, 5)

   B (2, 6)   D (x, y)   C (8, 0)

7. In $\triangle ABC$ and $\triangle PQR$, $\angle A = \angle P$, $\angle B = \angle Q$ and $\angle C = \angle R$, $AB = \dfrac{1}{2}$ PQ. Then, the two triangles are

(a) congruent but not similar

(b) congruent as well as similar

(c) neither congruent nor similar

(d) similar but not congruent

8. The distance of a point P(36, 15) from the origin is

(a) 15 units   (b) 39 km   (c) 39 units   (d) 36 units

9. If $3 \sin \theta = 2$ then value of $5 \tan^2 \theta + 2$ is

(a) 5   (b) 4   (c) 2   (d) 6

10. If $\cot \theta = \dfrac{1}{\sqrt{3}}$, then the value of $\dfrac{1 - \cos^2 \theta}{2 - \sin^2 \theta}$ is

(a) 1   (b) $\dfrac{5}{3}$ (c) $\dfrac{3}{5}$ (d) $\dfrac{-3}{5}$

11. If a 18 m long ladder is placed against a 9 m long wall such that it just reaches the window, then the elevation of the window is equal to

(a) 30°   (b) 60°   (c) 45°   (d) 90°

12. Chord of outer circle of two concentric circles touches the inner circle. If radii of concentric circles are 14 cm and 50 cm then the length of chord is

(a) 50 cm   (b) 48 cm   (c) 96 cm   (d) 14 cm

13. In figure value of x is
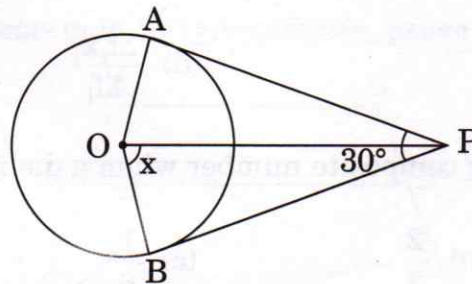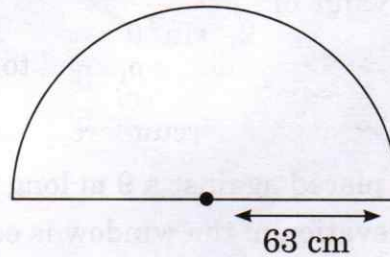

(a) 75°   (b) 60°   (c) 90°   (d) 30°

14. Area of shaded region in the given figure, if the radius of circle is 7 cm, is
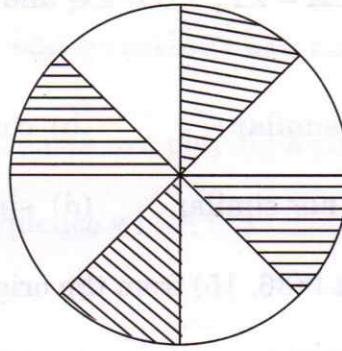
(a) $\dfrac{77}{2}$ cm^2 (b) 77 cm^2 (c) $\dfrac{154}{2}$ cm^2 (d) $\dfrac{154}{3}$ cm^2

15. In the given figure, the shape of the top of a table is in shape of semicircles with radius 63 cm then the perimeter of the top of table is

63 cm

(a) 198 cm (b) 324 cm (c) 126 cm (d) 252 cm

16. For calculating median of grouped frequency distribution, formula is

(a) $1 + \left(\dfrac{\frac{n}{2} - cf}{f} \right) \times h$ (b) $1 + \left(\dfrac{\frac{n}{2} - f}{cf} \right) \times h$

(c) $h + \left(\dfrac{\frac{n}{2} - cf}{f} \right) \times 1$ (d) $\dfrac{\Sigma f_i x_i}{\Sigma f_i}$

17. Probability of getting composite number when a die is thrown is

(a) $\dfrac{1}{2}$ (b) $\dfrac{2}{3}$ (c) $\dfrac{1}{6}$ (d) $\dfrac{1}{3}$

18. The probability of red queen when a card is drawn from well shuffled pack of 52 cards.
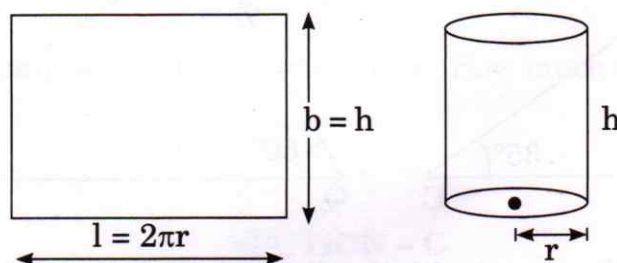
(a) $\dfrac{1}{52}$

(b) $\dfrac{1}{26}$

(c) $\dfrac{3}{52}$

(d) $\dfrac{1}{13}$

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):** The curved surface area of right circular cylinder of height 'h' and base radius 'r' is 2πrh.

Statement R (Reason): The cylinder is opened to form a rectangle of length 'l' and breadth 'b' which are equal to circumference of the cylinder and height of the cylinder respectively.

(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.

18. The probability of red queen when a card is drawn from well shuffled pack of 52 cards.

(a) $\dfrac{1}{52}$

(b) $\dfrac{1}{26}$

(c) $\dfrac{3}{52}$

(d) $\dfrac{1}{13}$

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): The curved surface area of right circular cylinder of height 'h' and base radius 'r' is $2\pi rh$.

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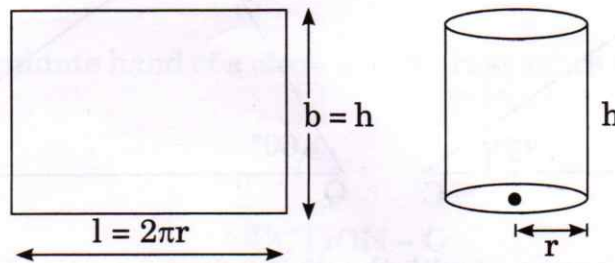
(a) Both assertion (A) and reason (R) are true and reason (R) is the **correct** explanation of assertion (A).

(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):** Series 5, 7, 9, 11........ is an A.P. series, having nth term is 2n + 3.

Statement R (Reason): 5, 7, 9, 11......... is an A.P. because common difference is 2.

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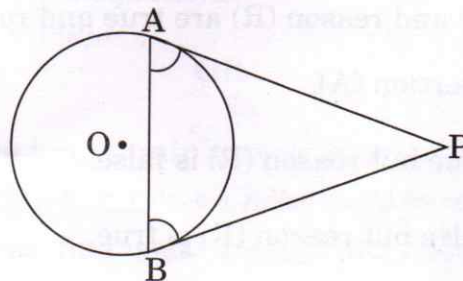
(d) Assertion (A) is false but reason (R) is true.

SECTION – B

Section B consists of 5 questions of 2 marks each.

21. Is $\triangle ABC \sim \triangle PQR$ or not? Give reason.
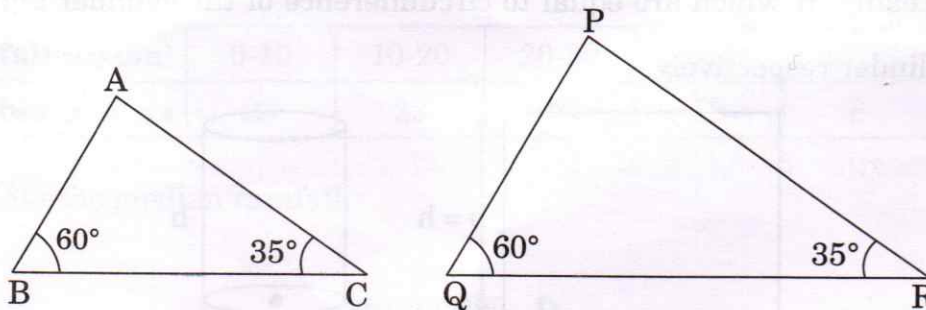
22. Check whether 5^n can end with the digit 0 for any natural number n.

23. Prove that angle formed by the tangents drawn from an external point to the circle with common chord are equal.
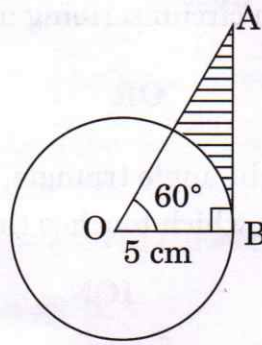
24. Given $\tan\theta = \dfrac{a}{b}$ then find the value of $\dfrac{2\tan\theta}{1+\tan^2\theta}$

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OR

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Find the value of $\dfrac{3 - \sin^2 60°}{\sin^2 30° + \cos^2 30°} - 2\tan^2 30° + \sec 30° \csc 60°$

25. Find the area of shaded region.

In the given figure a circle with centre O, AB is a tangent of length 12 cm with point of contact B.

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OR

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The length of minute hand of a clock is 7 cm. How much area does it sweep in 25 minutes?

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SECTION – C
Section C consists of 6 questions of 3 marks each.

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26. Find HCF and LCM of 175 and 255 and verify that HCF × LCM = Product of 2 Numbers.

27. α and β are the zeroes of a quadratic polynomial $6x^2 - 3x + 10$. find a quadratic polynomial whose zeroes are $\dfrac{1}{\alpha^2}$ and $\dfrac{1}{\beta^2}$.

28. Prove that $\dfrac{\cos\theta - \sin\theta + 1}{\cos\theta + \sin\theta - 1} = \dfrac{1}{\csc\theta - \cot\theta}$ where angle θ is an acute angle.

29. Solve the following linear equations:

$401x - 577y = 1027$ and $-577x + 401y = -1907$

OR

Solve the following pair of linear equations graphically;
$2x - y = 1$ and $3x + 2y = 12$

30. Prove that the parallelogram circumscribing a circle is a rhombus.

OR

If a, b, c are the sides of a right angle triangle, where c is the hypotenuse, prove that the radius r of the circle which touches the sides of the triangle is given by $r = \dfrac{a + b - c}{2}$.

31. The annual rainfall records of Jaipur of 90 days is given in following frequency distribution.

Rainfall (in cm)	0-10	10-20	20-30	30-40	40-50	50-60
Number of days	23	22	16	12	8	9

Calculate the median rainfall.

SECTION – D

Section D consists of 4 questions of 5 marks each.

32. Find the value of k for which the quadratic equation $(k + 1)x^2 - 6(k + 1)x + 3(k + 9) = 0$, has equal roots. Also find the quadratic equation whose roots are double to the roots of above equations.

OR

For the distance of 200 km, a train travels with uniform speed. If the speed of train is reduced by 10 km/h, it takes 1 hour more to cover same distance. Is this situation possible? If yes; find usual speed of the train.

33. Determine the mean of given frequency distribution.

Marks	Number of Students
Below 10	2
Below 20	8
Below 30	10
Below 40	12
Below 50	26
Below 60	30
Below 70	39
Below 80	44

34. Find the capacity of a right circular cylindrical vessel whose height is 20 cm and radius of its base 7 cm. If a hemispherical portion of same radius raised upward at the bottom of the given cylinder as shown in figure, then find the volume of the liquid filled in this cylindrical vessel.
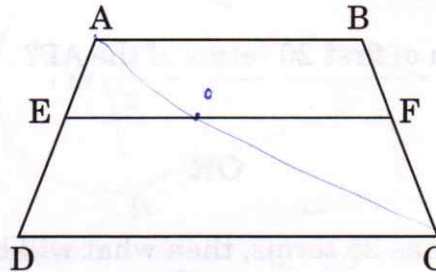

20 cm

7 cm
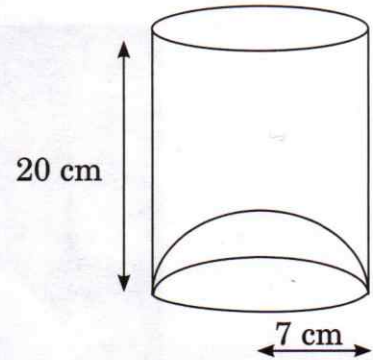
OR

The ice cream cone is of radius 3.5 cm and height 13 cm. Calculate the volume of ice cream provided in 20 such cones if its $\frac{1}{6}$th part is left unfilled with ice cream.

35. (a) State Thales theorem and its converse.

(b) In the given trapezium ABCD, AB || DC and EF || DC.

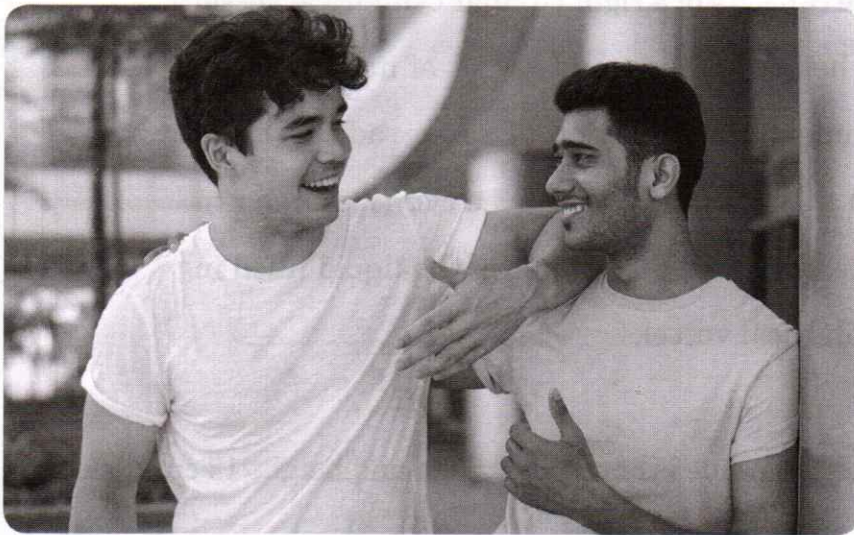Using Thales theorem in the given figure, prove that $\dfrac{AE}{ED} = \dfrac{BF}{FC}$

Case study based questions are compulsory.

36. Two friends Pradeep and Deepak are playing a game. Pradeep asks Deepak to think of a mathematical sequence which is as follows in increasing order :

a, a + d, a + 2d, a + 3d.........

The 10th term of the sequence is 109 and 15th term is 149.

Based on the above information, answer the following questions:

(i) What is Ist term of above sequence?

(ii) What is the common difference, if the sequence forms an A.P.?

(iii) What is the sum of first 20 terms of the AP?

OR

If the sequence has 25 terms, then what will be the sum of last 10 terms?

37. Aarav runs a medical store that offers home delivery to its customers. His store is located at point A as indicated in the map below. He receives more orders from locations B, C, and D. Using the given information answer the following questions.
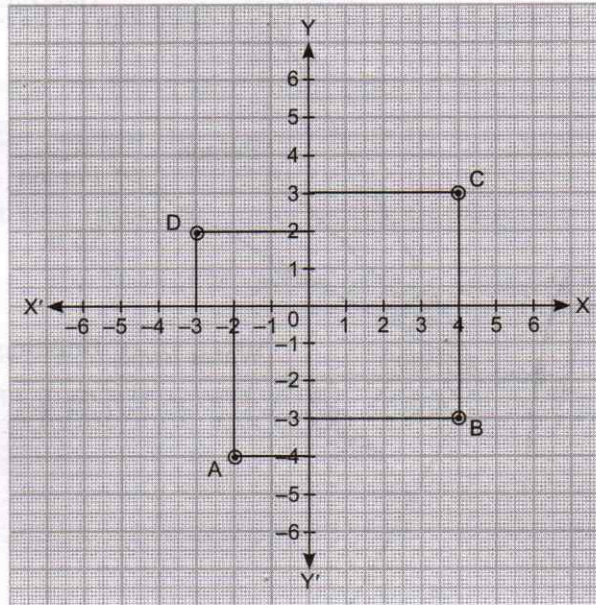

(i) What are the co-ordinates of medical store A?

(ii) In which quadrants B, C and D lie?

(iii) Which location is nearby Aarav's medical store, B or D?

OR

If the delivery boy walks from Aarav's medical store to D and then to C, then find total distance travelled by him.

38. During heavy flood, a person got trapped in a building 15 m above the water level. Information about this was given by a boat of the rescue team to a Helicopter carrying the rescue team. The angle of elevation of top of the building from boat is 30°. The helicopter rescues the person with the help of a rope by lifting him

towards the boat. During this time the angle of elevation of the person from the boat becomes 45° at a particular instant and angle of elevation of the helicopter becomes 60° from the boat. At the same time, the image of the person in the water makes an angle of depression of 60° with the boat. Now answer the following:
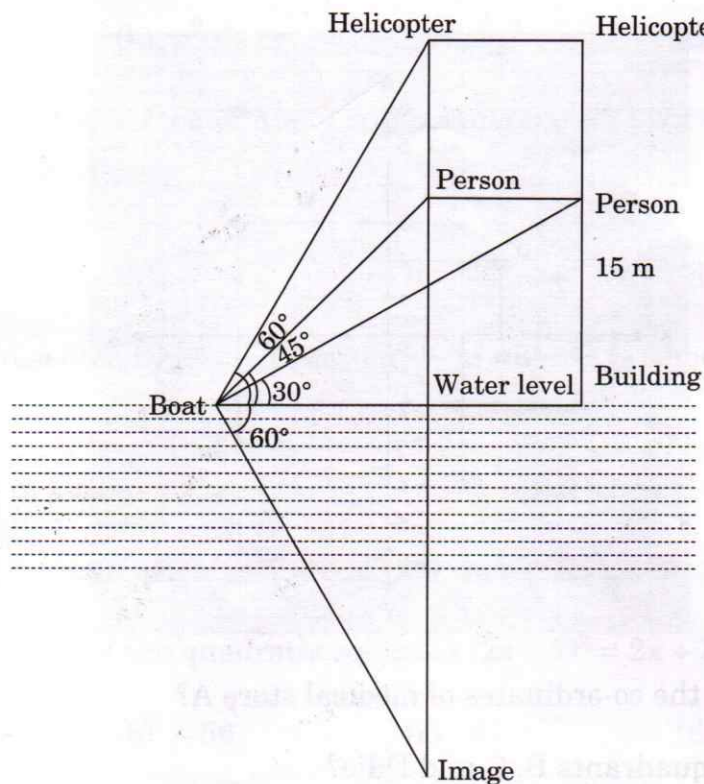
(i) Find height of helicopter from water level.

(ii) Find the length of rope by which the person is rescued.

(iii) Find the distance between the person and his image formed in water.

OR

If the helicopter takes 5 sec to reach at the particular instant from the top of the building then what will be the speed of the helicopter?

@darealarnav

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