

Mathematics
Sample Question Paper – 2
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 paper is divided into five Sections - A, B, C, D and E.
 - (3) Section A: Questions 1-18 are MCQs and Questions 19-20 are Assertion-Reason questions of 1 mark each.
 - (4) Section B: Questions 21-25 are Very Short Answer questions of 2 marks each.
 - (5) Section C: Questions 26-31 are Short Answer questions of 3 marks each.
 - (6) Section D: Questions 32-35 are Long Answer questions of 5 marks each.
 - (7) Section E: Questions 36-38 are case study based questions of 4 marks each.
 - (8) There is no overall choice. Internal choice is provided in 2 questions of Section B, 2 of Section C, 2 of Section D, and the 2-mark part of each case study.
 - (9) Use $\pi = 22/7$ unless otherwise stated. Draw neat figures wherever required. Calculators are not allowed.
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SECTION A

(Questions 1 to 20 carry 1 mark each. $20 \times 1 = 20$)

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. If A(2, 1) and B(2, 8), then AB is:
(A) 5 units (B) 6 units
(C) 7 units (D) 10 units
3. The zero of $p(x) = 5x + 15$ is:
(A) -5 (B) -3
(C) 3 (D) 5
4. The graph of $y = 4x - 7$ is parallel to the graph of:
(A) $y = 4x + 2$ (B) $y = -4x + 2$
(C) $y = 2x + 4$ (D) $y = 7x - 4$
5. Which number has a non-terminating, non-repeating decimal expansion?
(A) $3/8$ (B) $7/20$
(C) $\sqrt{11}$ (D) 0.272727...
6. Which statement is correct?
(A) Every irrational number is an integer. (B) Every integer is rational.
(C) Every rational number is natural. (D) Zero is irrational.
7. $(2a + 3b)^2$ equals:
(A) $4a^2 + 9b^2$ (B) $4a^2 + 12ab + 9b^2$
(C) $2a^2 + 6ab + 3b^2$ (D) $4a^2 - 12ab + 9b^2$

8. One factor of $x^2 - 11x + 30$ is:

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

9. The perpendicular from the centre of a circle to a chord:

- (A) doubles the chord
(B) bisects the chord
(C) is parallel to the chord
(D) is a tangent

10. In the same circle, if two chords subtend equal angles at the centre, the chords are:

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

11. A circle has radius 14 cm. Its area is:

- (A) 44 cm^2 (B) 88 cm^2
(C) 308 cm^2 (D) 616 cm^2

12. A minute hand 14 cm long sweeps for 15 minutes. The angle swept is:

- (A) 30° (B) 60°
(C) 90° (D) 120°

13. A card is chosen at random from cards numbered 1 to 10. The probability of obtaining a multiple of 3 is:

- (A) $1/10$ (B) $3/10$
(C) $1/3$ (D) $7/10$

14. The sample space for tossing one coin is:

- (A) {H} (B) {T}
(C) {H, T} (D) {HH, HT, TH, TT}

15. In the AP 11, 7, 3, -1, ... the common difference is:

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

16. The n th term of 2, 5, 8, 11, ... is:

- (A) $2n + 1$ (B) $3n - 1$
(C) $3n + 1$ (D) $5n - 3$

17. In the GP 5, 15, 45, 135, ... the fifth term is:

- (A) 225 (B) 405
(C) 625 (D) 1215

18. Which sequence is NOT a GP?

(A) 2, 6, 18, 54, ...

(B) 81, 27, 9, 3, ...

(C) 1, 4, 7, 10, ...

(D) 4, -8, 16, -32, ...

Questions 19 and 20 are Assertion-Reason based. Choose:

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

19. Assertion (A): Between any two distinct rational numbers, infinitely many rational numbers can be found.

Reason (R): The average of two distinct rational numbers is a rational number lying between them.

20. Assertion (A): Opposite angles of a cyclic quadrilateral are supplementary.

Reason (R): 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. From the coordinate grid shown, find PR and QR. Hence state whether ΔPQR is right-angled.

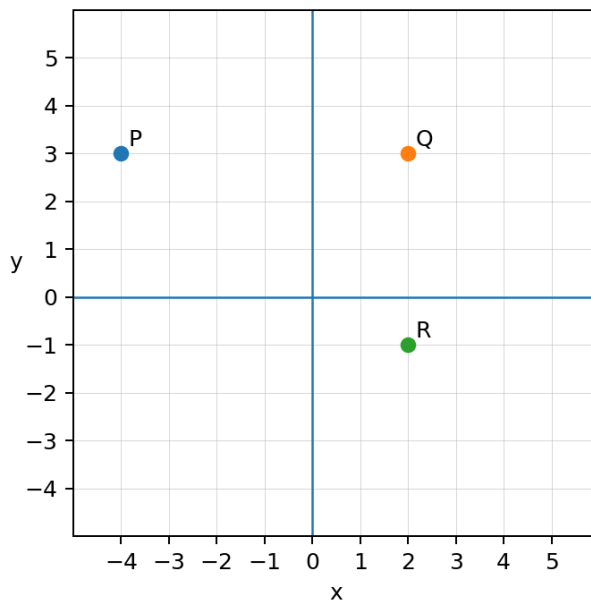


Figure for Question 21

22. (a) Using a suitable identity, evaluate 998^2 .

OR

(b) Factorise: $4x^2 + 20xy + 25y^2$.

23. A fair die is rolled once. Write the sample space and find the probability of getting a number which is a factor of 6.

24. (a) Find the 21st term of the AP $-5, -1, 3, 7, \dots$

OR

(b) Write the explicit formula for the GP $3, 12, 48, 192, \dots$ and find its 6th term.

25. A chord AB of a circle with centre O subtends an angle of 100° at O. What angle does the same chord subtend at a point C on the remaining part of the circle?

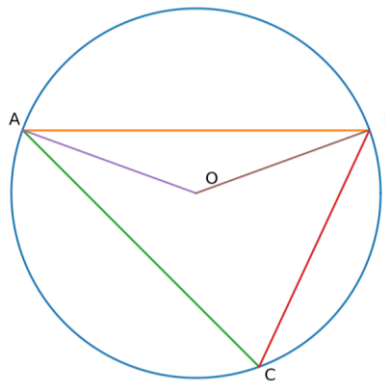


Figure for Question 25

SECTION C

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

26. Find three rational numbers between $\frac{2}{5}$ and $\frac{3}{5}$. Explain briefly how you obtained them.

27. The graph shown represents a linear polynomial $p(x)$. Write the coordinates where it cuts the axes. Hence write $p(x)$ in the form $ax + b$, taking the coefficient of x as -1 .

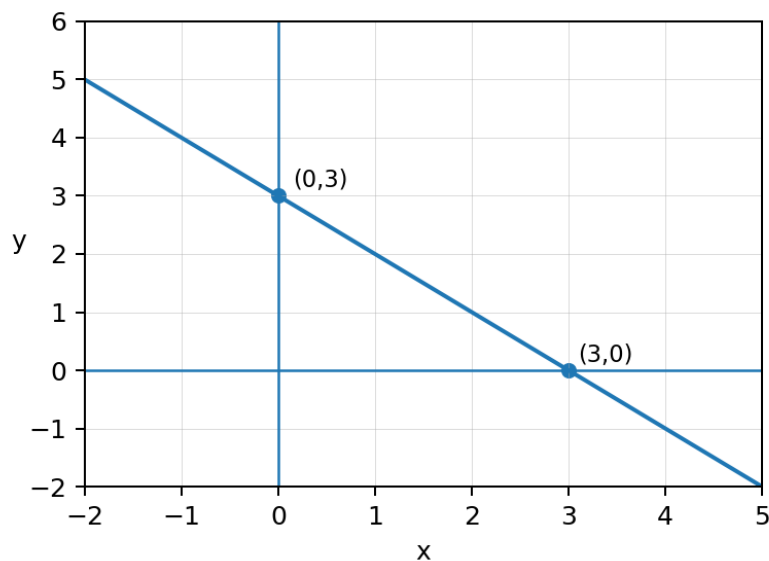


Figure for Question 27

28. (a) Factorise completely: $x^2 + 13x + 42$. Verify your factorisation by multiplication.

OR

(b) Simplify using identities: $(3x + 2y)^2 - (3x - 2y)^2$.

29. Prove that equal chords of a circle subtend equal angles at the centre.

30. (a) A sector of radius 14 cm has central angle 120° . Find its arc length and area.

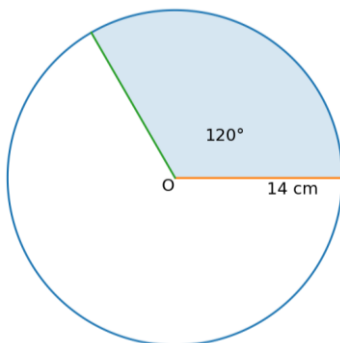


Figure for Question 30(a)

OR

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

31. Two fruit baskets are used in a random experiment. Basket A contains one apple and two oranges; Basket B contains one banana and one mango. One fruit is picked from each basket. Draw a tree diagram, list the sample space, and find the probability of picking an apple and a banana.

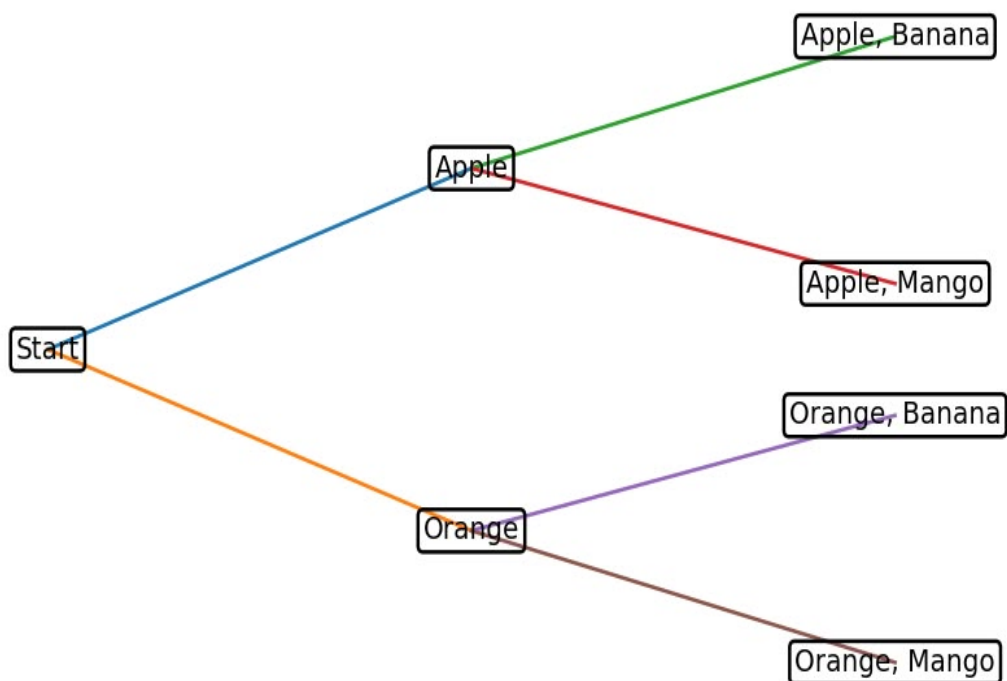


Figure for Question 31

SECTION D

Questions 32 to 35 carry 5 marks each. $4 \times 5 = 20$

32. The first three stages of a matchstick pattern are shown below. One new hexagon is added at every stage and shares one side with the preceding hexagon.

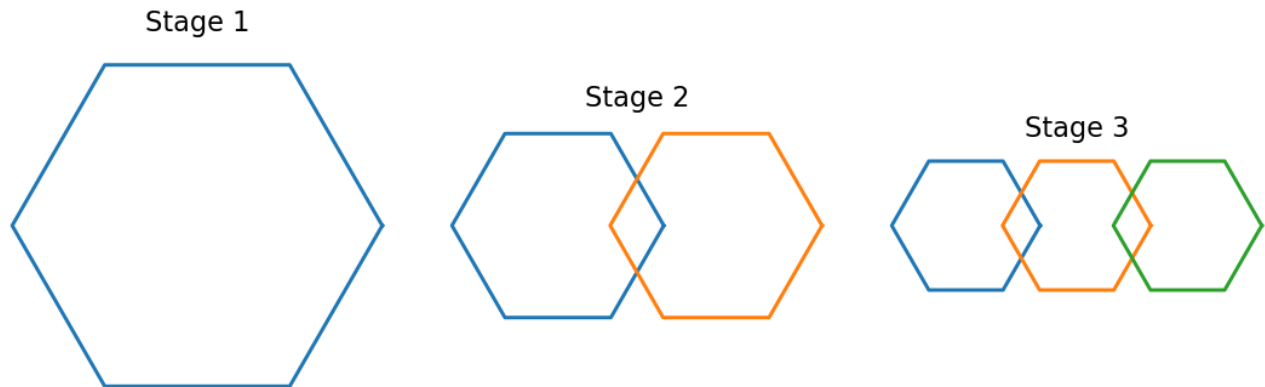


Figure for Question 32

- (i) Write the number of matchsticks needed for Stages 1, 2 and 3.
- (ii) Show that the sequence is an AP.
- (iii) Find a rule for the number of matchsticks at Stage n .
- (iv) Find the number needed at Stage 30.

33. (a) Prove that the perpendicular bisector of a chord passes through the centre of a circle. Using this result, a chord of length 24 cm is at a distance 5 cm from the centre. Find the radius.

OR

(b) 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 $\angle D$.

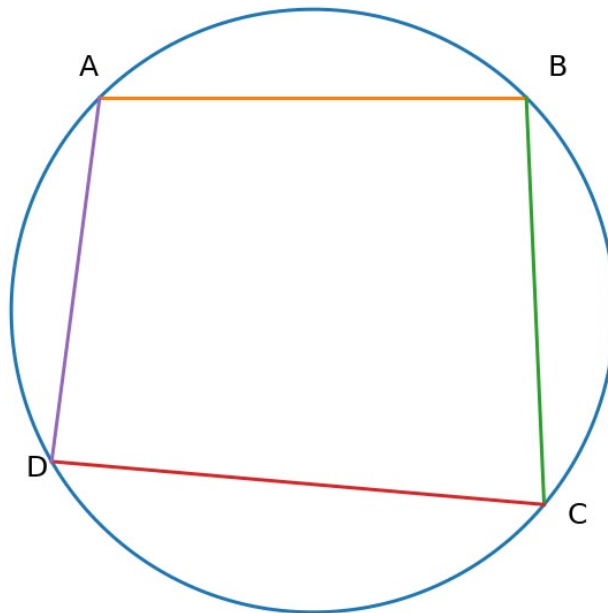


Figure for Question 33(b) only

34. (a) A triangular field has sides 25 m, 39 m and 56 m. Find its area using Heron's formula. Also find the cost of grassing it at ₹18 per m^2 .

OR

(b) A chord of a circle of radius 14 cm subtends 90° at the centre. Find the area of the minor sector and the area of the triangle formed by the two radii and the chord. Hence find the area of the minor segment.

35. A box contains 4 balls numbered 1 to 4. A ball is drawn and its number recorded. Without replacing it, a second ball is drawn.

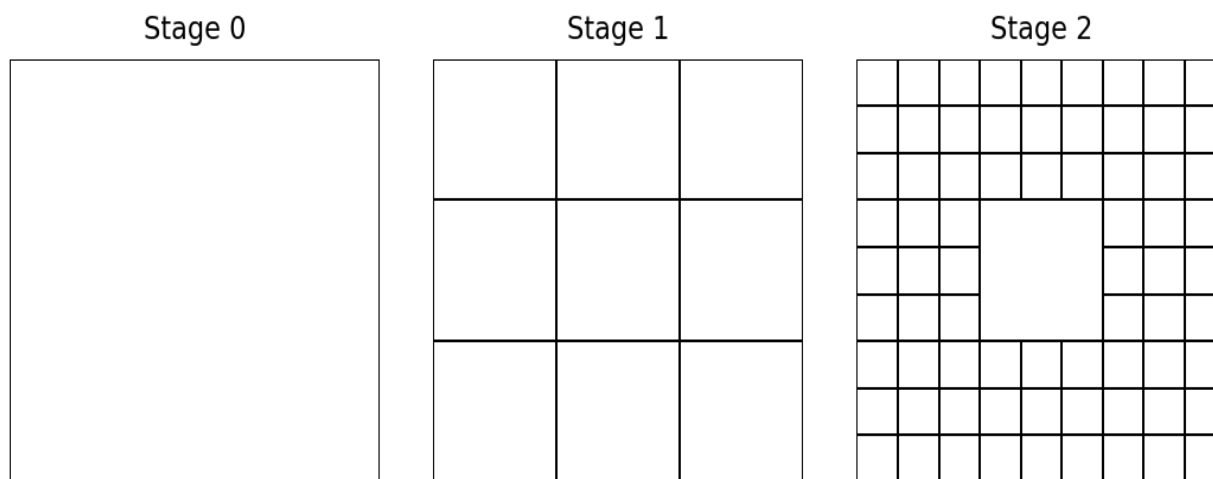
- (i) Draw a tree diagram or systematically list the sample space.
- (ii) Find the number of outcomes.
- (iii) Find the probability that the sum of the two recorded numbers is 5.
- (iv) Find the probability that the second number is greater than the first.

SECTION E

(Questions 36 to 38 are case study based and carry 4 marks each. $3 \times 4 = 12$)

Case Study - 1

36. A square carpet pattern starts with one square. At each stage, every retained square is divided into 9 equal squares and the centre square is removed. Thus the number of retained small squares follows 1, 8, 64, 512,



Stages 0, 1 and 2

- (i) Is the sequence an AP or a GP? State its common ratio.
- (ii) How many retained squares will there be at Stage 4 if Stage 0 has 1 square?
- (iii) (a) Write an explicit formula for the number of retained squares at Stage n .

OR

- (iii) (b) Write a recursive rule for the sequence and use it to obtain the next term after 512.

Case Study - 2

37. A cab company charges a fixed booking amount plus a constant amount per kilometre. For a 2 km trip the fare is ₹74, and for a 5 km trip the fare is ₹140. Let the fare be represented by the linear polynomial $F(x) = ax + b$, where x is the distance in kilometres.

(i) Find the increase in fare when the distance increases from 2 km to 5 km.

(ii) Find a , the fare per kilometre.

(iii) (a) Find b and hence write $F(x)$.

OR

(iii) (b) Find the fare for a 10 km trip and the distance travelled if the fare is ₹250.

Case Study - 3

38. A circular park has radius 14 m. A 90° sector is reserved as a flower garden and the remaining region is used as a walking lawn.

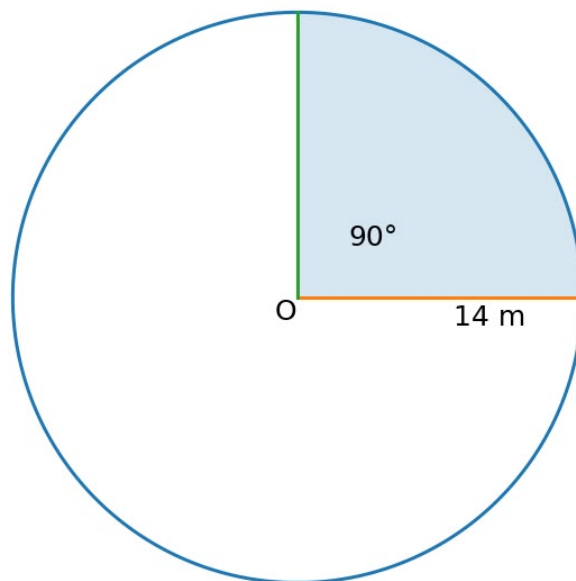


Figure for Question 38

(i) Find the circumference of the park.

(ii) Find the area of the complete park.

(iii) (a) Find the area of the 90° flower garden.

OR

(iii) (b) Find the area of the remaining lawn.