

PERIODIC TEST / CLASS ASSESSMENT EXAMINATION 2026-27

SUBJECT: MATHEMATICS (GANITA MANJARI) | CLASS: IX

Time Allowed: 2 Hours	Maximum Marks: 40
Student Name: _____	Roll No.: _____

QUESTION PAPER BLUEPRINT (EXACT AS PER USER SPECIFICATION)

Unit / Chapter Name	1M	2M	3M	4M	Total
The world of numbers	2	2	3	—	7
Exploring algebraic identities	3	4	3	—	10
I'm Up and Down, and Round and Round (Circles)	2	2	3	4	11
Measuring space: Perimeter and Area	3	2	3	4	12
Total Breakdown	10	10	12	8	40

GENERAL INSTRUCTIONS

1. This question paper is strictly framed according to the NCERT Class 9 'Ganita Manjari' syllabus.
2. The question paper comprises FOUR Sections: A, B, C, and D.
3. Section A contains 10 objective/MCQ questions of 1 mark each.
4. Section B contains 5 short answer questions of 2 marks each.
5. Section C contains 4 short answer questions of 3 marks each.
6. Section D contains 2 Case Study-Based integrated questions of 4 marks each with sub-parts.
7. All questions are compulsory. Internal choices have been provided in 4-mark Case Study questions.

SECTION A — OBJECTIVE & VERY SHORT QUESTIONS

10 Marks (1M × 10)

- Q1.** Which of the following numbers is an irrational number?
(a) 3.1415 (b) $\sqrt{9}$ (c) $\sqrt{5}$ (d) 2.555...
- Q2.** Evaluate and simplify the exponential expression: $(64)^{(1/3)}$
(a) 2 (b) 4 (c) 8 (d) 16
- Q3.** What is the degree of the polynomial $P(x) = 4x^4 - 3x^3 + 7x - 5$?
(a) 3 (b) 4 (c) 1 (d) 0
- Q4.** Find the zero of the linear polynomial $p(x) = 3x - 12$.
(a) 3 (b) -4 (c) 4 (d) 12
- Q5.** Using the algebraic identity $(x + a)(x + b) = x^2 + (a + b)x + ab$, what is the constant term in $(x + 4)(x + 10)$?
(a) 14 (b) 40 (c) 4 (d) 10

Q6. An angle subtended by a diameter at any point on the semicircle is equal to:

- (a) 45° (b) 60° (c) 90° (d) 180°

Q7. If the angle subtended by a chord AB at the centre O of a circle of radius 6 cm is 60° , what is the length of chord AB?

- (a) 3 cm (b) 6 cm (c) 12 cm (d) $6\sqrt{3}$ cm

Q8. In Heron's formula $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$, what does the variable 's' represent?

- (a) Perimeter (b) Semi-perimeter (c) Height (d) Side length

Q9. Calculate the area of an equilateral triangle having a side length of 6 cm.

- (a) $9\sqrt{3}$ cm² (b) $18\sqrt{3}$ cm² (c) $36\sqrt{3}$ cm² (d) 12 cm²

Q10. The side lengths of a triangular board are in the ratio 3 : 4 : 5 and its total perimeter is 36 cm. What is the length of its shortest side?

- (a) 3 cm (b) 9 cm (c) 12 cm (d) 15 cm

SECTION B — SHORT ANSWER QUESTIONS (TYPE I)

10 Marks (2M × 5)

Q11. Rationalize the denominator of the given real number expression and simplify:

$$2 / (\sqrt{7} - \sqrt{5})$$

Q12. Factorise the algebraic expression completely using standard identities:

$$49a^2 - 25b^2$$

Q13. Evaluate the product $(103) \times (107)$ without performing direct multiplication, by using a suitable algebraic identity.

Q14. A chord of a circle is 16 cm long and its perpendicular distance from the centre of the circle is 6 cm. Calculate the radius of the circle.

Q15. Find the area of an isosceles triangle whose equal sides measure 10 cm each and the base measures 12 cm, using Heron's formula.

SECTION C — SHORT ANSWER QUESTIONS (TYPE II)

12 Marks (3M × 4)

Q16. Express the non-terminating recurring decimal number $0.2353535\ldots$ ($0.23\overline{5}$) in the form p/q , where p and q are integers and $q \neq 0$.

Q17. Completely factorise the cubic polynomial expression:

$$p(x) = x^3 - 3x^2 - 9x - 5$$

Q18. In a circle with centre O, ABCD is a cyclic quadrilateral. If the measure of opposite angle $\angle ADC = 110^\circ$:

- State the relationship between opposite angles of a cyclic quadrilateral.
- Calculate the measure of angle $\angle ABC$.
- If point O lies inside the quadrilateral, find the reflex angle $\angle AOC$ at the centre.

Q19. A triangular field has sides measuring 120 m, 80 m, and 50 m.

- Calculate the area of the triangular field using Heron's formula.
- Find the total cost of fencing the boundary with barbed wire at ₹20 per metre, leaving a gap of 3 m on one side for a entrance gate.

SECTION D — CASE STUDY BASED QUESTIONS

8 Marks (4M × 2)

Q20. CASE STUDY 1: CIRCULAR SPORTS TRACK & CHORD PROPERTIES**(Chapter: I'm Up and Down, and Round and Round)**

A school constructed a circular sports ground with a central flag post located at centre O. During an annual sports event, a straight rope AB of length 24 m is stretched across the circular ground to mark the tug-of-war boundary line. The perpendicular distance from the central flag post O to the rope AB is 5 m.

(i) State the geometric property concerning the perpendicular drawn from the centre of a circle to a chord. (1 Mark)

(ii) Calculate the radius of the circular sports ground. (1 Mark)

(iii) If another parallel boundary rope CD of length 10 m is stretched on the opposite side of the centre O, calculate the distance between the two parallel ropes AB and CD. (2 Marks)

[OR]

(iii) If an arc AB subtends an angle of 100° at the central flag post O, calculate the angle subtended by the same arc at any point C on the remaining circular boundary. (2 Marks)

Q21. CASE STUDY 2: TRIANGULAR GARDEN LANDSCAPING**(Chapter: Measuring space: Perimeter and Area)**

A residential society designed a triangular decorative lawn PQR. The three side measurements of the garden plot are PQ = 25 m, QR = 25 m, and PR = 14 m. The management decides to cover the lawn with natural green grass turf and create a walking pathway along its longest boundary.

(i) Calculate the semi-perimeter (s) of the triangular garden plot PQR. (1 Mark)

(ii) Calculate the total area of the triangular garden plot using Heron's formula. (1 Mark)

(iii) If the plot is divided into two equal triangular sections along the median from Q to base PR, calculate the area of each section and the total cost of laying grass turf at ₹50 per m^2 . (2 Marks)

[OR]

(iii) Calculate the height (altitude) of the triangular garden corresponding to the base PR (14 m). (2 Marks)

ANSWER KEY & DETAILED MARKING SCHEME

SECTION A SOLUTIONS (1 Mark Each)

- **Q1: (c) $\sqrt{5}$** — Reason: $\sqrt{5}$ is a non-terminating, non-recurring decimal, hence irrational. (1M)
- **Q2: (b) 4** — Solution: $(64)^{(1/3)} = (4^3)^{(1/3)} = 4$. (1M)
- **Q3: (b) 4** — Reason: The highest power of x in P(x) is 4. (1M)
- **Q4: (c) 4** — Solution: $3x - 12 = 0 \Rightarrow 3x = 12 \Rightarrow x = 4$. (1M)
- **Q5: (b) 40** — Solution: $(x + 4)(x + 10) = x^2 + 14x + 40$. Constant term is 40. (1M)
- **Q6: (c) 90°** — Theorem: Angle subtended by a diameter in a semicircle is a right angle (90°). (1M)
- **Q7: (b) 6 cm** — Solution: In $\triangle AOB$, $OA = OB = 6$ cm and $\angle AOB = 60^\circ$, so $\triangle AOB$ is equilateral. $AB = 6$ cm. (1M)
- **Q8: (b) Semi-perimeter** — Definition: $s = (a + b + c)/2$. (1M)
- **Q9: (a) $9\sqrt{3} \text{ cm}^2$** — Solution: Area = $(\sqrt{3}/4) \times a^2 = (\sqrt{3}/4) \times 36 = 9\sqrt{3} \text{ cm}^2$. (1M)
- **Q10: (b) 9 cm** — Solution: Sides = $3x, 4x, 5x$. Perimeter $12x = 36 \Rightarrow x = 3$. Shortest side = $3(3) = 9$ cm. (1M)

SECTION B SOLUTIONS (2 Marks Each)

- **Q11: Rationalize $2 / (\sqrt{7} - \sqrt{5})$**

Solution:

Multiply numerator and denominator by conjugate $(\sqrt{7} + \sqrt{5})$:

$$= [2 \times (\sqrt{7} + \sqrt{5})] / [(\sqrt{7} - \sqrt{5})(\sqrt{7} + \sqrt{5})] \quad [1 \text{ Mark}]$$

$$= 2(\sqrt{7} + \sqrt{5}) / (7 - 5) = 2(\sqrt{7} + \sqrt{5}) / 2 = \sqrt{7} + \sqrt{5} \quad [1 \text{ Mark}]$$

- **Q12: Factorise $49a^2 - 25b^2$**

Solution:

Express as difference of squares: $(7a)^2 - (5b)^2$ [1 Mark]

Using identity $a^2 - b^2 = (a + b)(a - b)$:

$$= (7a + 5b)(7a - 5b) \quad [1 \text{ Mark}]$$

- **Q13: Evaluate 103×107**

Solution:

Express as $(100 + 3)(100 + 7)$ [1 Mark]

Using identity $(x + a)(x + b) = x^2 + (a + b)x + ab$:

$$= 100^2 + (3 + 7)(100) + (3 \times 7) = 10000 + 1000 + 21 = 11021 \quad [1 \text{ Mark}]$$

- **Q14: Radius of circle with chord 16 cm and distance 6 cm**

Solution:

Perpendicular from centre bisects chord: Half chord length = $16/2 = 8$ cm. [1 Mark]

In right triangle formed by radius (r), distance (6 cm) and half-chord (8 cm):

$$r^2 = 6^2 + 8^2 = 36 + 64 = 100 \Rightarrow r = \sqrt{100} = 10 \text{ cm.} \quad [1 \text{ Mark}]$$

- **Q15: Area of isosceles triangle (10 cm, 10 cm, 12 cm)**

Solution:

$$s = (10 + 10 + 12)/2 = 32/2 = 16 \text{ cm.} \quad [1 \text{ Mark}]$$

$$\text{Area} = \sqrt{(16 \times (16-10) \times (16-10) \times (16-12))} = \sqrt{(16 \times 6 \times 6 \times 4)}$$

$$= \sqrt{(16 \times 36 \times 4)} = 4 \times 6 \times 2 = 48 \text{ cm}^2. \quad [1 \text{ Mark}]$$

SECTION C SOLUTIONS (3 Marks Each)

- **Q16: Express $0.23\overline{5}$ in p/q form**

Solution:

$$\text{Let } x = 0.2353535... \text{ ---- (1)}$$

$$10x = 2.353535... \text{ ---- (2) [1 Mark]}$$

$$1000x = 235.353535... \text{ ---- (3) [1 Mark]}$$

$$\text{Subtracting (2) from (3): } 990x = 233 \Rightarrow x = 233 / 990. \text{ [1 Mark]}$$

• **Q17: Factorise $p(x) = x^3 - 3x^2 - 9x - 5$**

Solution:

By trial, $p(-1) = (-1)^3 - 3(-1)^2 - 9(-1) - 5 = -1 - 3 + 9 - 5 = 0$. So $(x + 1)$ is a factor. [1 Mark]

Dividing $p(x)$ by $(x + 1)$: $p(x) = (x + 1)(x^2 - 4x - 5)$ [1 Mark]

Factorising $x^2 - 4x - 5 = (x - 5)(x + 1)$.

Hence, $p(x) = (x + 1)^2(x - 5)$. [1 Mark]

• **Q18: Cyclic Quadrilateral ABCD with $\angle ADC = 110^\circ$**

Solution:

(i) Opposite angles of a cyclic quadrilateral are supplementary (sum to 180°). [1 Mark]

(ii) $\angle ABC + \angle ADC = 180^\circ \Rightarrow \angle ABC = 180^\circ - 110^\circ = 70^\circ$. [1 Mark]

(iii) Central angle $\angle AOC = 2 \times \angle ADC = 2 \times 110^\circ = 220^\circ$ (reflex angle). [1 Mark]

• **Q19: Triangular field (120m, 80m, 50m)**

Solution:

$$(i) s = (120 + 80 + 50)/2 = 125 \text{ m.}$$

$$\text{Area} = \sqrt{(125 \times 5 \times 45 \times 75)} = \sqrt{(5^3 \times 5 \times 3^2 \times 5 \times 3 \times 5^2)} = 375\sqrt{15} \text{ m}^2 \approx 1452.37 \text{ m}^2. \text{ [2 Marks]}$$

$$(ii) \text{Length of fence} = \text{Perimeter} - \text{Gate} = 250 - 3 = 247 \text{ m.}$$

$$\text{Cost} = 247 \text{ m} \times ₹20/\text{m} = ₹4,940. \text{ [1 Mark]}$$

SECTION D SOLUTIONS (4 Marks Each)

• **Q20: Case Study 1 Solutions (Circular Sports Track)**

(i) Theorem: The perpendicular drawn from the centre of a circle to a chord bisects the chord. (1 Mark)

(ii) Half of chord AB = $24 / 2 = 12$ m. Perpendicular distance = 5 m.

$$\text{Radius } r = \sqrt{(12^2 + 5^2)} = \sqrt{(144 + 25)} = \sqrt{169} = 13 \text{ m. (1 Mark)}$$

(iii) For chord CD = 10 m, half length = 5 m. Distance from centre $d_2 = \sqrt{(13^2 - 5^2)} = \sqrt{(169 - 25)} = \sqrt{144} = 12$ m.

Since chords lie on opposite sides of centre O, total distance between AB and CD = 5 m + 12 m = 17 m. (2 Marks)

[OR]

(iii) Theorem: Angle subtended by an arc at centre is double the angle subtended at any point on the remaining circle.

Angle at circumference = $100^\circ / 2 = 50^\circ$. (2 Marks)

• **Q21: Case Study 2 Solutions (Triangular Garden PQR)**

(i) Semi-perimeter $s = (25 + 25 + 14)/2 = 64/2 = 32$ m. (1 Mark)

$$(ii) \text{Area} = \sqrt{(32 \times (32-25) \times (32-25) \times (32-14))} = \sqrt{(32 \times 7 \times 7 \times 18)}$$

$$= \sqrt{(16 \times 2 \times 49 \times 2 \times 9)} = 4 \times 7 \times 2 \times 3 = 168 \text{ m}^2. \text{ (1 Mark)}$$

(iii) A median divides a triangle into two triangles of equal area.

$$\text{Area of each section} = 168 / 2 = 84 \text{ m}^2.$$

$$\text{Total turfing cost} = 168 \text{ m}^2 \times ₹50/\text{m}^2 = ₹8,400. \text{ (2 Marks)}$$

[OR]

$$(iii) \text{Area} = (1/2) \times \text{base} \times \text{height} \Rightarrow 168 = (1/2) \times 14 \times h$$

$$\Rightarrow 7h = 168 \Rightarrow h = 24 \text{ m. Height corresponding to base PR is 24 m. (2 Marks)}$$