

HALF-YEARLY EXAMINATION – 2026–27**MATHEMATICS – STANDARD (Code 041)****CLASS X | Chapters 1–8 | Time: 3 Hours | Maximum Marks: 80****Name:** _____**Roll No.:** _____**School:** _____**Date:** _____**General Instructions**

- All questions are compulsory. The paper has five sections: A, B, C, D and E.
- Section A: $20 \times 1 = 20$; Section B: $5 \times 2 = 10$; Section C: $6 \times 3 = 18$; Section D: $4 \times 5 = 20$; Section E: $3 \times 4 = 12$.
- Internal choices are provided as indicated. There is no overall choice.
- Use $\pi = 22/7$ wherever required unless otherwise stated. Calculators are not allowed.
- Draw neat figures wherever required and show all necessary steps.

SECTION A – Multiple Choice / Assertion–Reason Questions ($20 \times 1 = 20$)

1. The HCF of 135 and 225 is:
(A) 15 (B) 30 (C) 45 (D) 90
2. Which of the following is irrational?
(A) 0.25 (B) $\sqrt{2}$ (C) $3/5$ (D) 0.121212...
3. The zeroes of $p(x) = x^2 - 5x + 6$ are:
(A) 1, 6 (B) 2, 3 (C) -2, -3 (D) 0, 6
4. The pair $2x + 3y = 7$ and $4x + 6y = 14$ has:
(A) no solution (B) a unique solution (C) infinitely many solutions (D) exactly two solutions
5. The roots of $x^2 - 7x + 12 = 0$ are:
(A) 2, 6 (B) 3, 4 (C) -3, -4 (D) 1, 12
6. The 10th term of the A.P. 3, 7, 11, ... is:
(A) 35 (B) 37 (C) 39 (D) 41
7. If two angles of one triangle are respectively equal to two angles of another triangle, the triangles are similar by:
(A) SSS (B) SAS (C) AA (D) RHS
8. The distance of the point (3, 4) from the origin is:
(A) 3 (B) 4 (C) 5 (D) 7
9. The value of $\sin 30^\circ$ is:
(A) 0 (B) $1/2$ (C) $\sqrt{3}/2$ (D) 1
10. The value of $\tan 45^\circ$ is:
(A) 0 (B) $1/2$ (C) 1 (D) $\sqrt{3}$
11. For any acute angle θ , $\sin^2\theta + \cos^2\theta$ equals:
(A) 0 (B) 1 (C) 2 (D) $\sin \theta$
12. The midpoint of A(2, 3) and B(4, 7) is:
(A) (2, 5) (B) (3, 5) (C) (3, 4) (D) (6, 10)
13. If $\text{HCF}(96, 404) = 4$, then $\text{LCM}(96, 404)$ is:
(A) 9696 (B) 9700 (C) 9796 (D) 9800

14. One factor of $x^2 - 9$ is:

- (A) $x + 9$ (B) $x - 9$ (C) $x - 3$ (D) $x^2 + 3$

15. For the pair $ax + by + c = 0$ and $a'x + b'y + c' = 0$ to have a unique solution, which condition is required?

- (A) $a/a' = b/b' = c/c'$ (B) $a/a' \neq b/b'$ (C) $a/a' = b/b' \neq c/c'$ (D) $a/a' = c/c'$

16. If α and β are the zeroes of $x^2 - 6x + 8$, then $\alpha + \beta$ is:

- (A) 8 (B) -8 (C) 6 (D) -6

17. If the 7th term of an A.P. is 20 and the 13th term is 38, then its common difference is:

- (A) 2 (B) 3 (C) 4 (D) 6

18. The point dividing the line segment joining A(1, 2) and B(7, 8) internally in the ratio 1 : 2 is:

- (A) (2, 3) (B) (3, 4) (C) (5, 6) (D) (4, 5)

19. If $\tan A = 3/4$, where A is acute, then $\sec A$ is:

- (A) $3/5$ (B) $4/5$ (C) $5/4$ (D) $4/3$

20. Assertion (A): If the zeroes of a quadratic polynomial are equal, then its graph touches the x-axis at exactly one point.

Reason (R): For equal zeroes, the discriminant of the corresponding quadratic equation is zero.

- (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 – Very Short Answer Questions ($5 \times 2 = 10$)

21. Using Euclid's division algorithm, find the HCF of 135 and 225. **OR**

Prove that $\sqrt{5}$ is irrational.

22. Solve: $2x + y = 7$ and $x - y = 2$.

23. Find the zeroes of $x^2 - 7x + 10$ and verify the relationship between the zeroes and the coefficients. **OR**

If α and β are the zeroes of $2x^2 - 5x - 3$, find $\alpha + \beta$ and $\alpha\beta$.

24. Find the number of terms in the A.P. 7, 11, 15, ..., 79. **OR**

Find the 15th term of the A.P. 12, 9, 6,

25. In $\triangle ABC$, $DE \parallel BC$, where D lies on AB and E lies on AC. If $AD = 3$ cm, $DB = 2$ cm and $AE = 4.5$ cm, find EC.

SECTION C – Short Answer Questions ($6 \times 3 = 18$)

26. Find the distance between P(-2, 3) and Q(4, -5).

27. Use Euclid's division algorithm to find the HCF of 867 and 255. Hence express the HCF as a linear combination of 867 and 255.

28. A school bought 12 notebooks and 8 pens for ₹520. Another purchase of 8 notebooks and 12 pens cost ₹480. Find the cost of one notebook and one pen.

29. Solve $2x^2 - 5x - 3 = 0$ by using the quadratic formula. **OR**

Find the value(s) of k for which $x^2 - 2(k + 1)x + k^2 = 0$ has equal roots.

30. The 5th term of an A.P. is 18 and the 12th term is 46. Find the first term and the common difference. Hence find the 20th term.

31. In $\triangle ABC$, D lies on AB and E lies on AC such that $DE \parallel BC$. Prove that $AD/DB = AE/EC$. **OR**

If $\tan \theta = 5/12$, where θ is acute, find $\sin \theta$, $\cos \theta$ and $\sec \theta$.

SECTION D – Long Answer Questions ($4 \times 5 = 20$)

32. A point P divides the line segment joining A(−2, 3) and B(6, −5) internally in the ratio 3 : 1. Find the coordinates of P. Also find the distance of P from the origin.

33. The sum of two numbers is 27 and their difference is 5. Form a pair of linear equations and solve them. Then find the product of the two numbers. **OR**

A taxi charges a fixed amount plus a rate per kilometre. For a 10 km journey the fare is ₹180 and for a 16 km journey it is ₹270. Find the fixed charge and the charge per kilometre.

34. In $\triangle ABC$, $\angle A = 90^\circ$. $AD \perp BC$. Prove that $\triangle ADB \sim \triangle ABC$ and $\triangle ADC \sim \triangle ABC$. Hence show that $AD^2 = BD \times DC$. **OR**
In two similar triangles ABC and PQR, $AB/PQ = 3/5$. If the area of $\triangle ABC$ is 54 cm^2 , find the area of $\triangle PQR$ and justify your answer.

35. A two-digit number is four times the sum of its digits. If 18 is added to the number, the digits are interchanged. Find the number using a pair of equations or a quadratic-equation based method. **OR**

The 4th term of an A.P. is 10 and the 9th term is 25. Find the sum of the first 25 terms and determine whether 200 is a term of the A.P.

SECTION E – Case Study Based Questions ($3 \times 4 = 12$)

36. Case Study – Seating Arrangement

A school auditorium has rows of seats arranged so that the first row has 18 seats, the second row has 21 seats, the third row has 24 seats, and so on. The number of seats forms an A.P.

- (a) What is the common difference? [1]
- (b) How many seats are there in the 10th row? [1]
- (c) Find the total number of seats in the first 20 rows. [2]

OR

Find the number of seats in the 20th row. [2]

37. Case Study – Coordinate Geometry

A triangular garden has vertices A(2, 1), B(8, 1) and C(5, 7). A pathway is planned from A to the midpoint M of BC.

- (a) Find the coordinates of M. [1]
- (b) Find the length AB. [1]
- (c) Find the length AM and determine whether AM is perpendicular to BC. Give a mathematical justification. [2]

OR

Find the area of $\triangle ABC$ using the coordinate method. [2]

38. Case Study – Heights and Angles

From a point on the ground, the angle of elevation of the top of a vertical tower is 30° . On moving 20 m towards the tower, the angle becomes 60° . Let the original distance from the tower be x metres and the tower height be h metres.

- (a) Write an equation relating h and x using $\tan 30^\circ$. [1]
- (b) Write an equation relating h and x using $\tan 60^\circ$ after moving 20 m. [1]
- (c) Solve the two equations to find x and h. [2]

OR

Show that $h = 10\sqrt{3}$ m using the two trigonometric relations. [2]

End of Question Paper

Teacher's note: Difficulty distribution: 30% Low, 40% Medium and 30% High (24, 32 and 24 marks respectively).

Pattern basis: Latest available CBSE Class X Mathematics Standard board-style structure, adapted for a half-yearly examination restricted to Chapters 1–8.