

NAME: _____

A2.N.9: Perform arithmetic operations on complex numbers and write the answers in the form $a + bi$
Note: This includes simplifying expressions with complex denominators

1. 060111b, P.I. A2.N.9

Melissa and Joe are playing a game with complex numbers. If Melissa has a score of $5 - 4i$ and Joe has a score of $3 + 2i$, what is their total score?

- [A] $8 - 6i$ [B] $8 + 2i$
[C] $8 + 6i$ [D] $8 - 2i$

2. 060304b, P.I. A2.N.9

The relationship between voltage, E , current, I , and resistance, Z , is given by the equation $E = IZ$. If a circuit has a current $I = 3 + 2i$ and a resistance $Z = 2 - i$, what is the voltage of this circuit?

- [A] $8 + i$ [B] $4 - i$ [C] $8 + 7i$ [D] $4 + i$

3. 010325b, P.I. A2.N.9

In an electrical circuit, the voltage, E , in volts, the current, I , in amps, and the opposition to the flow of current, called impedance, Z , in ohms, are related by the equation $E = IZ$. A circuit has a current of $(3 + i)$ amps and an impedance of $(-2 + i)$ ohms. Determine the voltage in $a + bi$ form.

4. 080621b, P.I. A2.N.9

The complex number $c + di$ is equal to $(2 + i)^2$. What is the value of c ?

5. 080122b, P.I. A2.N.9

Show that the product of $a + bi$ and its conjugate is a real number.

6. 010219b, P.I. A2.N.9

The expression $(-1 + i)^3$ is equivalent to

- [A] $2 + 2i$ [B] $-1 - i$
[C] $-3i$ [D] $-2 - 2i$

7. 010811b, P.I. A2.N.9

The expression $\frac{10}{3+i}$ is equivalent to

- [A] $3 + i$ [B] $3 - i$
[C] $\frac{5}{4}$ [D] $\frac{15 + 5i}{4}$

8. 060513b, P.I. A2.N.9

The expression $\frac{2+i}{3+i}$ is equivalent to

- [A] $\frac{6+i}{8}$ [B] $\frac{7+i}{10}$
[C] $\frac{6+5i}{8}$ [D] $\frac{7-5i}{10}$

9. 060509b, P.I. A2.N.9

Impedance measures the opposition of an electrical circuit to the flow of electricity. The total impedance in a particular circuit is given by the formula $Z_T = \frac{Z_1 Z_2}{Z_1 + Z_2}$. What is the total impedance of a circuit, Z_T , if $Z_1 = 1 + 2i$ and $Z_2 = 1 - 2i$?

- [A] $-\frac{3}{2}$ [B] 0 [C] 1 [D] $\frac{5}{2}$

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[7] B

[8] B

[9] D

[1] D

[2] A

[2] $-7 + i$, and appropriate work is shown, such as $(-2 + i)(3 + i)$.

[1] Appropriate work is shown, but one computational error is made.

or [1] $-7 + i$, but no work is shown.

[0] $(-2 + i)(3 + i)$ is shown but not multiplied, or the values are added instead of multiplied.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[3] obviously incorrect procedure.

[2] 3, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The expression $3 + 4i$ is found, but c is not identified.

or [1] 3, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[2] Appropriate work is shown, such as $(a + bi)(a - bi) = a^2 + b^2$.

[1] The conjugate is incorrect, but multiplication and substitution for i^2 are appropriate.

or [1] The conjugate is correct, but one or more errors in multiplication and/or substitution for i^2 are made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[5] incorrect procedure.

[6] A