Roll No.

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:

(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,** 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.

(iv) 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**.

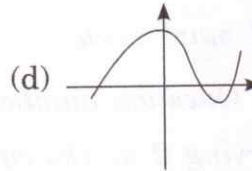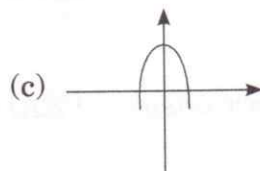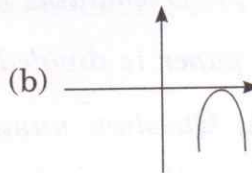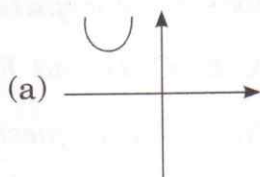## SECTION – A   20×1=20

This section consists of 20 questions of 1 mark each.

1. If A = 2n + 13, B = n + 7, where n is a natural number, then HCF of A and B is   1

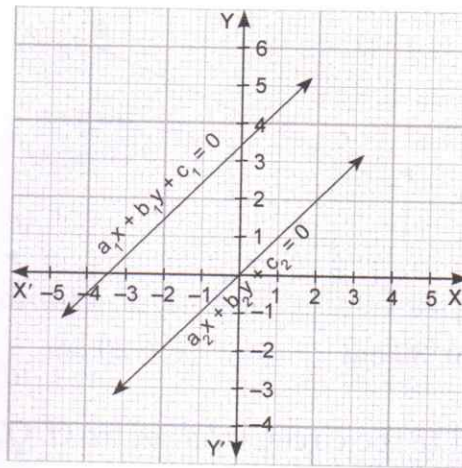   (a) 2   (b) 1   (c) 3   (d) 4

2. Which of the following is not the graph of quadratic polynomial?   1

3. The lines representing the given pair of linear equations are non-intersecting. Which of the following statements is true?   **1**

(a) $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$ (b) $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$ (c) $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$ (d) $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$

4. The nature of roots of the quadratic equation $9x^2 - 6x - 2 = 0$ is   **1**

(a) no real roots   (b) 2 equal real roots

(c) 2 distinct real roots   (d) more than 2 real roots

5. Two APs have the same common difference. The first term of one of these is (-1) and that of the other is (-8). Then the difference between their 4th terms is   **1**

(a) 1   (b) -7 (c) 7   (d) 9

6. Three vertices of a parallelogram, taken in order, are $(1, 2)$, $(0, 4)$ and $(3, 7)$, then the fourth vertex is   **1**

(a) $(4, 5)$ (b) $(5, 4)$ (c) $(6, 3)$ (d) $(9, 5)$

7. The ratio in which the line segment joining the points $(1, -3)$ and $(4, 5)$ divided by x-axis is   **1**
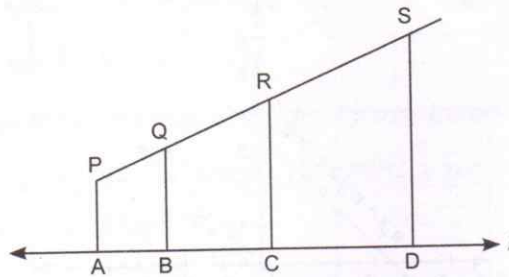
(a) 3:5   (b) 5:3   (c) 1:5   (d) 5:1

8. In the given figure, PA, QB, RC and SD are all perpendiculars to a line l. If
AB = 6 cm, BC = 9 cm, CD = 15 cm and SP = 40 cm, then PQ =   **1**

(a) 6 cm   (b) 30 cm   (c) 20 cm   (d) 8 cm

9. In figure AT is tangent to the circle, with centre O. OT = 4 cm, ∠OTA = 30°,
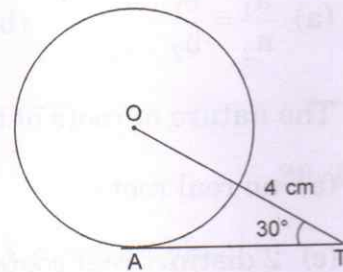then AT =   **1**

(a) 4 cm

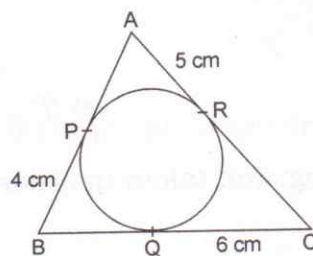(b) 2 cm

(c) $2\sqrt{3}$ cm

(d) $4\sqrt{3}$ cm

10. In figure, the perimeter of ΔABC is   **1**

(a) 15 cm   (b) 30 cm   (c) 32 cm   (d) 120 cm

11. If $\sin \theta + \cos \theta = \sqrt{2}$, then value of $\sin \theta - \cos \theta$ is   **1**

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

12. The length of shadow of a vertical pole of height 12 m, when altitude of Sun is 30°, is   1

  (a) $12\sqrt{3}$ m   (b) $4\sqrt{3}$ m   (c) 12 m   (d) $6\sqrt{3}$ m

13. The value of $\dfrac{\tan 60°}{\cot 30°} + \dfrac{\sec 30°}{\operatorname{cosec} 60°}$ is   1

  (a) 0   (b) 1   (c) 2   (d) 3

14. The perimeter of quadrant of a circle of radius 7 cm is   1

  (a) 14 cm   (b) 4 cm   (c) 22 cm   (d) 25 cm

15. The circumference of two circles are in the ratio 2 : 5. The ratio of their area is   1

  (a) 2 : 5   (b) 3 : 5   (c) 4 : 25   (d) 7 : 5

16. Which of the following statements is not true?   1

  (a) A desired outcome of the random experiment is known as an event of the random experiment.

  (b) Those events whose probability is zero is possible event.

  (c) Getting 7 in a single throw of a die is impossible.

  (d) The probability of an event which is sure to occur is 1.

17. If class size is 4 and the lower limit of first class is 8, if there are 7 classes then upper limit of last class is   1

  (a) 36   (b) 32   (c) 40   (d) 28

18. The probability that a non-leap year has 53 Sundays, is   1

  (a) $\dfrac{2}{7}$ (b) $\dfrac{5}{7}$ (c) $\dfrac{6}{7}$ (d) $\dfrac{1}{7}$

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) :** a, b, c are in AP if and only if 2b = a + c.

    Reason (R) : The sum of first n odd natural numbers is n^2.   1

20. **Assertion (A):** In a circle of radius 6 cm, the angle of a sector is 60°. Then the area of the sector is $18\frac{6}{7}$ cm^2.

    Reason (R): Area of the circle with radius r is πr^2.   1

SECTION – B

This section consists of 5 questions of 2 marks each.
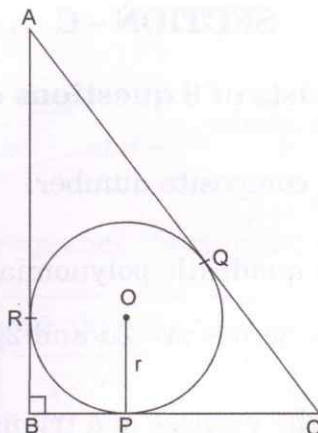
21. Prove that $\sqrt{5}$ is an irrational number.   2

22. $\triangle ABC \sim \triangle PQR$, such that $\angle A = 69°$, $\angle Q = 51°$, then find $\angle R$.   2

23. In the given figure, $\triangle ABC$ is a right-angled triangle with $\angle B = 90°$, AB = 12 cm and BC = 5 cm. Find radius of circle.   2

24. (a) Prove that, $\dfrac{1 + \csc\theta}{\csc\theta} = \dfrac{\cos^2\theta}{1 - \sin\theta}$, where $0° \leq \theta \leq 90°$. 2

OR

(b) Prove that, $(1 - \sin\theta)(\sec\theta + \tan\theta) = \cos\theta$, where $0° \leq \theta \leq 90°$. 2
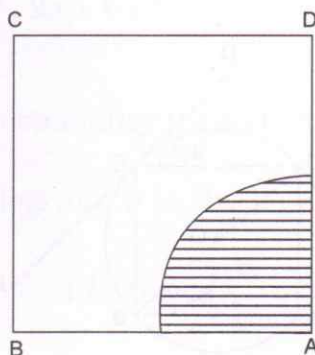
25. (a) A brooch is made with silver wire in the form of a circle with diameter

35 mm. The wire is also used in making 5 diameters which divide the

circle into 10 equal sectors. Find the area of each sector of brooch. 2

OR

(b) An arc having radius equal to half the side of a square of length 7 cm is

drawn as shown in figure. Find the area of shaded region. 2

SECTION – C

This section consists of 6 questions of 3 marks each.

26. Explain why $15 \times 7 + 7$ is a composite number.   **3**

27. If α and β are zeroes of the quadratic polynomial $4x^2 + 4x + 1$, then form a quadratic polynomial whose zeroes are 2α and 2β.   **3**

28. (a) Determine graphically the vertices of a triangle, the equations of whose sides are given as:

$$2y - x = 8, \; 5y - x = 14, \; - x + \frac{y}{2} = \frac{1}{2}$$ **3**

OR

(b) Seven times a two-digit number is equal to four times the number obtained by reversing the order of its digits. If the difference of the digits is 3, determine the number.   **3**

29. (a) Two tangents PQ and PR are drawn from an external point to a circle with centre O. Prove that QORP is a cyclic quadrilateral.   **3**

OR

(b) In the given figure, ABCD is a cyclic quadrilateral and PQ is tangent to the circle at C. If BD is a diameter, $\angle DCQ = 40°$ and $\angle ABD = 60°$, find $\angle BCP$.   **3**
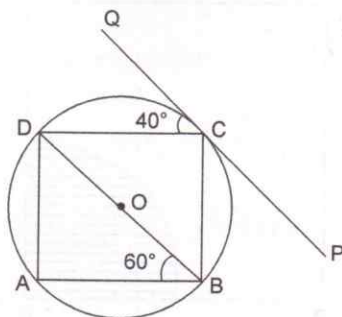
30. Prove the following identity:

$$\frac{\sin \theta}{\sec \theta + \tan \theta - 1} = 1 - \frac{\cos \theta}{\cosec \theta + \cot \theta - 1}, \text{ where } 0° \leq \theta \leq 90°. \qquad 3$$

31. The mode of the following frequency distribution is 44. Find missing frequency. **3**

Class interval	0–10	10–20	20–30	30–40	40–50	50–60	Total
Frequency	5	13	x	22	30	y	100

SECTION – D

This section consists of 4 questions of 5 marks each.

32. (a) A pole has to be erected at a point on the boundary of a circular park of

diameter 13 metres in such a way that the differences of its distances

from two diametrically opposite fixed gates A and B on the boundary is

7 metres. Is it possible to do so? If yes, at what distances from the two

gates should the pole be erected? **5**

OR

(b) Solve the following quadratic equation by factorisation method.

$$\frac{1}{2a + b + x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{x}, \quad 2a + b \neq 0 \qquad 5$$

33. State and prove basic proportionality theorem and using the theorem prove

that, if ABCD is a parallelogram, P is the point on side BC and DP when

produced meets AB produced at L, then $\dfrac{DP}{PL} = \dfrac{DC}{BL}$. **5**

34. (a) A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of cone is 4 cm and diameter of the base is 8 cm. Determine the volume of the toy. If a cube circumscribes the toy then find the difference of the volumes of cube and the toy. Also, find the total surface area of the toy.   **5**

OR

(b) A circus tent is in the shape of cylinder surmounted by a conical top of same diameter. If their common diameter is 56 m, the height of cylindrical part is 6 m and the total height of tent above the ground is 27 m, find the area of the canvas used in making the tent. Also, find the volume of the tent.   **5**

35. Find the missing frequency and the median for the following distribution table if the mean is 18.   **5**

Class interval	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Frequency	3	6	9	13	-	5	4

SECTION – E

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

36. Priya is preparing for the bicycle Marathon. Her racing bicycle has a device to calculate the number of kilometres she cycled. She decides to increase the distance she cycles everyday by a fixed number of kilometres.

Now answer the following:

(i) On the first day Priya cycled 8 kms and increase the distance covered each day by 3 km. How much distance she cycle on 5th day?   **1**

(ii) (a) Priya plans to go on a cycle tour from Bangalore to Mangalore covering 425 km. She travels 20 km on day 1 and increases the distance covered each day by 5 km. In how many days will she reach her destination?   **2**

OR

(b) Priya plans to go on cycle tour from Banglore to Surathkal covering 450 km. She travels 15 km on day 1 and increases the distance covered each day by 4 km. How many kilometer she cycled in 8 days? **2**

(iii) On third day Priya cycled 11 km and on 8th day she cycled 26 km. How much kilometer she cycled on Ist day. **1**

37. Students of class X of a secondary school in Delhi have been allotted a rectangular plot of land for their maths integrated project. They made a rectangular grid on this plot as shown in the figure.
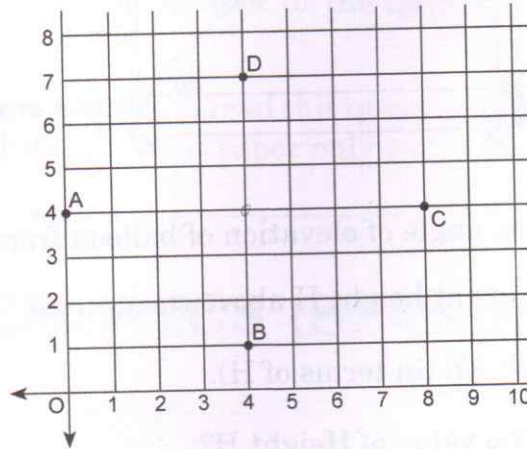
Four students take their positions at A, B, C and D as shown in the grid.

Refer to the sketch

(i) find the distance between B and D. **1**

(ii) find the mid-point of AC. **1**

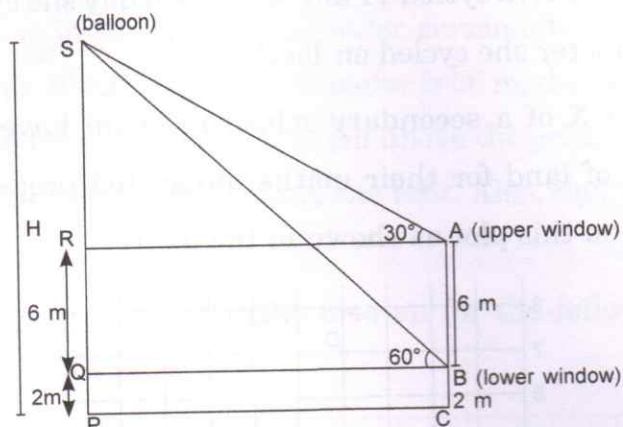(iii) (a) find the distance of C from the x-axis. **2**

OR

(b) Find the coordinates of the point which divides the line segment BD in the ratio 1 : 2 internally. **2**

38. A building is made by keeping the lower window of a building at a particular height above the ground and upper window is constructed at some height vertically above the lower window. Position of both windows are shown in diagram.

Both windows are designed and constructed in order to have proper Sun light.

At certain instant, the angle of elevation of balloon from these windows are shown. Balloon is flying at height H above the ground.

   (i)   Find the length AR (in terms of H).   **1**

   (ii) What will be the value of Height H?   **1**

   (iii) (a) Find the distance between the balloon and the upper window.   **2**

<div align="center">

OR

</div>

       (b) Find the distance between the balloon and the lower window.   **2**