

Model Question Paper 1
Half-Yearly Examination 2026-27
MATHEMATICS

Time Allowed: 3 Hours

Maximum Marks: 80

General Instructions:

1. This question paper has 5 sections: A, B, C, D and E.
2. Section A has 20 objective type questions (Multiple Choice Questions and Assertion-Reason questions) carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each. Answers to these should not exceed 40-50 words each.
4. Section C has 6 questions carrying 3 marks each. Answers to these should not exceed 60-80 words each.
5. Section D has 4 questions carrying 5 marks each. Answers to these should not exceed 120 words each.
6. Section E has 3 source/case-based questions carrying 4 marks each, with four sub-parts of 1 mark each.
7. There is no overall choice. However, internal choices have been provided in all four questions of Section D and in one sub-part of each case-based question of Section E. A student has to attempt only one of the choices in such questions.
8. Use of calculators is not permitted.
9. Wherever necessary, neat and labelled figures should be drawn.

SECTION A

Question numbers 1 to 20 carry 1 mark each. Choose the most appropriate answer.

1. Which of the following numbers is a perfect square? [1]
(a) 48
(b) 64
(c) 90
(d) 150
2. The cube root of 1331 is: [1]
(a) 9
(b) 10
(c) 11
(d) 12
3. Using the pattern $1+3=2^2$, $1+3+5=3^2$, $1+3+5+7=4^2$, the sum of the first 6 odd natural numbers ($1+3+5+7+9+11$) is: [1]
(a) 25
(b) 30
(c) 36
(d) 49
4. Simplify: $5^3 \times 5^{-5}$. [1]
(a) $5^2 = 25$
(b) $5^{-2} = 1/25$
(c) 5^8
(d) 5^{-8}
5. The standard form of 3,50,000 is: [1]
(a) 3.5×10^5

- (b) 35×10^4
- (c) 3.5×10^6
- (d) 0.35×10^6

6. The value of $(2^3)^2 \div 2^4$ is: [1]

- (a) 2
- (b) 4
- (c) 8
- (d) 16

7. The additive inverse of $-5/8$ is: [1]

- (a) $-5/8$
- (b) $5/8$
- (c) $8/5$
- (d) $-8/5$

8. A rational number lying between $-1/3$ and $1/3$ is: [1]

- (a) $-1/2$
- (b) 0
- (c) $2/3$
- (d) 1

9. This question consists of two statements — Assertion (A) and Reason (R). Choose the correct option: [1]

Assertion (A): Division of rational numbers is not commutative.

Reason (R): For rational numbers a and b ($b \neq 0$), $a \div b$ is generally not equal to $b \div a$; for example, $2 \div 4 = 1/2$ but $4 \div 2 = 2$, and these are not equal.

- (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

10. The sum of the four interior angles of any quadrilateral is: [1]

- (a) 180°
- (b) 270°
- (c) 360°
- (d) 540°

11. In a parallelogram, one angle measures 70° . Its adjacent angle measures: [1]

- (a) 70°
- (b) 110°
- (c) 180°
- (d) 290°

12. Which quadrilateral has diagonals that bisect each other at right angles, but are NOT necessarily equal in length? [1]

- (a) Rectangle
- (b) Rhombus

- (c) Trapezium
- (d) Kite

13. A number is divisible by 12 if it is divisible by: [1]

- (a) 2 and 3
- (b) 3 and 4
- (c) 4 and 6
- (d) 2 and 6

14. The HCF of 24 and 36 is: [1]

- (a) 6
- (b) 8
- (c) 12
- (d) 18

15. Using the distributive law, $7 \times (20 + 3)$ is equal to: [1]

- (a) $7 \times 20 + 7 \times 3$
- (b) $7 \times 20 + 3$
- (c) $7 + 20 \times 3$
- (d) $20 + 7 \times 3$

16. The product of $(3x)$ and $(4x^2)$ is: [1]

- (a) $7x^3$
- (b) $12x^3$
- (c) $12x^2$
- (d) $7x^2$

17. Using the distributive law, $a(b - c)$ is equal to: [1]

- (a) $ab - ac$
- (b) $ab + ac$
- (c) $a - bc$
- (d) $ab - c$

18. ₹1200 is divided among A, B and C in the ratio 2:3:5. B's share is: [1]

- (a) ₹240
- (b) ₹360
- (c) ₹400
- (d) ₹600

19. If 5 pens cost ₹60, the cost of 8 pens (at the same rate) is: [1]

- (a) ₹90
- (b) ₹96
- (c) ₹100
- (d) ₹75

20. This question consists of two statements — Assertion (A) and Reason (R). Choose the correct option: [1]

Assertion (A): A discount of 20% on a marked price of ₹500 reduces the selling price to ₹400.

Reason (R): Selling Price = Marked Price – Discount, and Discount = 20% of ₹500 = ₹100, so Selling Price = 500 – 100 = ₹400.

- (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

SECTION B

Question numbers 21 to 25 carry 2 marks each.

- 21. Find the square root of 225 by the prime factorisation method. [2]
- 22. Find the LCM of 18 and 24 using prime factorisation. [2]
- 23. Verify that addition of rational numbers is associative for $-\frac{1}{2}$, $\frac{1}{3}$ and $-\frac{1}{6}$, by checking that $(-\frac{1}{2} + \frac{1}{3}) + (-\frac{1}{6}) = -\frac{1}{2} + (\frac{1}{3} + (-\frac{1}{6}))$. [2]
- 24. Using the distributive law, find the product $3x(2x + 5y - 4)$. [2]
- 25. The four interior angles of a quadrilateral are in the ratio 1:2:3:4. Find the measure of each angle. [2]

SECTION C

Question numbers 26 to 31 carry 3 marks each.

- 26. Find the smallest number by which 72 must be multiplied so that the product is a perfect square. Also find the square root of the resulting number. [3]
- 27. The ratio of the number of boys to girls in a class is 4:5. If there are 20 boys, find the number of girls and the total number of students in the class. [3]
- 28. Simplify: $\frac{2}{3} + (-\frac{5}{6}) \times \frac{3}{5}$. [3]
- 29. Multiply $(2x+3)(x-5)$ and simplify your answer. [3]
- 30. In a parallelogram ABCD, angle A = 108° . Diagonal BD bisects angle B into two equal parts. Given $AB \parallel DC$, find angle B, angle C, angle D, and each half of the bisected angle B. [3]
- 31. Using divisibility tests, check whether the number 47,952 is divisible by (a) 8, and (b) 9. Show your working. [3]

SECTION D

Question numbers 32 to 35 carry 5 marks each.

- 32. (a) Simplify using laws of exponents: $3^4 \times 3^{-2} \div 3^{-3}$. (b) Express 5,60,00,000 in standard form. (c) Simplify: $(\frac{2}{3})^{-2}$. [5]

OR

(a) Simplify using laws of exponents: $5^3 \times 5^{-5} \div 5^{-4}$. (b) Express 0.000082 in standard form. (c) Simplify: $(3/5)^{-2}$.

33. By using suitable properties, find: $2/3 \times 3/5 + 2/3 \times 2/5 - 2/3 \times 1$. [5]

OR

By using suitable properties, find: $5/7 \times (-3/4) + 5/7 \times (-1/4) + 5/7 \times 1$.

34. (a) Using the distributive law, expand and simplify: $(x+4)(x+7) - (x+2)(x+3)$. (b) A rectangular garden has length $(2x+5)$ m and breadth $(x+3)$ m. Using distributive multiplication, find an expression for its area in simplest form. [5]

OR

(a) Using the distributive law, expand and simplify: $(x+6)(x+2) - (x+1)(x+4)$. (b) A rectangular hall has length $(3x+2)$ m and breadth $(x+4)$ m. Find an expression for its area in simplest form.

35. The angles of a quadrilateral are in the ratio 3:4:5:6. (a) Find the measure of each angle. (b) Show that one pair of these (consecutive) angles is supplementary, and explain what this suggests about the quadrilateral possibly being a trapezium. (c) Find the largest angle. [5]

OR

The angles of a quadrilateral are in the ratio 2:3:4:6. (a) Find the measure of each angle. (b) Verify that the sum of the angles equals 360° . (c) Find the difference between the largest and smallest angles.

SECTION E

Question numbers 36 to 38 are source/case-based questions carrying 4 marks each, with four sub-parts of 1 mark each.

Case Study 1 — Question 36 [4 Marks]

A hall's floor is to be paved with square tiles arranged in a square pattern, and exactly 1225 tiles are used in all, arranged n tiles along each side ($n \times n$ tiles). Each tile has a side of 20 cm. The workers later consider whether a bigger tile size would exactly fit the same floor without any cutting.

(i) Is 1225 a perfect square? Find its square root by prime factorisation. [1]

(ii) Find the area of one tile and the total area covered by all 1225 tiles, in square metres. [1]

(iii) Using $n = 35$ (from part (i)), find the length of one side of the (square) floor in metres. [1]

(iv) The workers want to re-tile the same floor using bigger square tiles of side 25 cm instead, without cutting any tiles. Will the 700 cm side of the floor be exactly covered by a whole number of these bigger tiles? Justify with a calculation. [1]

OR If the cost of tiling is ₹150 per square metre, find the total cost of tiling the floor (area 49 m^2 , from part (ii)).

Case Study 2 — Question 37 [4 Marks]

A recipe for a dish serving 5 people needs 250 g of rice, 100 g of dal, and 3 spoons of oil. A family wants to prepare the same dish for 12 people, scaling all the ingredients proportionally using the unitary method.

(i) Write the ratio of the original number of people to the new number of people (5 people to 12 people) in simplest form. [1]

(ii) Using the unitary method, find the quantity of rice needed for 12 people. [1]

(iii) Using the unitary method, find the quantity of dal needed for 12 people. [1]

(iv) Find the quantity of oil (in spoons) needed for 12 people, given that 3 spoons are needed for 5 people. [1]

OR If the family later has only 8 guests instead, find the quantity of rice needed for them using the unitary method.

Case Study 3 — Question 38 [4 Marks]

A kite-shaped garden ABCD has $AB = AD = 10$ m and $CB = CD = 17$ m. The diagonals AC and BD intersect at right angles at point O (a property of a kite), and it is given that $AO = 6$ m.

- (i)** State two properties of the diagonals of a kite that apply to this garden. [1]
- (ii)** Using the right triangle AOB (right-angled at O), find the length OB. [1]
- (iii)** Using the right triangle BOC (right-angled at O), where $CB = 17$ m and $OB = 8$ m, find the length OC, and hence find the length of diagonal AC. [1]
- (iv)** Find the length of diagonal BD, and hence find the area of the kite-shaped garden using $\text{Area} = \frac{1}{2} \times d_1 \times d_2$. [1]
OR If fencing wire costs ₹40 per metre and the perimeter of the kite is $AB+BC+CD+DA = 10+17+17+10 = 54$ m, find the total cost of fencing the garden.