

Algebra 2 - Complex Numbers: Adding, Subtracting and Multiplying - Test Answer Key

Common Core N-CN.A.1, N-CN.A.2 · maths-pdf.fr/en/

Use this answer key and scoring guide to grade the test on complex numbers (N-CN.A.1). Each solution shows the full reasoning, and the scoring note explains how many points to award for correct setup, correct work, and a correct final answer. Partial credit rewards a sound method even when a small arithmetic slip changes the result.

Algebra 2 · Common Core State Standards: **N-CN.A.1, N-CN.A.2**

Question 1 - Imaginary radicals [2 pts]

- a. $\sqrt{-64} = 8i$
- b. $\sqrt{-75} = i\sqrt{25 \cdot 3} = 5i\sqrt{3}$

(a) $8i$; (b) $5i\sqrt{3}$

Scoring: 1 point for each part.

Question 2 - Powers of i [2 pts]

- a. $15 = 4 \cdot 3 + 3$, so $i^{15} = i^3 = -i$.
- b. $102 = 4 \cdot 25 + 2$, so $i^{102} = i^2 = -1$.

(a) $-i$; (b) -1

Scoring: 1 point for each part.

Question 3 - Add and subtract [2 pts]

- a. $(6-2)+(-3+8)i = 4+5i$
- b. $4+i-9+5i = -5+6i$

(a) $4+5i$; (b) $-5+6i$

Scoring: 1 point for each part.

Question 4 - Multiply [3 pts]

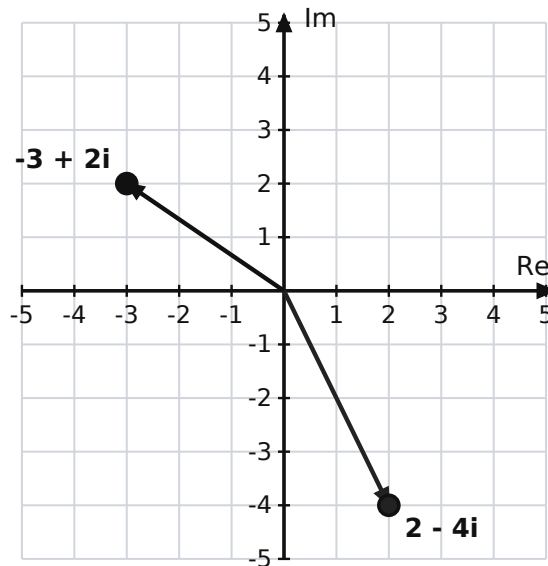
a. $3-12i+2i-8i^2=3-10i+8=11-10i$

b. $4-49i^2=4+49=53$

(a) $11-10i$; **(b)** 53

Scoring: Part (a): 1 point for the four correct partial products, 1 point for replacing i^2 and combining. Part (b): 1 point.

Question 5 - Read the plane [2 pts]



$$A = -3 + 2i, B = 2 - 4i.$$

A is $-3+2i$ and B is $2-4i$. Sum: $(-3+2)+(2-4)i=-1-2i$.

$$\mathbf{A = -3+2i, B = 2-4i, A + B = -1-2i}$$

Scoring: 1 point for both numbers, 1 point for the sum.

Question 6 - Complex solutions [2 pts]

$$3x^2 = -48, \text{ so } x^2 = -16.$$

$$x = \pm 4i.$$

$$x = 4i \text{ or } x = -4i$$

Scoring: 1 point for isolating x^2 , 1 point for both complex solutions.

Question 7 - Expression with powers [3 pts]

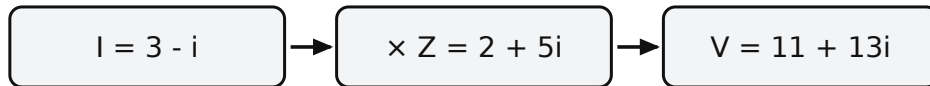
$$3i^2 = -3. \quad i^5 = i, \text{ so } -2i^5 = -2i. \quad (1+i)^2 = 1+2i-1 = 2i.$$

$$\text{Sum: } -3 - 2i + 2i = -3.$$

$$-3 + 0i = -3$$

Scoring: 1 point for each of the three terms simplified correctly (the final sum is then determined).

Question 8 - Impedance [2 pts]



$$V = 11 + 13i \text{ volts}$$

$$(3-i)(2+5i) = 6 + 15i - 2i - 5i^2.$$

$$-5i^2 = 5, \text{ so } 6 + 5 + 13i = 11 + 13i.$$

$$11 + 13i \text{ volts}$$

Scoring: 1 point for the correct distribution, 1 point for the final answer.

Question 9 - Equal complex numbers [2 pts]

$$\text{Real parts: } x+3=7, \text{ so } x=4.$$

$$\text{Imaginary parts: } 2-y=5, \text{ so } y=-3.$$

$$x=4, y=-3$$

Scoring: 1 point for each variable.

Total

20 points

