

Series RMT-DS2

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Q.P. Code RSPL/3

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

- Please check that this question paper contains **12** printed pages.
- Please check that this question paper contains **38** questions.
- Q.P. Code 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 write down the serial number of the question in the answer-book before attempting it.**
- **15** minute time has been allotted to read this question paper. During this time, the students will read the question paper only and will not write any answer on the answer-book.

MATHEMATICS (STANDARD)

Time allowed : 3 hours

Maximum Marks : 80

General Instructions :

Read the following instructions carefully and follow them:

- This question paper contains **38** questions. **All** questions are **compulsory**.*
- This question paper is divided into **five** Sections – **A, B, C, D** and **E**.*
- In **Section A**, Question numbers **1** to **18** are multiple choice questions (MCQs) and question numbers **19** and **20** are Assertion – Reason based questions of **1** mark each.*
- In **Section B**, Question numbers **21** to **25** are very short answer (VSA) type questions carrying **2** marks each.*

- (v) In **Section C**, Question numbers **26 to 31** are short answer (SA) type questions carrying **3 marks each**.
 - (vi) In **Section D**, Question numbers **32 to 35** are long answer (LA) type questions carrying **5 marks each**.
 - (vii) In **Section E**, Question numbers **36 to 38** are **case-study based integrated** questions carrying **4 marks each**. Internal choice is provided in **2 marks** question 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 of 2 marks in Section E**.
 - (ix) Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.
 - (x) Use of calculators is **NOT allowed**.
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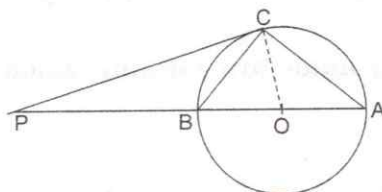
SECTION - A

20×1=20

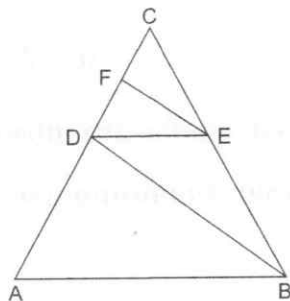
This section consists of 20 questions of 1 mark each.

1. If HCF and LCM of two numbers are 4 and 9696, then the product of two numbers is **1**
 - (a) 9696 (b) 24242 (c) 38784 (d) 4848
2. If α and β are zeroes of the polynomial $x^2 + 2x - 4$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ is **1**
 - (a) $\frac{1}{2}$ (b) $\frac{-1}{2}$
 - (c) 0 (d) None of these
3. The values of p for which the system of equations $(2p - 1)x + (p - 1)y = 2p + 1$; $y + 3x - 1 = 0$ has no solution is **1**
 - (a) 2 (b) -2 (c) 3 (d) -3

4. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then 1
 (a) $a = -7, b = -1$ (b) $a = 5, b = -1$ (c) $a = 2, b = -6$ (d) $a = 0, b = -6$
5. Which term of the AP: 22, 19, 16 ..., is its first negative term? 1
 (a) 9 (b) 8 (c) 10 (d) 11
6. Which of the following statements is not true? 1
 (a) The given four points will form a parallelogram if opposite sides are equal.
 (b) The given four points will form a rhombus if all the four sides are equal.
 (c) Three points will form a right-angled triangle, if sum of squares of any two sides is equal to square of third largest side.
 (d) Three points will be collinear if sum of two sides is not equal to third side.
7. Perimeter of the triangle whose vertices are (0, 12), (0, 0) and (5, 0) is 1
 (a) 20 units (b) 25 units (c) 17 units (d) 30 units
8. The tangent at a point C of a circle and a diameter AB when extended intersect at P. If $\angle PCA = 110^\circ$, then $\angle CBA =$ 1



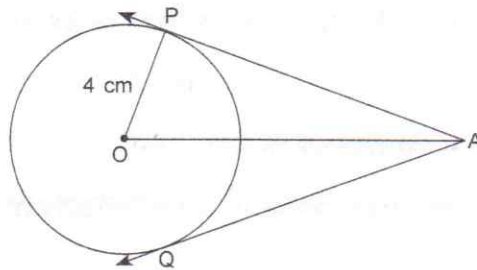
- (a) 80° (b) 60° (c) 40° (d) 70°
9. In figure $AB \parallel DE$, $BD \parallel EF$, then $DC^2 =$ 1



- (a) $CF \times AC$ (b) $CF \times CE$ (c) $CF \times EF$ (d) $CF \times AD$

10. In the given figure, AP and AQ are tangents to a circle of radius 4 cm. If $AP = 4\sqrt{3}$ cm, then $\angle PAQ$ is

1



- (a) 40° (b) 45° (c) 60° (d) 30°
11. $3 \cot \theta = 2$, the value of $\tan \theta =$
- (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{3}{\sqrt{13}}$ (d) $\frac{2}{\sqrt{13}}$
12. Given that $\sin \theta = \frac{a}{b}$, then $\cos \theta$ is
- (a) $\frac{b}{\sqrt{b^2 - a^2}}$ (b) $\frac{b}{a}$ (c) $\frac{\sqrt{b^2 - a^2}}{b}$ (d) $\frac{a}{\sqrt{b^2 - a^2}}$
13. If $\sin (47^\circ - \alpha) = \cos 60^\circ$, then value of α is
- (a) 10° (b) 17° (c) -13° (d) 20°
14. The number of revolutions made by a circular wheel of radius 0.7 m in rolling a distance of 176 m is
- (a) 22 (b) 24 (c) 75 (d) 40
15. If V is the volume of a cuboid of faces x, y, z, then the product of areas of these adjacent faces of a cuboid is
- (a) $\sqrt[3]{V}$ (b) \sqrt{V} (c) V^2 (d) V
16. 2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from remaining pack. The probability of getting a black card is
- (a) $\frac{22}{52}$ (b) $\frac{22}{46}$ (c) $\frac{24}{52}$ (d) $\frac{24}{46}$

17. The mean and median of the same data are 24 and 26 respectively. The value of mode is: 1

- (a) 23 (b) 26 (c) 25 (d) 30

18. The median from the table 1

Value	7	8	9	10	11	12	13
Frequency	2	1	4	5	6	1	3

is

- (a) 11 (b) 10 (c) 12 (d) 11.5

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 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.

19. **Assertion (A):** Discriminant of the quadratic equation $3x^2 + 4x - 5 = 0$ is 76.

Reason (R): $D = b^2 + 4ac$ 1

20. **Assertion (A):** The number of bags can be stored in a cuboid granary of dimensions $12 \text{ m} \times 6 \text{ m} \times 5 \text{ m}$, if each bag occupies a space of 0.48 m^3 are 750.

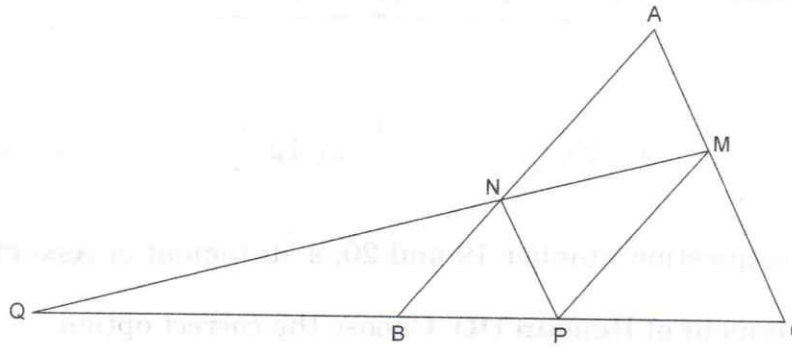
Reason (R): Number of bags = $\frac{\text{Volume of granary}}{\text{Volume of one bag}}$ 1

SECTION - B

This section consists of 5 questions of 2 marks each.

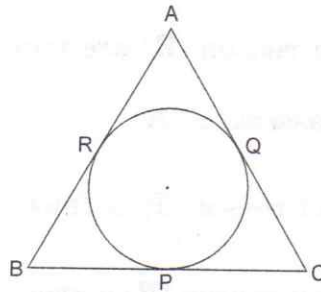
21. Prove that $3 - 2\sqrt{5}$ is an irrational. 2

22. In the given figure, P is the point on the side BC of $\triangle ABC$ such that $MP \parallel AB$ and $NP \parallel AC$. If MN and CB produced meet at Q prove that $PQ^2 = QB \times QC$ 2



23. In the given figure, an isosceles $\triangle ABC$, with $AB = AC$, circumscribes a circle.

Prove that point of contact P bisects the base. 2



24. (a) A cone and a sphere have equal radii and equal volume. What is the ratio of the diameter of the sphere to the height of the cone? 2

OR

(b) From a solid cylinder of height 20 cm and diameter 12 cm, a conical cavity of height 8 cm and radius 6 cm is hollowed out. Find the total surface area of the remaining solid. 2

25. (a) Prove that $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

2

OR

(b) Prove that $\frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} = 1 - 2 \sin^2 \theta$.

2

SECTION - C

This section consists of 6 questions of 3 marks each.

26. Army day in India is celebrated with great enthusiasm every year on 15th of January. It is celebrated every year at all the army command headquarters



and national capital by organizing army parades including many other military shows. On Army Day an army contingent of 200 members is to march behind an army band of 168 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

3

27. (a) How many terms are there in an AP whose first and fifth terms are -14 and 2 , respectively and the last term is 62 ?

3

OR

- (b) Which term of the AP : $65, 61, 57, 53, \dots$ is the first negative term ?

3

28. For the quadratic polynomial $f(x) = ax^2 + bx + c$, $a \neq 0$ if $a + c = b$, find the zeroes of the polynomial.

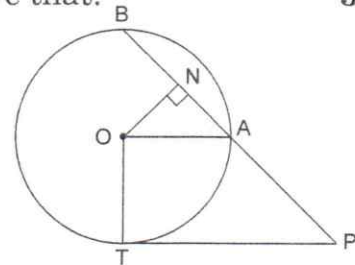
3

29. (a) In the given figure, PT is a tangent and PAB is a secant to a circle with centre O. ON is perpendicular to the chord AB. Prove that: 3

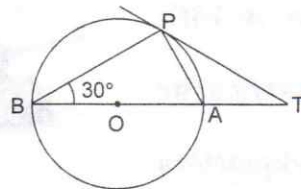
(i) $PA \times PB = PN^2 - AN^2$

(ii) $PN^2 - AN^2 = OP^2 - OT^2$

OR



- (b) In the given figure, O is the centre of the circle and TP is the tangent to the circle from an external point T. If $\angle PBT = 30^\circ$, prove that $BA : AT = 2 : 1$. 3



30. If $x = p \cos^3 \theta$ and $y = q \sin^3 \theta$, prove that $\left(\frac{x}{p}\right)^{2/3} + \left(\frac{y}{q}\right)^{2/3} = 1$ 3

31. The marks obtained by 100 students in a mathematics test consisting of 100 marks are given in the following table:

Marks obtained	Number of students
0 – 14	8
14 – 28	20
28 – 42	28
42 – 56	18
56 – 70	26

Find the mean marks obtained by the students. 3

SECTION - D

This section consists of 4 questions of 5 marks each.

32. (a) The sum of three numbers of an AP is 3 and the product of the first and the third number is (-35) . Find the three numbers. 5

OR

- (b) Shalini gets pocket money from her father every day. Out of the pocket money, she saves ₹ 30 on the first day and on each succeeding day, she increases her savings by 500 paise. At the end of every month, Shalini purchases some biscuits packs, toffees and nuts from the amount that she saved and distribute these items to the needy children in her school. **5**

(i) Find the amount saved by Shalini on 10th day.

(ii) Find the total amount saved by Shalini in 30 days.

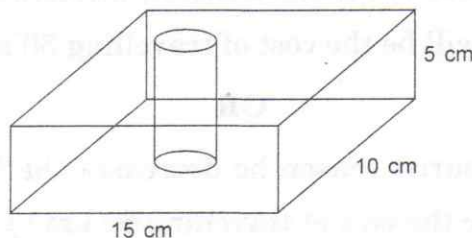
- 33.** The diagonals of a quadrilateral ABCD intersect each other at the point O

such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium. **5**

- 34.** (a) A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. (use $\pi = 3.14$) **5**

OR

- (b) From a cuboidal solid metallic block of dimensions $15 \text{ cm} \times 10 \text{ cm} \times 5 \text{ cm}$, a cylindrical hole of diameter 7 cm is drilled out. Find the surface area of the remaining block. **5**



35. The median of the distribution given below is 14.4.

Class interval	Frequency
0 – 6	4
6 – 12	x
12 – 18	5
18 – 24	y
24 – 30	1

Find the values of x and y, if the sum of frequency is 20.

5

SECTION – E

This section consists of 3 Case-Study Based Questions of 4 marks each.

36. Sumedh is a science graduate. Driving in his passion. After finishing his graduation he drives a taxi in Sikkim. He charges a fixed amount together with the charge for the distance covered.



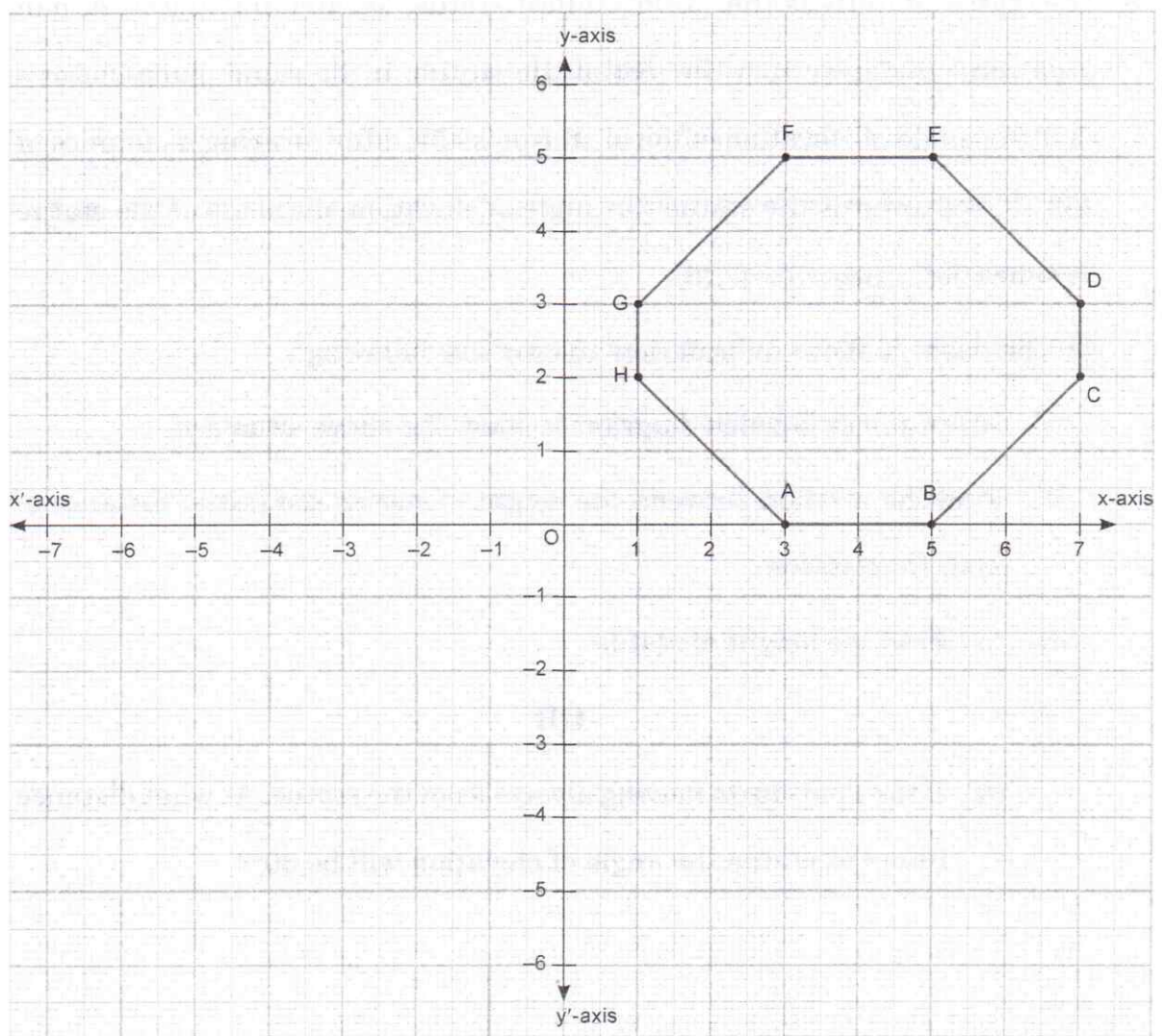
A person paid him ₹ 1100 for travelling 50 km by his taxi. On the next day a person paid him ₹ 1900 for travelling 90 km by his taxi.

- (i) What are the fixed charges for his taxi? 1
- (ii) What is the rate per kilometre for travelling by his taxi? 1
- (iii) (a) If in peak tourist season Sumedh increases the fixed charges by 60%, what will be the cost of travelling 50 km by his taxi? 2

OR

- (b) If in lean tourist season he decreases the fixed charges by 50%, what will be the cost of travelling 60 km by his taxi? 2

37. Some friends went to a shop and they saw shop to be well decorated and having mirrors on wall and on the roof also so they can see their images all around. They also noticed one decorated box and when they looked around different shapes and changed decoration was visible, they got an idea and at home they tried having different images on a graph paper used concept of coordinate geometry.



Using the above answer the following:

- (i) What is the difference between abscissas of points F and B? 1
- (ii) What is the difference between ordinates of points H and E? 1
- (iii) (a) Find the difference of distance GD – distance HA. 2

OR

- (b) Find the distance GC. 2

38. The statue of unity is the world's tallest statue, located in Gujarat. A man from some distance from the foot of the statue in the same plane observe that the angle of elevation of top of statue is 45° , after covering a distance of 252.73 feet towards the statue the angle of elevation of the top of the statue becomes 60° . (use $\sqrt{3} = 1.73$).

On the basis of above information answer the following:

- (i) Draw a neat labelled diagram to show the above situation. 1
- (ii) Find the relation between the height of statue and initial distance of man from statue. 1
- (iii) (a) Find the height of statue. 2

OR

- (b) If the man starts moving always from the statue. At what distance from the statue the angle of elevation will be 30° ? 2