

N.CN.A.2: Operations with Complex Numbers 2

- 1 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?
 - 1) $8 + 6i$
 - 2) $8 + 2i$
 - 3) $8 - 6i$
 - 4) $8 - 2i$

- 2 The expression $(3 - 7i)^2$ is equivalent to
 - 1) $-40 + 0i$
 - 2) $-40 - 42i$
 - 3) $58 + 0i$
 - 4) $58 - 42i$

- 3 The expression $(-1 + i)^3$ is equivalent to
 - 1) $-3i$
 - 2) $-2 - 2i$
 - 3) $-1 - i$
 - 4) $2 + 2i$

- 4 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?
 - 1) $8 + i$
 - 2) $8 + 7i$
 - 3) $4 + i$
 - 4) $4 - i$

- 5 The product of $(2\sqrt{2} + 5i)$ and $(5\sqrt{2} - 2i)$ is
 - 1) 30
 - 2) $30 + 21i\sqrt{2}$
 - 3) $30 + 29i\sqrt{2}$
 - 4) $10 + 21i\sqrt{2}$

- 6 If $x = 3i$, $y = 2i$, and $z = m + i$, the expression xy^2z equals
 - 1) $-12 - 12mi$
 - 2) $-6 - 6mi$
 - 3) $12 - 12mi$
 - 4) $6 - 6mi$

- 7 The expression $(x + i)^2 - (x - i)^2$ is equivalent to
 - 1) 0
 - 2) -2
 - 3) $-2 + 4xi$
 - 4) $4xi$

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

- 9 If x is a real number, express $2xi(i - 4i^2)$ in simplest $a + bi$ form.

- 10 Determine the value of n in simplest form:
 $i^{13} + i^{18} + i^{31} + n = 0$

- 11 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.

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Answer Section

1 ANS: 4 REF: 060111b

2 ANS: 2

$$(3 - 7i)(3 - 7i) = 9 - 21i - 21i + 49i^2 = 9 - 42i - 49 = -40 - 42i$$

REF: fall0901a2

3 ANS: 4

$$\begin{aligned} (-1 + i)(-1 + i)(-1 + i) &= (1 - i - i + i^2)(-1 + i) = (1 - 2i - 1)(-1 + i) = \\ &= -2i(-1 + i) = 2i - 2i^2 = 2i - 2(-1) = 2 + 2i \end{aligned}$$

REF: 010219b

4 ANS: 1

$$\mathbb{E} = \mathbb{Z} = (3 + 2i)(2 - i) = 6 - 3i + 4i - 2i^2 = 6 + i - 2(-1) = 8 + i$$

REF: 060304b

5 ANS: 2

$$(2\sqrt{2} + 5i)(5\sqrt{2} - 2i) = 10\sqrt{4} - 4i\sqrt{2} + 25i\sqrt{2} - 10i^2 = 30 + 21i\sqrt{2}$$

REF: 011717a2

6 ANS: 3

$$(3i)(2i)^2(m + i)$$

$$(3i)(4i^2)(m + i)$$

$$(3i)(-4)(m + i)$$

$$(-12i)(m + i)$$

$$-12mi - 12i^2$$

$$-12mi + 12$$

REF: 061319a2

7 ANS: 4

$$(x + i)^2 - (x - i)^2 = x^2 + 2xi + i^2 - (x^2 - 2xi + i^2) = 4xi$$

REF: 011327a2

8 ANS:

$$3. (2 + i)^2 = (2 + i)(2 + i) = 4 + 4i + i^2 = 4 + 4i - 1 = 3 + 4i.$$

REF: 080621b

9 ANS:

$$2xi(i - 4i^2) = 2xi^2 - 8xi^3 = 2xi^2 - 8xi^3 = -2x + 8xi$$

REF: 011533a2

10 ANS:

$$i^{13} + i^{18} + i^{31} + n = 0$$

$$i + (-1) - i + n = 0$$

$$-1 + n = 0$$

$$n = 1$$

REF: 061228a2

11 ANS:

$$-7 + i. E = IZ = (3+i)(-2+i) = -6 + 3i - 2i + i^2 = -6 + i - 1 = -7 + i$$

REF: 010325b