

Complex Numbers and Quadratic Equations — Assignment 1

Class 11 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

The Imaginary Unit and Standard Form

MCQ Questions (choose the correct option)

- The value of i^2 is
 - -1
 - 1
 - 0
 - i
- The real part of the complex number $3 + 4i$ is
 - 3
 - 4
 - $4i$
 - -3
- The conjugate of $a + ib$ is
 - $a - ib$
 - $-a + ib$
 - $-a - ib$
 - $b + ia$
- If $z = -5 + 2i$, then $\text{Im}(z)$ is
 - 2
 - -5
 - 5
 - -2

1 Mark Questions

- Find the value of i^2 and i^3 .
- Write the real and imaginary parts of $5 - 7i$.
- Write the conjugate of $2 + 3i$.

2 Mark Questions

- Express $(1 + i)(2 - i)$ in the standard form $a + ib$.
- Find the values of i^{-1} and i^{-2} .

3 Mark Questions

- Express the following in the form $a + ib$: (i) $i^9 + i^{19}$, (ii) $(3 + i\sqrt{5})(3 - i\sqrt{5})$, (iii) i^{-39} .
- Find the real and imaginary parts of the complex number $(1 + i)/(1 - i)$.

Addition, Subtraction, Multiplication and Division

MCQ Questions (choose the correct option)

- If $z_1 = 2 + 3i$ and $z_2 = 1 - i$, then $z_1 + z_2$ is
 - $3 + 2i$
 - $3 + 4i$
 - $1 + 4i$
 - $3 - 2i$
- If $z_1 = 2 + 3i$ and $z_2 = 1 - i$, then $z_1 - z_2$ is
 - $1 + 4i$
 - $3 + 2i$
 - $1 + 2i$
 - $1 - 4i$
- To divide two complex numbers, we multiply the numerator and denominator by the
 - conjugate of the denominator
 - conjugate of the numerator
 - modulus of the denominator
 - argument
- If $z_1 = 1 + i$ and $z_2 = 1 - i$, then $z_1 z_2$ is
 - 2
 - $2i$
 - 0
 - 1

1 Mark Questions

- If $z_1 = 2 + 3i$ and $z_2 = 1 - i$, find $z_1 + z_2$.
- Find $z_1 - z_2$ for $z_1 = 2 + 3i$ and $z_2 = 1 - i$.
- Find $(1 + i)(1 - i)$.

2 Mark Questions

- If $z_1 = 3 + 4i$ and $z_2 = 2 - i$, find $z_1 + z_2$ and $z_1 z_2$.
- Express $1/(1 + i)$ in the form $a + ib$.

3 Mark Questions

- If $z_1 = 2 + 3i$ and $z_2 = 1 - i$, find $z_1 + z_2$, $z_1 - z_2$, $z_1 z_2$ and z_1/z_2 .
- Express $(3 + 2i)/(1 - 2i)$ in the standard form $a + ib$.

Conjugate and Modulus**MCQ Questions (choose the correct option)**

- The modulus of $3 + 4i$ is
 - 5
 - 7
 - 25
 - 1
- For a complex number z , $z \cdot \bar{z}$ equals

- (A) $|z|^2$
 (B) $|z|$
 (C) $2|z|$
 (D) z^2
3. The modulus of $(1 + i)$ is
 (A) $\sqrt{2}$
 (B) 2
 (C) 1
 (D) $\sqrt{3}$
4. If $z = 3 + 4i$, then $z\bar{z}$ is
 (A) 25
 (B) 7
 (C) 5
 (D) 24

1 Mark Questions

- Find the modulus of $3 + 4i$.
- Write $|2 - i|$.
- What is $z\bar{z}$ for a complex number z ?

2 Mark Questions

- Find the modulus and conjugate of $1 + i\sqrt{3}$.
- If $z = 2 + 3i$, verify that $z\bar{z} = |z|^2$.

3 Mark Questions

- Find the modulus and conjugate of $(3 + 4i)/(1 - 2i)$ and express it in the form $a + ib$.
- If $z_1 = 2 + i$ and $z_2 = 1 - 3i$, find $|z_1 z_2|$ and show that $|z_1 z_2| = |z_1||z_2|$.

Argand Plane and Polar Form

MCQ Questions (choose the correct option)

- In the Argand plane, the complex number $a + ib$ is represented by the point
 (A) (a, b)
 (B) (b, a)
 (C) $(a, -b)$
 (D) $(-a, b)$
- The polar form of a complex number $z = r(\cos \theta + i \sin \theta)$ uses
 (A) modulus r and argument θ
 (B) only the real part
 (C) only the imaginary part
 (D) the conjugate
- The argument of $1 + i$ is
 (A) $\pi/4$
 (B) $\pi/2$
 (C) $\pi/3$

(D) $\pi/6$

4. The modulus of a complex number in polar form is denoted by

(A) r

(B) θ

(C) i

(D) z

1 Mark Questions

1. How is a complex number represented in the Argand plane?

2. Find the argument of $1 + i$.

3. Write the polar form of a complex number.

2 Mark Questions

1. Find the modulus and argument of $-1 + i\sqrt{3}$.

2. Represent $2 + 2i$ in polar form.

3 Mark Questions

1. Find the modulus and argument of $z = -1 - i$ and express it in polar form.

2. Represent the complex numbers $1 + i$, $-1 + i$ and $-1 - i$ in the Argand plane and find the modulus and argument of each.

Quadratic Equations with Complex Roots

MCQ Questions (choose the correct option)

1. If the discriminant of a quadratic equation is negative, its roots are

(A) complex conjugates

(B) real and equal

(C) real and distinct

(D) zero

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

(A) $\pm i$

(B) ± 1

(C) 0

(D) $\pm 2i$

3. The roots of a quadratic with a negative discriminant are

(A) conjugate pairs $a \pm ib$

(B) equal real roots

(C) irrational roots

(D) integers

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

(A) $1 \pm 2i$

(B) $1 \pm i$

(C) $2 \pm i$

(D) $-1 \pm 2i$

1 Mark Questions

1. What is the nature of the roots when the discriminant is negative?
2. Solve $x^2 + 1 = 0$.
3. Find the discriminant of $x^2 - 2x + 5 = 0$.

2 Mark Questions

1. Solve $x^2 + 2 = 0$.
2. Solve the quadratic equation $x^2 - 4x + 13 = 0$.

3 Mark Questions

1. Solve the quadratic equation $x^2 + x + 1 = 0$ and write the roots in the form $a + ib$.
2. Solve the equation $x^2 - 2x + 5 = 0$ and verify that the roots are complex conjugates of each other.

Cube Roots of Unity

MCQ Questions (choose the correct option)

1. The cube roots of unity are
 - (A) $1, \omega, \omega^2$
 - (B) $1, i, -i$
 - (C) $1, -1, i$
 - (D) $0, 1, \omega$
2. If ω is a cube root of unity, then $1 + \omega + \omega^2$ equals
 - (A) 0
 - (B) 1
 - (C) 3
 - (D) ω
3. The value of ω^3 is
 - (A) 1
 - (B) 0
 - (C) -1
 - (D) ω
4. The non-real cube roots of unity are
 - (A) complex conjugates of each other
 - (B) equal
 - (C) real
 - (D) zero

1 Mark Questions

1. Write the cube roots of unity.
2. Find the value of $1 + \omega + \omega^2$.
3. What is ω^3 ?

2 Mark Questions

1. Prove that $1 + \omega + \omega^2 = 0$.
2. If ω is a cube root of unity, find the value of $\omega^{10} + \omega^{20}$.

3 Mark Questions

1. Find the cube roots of unity and prove that $1 + \omega + \omega^2 = 0$ and $\omega^3 = 1$.
2. If ω is a non-real cube root of unity, prove that $(1 + \omega)^3 - (1 + \omega^2)^3 = 0$.