

KENDRIYA VIDYALAYA SANGATHAN
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 (SESSION 2026-27)

Unit / Chapter Name	1M	2M	3M	4M	Total Marks
1. The world of numbers	2 (2M)	1 (2M)	1 (3M)	—	7 Marks
2. Exploring algebraic identities	3 (3M)	2 (4M)	1 (3M)	—	10 Marks
3. I'm Up and Down, and Round and Round	2 (2M)	1 (2M)	1 (3M)	1 CS (4M)	11 Marks
4. Measuring space: Perimeter and Area	3 (3M)	1 (2M)	1 (3M)	1 CS (4M)	12 Marks
Total Breakdown	10 Qs (10M)	5 Qs (10M)	4 Qs (12M)	2 Qs (8M)	40 Marks

GENERAL INSTRUCTIONS

1. This question paper is divided into FOUR Sections: A, B, C, and D.
2. Section A contains 10 multiple-choice and short objective questions of 1 mark each.
3. Section B contains 5 short answer questions of 2 marks each.
4. Section C contains 4 short answer questions of 3 marks each.
5. Section D contains 2 Case Study-Based integrated questions of 4 marks each with sub-parts.
6. All questions are compulsory. Internal choices have been provided in selected questions.
7. Use of calculators or logarithmic tables is strictly prohibited. You may request graph paper where necessary.

SECTION A — OBJECTIVE & VERY SHORT QUESTIONS
10 Marks (1M × 10)**Q1.** Which of the following numbers represents an irrational number?

- (a) 3.14159 (b)
- $\sqrt{4}$
- (c)
- $\sqrt{7}$
- (d) 2.555...

Q2. What is the simplified value of the exponent expression $(81)^{(3/4)}$?

- (a) 9 (b) 27 (c) 3 (d) 81

Q3. Find the degree of the polynomial $P(x) = 7x^5 - 4x^3 + 2x^2 - 9$.

- (a) 3 (b) 4 (c) 5 (d) 0

Q4. What is the zero of the linear polynomial $p(x) = 5x - 15$?

- (a) -3 (b) 3 (c) 15 (d)
- $1/5$

Q5. Using the algebraic identity $(a + b)^2 = a^2 + 2ab + b^2$, find the coefficient of 'x' in the expansion of $(2x + 3)^2$.

- (a) 6 (b) 12 (c) 4 (d) 9

Q6. In which quadrant of the Cartesian plane does the coordinate point P(-6, 4) lie?

- (a) Quadrant I (b) Quadrant II (c) Quadrant III (d) Quadrant IV

Q7. What is the perpendicular distance of the point A(5, -7) from the x-axis?

- (a) 5 units (b) -7 units (c) 7 units (d) 12 units

Q8. In Heron's formula $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$, what does 's' represent for a triangle with sides a, b, and c?

- (a) Total Perimeter (b) Semi-perimeter $= (a+b+c)/2$ (c) Square of side (d) Height of triangle

Q9. Find the area of an equilateral triangle having a side of length 8 cm.

- (a) $16\sqrt{3} \text{ cm}^2$ (b) $32\sqrt{3} \text{ cm}^2$ (c) $64\sqrt{3} \text{ cm}^2$ (d) $8\sqrt{3} \text{ cm}^2$

Q10. The side lengths of a triangular plot are in the ratio 3 : 4 : 5 and its perimeter is 120 m. What is the length of its longest side?

- (a) 30 m (b) 40 m (c) 50 m (d) 60 m

SECTION B — SHORT ANSWER QUESTIONS (TYPE I)

10 Marks (2M × 5)

Q11. Rationalize the denominator of the real number expression:

$$1 / (4 + \sqrt{5})$$

Q12. Factorise the algebraic binomial expression completely using standard identities:

$$36x^2 - 81y^2$$

Q13. Evaluate the product $(105) \times (95)$ without performing direct multiplication, using a suitable algebraic identity.

Q14. Plot the coordinates A(2, 3), B(-3, 3), C(-3, -2), and D(2, -2) on a Cartesian coordinate plane. Name the geometric figure formed by joining these points in sequence A-B-C-D-A.

Q15. Calculate the area of a triangle whose three sides measure 13 cm, 14 cm, and 15 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:

$$p(x) = x^3 - 6x^2 + 11x - 6$$

Q18. Three vertices of a rectangle ABCD plotted on a Cartesian plane are A(4, 2), B(-2, 2), and C(-2, -3).

- Plot the given points on a coordinate graph.
- State the exact coordinates of the fourth vertex D.
- Calculate the perimeter and area of rectangle ABCD.

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

- Calculate the area of the triangular field.
- Find the cost of enclosing the boundary with barbed wire at ₹20 per metre, leaving a gap of 3 m on one side for a wooden gate.

SECTION D — CASE STUDY BASED QUESTIONS

8 Marks (4M × 2)

Q20. CASE STUDY 1: PARK NAVIGATION & COORDINATE MAP

A city municipality mapped out a newly constructed Smart Park on a two-dimensional Cartesian plane to assist visitors with GPS navigation. The Central Entrance Gate is designated as the Origin $O(0, 0)$.

Key landmark positions are recorded as follows:

- Main Fountain (F): Located at coordinates $(4, 3)$
- Children's Play Area (P): Located at coordinates $(-5, 3)$
- Botanical Reading Library (L): Located at coordinates $(-5, -4)$
- Open Food Court (C): Located at coordinates $(4, -4)$

(i) Identify and name the geometric quadrilateral formed by joining points F, P, L, and C in order. (1 Mark)

(ii) In which quadrants do the Children's Play Area (P) and Botanical Library (L) lie? (1 Mark)

(iii) Calculate the straight-line distance between the Main Fountain (F) and the Children's Play Area (P), and find the total area of region FPLC. (2 Marks)

[OR]

(iii) Find the distance of the Main Fountain (F) from the Entrance Gate $O(0,0)$ using the distance formula or Pythagorean relation. (2 Marks)

Q21. CASE STUDY 2: ARCHITECTURAL LAND DESIGN & TURFING

A landscape architect is designing two decorative green lawn patches, Section A and Section B, inside a luxury housing society using artificial grass turf.

- Section A is an isosceles triangular patch with side measurements 13 m, 13 m, and 10 m.
- Section B is a scalene triangular patch with side measurements 15 m, 14 m, and 13 m.

(i) Determine the semi-perimeter (s) for both Section A and Section B. (1 Mark)

(ii) Compute the total surface area of Section A using Heron's formula. (1 Mark)

(iii) Compute the total surface area of Section B using Heron's formula and specify which section has a larger area and by how much. (2 Marks)

[OR]

(iii) If the cost of laying artificial synthetic turf is ₹120 per square metre, calculate the total cost for turfing Section B. (2 Marks)

ANSWER KEY & DETAILED MARKING SCHEME

SECTION A SOLUTIONS (1 Mark Each)

- **Q1: (c) $\sqrt{7}$** — Reason: $\sqrt{7}$ is a non-terminating, non-recurring decimal, hence irrational. (1M)
- **Q2: (b) 27** — Solution: $(81)^{(3/4)} = (3^4)^{(3/4)} = 3^3 = 27$. (1M)
- **Q3: (c) 5** — Reason: The highest exponent of x in P(x) is 5. (1M)
- **Q4: (b) 3** — Solution: $5x - 15 = 0 \Rightarrow 5x = 15 \Rightarrow x = 3$. (1M)
- **Q5: (b) 12** — Solution: $(2x + 3)^2 = 4x^2 + 2(2x)(3) + 9 = 4x^2 + 12x + 9$. Coefficient of x is 12. (1M)
- **Q6: (b) Quadrant II** — Reason: x-coordinate is negative (-6) and y-coordinate is positive (+4). (1M)
- **Q7: (c) 7 units** — Reason: Distance from x-axis is |y-coordinate| = |-7| = 7 units. (1M)
- **Q8: (b) Semi-perimeter** — Definition: $s = (a + b + c)/2$. (1M)
- **Q9: (a) $16\sqrt{3} \text{ cm}^2$** — Solution: Area = $(\sqrt{3}/4) \times a^2 = (\sqrt{3}/4) \times 64 = 16\sqrt{3} \text{ cm}^2$. (1M)
- **Q10: (c) 50 m** — Solution: Ratio = 3x:4x:5x. $12x = 120 \Rightarrow x = 10$. Longest side = $5x = 50 \text{ m}$. (1M)

SECTION B SOLUTIONS (2 Marks Each)

- **Q11: Rationalize $1/(4 + \sqrt{5})$**

Solution:

Multiply numerator and denominator by conjugate $(4 - \sqrt{5})$:

$$= [1 \times (4 - \sqrt{5})] / [(4 + \sqrt{5})(4 - \sqrt{5})] \quad [1 \text{ Mark}]$$

$$= (4 - \sqrt{5}) / (4^2 - (\sqrt{5})^2) = (4 - \sqrt{5}) / (16 - 5) = (4 - \sqrt{5}) / 11 \quad [1 \text{ Mark}]$$

- **Q12: Factorise $36x^2 - 81y^2$**

Solution:

Rewrite as difference of squares: $(6x)^2 - (9y)^2$ [1 Mark]

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

$$= (6x + 9y)(6x - 9y) = 9(2x + 3y)(2x - 3y) \quad [1 \text{ Mark}]$$

- **Q13: Evaluate 105×95**

Solution:

Express as $(100 + 5)(100 - 5)$ [1 Mark]

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

$$= 100^2 - 5^2 = 10000 - 25 = 9975 \quad [1 \text{ Mark}]$$

- **Q14: Plot points A(2,3), B(-3,3), C(-3,-2), D(2,-2)**

Solution:

Length = AB = $|2 - (-3)| = 5$ units. Width = AD = $|3 - (-2)| = 5$ units. [1 Mark]

Since all side lengths are equal (5 units) and adjacent sides are perpendicular, the geometric figure formed is a Square. [1 Mark]

- **Q15: Area of triangle with sides 13 cm, 14 cm, 15 cm**

Solution:

Semi-perimeter $s = (13 + 14 + 15)/2 = 42/2 = 21 \text{ cm}$. [1 Mark]

Area = $\sqrt{(21 \times (21-13) \times (21-14) \times (21-15))} = \sqrt{(21 \times 8 \times 7 \times 6)}$

$$= \sqrt{(3 \times 7 \times 2^3 \times 7 \times 2 \times 3)} = \sqrt{(3^2 \times 7^2 \times 2^4)} = 3 \times 7 \times 2 = 84 \text{ cm}^2. \quad [1 \text{ Mark}]$$

SECTION C SOLUTIONS (3 Marks Each)

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

Solution:

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

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

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

Subtracting (2) from (3):

$$1000x - 10x = 235.353535... - 2.353535...$$

$$990x = 233 \Rightarrow x = 233 / 990. \text{ [1 Mark]}$$

● **Q17: Factorise $p(x) = x^3 - 6x^2 + 11x - 6$**

Solution:

By trial method, $p(1) = 1^3 - 6(1)^2 + 11(1) - 6 = 1 - 6 + 11 - 6 = 0.$

Therefore, $(x - 1)$ is a factor of $p(x)$. [1 Mark]

Dividing $p(x)$ by $(x - 1)$:

$$p(x) = (x - 1)(x^2 - 5x + 6) \text{ [1 Mark]}$$

$$\text{Factorising quadratic } x^2 - 5x + 6 = (x - 2)(x - 3).$$

$$\text{Hence, } p(x) = (x - 1)(x - 2)(x - 3). \text{ [1 Mark]}$$

● **Q18: Rectangle vertices A(4,2), B(-2,2), C(-2,-3)**

Solution:

(i) Correct plotting on graph axes. [1 Mark]

(ii) Coordinates of D = (4, -3). [1 Mark]

(iii) Length AB = $4 - (-2) = 6$ units; Breadth BC = $2 - (-3) = 5$ units.

$$\text{Perimeter} = 2(6 + 5) = 22 \text{ units. Area} = 6 \times 5 = 30 \text{ sq units. [1 Mark]}$$

● **Q19: Triangular field sides 120m, 80m, 50m**

Solution:

$$(i) s = (120 + 80 + 50)/2 = 250/2 = 125 \text{ m.}$$

$$\text{Area} = \sqrt{(125 \times (125-120) \times (125-80) \times (125-50))} = \sqrt{(125 \times 5 \times 45 \times 75)}$$

$$= \sqrt{(5^3 \times 5 \times 3^2 \times 5 \times 3 \times 5^2)} = \sqrt{(5^7 \times 3^3)} = 375\sqrt{15} \text{ m}^2 \approx 1452.37 \text{ m}^2. \text{ [2 Marks]}$$

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

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

SECTION D SOLUTIONS (4 Marks Each)

● **Q20: Case Study 1 Solutions (Smart Park Navigation)**

(i) F(4,3), P(-5,3), L(-5,-4), C(4,-4).

$$\text{Length FP} = 4 - (-5) = 9 \text{ units. Height PL} = 3 - (-4) = 7 \text{ units.}$$

Since opposite sides are equal and adjacent sides are perpendicular, FPLC forms a Rectangle. (1 Mark)

(ii) Point P(-5, 3) lies in Quadrant II. Point L(-5, -4) lies in Quadrant III. (1 Mark)

(iii) Distance FP = 9 units. Total Area = Length $\times$ Width = $9 \times 7 = 63$ sq units. (2 Marks)

[OR]

$$(iii) \text{Distance OF from Origin (0,0) to F(4,3)} = \sqrt{(4^2 + 3^2)} = \sqrt{(16 + 9)} = \sqrt{25} = 5 \text{ units. (2 Marks)}$$

● **Q21: Case Study 2 Solutions (Turving Sections A & B)**

$$(i) \text{Section A semi-perimeter } s_1 = (13 + 13 + 10)/2 = 36/2 = 18 \text{ m.}$$

$$\text{Section B semi-perimeter } s_2 = (15 + 14 + 13)/2 = 42/2 = 21 \text{ m. (1 Mark)}$$

$$(ii) \text{Area Section A} = \sqrt{(18 \times (18-13) \times (18-13) \times (18-10))} = \sqrt{(18 \times 5 \times 5 \times 8)}$$

$$= \sqrt{(2 \times 9 \times 25 \times 8)} = \sqrt{(144 \times 25)} = 12 \times 5 = 60 \text{ m}^2. \text{ (1 Mark)}$$

$$(iii) \text{Area Section B} = \sqrt{(21 \times (21-15) \times (21-14) \times (21-13))} = \sqrt{(21 \times 6 \times 7 \times 8)}$$

$$= \sqrt{(3 \times 7 \times 2 \times 3 \times 7 \times 2^3)} = \sqrt{(3^2 \times 7^2 \times 2^4)} = 3 \times 7 \times 4 = 84 \text{ m}^2.$$

$$\text{Section B has a larger area by } (84 - 60) = 24 \text{ m}^2. \text{ (2 Marks)}$$

[OR]

(iii) Total Cost of turfing Section B = Area $\times$ Rate = $84 \text{ m}^2 \times ₹120/\text{m}^2 = ₹10,080$. (2 Marks)