

Mathematics
Sample Question Paper – 1
Class IX (Ganita Manjari)

Time Allowed: 3 Hours

Maximum Marks: 80

General Instructions:

1. This question paper contains 38 questions. All questions are compulsory.
 2. The question paper is divided into five sections - A, B, C, D and E.
 3. Section A consists of Questions 1 to 20 of 1 mark each.
 4. Section B consists of Questions 21 to 25 of 2 marks each.
 5. Section C consists of Questions 26 to 31 of 3 marks each.
 6. Section D consists of Questions 32 to 35 of 5 marks each.
 7. Section E consists of Questions 36 to 38, case study based, of 4 marks each.
 8. There is no overall choice. Internal choice is provided in 2 questions each in Sections B, C and D, and in the 2-mark sub-question of each case study in Section E.
 9. Draw neat figures wherever required. Use $\pi = 22/7$ unless another value is stated.
 10. Use of calculators is not allowed.
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SECTION A

Questions 1 to 20 carry 1 mark each. (20 × 1 = 20)

1. The reflection of the point (3, -5) in the x-axis is:

- (A) (-3, -5) (B) (3, 5)
(C) (-3, 5) (D) (5, 3)

2. In the figure, P(-2, 3) and Q(3, 3) are joined. PQ is parallel to the:

- (A) x-axis (B) y-axis
(C) line $y = x$ (D) neither axis

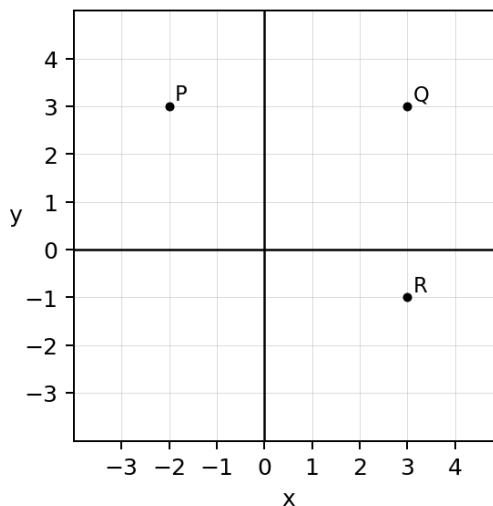


Figure for Question 2

3. The zero of $p(x) = 5x + 15$ is:

- (A) -5 (B) -3
(C) 3 (D) 5

4. The graph of $y = 2x - 4$ cuts the x-axis at:

- (A) (0, -4) (B) (2, 0)
(C) (-2, 0) (D) (0, 2)

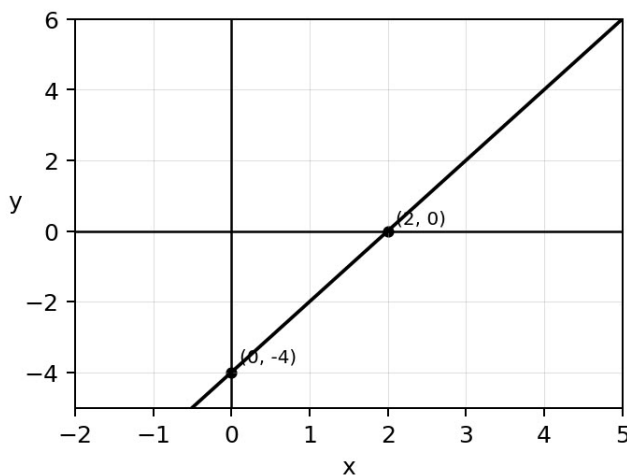


Figure for Question 4

5. Which number has a non-terminating, non-repeating decimal expansion?

- (A) $\frac{7}{8}$
(B) $\frac{11}{20}$
(C) $\sqrt{5}$
(D) 0.272727...

6. Which statement is true?

- (A) There is no rational number between $\frac{2}{5}$ and $\frac{3}{5}$.
(B) There are infinitely many rational numbers between them.
(C) There is exactly one rational number between them.
(D) Every number between them is irrational.

7. 99^2 is most conveniently evaluated using:

- (A) $(a+b)^2$ (B) $(a-b)^2$
(C) a^2-b^2 (D) $(a+b)^3$

8. $x^2 + 11x + 30$ equals:

- (A) $(x+5)(x+6)$ (B) $(x-5)(x-6)$
(C) $(x+3)(x+10)$ (D) $(x-3)(x-10)$

9. If two chords of the same circle subtend equal angles at the centre, then the chords are:

- (A) parallel
(B) perpendicular
(C) equal
(D) diameters

10. The perpendicular from the centre O to chord AB meets AB at M. Then:

(A) $AM > MB$

(B) $AM = MB$

(C) $OM = AB$

(D) $OA = AM$

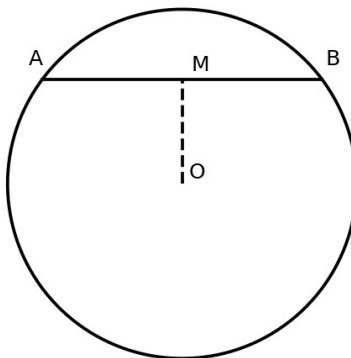


Figure for Question 10

11. The area of a quadrant of a circle of radius 14 cm is:

(A) 154 cm^2

(B) 308 cm^2

(C) 616 cm^2

(D) 44 cm^2

12. A 7 cm long minute hand sweeps an angle of 60° . The area swept is:

(A) $77/3 \text{ cm}^2$

(B) $154/3 \text{ cm}^2$

(C) 77 cm^2

(D) 154 cm^2

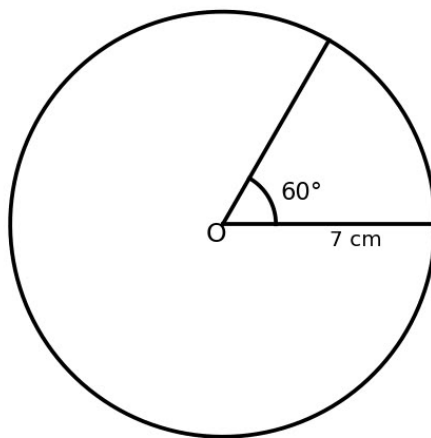


Figure for Question 12

13. A fair die is rolled once. The probability of obtaining a number greater than 4 is:

(A) $1/6$

(B) $1/3$

(C) $1/2$

(D) $2/3$

14. In 200 trials, an event occurs 46 times. Its experimental probability is:

(A) $23/100$

(B) $46/100$

(C) $77/100$

(D) $154/200$

15. The sequence 11, 7, 3, -1, ... is an AP with common difference:

- (A) 4 (B) -4
(C) -8 (D) 3

16. The n th term of 1, 5, 9, 13, ... is:

- (A) $4n+1$ (B) $4n-3$
(C) $5n-4$ (D) $n+4$

17. In the GP 81, 27, 9, 3, ... the common ratio is:

- (A) 3 (B) -3
(C) $1/3$ (D) $-1/3$

18. A sequence has recursive rule $t_1 = 2$ and $t_n = 3t_{n-1}$. Its fourth term is:

- (A) 18 (B) 27
(C) 54 (D) 81

For Questions 19 and 20, choose the correct option:

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

(B) Both are true, but Reason is not the correct explanation of Assertion.

(C) Assertion is true, but Reason is false.

(D) Assertion is false, but Reason is true.

19. *Assertion:* The graph of $p(x) = ax + b$, $a \neq 0$, is a straight line.

Reason: For every value of x , $p(x)$ gives exactly one corresponding value of y .

20. *Assertion:* Opposite angles of a cyclic quadrilateral are supplementary.

Reason: The angle subtended by an arc at the centre is twice the angle subtended by the same arc at a point on the remaining circle.

SECTION B

Questions 21 to 25 carry 2 marks each. ($5 \times 2 = 10$)

21. Find the distance between A(-1, 2) and B(5, 2). What geometrical feature of the coordinates lets you find the answer without using the distance formula?

22. (a) Using a suitable identity, evaluate 1003^2 .

OR

(b) Factorise completely: $4s^2 + 20st + 25t^2$.

23. In a circle with centre O, AB and CD are equal chords. If $\angle AOB = 86^\circ$, find $\angle COD$. Name the property used.

24. (a) Find the 25th term of the AP 4, 9, 14, 19,

OR

(b) Write the explicit formula for the GP 5, 15, 45, 135,

25. The letters of the word PEACE are written on five identical cards and one card is drawn at random. Find the probability that the card shows (i) E, (ii) a letter other than E.

SECTION C

Questions 26 to 31 carry 3 marks each. ($6 \times 3 = 18$)

26. Show that $\sqrt{7}$ is irrational.

27. The endpoints of a line segment are A(-4, 3) and B(2, -5). Find (i) its midpoint and (ii) its length.

28. (a) A linear polynomial $p(x)$ passes through the points (1, 5) and (3, 11). Find $p(x)$ and the point where its graph cuts the x-axis.

OR

(b) The graph of $y = ax + b$ passes through (0, 3) and (4, -5). Find a and b. Also state whether the line rises or falls as x increases.

29. Prove that the perpendicular drawn from the centre of a circle to a chord bisects the chord.

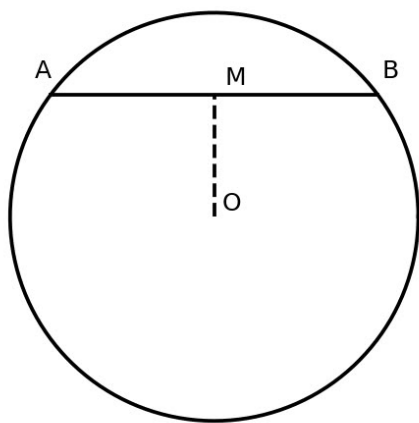


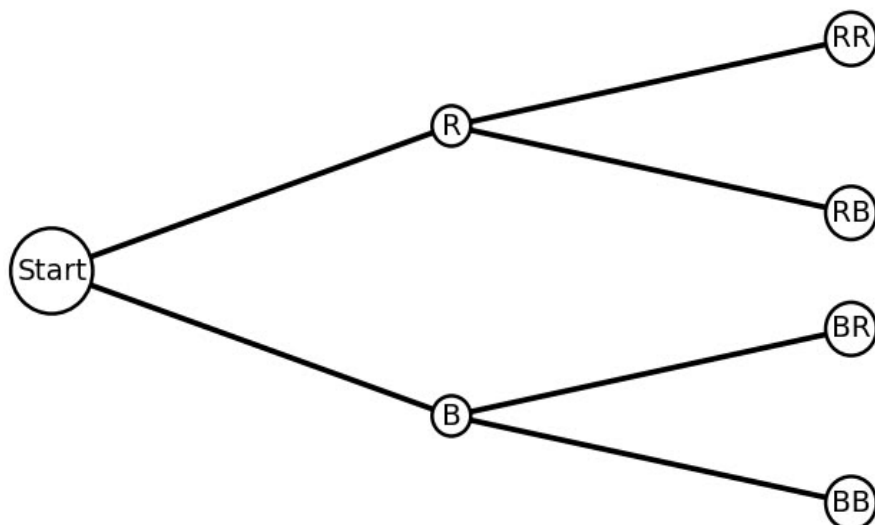
Figure for Question 29

30. (a) A chord of a circle of radius 14 cm subtends 90° at the centre. Find the area of the minor sector.

OR

(b) The circumference of a circular track is 132 m. Find its radius and area.

31. A box contains 3 red balls and 2 blue balls. Two balls are drawn one after another without replacement. Draw a tree diagram and find the probability that the balls are of different colours.



Tree structure for Question 31; complete the branch probabilities while solving.

SECTION D

Questions 32 to 35 carry 5 marks each. (4 × 5 = 20)

32. The first three stages of a row of joined hexagons are shown below. One hexagon needs 6 matchsticks; each new hexagon shares one side with the preceding hexagon.

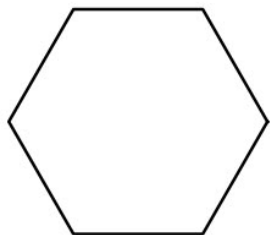
(i) Write the number of matchsticks needed in Stages 1, 2, 3, 4 and 5.

(ii) Show that these numbers form an AP.

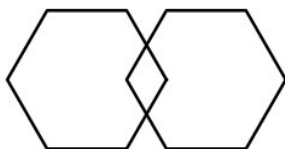
(iii) Obtain a rule for the n th stage.

(iv) How many matchsticks are needed for Stage 30?

Stage 1



Stage 2



Stage 3



Growing hexagon pattern for Question 32

33. (a) If $a + b = 12$ and $ab = 32$, use identities to find (i) $a^2 + b^2$, (ii) $a^3 + b^3$, and hence factorise $x^2 - 12x + 32$.

OR

(b) Factorise $x^3 + 2x^2 - 9x - 18$ completely. Hence find all values of x for which the expression is zero.

34. (a) ABCD is a cyclic quadrilateral. If $\angle A = (4x + 8)^\circ$ and $\angle C = (6x - 18)^\circ$, find x , $\angle A$ and $\angle C$. If $\angle B = 72^\circ$, also find $\angle D$. Justify each step.

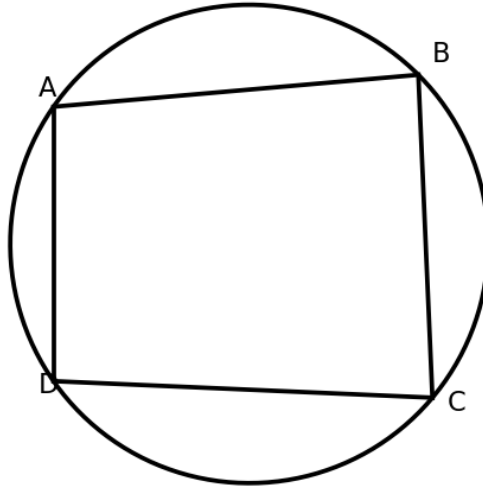


Figure for Question 34(a)

OR

(b) A chord AB of a circle of radius 10 cm is 16 cm long. The perpendicular OM from the centre to AB meets it at M. Prove that M is the midpoint of AB and find OM.

35. A triangular field has sides 13 m, 14 m and 15 m.

(i) Find its area using Heron's formula.

(ii) A circular flower bed of radius 3.5 m is made in the field. Find the area of the remaining part of the field. Use $\pi = 22/7$.

SECTION E

Questions 36 to 38 are case study based. Each question carries 4 marks. ($3 \times 4 = 12$)

Case Study 1

36. A town map uses a coordinate grid. Two libraries are at A(1, 1) and B(5, 1), while a school is at S(3, 4).

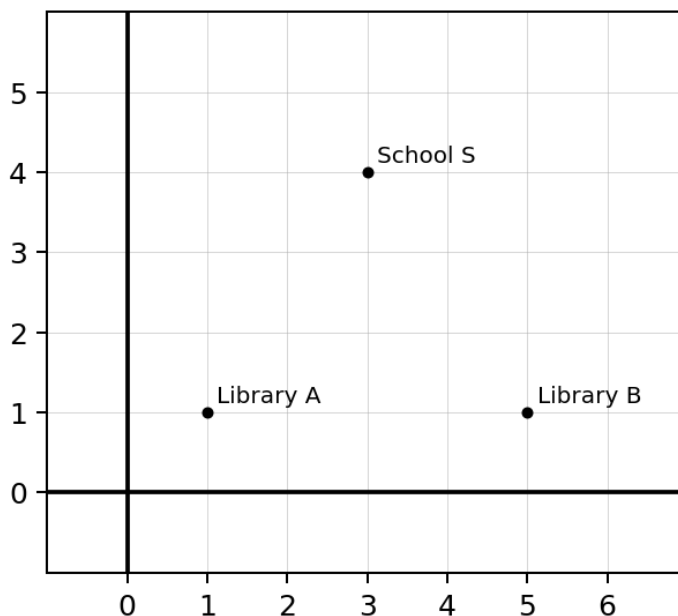
(i) Find AB.

(ii) Find the midpoint of AB.

(iii) (a) Find SA and SB and state what you observe.

OR

(iii) (b) A community centre C is the reflection of S in the x-axis. Write the coordinates of C and find SC. (2)



Coordinate map for Case Study 1

Case Study 2

37. A rectangular game mat is 6 m by 4 m. A circular target of radius 1 m lies completely inside it. A point is selected at random from the mat. Assume that the chance of landing in a region is proportional to its area.

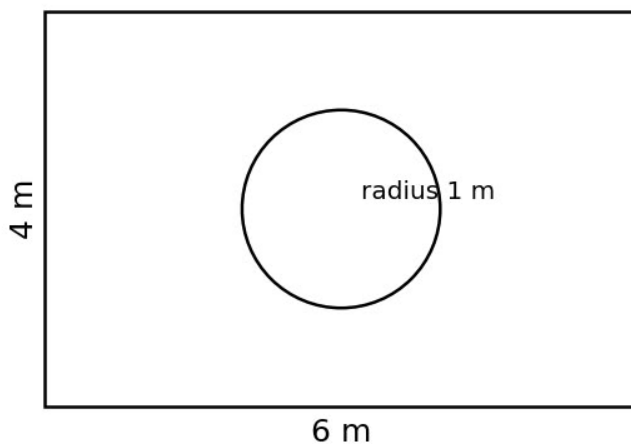
(i) Find the area of the mat.

(ii) Find the area of the circular target.

(iii) (a) Find the probability that the point lies inside the target.

OR

(iii) (b) Find the probability that the point lies outside the target.



Game mat for Case Study 2

Case Study 3

38. A bacteria culture starts with 30 bacteria and the number doubles every hour. Thus the numbers form the sequence 30, 60, 120, 240,

(i) Is the sequence an AP or a GP? Give its common ratio/difference.

(ii) How many bacteria are present after the 4th doubling?

(iii) (a) Write an explicit formula for the number after n doublings and find the number after 8 doublings.

OR

(iii) (b) Write a recursive formula for the sequence and use it to obtain the next two terms after 240.