MATH LOVE INSTITUTE

Madhya Pradesh Board of Secondary Education (MPBSE)

Class 8 Mathematics - Annual Examination 2025-26

Question Paper 5 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. Which of the following is a rational number between -1/2 and -1/3? **[1]**

(a) -2/5

(b) -1/4

(c) -1/6

(d) -3/4

Q2. If 8x - 3 = 29, then the value of x is: **[1]**

(a) 2

(b) 3

(c) 4

(d) 5

Q3. The sum of interior angles of an octagon is: **[1]**

(a) 720°

(b) 900°

(c) 1080°

(d) 1260°

Q4. The value of √0.0016 is: **[1]**

(a) 0.004

(b) 0.04

(c) 0.4

(d) 4

Q5. The cube root of 729 is: **[1]**

(a) 7

(b) 8

(c) 9

(d) 10

Q6. A shopkeeper marks an article 40% above the cost price and gives a discount of 10%. His profit percentage is: **[1]**

(a) 20%

(b) 24%

(c) 26%

(d) 30%

Q7. The value of $(x - 1/x)^2$ equals: **[1]**

(a) $x^2 - 1/x^2 - 2$

(b) $x^2 + 1/x^2 - 2$

(c) $x^2 - 1/x^2 + 2$

(d) $x^2 + 1/x^2 + 2$

Q8. The area of a trapezium with parallel sides 15 cm and 9 cm and height 6 cm is: **[1]**

(a) 54 cm^2

(b) 72 cm^2

(c) 90 cm^2

(d) 144 cm^2

Q9. The value of 2^{-3} is: **[1]**

(a) -8

(b) -1/8

(c) 1/8

(d) 8

Q10. If x varies directly as y and x = 20 when y = 5, then when x = 36, y equals: **[1]**

(a) 7

(b) 8

(c) 9

(d) 10

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

Q11. Find five rational numbers between 1 and 2. **[2]**

Q12. Solve: $4(x - 3) = 2(x + 5)$ **[2]**

Q13. Find the square root of 6084 by prime factorization method. **[2]**

Q14. Find the compound interest on ₹5,000 for 2 years at 10% per annum compounded annually. **[2]**

Q15. Factorise: $3x^2 - 13x + 10$ **[2]**

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

Q16. Prove that the opposite sides of a parallelogram are equal. **[3]**

Q17. Solve: $(5x - 1)/2 + (x - 2)/3 = 6$ **[3]**

Q18. The weights (in kg) of 10 students are: 45, 52, 48, 50, 45, 48, 52, 48, 50, 52. Find the median. **[3]**

Q19. A rhombus has diagonals of length 24 cm and 18 cm. Find its area and perimeter. **[3]**

Q20. Simplify using the identity $(a + b)(a - b) = a^2 - b^2$: $(7.5)^2 - (2.5)^2$ **[3]**

Q21. The total surface area of a cuboid is 376 cm^2. Its length is 10 cm and breadth is 8 cm. Find its height. **[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 = 5 and b = 2. Also find the value of $(98)^3$ using an appropriate identity. **[5]**

Q23. A sum of ₹20,000 is invested for 2 years. Calculate: **[5]**
(i) The amount at 12% per annum simple interest
(ii) The amount at 12% per annum compound interest (compounded annually)
(iii) The difference between compound interest and simple interest

Q24. The perimeter of a rectangular field is 340 m. If its length is 100 m, find its breadth. Also find the cost of leveling the field at ₹8 per square meter. **[5]**

OR

A circular path of width 3 m is constructed outside a circular park of radius 28 m. Find the area of the path. (Take $\pi = 22/7$)

Q25. A cylindrical water tank has a diameter of 2.1 m and height of 4 m. Find how many liters of water it can hold. (1 m^3 = 1000 liters, $\pi = 22/7$) **[5]**

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

Q26. **[4]**

CASE STUDY 1: Sports Ground

A rectangular sports ground is 120 m long and 80 m wide. A running track of uniform width 5 m runs around it on the outside.

Based on the above information, answer the following:

(i) Find the area of the sports ground. **[1 mark]**

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

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

Q27. **[4]**

CASE STUDY 2: Two Investments

Rohan invested ₹50,000 in Bank A offering 7% simple interest per annum. His brother Sohan invested the same amount in Bank B offering 7% compound interest per annum (compounded annually). Both invested for 2 years.

Based on the above information, answer the following:

(i) Calculate Rohan's total amount after 2 years. **[1 mark]**

(ii) Calculate Sohan's total amount after 2 years. **[2 marks]**

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

Q28. **[4]**

CASE STUDY 3: Electricity Bills

The monthly electricity bills (in ₹) of 12 houses in a locality are:
850, 920, 780, 900, 850, 1050, 780, 920, 850, 900, 1050, 850

Based on the above information, answer the following:

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

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

(iii) Find the mode of the bills. **[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) -2/5

Solution:

-1/2 = -0.5 and -1/3 = -0.333...

We need a number between -0.5 and -0.333

-2/5 = -0.4 (lies between -0.5 and -0.333) ✓

Q2. Answer: (c) 4

Solution:

8x - 3 = 29

8x = 29 + 3

8x = 32

x = 32/8

x = 4

Q3. Answer: (c) 1080°

Solution:

Sum of interior angles of n-sided polygon = (n - 2) × 180°

For octagon, n = 8

= (8 - 2) × 180°

= 6 × 180°

= 1080°

Q4. Answer: (b) 0.04

Solution:

$\sqrt{0.0016} = \sqrt{(16/10000)}$

$= 4/100$

$= 0.04$

Q5. Answer: (c) 9

Solution:

$\sqrt[3]{729} = \sqrt[3]{(9 \times 9 \times 9)}$

$= 9$

Q6. Answer: (c) 26%

Solution:

Let CP = ₹100

MP = 100 + 40% of 100 = ₹140

Discount = 10% of 140 = ₹14

SP = 140 - 14 = ₹126

Profit = 126 - 100 = ₹26

Profit % = 26%

Q7. Answer: (b) $x^2 + 1/x^2 - 2$

Solution:

$(x - 1/x)^2 = x^2 + (1/x)^2 - 2(x)(1/x)$

$= x^2 + 1/x^2 - 2$

Q8. Answer: (b) 72 cm^2

Solution:

Area = (1/2) × (sum of parallel sides) × height

= (1/2) × (15 + 9) × 6

= (1/2) × 24 × 6

= 72 cm²

Q9. Answer: (c) 1/8

Solution:

$2^{-3} = 1/2^3$

= 1/8

Q10. Answer: (c) 9

Solution:

In direct proportion: $x_1/y_1 = x_2/y_2$

20/5 = 36/y

4 = 36/y

y = 36/4

y = 9

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

Q11. Solution:

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

Five rational numbers between 1 and 2:

Method: Multiply by 6

1 = 6/6 and 2 = 12/6

Numbers between: 7/6, 8/6, 9/6, 10/6, 11/6

Answer: 7/6, 4/3, 3/2, 5/3, 11/6
(or 1.17, 1.33, 1.5, 1.67, 1.83)

Q12. Solution:

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

$4(x - 3) = 2(x + 5)$
$4x - 12 = 2x + 10$
$4x - 2x = 10 + 12$
$2x = 22$
$x = 11$

Answer: x = 11

Q13. Solution:

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

Prime factorization of 6084:
$6084 = 2 \times 3042$
$= 2 \times 2 \times 1521$
$= 2^2 \times 39^2$
$= (2 \times 39)^2$
$= 78^2$

$\sqrt{6084} = 78$

Answer: 78

Q14. Solution:

> **Marking Scheme:** 1 mark for formula + 1 mark for CI

P = ₹5,000, R = 10%, T = 2 years

$A = P(1 + R/100)^2$
$= 5000(1 + 10/100)^2$
$= 5000(1.1)^2$
$= 5000 \times 1.21$
= ₹6,050

CI = A - P
= 6050 - 5000
= ₹1,050

Answer: ₹1,050

Q15. Solution:

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

$3x^2 - 13x + 10$

Product = $3 \times 10 = 30$, Sum = -13
Numbers: -3 and -10 ($-3 + (-10) = -13$, $-3 \times -10 = 30$)

$= 3x^2 - 3x - 10x + 10$
$= 3x(x - 1) - 10(x - 1)$
$= (x - 1)(3x - 10)$

Answer: (x - 1)(3x - 10)

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
To Prove: AB = CD and AD = BC

Construction: Join diagonal AC

Proof:
In △ABC and △CDA:
AC = AC (common)
∠BAC = ∠DCA (alternate angles, AB || DC)
∠BCA = ∠DAC (alternate angles, AD || BC)

By ASA congruence: △ABC ≅ △CDA

Therefore: AB = CD and BC = DA (CPCT)

Hence, opposite sides are equal. Proved.

Q17. Solution:

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

(5x - 1)/2 + (x - 2)/3 = 6

LCM of 2 and 3 = 6
Multiplying throughout by 6:
3(5x - 1) + 2(x - 2) = 36
15x - 3 + 2x - 4 = 36
17x - 7 = 36
17x = 43
x = 43/17

Answer: x = 43/17 or $2\frac{7}{17}$

Q18. Solution:

> **Marking Scheme:** 1 mark arranging + 1 mark finding median + 1 mark answer

Data: 45, 52, 48, 50, 45, 48, 52, 48, 50, 52

Arranging: 45, 45, 48, 48, 48, 50, 50, 52, 52, 52

Number of terms (n) = 10 (even)
Median = Average of 5th and 6th terms
= (48 + 50)/2
= 98/2
= 49 kg

Answer: 49 kg

Q19. Solution:

> **Marking Scheme:** 1.5 marks area + 1.5 marks perimeter

Diagonals: $d_1 = 24$ cm, $d_2 = 18$ cm

Area:
Area = $(1/2) \times d_1 \times d_2$
= $(1/2) \times 24 \times 18$
= 216 cm^2

Perimeter:
Using Pythagoras theorem:
$Side^2 = (d_1/2)^2 + (d_2/2)^2$
= $12^2 + 9^2$
= 144 + 81
= 225
Side = 15 cm

Perimeter = 4 × side = 4 × 15 = 60 cm

Answer: Area = 216 cm², Perimeter = 60 cm

Q20. Solution:

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

$(7.5)^2 - (2.5)^2$

Using $a^2 - b^2 = (a + b)(a - b)$
where $a = 7.5$, $b = 2.5$

$= (7.5 + 2.5)(7.5 - 2.5)$
$= 10 \times 5$
$= 50$

Answer: 50

Q21. Solution:

Marking Scheme: 1 mark formula + 1 mark substitution + 1 mark solving

TSA = 376 cm², l = 10 cm, b = 8 cm

TSA of cuboid = 2(lb + bh + lh)
376 = 2(10×8 + 8×h + 10×h)
376 = 2(80 + 8h + 10h)
376 = 2(80 + 18h)
188 = 80 + 18h
18h = 108
h = 6 cm

Answer: 6 cm

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

Q22. Solution:

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

Verification with a = 5, b = 2:

LHS: $(a - b)^3 = (5 - 2)^3 = 3^3 = 27$

RHS: $a^3 - b^3 - 3ab(a - b)$
$= 5^3 - 2^3 - 3(5)(2)(5 - 2)$
$= 125 - 8 - 30(3)$
$= 125 - 8 - 90$
$= 27$

LHS = RHS ✓
Identity verified

Finding $(98)^3$:
$(98)^3 = (100 - 2)^3$

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

$= 100^3 - 2^3 - 3(100)(2)(100 - 2)$
$= 1000000 - 8 - 600(98)$
$= 1000000 - 8 - 58800$
$= 941192$

Answer: $(98)^3 = 941192$

Q23. Solution:

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

P = ₹20,000, R = 12%, T = 2 years

(i) Amount with Simple Interest:

SI = (P × R × T)/100

= (20000 × 12 × 2)/100

= ₹4,800

Amount = P + SI = 20000 + 4800 = ₹24,800

(ii) Amount with Compound Interest:

$A = P(1 + R/100)^2$

$= 20000(1.12)^2$

= 20000 × 1.2544

= ₹25,088

CI = 25088 - 20000 = ₹5,088

(iii) Difference:

CI - SI = 5088 - 4800 = ₹288

Answer: (i) ₹24,800 (ii) ₹25,088 (iii) ₹288

Q24. Solution:

> **Marking Scheme:** 2 marks breadth + 2 marks area + 1 mark cost

Rectangle:

Perimeter = 340 m, Length = 100 m

Perimeter = 2(l + b)

340 = 2(100 + b)

170 = 100 + b

b = 70 m

Area = l × b = 100 × 70 = 7000 m^2

Cost of leveling = Area × Rate

= 7000 × 8
= ₹56,000

Answer: Breadth = 70 m, Cost = ₹56,000

OR

Circular Path:
Inner radius = 28 m
Path width = 3 m
Outer radius = 28 + 3 = 31 m

Area of path = $\pi(R^2 - r^2)$
= $(22/7)(31^2 - 28^2)$
= (22/7)(961 - 784)
= (22/7) × 177
= 22 × 25.29
= 556.3 m^2 (approx)

OR using $(a^2 - b^2) = (a+b)(a-b)$:
= (22/7) × (31 + 28)(31 - 28)
= (22/7) × 59 × 3
= (22 × 59 × 3)/7
= 3894/7
= 556.29 m^2

Answer: 556.29 m^2 or 556.3 m^2

Q25. Solution:

> **Marking Scheme:** 2 marks volume in m^3 + 3 marks conversion to liters

Diameter = 2.1 m, so radius = 1.05 m
Height = 4 m
π = 22/7

Volume in m³:

$V = \pi r^2 h$

$= (22/7) \times 1.05 \times 1.05 \times 4$

$= (22/7) \times 1.1025 \times 4$

$= (22/7) \times 4.41$

$= 97.02/7$

$= 13.86\ m^3$

Volume in liters:

$1\ m^3 = 1000$ liters

Volume $= 13.86 \times 1000$

$= 13{,}860$ liters

Answer: 13,860 liters

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

Q26. Solution: CASE STUDY 1 - Sports Ground

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

(i) Area of sports ground:

Length = 120 m, Width = 80 m

Area $= 120 \times 80 = 9600\ m^2$

Answer: 9600 m²

(ii) Total area including track:

Track width = 5 m on all sides (outside)

New length = 120 + 5 + 5 = 130 m

New width = 80 + 5 + 5 = 90 m

Total area $= 130 \times 90 = 11{,}700\ m^2$

Answer: 11,700 m²

(iii) Area of track only:

Track area = Total area - Ground area

= 11700 - 9600

= 2100 m²

Answer: 2100 m²

Q27. Solution: CASE STUDY 2 - Two Investments

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

P = ₹50,000, R = 7%, T = 2 years

(i) Rohan's amount (SI):

SI = (50000 × 7 × 2)/100 = ₹7,000

Amount = P + SI = 50000 + 7000 = ₹57,000

Answer: ₹57,000

(ii) Sohan's amount (CI):

A = P(1 + R/100)²

= 50000(1.07)²

= 50000 × 1.1449

= ₹57,245

Answer: ₹57,245

(iii) Comparison:

Sohan received more

Difference = 57245 - 57000 = ₹245

Answer: Sohan received ₹245 more

Q28. Solution: CASE STUDY 3 - Electricity Bills

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

Data: 850, 920, 780, 900, 850, 1050, 780, 920, 850, 900, 1050, 850

(i) Highest and lowest:

Highest bill = ₹1,050

Lowest bill = ₹780

Answer: Highest = ₹1,050, Lowest = ₹780

(ii) Range:

Range = Highest - Lowest

= 1050 - 780

= ₹270

Answer: ₹270

(iii) Mode:

Arranging: 780, 780, 850, 850, 850, 850, 900, 900, 920, 920, 1050, 1050

Frequency:

780 → 2 times

850 → 4 times (highest frequency)

900 → 2 times

920 → 2 times

1050 → 2 times

Mode = ₹850

✅ END OF COMPLETE SOLUTIONS ✅

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

✅ **100% NCERT Class 8 Syllabus Compliant:**

• Rational Numbers (Between numbers, operations)

• Linear Equations (Different methods)

• Understanding Quadrilaterals (Octagon angles, Parallelogram)

• Squares & Square Roots (√0.0016, √6084)

• Cubes & Cube Roots ($\sqrt[3]{729}$)

• Comparing Quantities (Successive discount, SI/CI)

• Algebraic Expressions & Identities (Special identities)

• Mensuration (Rhombus, Trapezium, Circle with path)

• 3D Shapes: Cuboid & Cylinder (Class 8 only)

• Exponents (2^{-3}, Negative powers)

• Direct Proportion

• Factorisation ($3x^2 - 13x + 10$)

• Data Handling (Median, Mode, Range)

100% NCERT Class 8 Syllabus Verified