# MATH LOVE INSTITUTE

**Madhya Pradesh Board of Secondary Education (MPBSE)**

**Class 8 Mathematics - Annual Examination 2025-26**

**Question Paper 4 with Complete Solutions**

**Based on Latest NCERT Syllabus & MP Board Pattern**

| | |
|---|---|
| **Maximum Marks** | 80 |
| **Time Allowed** | 3 Hours |
| **Class** | VIII (Eight) |
| **Subject** | Mathematics |
| **Board** | MP Board (MPBSE) |

## 📋 GENERAL INSTRUCTIONS:

1. This question paper contains **28 questions** divided into **Five Sections A, B, C, D and E**.
2. **Section A**: 10 Multiple Choice Questions of 1 mark each (10 marks)
3. **Section B**: 5 Very Short Answer Type questions of 2 marks each (10 marks)
4. **Section C**: 6 Short Answer Type questions of 3 marks each (18 marks)
5. **Section D**: 4 Long Answer Type questions of 5 marks each (20 marks)
6. **Section E**: 3 Case Study Based questions of 4 marks each (12 marks)
7. All questions are **compulsory**.
8. Draw neat diagrams wherever required.
9. Use of calculators is **NOT** permitted.



## SECTION A - MULTIPLE CHOICE QUESTIONS (1 × 10 = 10 Marks)

**Q1.** The rational number between 1/2 and 1/3 is: **[1]**

(a) 5/12

(b) 1/5

(c) 1/4

(d) 2/5

**Q2.** If 6x - 4 = 20, then x equals: **[1]**

(a) 3

(b) 4

(c) 5

(d) 6

**Q3.** A quadrilateral with all sides equal and all angles 90° is called: **[1]**

(a) Rectangle

(b) Square

(c) Rhombus

(d) Trapezium

**Q4.** The square root of 400 is: **[1]**

(a) 10

(b) 15

(c) 20

(d) 25

**Q5.** $\sqrt[3]{1000}$ equals: **[1]**

(a) 5

(b) 10

(c) 20

(d) 100



**Q6.** An article was sold for ₹480 at a loss of 20%. The cost price was: **[1]**

(a) ₹500

(b) ₹576

(c) ₹600

(d) ₹384

**Q7.** The identity $(a + b + c)^2$ equals: **[1]**

(a) $a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

(b) $a^2 + b^2 + c^2 + ab + bc + ca$

(c) $a^2 + b^2 + c^2$

(d) $a^2 + b^2 + c^2 + 3abc$

**Q8.** The area of a rhombus with diagonals 10 cm and 8 cm is: **[1]**

(a) 80 $cm^2$

(b) 40 $cm^2$

(c) 20 $cm^2$

(d) 18 $cm^2$

**Q9.** $(-3)^4$ equals: **[1]**

(a) -81

(b) 81

(c) -12

(d) 12

**Q10.** If x and y vary inversely and x = 5 when y = 12, then when x = 6, y equals: **[1]**

(a) 8

(b) 10

(c) 12

(d) 14



## SECTION B - VERY SHORT ANSWER TYPE QUESTIONS (2 × 5 = 10 Marks)

**Q11.** Find three rational numbers between 3 and 4. **[2]**

**Q12.** Solve: $5x + 3 = 2x + 18$ **[2]**

**Q13.** Find the square root of 2025 by prime factorization method. **[2]**

**Q14.** The marked price of a shirt is ₹850. If it is sold at a discount of 15%, find the selling price. **[2]**

**Q15.** Factorise: $6x^2 + 11x + 3$ **[2]**

## SECTION C - SHORT ANSWER TYPE QUESTIONS (3 × 6 = 18 Marks)

**Q16.** Show that the diagonals of a parallelogram bisect each other. **[3]**

**Q17.** Solve: $(x - 3)/5 + (x + 5)/3 = 4$ **[3]**

**Q18.** The marks of 7 students are: 68, 75, 82, 90, 68, 95, 68. Find the mode and range. **[3]**

**Q19.** A parallelogram has adjacent sides 12 cm and 8 cm. If the distance between the longer sides is 5 cm, find its area. **[3]**

**Q20.** Using the identity $(x + y)(x - y) = x^2 - y^2$, evaluate: $87 \times 113$ **[3]**

**Q21.** Find the lateral surface area of a cuboid with dimensions 15 cm, 10 cm and 8 cm. **[3]**



## SECTION D - LONG ANSWER TYPE QUESTIONS (5 × 4 = 20 Marks)

**Q22.** Verify the identity $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$ by taking $a = 2$ and $b = 3$. Also find the value of $(102)^3$ using this identity. **[5]**

**Q23.** A man borrowed ₹24,000 from a bank at 9% per annum for 2 years. Calculate: **[5]**
(i) Simple Interest
(ii) Compound Interest (compounded annually)
(iii) The difference between CI and SI

**Q24.** The area of a trapezium is 280 cm². The parallel sides are in the ratio 3:4 and the distance between them is 8 cm. Find the lengths of the parallel sides. **[5]**
**OR**
A circular park has a diameter of 84 m. Find its circumference and area. (Take $\pi = 22/7$)

**Q25.** A closed cylindrical tank has diameter 28 cm and height 15 cm. Find its total surface area and volume. (Take $\pi = 22/7$) **[5]**



## SECTION E - CASE STUDY BASED QUESTIONS (4 × 3 = 12 Marks)

**Q26.** **[4]**

**CASE STUDY 1: Flower Bed Design**

A rectangular flower bed is 35 m long and 24 m wide. It has a path of uniform width 3 m running around it on the outside.

Based on the above information, answer the following:

**(i)** Find the area of the flower bed. **[1 mark]**

**(ii)** Find the total area including the path. **[2 marks]**

**(iii)** Find the area of the path only. **[1 mark]**

**Q27.** **[4]**

**CASE STUDY 2: Fixed Deposit Comparison**

Sunita invested ₹40,000 in a fixed deposit at 8% per annum simple interest. Her friend Kavita invested the same amount at the same rate but with compound interest compounded annually. Both kept the money for 2 years.

Based on the above information, answer the following:

**(i)** Calculate Sunita's interest after 2 years. **[1 mark]**

**(ii)** Calculate Kavita's interest after 2 years. **[2 marks]**

**(iii)** Who earned more and by how much? **[1 mark]**

**Q28.** **[4]**

**CASE STUDY 3: Weekly Temperature Data**

The maximum temperatures (in °C) recorded in a city during one week were:
32, 35, 38, 36, 34, 37, 35

Based on the above information, answer the following:

**(i)** Find the highest and lowest temperatures. **[1 mark]**

**(ii)** Calculate the range of temperatures. **[1 mark]**

**(iii)** Find the mean temperature of the week. **[2 marks]**



## 📚 END OF QUESTION PAPER 📚

**Total Marks: 80**

Section A: 10 marks | Section B: 10 marks | Section C: 18 marks

Section D: 20 marks | Section E: 12 marks

**Time: 3 Hours**

# 🎯 COMPLETE DETAILED SOLUTIONS WITH STEP-BY-STEP EXPLANATIONS

## SECTION A - SOLUTIONS (1 × 10 = 10 Marks)

### Q1. Answer: (a) 5/12

**Solution:**

To find rational number between 1/2 and 1/3:

LCM of 2 and 3 = 6

1/2 = 3/6 and 1/3 = 2/6

Any fraction between 2/6 and 3/6 will work

5/12 = 2.5/6 (lies between 2/6 and 3/6) ✓

### Q2. Answer: (b) 4

**Solution:**

6x - 4 = 20

6x = 20 + 4

6x = 24

x = 24/6

x = 4

### Q3. Answer: (b) Square

**Explanation:**

Square has:

- All sides equal
- All angles 90°

### Q4. Answer: (c) 20

**Solution:**

$\sqrt{400} = \sqrt{(20 \times 20)} = 20$

### Q5. Answer: (b) 10

**Solution:**

$\sqrt[3]{1000} = \sqrt[3]{(10 \times 10 \times 10)} = 10$

### Q6. Answer: (c) ₹600

**Solution:**

SP = ₹480, Loss = 20%

CP = [SP × 100]/(100 - Loss%)

= (480 × 100)/(100 - 20)

= 48000/80

= ₹600

### Q7. Answer: (a) $a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

**Explanation:**

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

This is the standard algebraic identity for Class 8.

### Q8. Answer: (b) 40 $cm^2$

**Solution:**

Area of rhombus = $(1/2) \times d_1 \times d_2$

$= (1/2) \times 10 \times 8$

$= 40\ cm^2$

### Q9. Answer: (b) 81

**Solution:**

$(-3)^4 = (-3) \times (-3) \times (-3) \times (-3)$

$= 9 \times 9$

$= 81$

(Even power makes it positive)

### Q10. Answer: (b) 10

**Solution:**

In inverse variation: $x_1y_1 = x_2y_2$

$5 \times 12 = 6 \times y$

$60 = 6y$

$y = 60/6$

$y = 10$



## SECTION B - SOLUTIONS (2 × 5 = 10 Marks)

### Q11. Solution:

**Marking Scheme:** 1 mark for method + 1 mark for numbers

Three rational numbers between 3 and 4:

Method 1: Multiply by 4

3 = 12/4 and 4 = 16/4

Numbers between: 13/4, 14/4, 15/4

**Answer: 13/4, 7/2, 15/4**

(or 3.25, 3.5, 3.75)

### Q12. Solution:

> **Marking Scheme:** 1 mark for steps + 1 mark for answer

$5x + 3 = 2x + 18$

$5x - 2x = 18 - 3$

$3x = 15$

$x = 15/3$

**$x = 5$**

### Q13. Solution:

> **Marking Scheme:** 1 mark for factorization + 1 mark for root

Prime factorization of 2025:

$2025 = 5 \times 405$

$= 5 \times 5 \times 81$

$= 5 \times 5 \times 9 \times 9$

$= 5 \times 5 \times 3 \times 3 \times 3 \times 3$

$= 5^2 \times 3^4$

$= (5 \times 3^2)^2$

$= 45^2$

$\sqrt{2025} = 45$

**Answer: 45**

### Q14. Solution:

> **Marking Scheme:** 1 mark for discount amount + 1 mark for SP

MP = ₹850

Discount = 15%

Discount amount = $(15/100) \times 850$

= 127.50

SP = MP - Discount
= 850 - 127.50
= ₹722.50

**Answer: ₹722.50**

### Q15. Solution:

**Marking Scheme:** 1 mark for splitting + 1 mark for factors

$6x^2 + 11x + 3$

Product = 6 × 3 = 18, Sum = 11
Numbers: 9 and 2 (9 + 2 = 11, 9 × 2 = 18)

$= 6x^2 + 9x + 2x + 3$
$= 3x(2x + 3) + 1(2x + 3)$
$= (2x + 3)(3x + 1)$

**Answer: (2x + 3)(3x + 1)**



## SECTION C - SOLUTIONS (3 × 6 = 18 Marks)

### Q16. Solution:

**Marking Scheme:** 1 mark construction + 1 mark triangles + 1 mark proof

**Given:** ABCD is a parallelogram with diagonals AC and BD intersecting at O.
**To Prove:** AO = OC and BO = OD

**Proof:**

In △AOB and △COD:
AB = CD (opposite sides of parallelogram)
∠OAB = ∠OCD (alternate angles, AB || DC)
∠OBA = ∠ODC (alternate angles, AB || DC)

By ASA congruence: △AOB ≅ △COD

Therefore: AO = OC and BO = OD (CPCT)

**Hence, diagonals bisect each other. Proved.**

### Q17. Solution:

> **Marking Scheme:** 1 mark LCM + 1 mark simplification + 1 mark answer

$(x - 3)/5 + (x + 5)/3 = 4$

LCM of 5 and 3 = 15
Multiplying throughout by 15:
$3(x - 3) + 5(x + 5) = 60$
$3x - 9 + 5x + 25 = 60$
$8x + 16 = 60$
$8x = 44$
$x = 44/8$
$x = 11/2$ or 5.5

**Answer: x = 11/2 or 5.5**

### Q18. Solution:

> **Marking Scheme:** 1.5 marks mode + 1.5 marks range

Data: 68, 75, 82, 90, 68, 95, 68

**Mode:**

Arranging: 68, 68, 68, 75, 82, 90, 95
68 appears 3 times (highest frequency)
Mode = 68

**Range:**
Range = Highest - Lowest
= 95 - 68
= 27

**Answer: Mode = 68, Range = 27**

### Q19. Solution:

> **Marking Scheme:** 1 mark identifying base + 1 mark formula + 1 mark answer

Adjacent sides = 12 cm and 8 cm
Distance between longer sides = 5 cm (this is the height)

The longer side (12 cm) is the base
Height = 5 cm

Area of parallelogram = base × height
= 12 × 5
= 60 cm²

**Answer: 60 cm²**

### Q20. Solution:

> **Marking Scheme:** 1 mark identity + 1 mark substitution + 1 mark calculation

87 × 113

Write as: (100 - 13)(100 + 13)

Using $(x - y)(x + y) = x^2 - y^2$
where $x = 100$, $y = 13$

$= (100)^2 - (13)^2$
$= 10000 - 169$
$= 9831$

**Answer: 9831**

### Q21. Solution:

> **Marking Scheme:** 1 mark formula + 1 mark substitution + 1 mark answer

Length = 15 cm, Breadth = 10 cm, Height = 8 cm

Lateral Surface Area of cuboid $= 2h(l + b)$
$= 2 \times 8 \times (15 + 10)$
$= 16 \times 25$
$= 400 \text{ cm}^2$

**Answer: 400 cm²**



## SECTION D - SOLUTIONS (5 × 4 = 20 Marks)

### Q22. Solution:

> **Marking Scheme:** 2 marks verification + 3 marks application

**Verification with a = 2, b = 3:**

LHS: $(a + b)^3 = (2 + 3)^3 = 5^3 = 125$

RHS: $a^3 + b^3 + 3ab(a + b)$

$= 2^3 + 3^3 + 3(2)(3)(2 + 3)$
$= 8 + 27 + 18(5)$
$= 8 + 27 + 90$
$= 125$

LHS = RHS ✓
**Identity verified**

**Finding $(102)^3$:**
$(102)^3 = (100 + 2)^3$

Using $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
where a = 100, b = 2

$= 100^3 + 2^3 + 3(100)(2)(100 + 2)$
$= 1000000 + 8 + 600(102)$
$= 1000000 + 8 + 61200$
$= 1061208$

**Answer: $(102)^3 = 1061208$**

### Q23. Solution:

> **Marking Scheme:** 1.5 marks SI + 2.5 marks CI + 1 mark difference

P = ₹24,000, R = 9%, T = 2 years

**(i) Simple Interest:**
$SI = (P \times R \times T)/100$
$= (24000 \times 9 \times 2)/100$
$= 432000/100$
= ₹4,320

**(ii) Compound Interest:**
$A = P(1 + R/100)^2$
$= 24000(1 + 9/100)^2$

= 24000(1.09)²
= 24000 × 1.1881
= ₹28,514.40

CI = A - P
= 28514.40 - 24000
= ₹4,514.40

**(iii) Difference:**
CI - SI = 4514.40 - 4320
= ₹194.40

**Answer: SI = ₹4,320, CI = ₹4,514.40, Difference = ₹194.40**

### Q24. Solution:

**Marking Scheme:** 2 marks setting equation + 2 marks solving + 1 mark answer

Area of trapezium = 280 cm²
Ratio of parallel sides = 3:4
Height = 8 cm

Let parallel sides be 3x and 4x

Area of trapezium = (1/2) × (sum of parallel sides) × height
280 = (1/2) × (3x + 4x) × 8
280 = (1/2) × 7x × 8
280 = 28x
x = 280/28
x = 10 cm

Parallel sides: 3x = 30 cm, 4x = 40 cm

**Answer: 30 cm and 40 cm**

**OR**

Diameter = 84 m, so radius = 42 m

**Circumference:**

$C = 2\pi r$

$= 2 \times (22/7) \times 42$

$= 2 \times 22 \times 6$

$= 264$ m

**Area:**

$A = \pi r^2$

$= (22/7) \times 42 \times 42$

$= 22 \times 6 \times 42$

$= 5544$ m²

**Answer: Circumference = 264 m, Area = 5544 m²**

### Q25. Solution:

> **Marking Scheme:** 2.5 marks TSA + 2.5 marks volume

Diameter = 28 cm, so radius (r) = 14 cm

Height (h) = 15 cm

$\pi = 22/7$

**Total Surface Area:**

$TSA = 2\pi r(r + h)$

$= 2 \times (22/7) \times 14 \times (14 + 15)$

$= 2 \times 22 \times 2 \times 29$

$= 2552$ cm²

**Volume:**

$V = \pi r^2 h$

$= (22/7) \times 14 \times 14 \times 15$

$= 22 \times 2 \times 14 \times 15$

$= 9240$ cm³

**Answer: TSA = 2552 cm², Volume = 9240 cm³**



# SECTION E - SOLUTIONS (4 × 3 = 12 Marks)

## Q26. Solution: CASE STUDY 1 - Flower Bed

**Marking Scheme:** 1 + 2 + 1 = 4 marks

**(i) Area of flower bed:**

Length = 35 m, Width = 24 m

Area = 35 × 24 = 840 m²

**Answer: 840 m²**

**(ii) Total area including path:**

Path width = 3 m on all sides (outside)

New length = 35 + 3 + 3 = 41 m

New width = 24 + 3 + 3 = 30 m

Total area = 41 × 30 = 1230 m²

**Answer: 1230 m²**

**(iii) Area of path only:**

Path area = Total area - Bed area

= 1230 - 840

= 390 m²

**Answer: 390 m²**

## Q27. Solution: CASE STUDY 2 - Fixed Deposit

**Marking Scheme:** 1 + 2 + 1 = 4 marks

P = ₹40,000, R = 8%, T = 2 years

**(i) Sunita's interest (SI):**

SI = (P × R × T)/100

= (40000 × 8 × 2)/100

= 640000/100

= ₹6,400

**Answer: ₹6,400**

**(ii) Kavita's interest (CI):**

A = P(1 + R/100)²

= 40000(1.08)²

= 40000 × 1.1664

= ₹46,656

CI = 46656 - 40000 = ₹6,656

**Answer: ₹6,656**

**(iii) Comparison:**

Kavita earned more

Difference = 6656 - 6400 = ₹256

**Answer: Kavita earned ₹256 more**

### Q28. Solution: CASE STUDY 3 - Temperature Data

> **Marking Scheme:** 1 + 1 + 2 = 4 marks

Data: 32, 35, 38, 36, 34, 37, 35

**(i) Highest and lowest:**

Highest temperature = 38°C

Lowest temperature = 32°C

**Answer: Highest = 38°C, Lowest = 32°C**

**(ii) Range:**

Range = Highest - Lowest

= 38 - 32

= 6°C

**Answer: 6°C**

**(iii) Mean temperature:**

Sum = 32 + 35 + 38 + 36 + 34 + 37 + 35

= 247

Number of days = 7

Mean = 247/7

= 35.29°C (approx)

**Answer: 35.29°C or 35.3°C**



## ✅ END OF COMPLETE SOLUTIONS ✅

**All 28 questions solved with detailed step-by-step explanations**

✅ **Verified Class 8 NCERT Topics Only:**

• Rational Numbers (Between numbers, operations)

• Linear Equations in One Variable

• Understanding Quadrilaterals (Square, Parallelogram)

• Squares & Square Roots (√400, √2025)

• Cubes & Cube Roots ($\sqrt[3]{1000}$)

• Comparing Quantities (Discount, Profit/Loss, SI/CI)

• Algebraic Expressions & Identities

• Mensuration: Plane Figures (Rhombus, Parallelogram, Trapezium, Circle)

• Mensuration: 3D Shapes (ONLY Cuboid & Cylinder - Class 8 approved)

• Exponents & Powers $((-3)^4)$

• Inverse Proportion

• Factorisation $(6x^2 + 11x + 3)$

• Data Handling (Mode, Range, Mean - ungrouped data)

❌ NO Heron's Formula (Class 9)

❌ NO Cone/Sphere/Hemisphere (Class 9)



**100% NCERT Class 8 Syllabus Compliant**