MATHEMATICS MCQ BOOKLET

Grade 10 · Chapter 1 · Complex Numbers

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on the imaginary unit, powers of i, a + bi form, real and imaginary parts, operations, conjugates, modulus, the Argand plane, inverses, algebraic laws, and equations such as $x^2 + k = 0$. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. The imaginary unit i is defined by:

(A) $i = \sqrt{(-1)}$
(B) $i = 1$
(C) $i = -1$
(D) $i = 0$

Correct Answer: A

Explanation: No real square equals −1, so i is introduced with $i^2 = -1$.

2. The value of i^2 is:

(A) 1
(B) −1
(C) i
(D) 0

Correct Answer: B

Explanation: The value of i^2 is −1.

3. The value of i^3 equals:

(A) 1
(B) −1
(C) −i
(D) i

Correct Answer: C

Explanation: $i^3 = i^2 \cdot i = (-1)(i) = -i$, so the correct choice is −i.

4. The value of i^4 equals:

(A) −1
(B) i
(C) −i
(D) 1

Correct Answer: D

Explanation: $i^4 = (i^2)^2 = (-1)^2 = 1$, so the correct choice is 1.

5. The value of i^8 equals:

(A) 1
(B) −1
(C) i
(D) −i

Correct Answer: A

Explanation: $i^8 = (i^4)^2 = 1^2 = 1$, so the correct choice is 1.

6. The value of i^{10} equals:

(A) 1
(B) −1
(C) i

(D) −i

Correct Answer: B

Explanation: 10 mod 4 = 2, so $i^{10} = i^2 = -1$, so the correct choice is −1.

7. The value of i^{11} equals:

(A) 1
(B) −1
(C) −i
(D) i

Correct Answer: C

Explanation: 11 mod 4 = 3, so $i^{11} = i^3 = -i$, so the correct choice is −i.

8. The value of i^{12} equals:

(A) −1
(B) i
(C) −i
(D) 1

Correct Answer: D

Explanation: 12 mod 4 = 0, so $i^{12} = i^4 = 1$, so the correct choice is 1.

9. The value of i^{23} equals:

(A) −i
(B) 1
(C) −1
(D) i

Correct Answer: A

Explanation: 23 mod 4 = 3, so $i^{23} = i^3 = -i$, so the correct choice is −i.

10. The value of i^{50} equals:

(A) 1
(B) −1
(C) i
(D) −i

Correct Answer: B

Explanation: 50 mod 4 = 2, so $i^{50} = i^2 = -1$, so the correct choice is −1.

11. The value of i^{99} equals:

(A) 1
(B) −1
(C) −i
(D) i

Correct Answer: C

Explanation: 99 mod 4 = 3, so $i^{99} = i^3 = -i$, so the correct choice is −i.

12. The value of i^{100} equals:

(A) −1
(B) i
(C) −i
(D) 1

Correct Answer: D

Explanation: 100 mod 4 = 0, so $i^{100} = 1$, so the correct choice is 1.

13. Powers of i repeat with period:

(A) 4
(B) 2
(C) 3

(D) 6

Correct Answer: A

Explanation: Powers of i repeat with period 4.

14. The value of i^{-1} equals:

(A) 1
(B) −i
(C) −1
(D) i

Correct Answer: B

Explanation: $1/i = i^3/i^4 = i^3/1 = -i$, so the correct choice is −i.

15. The value of i^{-2} equals:

(A) 1
(B) i
(C) −1
(D) −i

Correct Answer: C

Explanation: $i^{-2} = 1/i^2 = 1/(-1) = -1$, so the correct choice is −1.

16. A complex number is written in standard form as:

(A) a/b only
(B) $\sqrt{(a^2 - b^2)}$
(C) a − b only
(D) a + bi where a, b ∈ R

Correct Answer: D

Explanation: Every complex number is expressed as a real part a plus an imaginary part bi.

17. The set of complex numbers is denoted by:

(A) C
(B) R
(C) Z
(D) Q

Correct Answer: A

Explanation: C is the standard symbol for the set of all numbers a + bi with real a and b.

18. Every real number is also a complex number because:

(A) reals have no square roots
(B) a real a equals a + 0i
(C) i is real
(D) C is a subset of R

Correct Answer: B

Explanation: Writing b = 0 in a + bi embeds every real inside C, so R ⊂ C.

19. The number 5 + 0i is classified as:

(A) pure imaginary
(B) neither real nor complex
(C) real
(D) undefined

Correct Answer: C

Explanation: Its imaginary part is zero, so it lies on the real axis.

20. The number 0 + 7i is classified as:

(A) real
(B) rational only
(C) not in C

(D) pure imaginary

Correct Answer: D

Explanation: A non-zero number with zero real part is pure imaginary.

21. The number 3 + 2i is classified as:

(A) a non-real complex number
(B) real
(C) pure imaginary
(D) not a complex number

Correct Answer: A

Explanation: Both parts are non-zero, so it is complex but not real or pure imaginary.

22. Which number is real?

(A) 2 + i
(B) −4
(C) 3i
(D) 1 + 2i

Correct Answer: B

Explanation: −4 equals −4 + 0i, so its imaginary part is zero.

23. Which number is pure imaginary?

(A) 5
(B) −3 + i
(C) 0 − 6i
(D) 2 + 0i

Correct Answer: C

Explanation: 0 − 6i — this correctly answers the question.

24. Which number is NOT real?

(A) 0
(B) √2
(C) π
(D) 4 + 3i

Correct Answer: D

Explanation: 4 + 3i has imaginary part 3 ≠ 0, so it is not a real number.

25. √(−4) in terms of i equals:

(A) 2i
(B) −2
(C) −2i
(D) 4i

Correct Answer: A

Explanation: √(−4) in terms of i equals 2i.

26. √(−9) in terms of i equals:

(A) 3
(B) 3i
(C) −3i
(D) 9i

Correct Answer: B

Explanation: √(−9) = √(9) · √(−1) = 3i, so the correct choice is 3i.

27. √(−25) in terms of i equals:

(A) 5
(B) −5
(C) 5i

(D) −25i

Correct Answer: C

Explanation: √(−25) = 5√(−1) = 5i, so the correct choice is 5i.

28. 2√(−3) simplified is:

(A) 2√3
(B) −2√3
(C) 6i
(D) 2√3 i

Correct Answer: D

Explanation: 2√(−3) = 2√3 · √(−1) = 2√3 i, so the correct choice is 2√3 i.

29. Evaluate (3 + 2i) + (1 + 4i):

(A) 4 + 6i
(B) 2 − 2i
(C) 4 + 2i
(D) 3 + 6i

Correct Answer: A

Explanation: Evaluate (3 + 2i) + (1 + 4i) 4 + 6i.

30. Evaluate (5 − i) + (2 + 3i):

(A) 3 + 4i
(B) 7 + 2i
(C) 7 − 4i
(D) 3 − 2i

Correct Answer: B

Explanation: Evaluate (5 − i) + (2 + 3i) 7 + 2i.

31. Evaluate (4 + 3i) − (2 + i):

(A) 6 + 4i
(B) 2 + 4i
(C) 2 + 2i
(D) 6 + 2i

Correct Answer: C

Explanation: Evaluate (4 + 3i) − (2 + i) 2 + 2i.

32. Evaluate (1 + 2i) − (3 + 5i):

(A) 4 + 7i
(B) −2 + 3i
(C) 2 + 3i
(D) −2 − 3i

Correct Answer: D

Explanation: 1 − 3 = −2 and 2 − 5 = −3, so the result is −2 − 3i.

33. Evaluate (0 + 3i) + (0 + 2i):

(A) 5i
(B) 5
(C) 6i
(D) 1 + 5i

Correct Answer: A

Explanation: Both numbers are pure imaginary; 3i + 2i = 5i.

34. The additive inverse of 3 + 2i is:

(A) 3 − 2i
(B) −3 − 2i
(C) −3 + 2i

(D) 3 + 2i

Correct Answer: B

Explanation: The additive inverse of 3 + 2i is −3 − 2i.

35. Evaluate i · i:

(A) 1
(B) i
(C) −1
(D) −i

Correct Answer: C

Explanation: Evaluate i · i −1.

36. Evaluate (2i)(3i):

(A) 6i
(B) 6
(C) −6i
(D) −6

Correct Answer: D

Explanation: (2i)(3i) = 6i² = 6(−1) = −6, so the correct choice is −6.

37. Evaluate (1 + i)(1 − i):

(A) 2
(B) 0
(C) 2i
(D) 1 − i²

Correct Answer: A

Explanation: Evaluate (1 + i)(1 − i) 2.

38. Evaluate (2 + 3i)(1 + i):

(A) 2 + 3i
(B) −1 + 5i
(C) 5 + 5i
(D) −1 − 5i

Correct Answer: B

Explanation: Evaluate (2 + 3i)(1 + i) −1 + 5i.

39. Evaluate (3 + 2i)(3 − 2i):

(A) 5
(B) 9 − 4i²
(C) 13
(D) 9 + 4i

Correct Answer: C

Explanation: Product with conjugate: 9 − (2i)² = 9 − 4(−1) = 13.

40. Evaluate i(4 + 2i):

(A) 4i + 2
(B) 4 + 2i
(C) 2 − 4i
(D) −2 + 4i

Correct Answer: D

Explanation: Evaluate i(4 + 2i) −2 + 4i.

41. Evaluate (1 + 2i)(3 − i):

(A) 5 + 5i
(B) 1 + 5i
(C) 3 − 2i

(D) 5 − 5i

Correct Answer: A

Explanation: Evaluate (1 + 2i)(3 − i) 5 + 5i.

42. Evaluate (1 + i)²:

(A) 1 + 2i
(B) 2i
(C) 1 + i²
(D) 2 + 2i

Correct Answer: B

Explanation: Evaluate (1 + i)² 2i.

43. For z = a + bi and w = c + di, zw equals:

(A) (ac + bd) + (ad + bc)i
(B) (ac − bd) + (ad − bc)i
(C) (ac − bd) + (ad + bc)i
(D) ac + bd

Correct Answer: C

Explanation: For z = a + bi and w = c + di, zw equals (ac − bd) + (ad + bc)i.

44. Evaluate 1/i:

(A) i
(B) 1
(C) −1
(D) −i

Correct Answer: D

Explanation: Evaluate 1/i −i.

45. Evaluate (1 + i)/(1 − i):

(A) i
(B) 1
(C) −i
(D) −1

Correct Answer: A

Explanation: Evaluate (1 + i)/(1 − i) i.

46. Evaluate (3 + 4i)/(1 + 2i):

(A) (11 + 2i)/5
(B) (11 − 2i)/5
(C) (−5 + 10i)/5
(D) 3 + 2i

Correct Answer: B

Explanation: Evaluate (3 + 4i)/(1 + 2i) (11 − 2i)/5.

47. Evaluate (2 + 3i)/i:

(A) 3 + 2i
(B) −3 + 2i
(C) 3 − 2i
(D) 2 − 3i

Correct Answer: C

Explanation: Evaluate (2 + 3i)/i 3 − 2i.

48. Evaluate 5/(2i):

(A) 5i/2
(B) 5/2
(C) −5/2

(D) −5i/2

Correct Answer: D

Explanation: Evaluate 5/(2i) −5i/2.

49. To divide by a non-zero complex number c + di, multiply numerator and denominator by:

(A) c − di
(B) c + di
(C) −c − di
(D) d + ci

Correct Answer: A

Explanation: To divide by a non-zero complex number c + di, multiply numerator and denominator by c − di.

50. The conjugate of 3 + 4i is:

(A) −3 + 4i
(B) 3 − 4i
(C) −3 − 4i
(D) 4 + 3i

Correct Answer: B

Explanation: The conjugate of 3 + 4i is 3 − 4i.

51. The conjugate of −2 + 5i is:

(A) 2 + 5i
(B) 2 − 5i
(C) −2 − 5i
(D) −2 + 5i

Correct Answer: C

Explanation: The conjugate of −2 + 5i is −2 − 5i.

52. The conjugate of the real number 7 is:

(A) −7
(B) 7i
(C) −7i
(D) 7

Correct Answer: D

Explanation: A real number has zero imaginary part, so its conjugate is itself.

53. The conjugate of 3i is:

(A) −3i
(B) 3i
(C) 3
(D) −3

Correct Answer: A

Explanation: The conjugate of 3i is −3i.

54. For z = a + bi, the product $z \cdot \bar{z}$ equals:

(A) $a^2 - b^2$
(B) $a^2 + b^2$
(C) 2a
(D) 2bi

Correct Answer: B

Explanation: $(a + bi)(a - bi) = a^2 - (bi)^2 = a^2 + b^2$, which is always real.

55. For z = 3 + 4i, the value of $z \cdot \bar{z}$ is:

(A) 7
(B) 12
(C) 25

(D) −7

Correct Answer: C

Explanation: For $z = 3 + 4i$, the value of $z \cdot \bar{z}$ is 25.

56. If z and w are complex, then the conjugate of zw equals:

(A) $\bar{z} + \bar{w}$

(B) $z \cdot w$

(C) $z + w$

(D) $\bar{z} \cdot \bar{w}$

Correct Answer: D

Explanation: If z and w are complex, then the conjugate of zw equals $\bar{z} \cdot \bar{w}$.

57. If z and w are complex with w ≠ 0, then the conjugate of z/w equals:

(A) $\bar{z}/\bar{w}$

(B) $\bar{z}/w$

(C) $z/\bar{w}$

(D) $z + \bar{w}$

Correct Answer: A

Explanation: Conjugation also distributes over division: $\overline{(z/w)} = \bar{z}/\bar{w}$.

58. The modulus |3 + 4i| equals:

(A) 7

(B) 5

(C) 25

(D) 1

Correct Answer: B

Explanation: $|z| = \sqrt{(3^2 + 4^2)} = \sqrt{25} = 5$, so the correct choice is 5.

59. The modulus |5 + 12i| equals:

(A) 17

(B) 7

(C) 13

(D) 25

Correct Answer: C

Explanation: $\sqrt{(5^2 + 12^2)} = \sqrt{(25 + 144)} = \sqrt{169} = 13$, so the correct choice is 13.

60. The modulus |−3 + 4i| equals:

(A) 1

(B) 7

(C) 25

(D) 5

Correct Answer: D

Explanation: $\sqrt{((-3)^2 + 4^2)} = \sqrt{(9 + 16)} = 5$, so the correct choice is 5.

61. The modulus |7| equals:

(A) 7

(B) 0

(C) 49

(D) √7

Correct Answer: A

Explanation: For a real number, $|a + 0i| = \sqrt{(a^2)} = |a|$, so $|7| = 7$.

62. The modulus |3i| equals:

(A) −3

(B) 3

(C) 9

(D) $\sqrt{3}$

Correct Answer: B

Explanation: $|0 + 3i| = \sqrt{(0^2 + 3^2)} = 3$, so the correct choice is 3.

63. For $z = a + bi$, $|z|^2$ equals:

(A) $a - b$
(B) $a^2 - b^2$
(C) $a^2 + b^2$
(D) $(a + b)^2$

Correct Answer: C

Explanation: By definition $|z| = \sqrt{(a^2 + b^2)}$, so $|z|^2 = a^2 + b^2$.

64. On the Argand plane, the horizontal axis represents:

(A) imaginary part only
(B) modulus only
(C) argument only
(D) real part

Correct Answer: D

Explanation: The horizontal axis is the real axis; the vertical axis is the imaginary axis.

65. On the Argand plane, the vertical axis represents:

(A) imaginary part
(B) real part
(C) modulus
(D) conjugate

Correct Answer: A

Explanation: Imaginary values are measured upward and downward along the vertical axis.

66. The complex number $3 + 2i$ is plotted at the point:

(A) (2, 3)
(B) (3, 2)
(C) (−3, 2)
(D) (3, −2)

Correct Answer: B

Explanation: Coordinates are (real part, imaginary part) = (3, 2).

67. The complex number $-1 - i$ is plotted at:

(A) (1, 1)
(B) (−1, 1)
(C) (−1, −1)
(D) (1, −1)

Correct Answer: C

Explanation: The complex number $-1 - i$ is plotted at (−1, −1).

68. The multiplicative inverse of i is:

(A) i
(B) 1
(C) −1
(D) −i

Correct Answer: D

Explanation: $i \cdot (-i) = -i^2 = -(-1) = 1$, so $1/i = -i$.

69. The multiplicative inverse of $2 + 2i$ is:

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

(D) −2 − 2i

Correct Answer: A

Explanation: The multiplicative inverse of 2 + 2i is (1 − i)/4.

70. Complex addition is commutative, meaning for all z, w in C:

(A) z + w = z − w
(B) z + w = w + z
(C) zw = wz only for reals
(D) z + w = 0

Correct Answer: B

Explanation: Adding complex numbers commutes because adding real and imaginary parts commutes.

71. Complex multiplication is associative, meaning:

(A) z + w = w + z
(B) z + 0 = z only
(C) z(wu) = (zw)u
(D) zw = z + w

Correct Answer: C

Explanation: Complex multiplication is associative, meaning z(wu) = (zw)u.

72. The distributive law for complex numbers states:

(A) z + w = w + z
(B) $z \cdot \bar{z} = |z|^2$ only
(C) z − z = 1
(D) z(w + u) = zw + zu

Correct Answer: D

Explanation: Multiplication distributes over addition exactly as for real numbers.

73. For z = 4 + 7i, the real part Re(z) equals:

(A) 4
(B) 7
(C) 4i
(D) 7i

Correct Answer: A

Explanation: In a + bi, the real part is the coefficient a, here 4.

74. For z = 4 + 7i, the imaginary part Im(z) equals:

(A) 7
(B) 4
(C) 7i
(D) 4i

Correct Answer: B

Explanation: Im(z) is the real coefficient b of the imaginary term, here 7 (not 7i).

75. For z = −5i, Re(z) and Im(z) are:

(A) Re = −5, Im = 0
(B) Re = −5, Im = −5
(C) Re = 0, Im = −5
(D) Re = 0, Im = 0

Correct Answer: C

Explanation: −5i = 0 + (−5)i, so the real part is 0 and Im(z) = −5.

76. The solutions of $x^2 + 9 = 0$ in C are:

(A) x = ±3
(B) x = 9
(C) no solution

(D) x = ±3i

Correct Answer: D

Explanation: $x^2 = -9$ gives $x = \pm\sqrt{(-9)} = \pm 3i$, so the correct choice is $x = \pm 3i$.

77. The solutions of $x^2 + 5 = 0$ in C are:

(A) $x = \pm\sqrt{5}\, i$
(B) $x = \pm\sqrt{5}$
(C) $x = \pm 5i$
(D) $x = \pm 5$

Correct Answer: A

Explanation: $x^2 = -5$, so $x = \pm\sqrt{(-5)} = \pm\sqrt{5} \cdot i$, so the correct choice is $x = \pm\sqrt{5}\, i$.

78. The solutions of $x^2 + 1 = 0$ in C are:

(A) x = ±1
(B) x = ±i
(C) x = 0
(D) x = 1 only

Correct Answer: B

Explanation: $x^2 = -1$ gives $x = \pm\sqrt{(-1)} = \pm i$, so the correct choice is $x = \pm i$.

79. The solutions of $x^2 + 16 = 0$ in C are:

(A) x = ±4
(B) x = ±16
(C) x = ±4i
(D) x = ±2i

Correct Answer: C

Explanation: $x^2 = -16$, so $x = \pm\sqrt{(-16)} = \pm 4i$, so the correct choice is $x = \pm 4i$.

80. Which equation has no real solution but has complex solutions?

(A) $x^2 - 4 = 0$
(B) $x^2 = 0$
(C) $x - 3 = 0$
(D) $x^2 + 4 = 0$

Correct Answer: D

Explanation: $x^2 + 4 = 0$ requires $x^2 = -4$, impossible in R but solvable in C as $\pm 2i$.

B. Less Important / Secondary Topics

81. Complex numbers were developed partly so mathematicians could work with:

(A) square roots of negative numbers
(B) only positive square roots
(C) Roman numerals
(D) only integers

Correct Answer: A

Explanation: Complex numbers were developed partly so mathematicians could work with square roots of negative numbers.

82. The Italian mathematician Rafael Bombelli helped early work on:

(A) only real radicals
(B) operations with expressions like √(-1)
(C) base-60 numerals
(D) logarithm tables only

Correct Answer: B

Explanation: Renaissance algebra needed rules for roots of negative radicands.

83. Carl Friedrich Gauss popularised the geometric view now called the:

(A) number line only
(B) unit circle for reals only
(C) Argand (complex) plane
(D) sexagesimal chart

Correct Answer: C

Explanation: Plotting a + bi as (a, b) links algebra to geometry.

84. Leonhard Euler connected i to trigonometry through formulas such as e^(iθ); at θ = π this gives:

(A) e^(iπ) = 1
(B) e^(iπ) = i
(C) e^(iπ) = 0
(D) e^(iπ) = −1

Correct Answer: D

Explanation: Euler's identity e^(iπ) + 1 = 0 is famous; here e^(iπ) = −1.

85. The distance from the origin to the point representing z on the Argand plane equals:

(A) |z|
(B) Re(z) only
(C) Im(z) only
(D) $\bar{z}$

Correct Answer: A

Explanation: Modulus |z| is the Euclidean distance √(a² + b²).

86. The conjugate of a sum satisfies $\overline{(z + w)}$ equals:

(A) $\bar{z} - \bar{w}$
(B) $\bar{z} + \bar{w}$
(C) z + w
(D) $\bar{z}\,\bar{w}$

Correct Answer: B

Explanation: The conjugate of a sum satisfies $\overline{(z + w)}$ equals $\bar{z} + \bar{w}$.

87. If z is real, then $\bar{z}$ equals:

(A) −z
(B) iz
(C) z
(D) 1/z

Correct Answer: C

Explanation: A real number has no imaginary part to flip, so it equals its own conjugate.

88. If z is pure imaginary (z = bi, b ≠ 0), then $\bar{z}$ equals:

(A) z
(B) b
(C) −b
(D) −z

Correct Answer: D

Explanation: Conjugating bi gives −bi, which is −z, so the correct choice is −z.

89. |z| is always a:

(A) non-negative real number
(B) pure imaginary number
(C) negative real
(D) complex number with nonzero imaginary part

Correct Answer: A

Explanation: Modulus √(a² + b²) is real and never negative.

90. For any complex z, $z + \bar{z}$ is always:

(A) pure imaginary
(B) real
(C) zero
(D) negative imaginary only

Correct Answer: B

Explanation: For any complex z, $z + \bar{z}$ is always real.

91. For any complex z, $z - \bar{z}$ is always:

(A) real
(B) rational only
(C) pure imaginary
(D) equal to |z|

Correct Answer: C

Explanation: (a + bi) − (a − bi) = 2bi, which is pure imaginary.

92. The additive identity in C is:

(A) 1
(B) i
(C) −1
(D) 0

Correct Answer: D

Explanation: The additive identity in C is 0.

93. The multiplicative identity in C is:

(A) 1
(B) 0
(C) i
(D) −i

Correct Answer: A

Explanation: The multiplicative identity in C is 1.

94. Zero in C has:

(A) no additive inverse
(B) no multiplicative inverse
(C) both inverses undefined
(D) a multiplicative inverse 1/0

Correct Answer: B

Explanation: 0 + 0i has additive inverse 0, but division by zero is undefined.

95. Subtraction of complex numbers is:

(A) not closed in C
(B) always real
(C) closed: a difference of two complex numbers is complex
(D) always pure imaginary

Correct Answer: C

Explanation: Subtraction of complex numbers is closed: a difference of two complex numbers is complex.

96. (2 + i) + (3 − 2i) equals:

(A) 5 + 3i
(B) 1 + 3i
(C) 6 − i
(D) 5 − i

Correct Answer: D

Explanation: (2 + i) + (3 − 2i) equals 5 − i.

97. (1 − 3i)(2 + i) equals:

(A) 5 − 5i
(B) 2 − 3i
(C) 1 − 6i
(D) 5 + 5i

Correct Answer: A

Explanation: (1 − 3i)(2 + i) equals 5 − 5i.

98. If |z| = 0, then z equals:

(A) i
(B) 0
(C) 1
(D) −1

Correct Answer: B

Explanation: $\sqrt{(a^2 + b^2)} = 0$ forces a = 0 and b = 0, so z = 0.

99. The complex conjugate of −4 − 3i is:

(A) 4 + 3i
(B) 4 − 3i
(C) −4 + 3i
(D) −4 − 3i

Correct Answer: C

Explanation: The complex conjugate of −4 − 3i is −4 + 3i.

100. Points on the imaginary axis (except 0) represent:

(A) real numbers only
(B) all complex numbers
(C) rational numbers only
(D) pure imaginary numbers

Correct Answer: D

Explanation: Coordinates (0, b) with b ≠ 0 are pure imaginary.

101. The equation $x^2 − 2x + 5 = 0$ has discriminant −16, so its roots in C are:

(A) x = 1 ± 2i
(B) x = 1 ± 2
(C) x = −1 ± 2i
(D) x = 2 ± i

Correct Answer: A

Explanation: The equation $x^2 − 2x + 5 = 0$ has discriminant −16, so its roots in C are x = 1 ± 2i.

102. i^{40} equals:

(A) −1
(B) 1
(C) i
(D) −i

Correct Answer: B

Explanation: 40 mod 4 = 0, so $i^{40} = 1$, so the correct choice is 1.

103. (3 − i)(3 + i) equals:

(A) 8
(B) 9 − i^2
(C) 10
(D) 6

Correct Answer: C

Explanation: Product with conjugate: 9 − i^2 = 9 + 1 = 10.

104. Simplify (4 + 2i)/(1 − i):

(A) 3 + i
(B) 1 − 3i
(C) 3 − i
(D) 1 + 3i

Correct Answer: D

Explanation: Simplify (4 + 2i)/(1 − i) 1 + 3i.

105. If z = 1 + i and w = 1 − i, then zw equals:

(A) 2
(B) 0
(C) 2i
(D) −2i

Correct Answer: A

Explanation: (1 + i)(1 − i) = 1 − i² = 2, so the correct choice is 2.

106. Engineering uses j instead of i for the imaginary unit mainly to avoid clashing with:

(A) the index variable in sums
(B) electric current symbol I
(C) the integer set Z
(D) the unit vector k

Correct Answer: B

Explanation: In electrical engineering, i often denotes current, so j marks √(-1).

107. The set C is:

(A) not closed under addition
(B) only closed under multiplication
(C) closed under +, −, ×, and ÷ (except ÷0)
(D) a subset of N

Correct Answer: C

Explanation: The set C is closed under +, −, ×, and ÷ (except ÷0).

108. Writing x = 2 + 3i means x is:

(A) a 2-by-3 matrix
(B) equal to 5
(C) pure imaginary
(D) a complex number with real 2 and imaginary 3

Correct Answer: D

Explanation: Writing x = 2 + 3i means x is a complex number with real 2 and imaginary 3.