

Complex Numbers and Quadratic Equations — CBSE Pattern Test 1

Class 11 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Maths · Complex Numbers and Quadratic Equations · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
(3) For MCQ questions choose the single correct option; for VSA answers write a single line.
(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- The value of i^2 is
 - -1
 - 1
 - 0
 - i
- The real part of the complex number $3 + 4i$ is
 - 3
 - 4
 - $4i$
 - -3
- If $z_1 = 2 + 3i$ and $z_2 = 1 - i$, then $z_1 + z_2$ is
 - $3 + 2i$
 - $3 + 4i$
 - $1 + 4i$
 - $3 - 2i$
- The modulus of $3 + 4i$ is
 - 5
 - 7
 - 25
 - 1
- For a complex number z , $z \cdot \bar{z}$ equals
 - $|z|^2$
 - $|z|$
 - $2|z|$
 - z^2
- In the Argand plane, a complex number $a + ib$ is represented by the point
 - (a, b)
 - (b, a)
 - $(a, -b)$
 - $(-a, b)$
- If the discriminant of a quadratic equation is negative, its roots are
 - complex conjugates

- (B) real and equal
- (C) real and distinct
- (D) zero

8. If ω is a cube root of unity, then $1 + \omega + \omega^2$ equals

- (A) 0
- (B) 1
- (C) 3
- (D) ω

9. Find the value of i^2 and i^3 .

10. Write the cube roots of unity.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

- 11. Find the value of i^4 .
- 12. Find the conjugate of $2 + 3i$.
- 13. Find the modulus of $1 + i$.
- 14. Find the discriminant of $x^2 - 2x + 5 = 0$.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

- 15. Express $(1 + i)(2 - i)$ in the standard form $a + ib$.
- 16. Express $1/(1 + i)$ in the form $a + ib$.
- 17. Find the modulus and argument of $-1 + i\sqrt{3}$.
- 18. Solve the quadratic equation $x^2 - 4x + 13 = 0$.

Section D — Long Answers ($2 \times 5 = 10$ marks)

- 19. Express $(3 + 2i)/(1 - 2i)$ in the standard form $a + ib$. Find the modulus and argument of $z = -1 - i$ and express it in polar form.
- 20. Find the cube roots of unity and prove that $1 + \omega + \omega^2 = 0$ and $\omega^3 = 1$.

Answer Key (Marking Scheme)

- Q1 — (A) -1 . Q2 — (A) 3 . Q3 — (A) $3 + 2i$. Q4 — (A) 5 .
- Q5 — (A) $|z|^2$. Q6 — (A) (a, b) . Q7 — (A) complex conjugates. Q8 — (A) 0 .
- Q9 — $i^2 = -1$, $i^3 = -i$.
- Q10 — $1, \omega, \omega^2$.
- Q11 — 1 .
- Q12 — $2 - 3i$.
- Q13 — $\sqrt{2}$.
- Q14 — $4 - 20 = -16$.
- Q15 — $3 + i$.
- Q16 — $(1 - i)/2$.
- Q17 — modulus 2 , argument $2\pi/3$.
- Q18 — $2 \pm 3i$.

Q19 — $(-1 + 8i)/5$; $\sqrt{2}(\cos(-3\pi/4) + i \sin(-3\pi/4))$.

Q20 — Proof via $\omega^3 = 1$.