

Complex Numbers and Quadratic Equations — CBSE Pattern Test 2

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

Test 2 — 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)

1. The imaginary part of the complex number $5 - 7i$ is

- (A) -7
- (B) 7
- (C) 5
- (D) -5

2. If $z_1 = 2 + 3i$ and $z_2 = 1 - i$, then $z_1 - z_2$ is

- (A) $1 + 4i$
- (B) $3 + 2i$
- (C) $1 + 2i$
- (D) $1 - 4i$

3. The modulus of $(1 + i)$ is

- (A) $\sqrt{2}$
- (B) 2
- (C) 1
- (D) $\sqrt{3}$

4. The argument of $1 + i$ is

- (A) $\pi/4$
- (B) $\pi/2$
- (C) $\pi/3$
- (D) $\pi/6$

5. The roots of $x^2 + 1 = 0$ are

- (A) $\pm i$
- (B) ± 1
- (C) 0
- (D) $\pm 2i$

6. The value of ω^3 for a cube root of unity ω is

- (A) 1
- (B) 0
- (C) -1
- (D) ω

7. The conjugate of $a + ib$ is

- (A) $a - ib$

(B) $-a + ib$

(C) $-a - ib$

(D) $b + ia$

8. If $z = 3 + 4i$, then $\bar{z}z$ is

(A) 25

(B) 7

(C) 5

(D) 24

9. Write the polar form of a complex number.

10. Find the conjugate of $a + ib$.

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

11. Write $|2 - i|$.

12. Find the values of i^{-1} and i^{-2} .

13. What is $z \cdot \bar{z}$ for a complex number z ?

14. Solve $x^2 + 1 = 0$.

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

15. Express $(3 + i\sqrt{5})(3 - i\sqrt{5})$ in the form $a + ib$.

16. If $z_1 = 3 + 4i$ and $z_2 = 2 - i$, find $z_1 + z_2$ and $z_1 z_2$.

17. Find the modulus and conjugate of $1 + i\sqrt{3}$.

18. Solve the quadratic equation $x^2 + x + 1 = 0$ and write the roots in the form $a + ib$.

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

19. If $z_1 = 2 + i$ and $z_2 = 1 - 3i$, find $|z_1 z_2|$ and show that $|z_1 z_2| = |z_1| |z_2|$. Represent the complex numbers $1 + i$, $-1 + i$ and $-1 - i$ in the Argand plane and find the modulus and argument of each.

20. Solve $x^2 - 2x + 5 = 0$ and verify that the roots are complex conjugates. If ω is a non-real cube root of unity, prove that $(1 + \omega)^3 - (1 + \omega^2)^3 = 0$.

Answer Key (Marking Scheme)

Q1 — (A) -7 . Q2 — (A) $1 + 4i$. Q3 — (A) $\sqrt{2}$. Q4 — (A) $\pi/4$.

Q5 — (A) $\pm i$. Q6 — (A) 1 . Q7 — (A) $a - ib$. Q8 — (A) 25 .

Q9 — $z = r(\cos \theta + i \sin \theta)$.

Q10 — $a - ib$.

Q11 — $\sqrt{5}$.

Q12 — $i^{-1} = -i$, $i^{-2} = -1$.

Q13 — $|z|^2$.

Q14 — $x = \pm i$.

Q15 — 14 .

Q16 — $5 + 3i$; $10 + 5i$.

Q17 — modulus 2 , conjugate $1 - i\sqrt{3}$.

Q18 — $x = (-1 \pm i\sqrt{3})/2$.

Q19 — $|z_1 z_2| = \sqrt{50}$; Argand as in notes.

Q20 — Roots $1 \pm 2i$; proof as in notes.