N.CN.A.3: Division of Complex Numbers

1 The expression $\dfrac{i^{16}}{i^3}$ is equivalent to

1) 1   2) −1   3) i 4) $-i$

2 What is the multiplicative inverse of $3i$?

1) $-3i$ 2) -3 3) $\dfrac{1}{3}$ 4) $-\dfrac{i}{3}$

3 What is the multiplicative inverse of $3-i$?

1) $\dfrac{3-i}{8}$ 2) $\dfrac{3+i}{8}$ 3) $\dfrac{3-i}{10}$ 4) $\dfrac{3+i}{10}$

4 The expression $\dfrac{1}{2-i}$ is equivalent to

1) $2+i$ 2) $-2-i$ 3) $\dfrac{2+i}{5}$ 4) $\dfrac{2+i}{3}$

5 Expressed in $a+bi$ form, $\dfrac{5}{3+i}$ is equivalent to

1) $\dfrac{15}{8}-\dfrac{5}{8}i$ 2) $\dfrac{5}{3}-5i$ 3) $\dfrac{3}{2}-\dfrac{1}{2}i$ 4) $15-5i$

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

1) $3-i$ 2) $3+i$ 3) $\dfrac{15+15i}{4}$ 4) $\dfrac{5}{4}$

7 The expression $\dfrac{1}{5+2i}$ is equivalent to

1) $\dfrac{5+2i}{21}$ 2) $\dfrac{5+2i}{29}$ 3) $\dfrac{5-2i}{21}$ 4) $\dfrac{5-2i}{29}$

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

1) $\dfrac{-6+9i}{13}$ 2) $\dfrac{6+9i}{13}$ 3) $\dfrac{-6-9i}{13}$ 4) $\dfrac{6-9i}{13}$

9 The expression $\dfrac{5}{4+3i}$ is equivalent to

1) $\dfrac{4-3i}{5}$ 2) $\dfrac{4+3i}{5}$ 3) $\dfrac{20+15i}{7}$ 4) $\dfrac{20-15i}{7}$

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

1) $\dfrac{6+5i}{8}$ 2) $\dfrac{6+i}{8}$ 3) $\dfrac{7-5i}{10}$ 4) $\dfrac{7+i}{10}$

11 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 $Z_T = \dfrac{Z_1 Z_2}{Z_1 + Z_2}$. What is the total impedance of a circuit, Z_T, if $Z_1 = 1+2i$
   and $Z_2 = 1-2i$?

   1) 1   2) 0   3) $\dfrac{5}{2}$ 4) $-\dfrac{3}{2}$

12 Express $\dfrac{5}{2-i}$ in simplest $a+bi$ form.

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Answer Section

1 ANS: 3

$$\frac{i^{16}}{i^3} = i^{13} = i$$

REF: 010518b

2 ANS: 4

$$\frac{1}{3i} \cdot \frac{3i}{3i} = \frac{3i}{9i^2} = \frac{3i}{-9} = -\frac{i}{3}$$

REF: 060614b

3 ANS: 4   REF: 068521siii

4 ANS: 3

$$\frac{1}{2-i} \cdot \frac{2+i}{2+i} = \frac{2+i}{4-i^2} = \frac{2+i}{5}$$

REF: 061014b

5 ANS: 3   REF: 069722siii

6 ANS: 1

$$\frac{10}{(3+i)} \cdot \frac{(3-i)}{(3-i)} = \frac{10(3-i)}{9-3i+3i-i^2} = \frac{10(3-i)}{9-(-1)} = \frac{10(3-i)}{10} = 3-i$$

REF: 010811b

7 ANS: 4   REF: 019522siii

8 ANS: 4   REF: 019414siii

9 ANS: 1   REF: 010128siii

10 ANS: 4

$$\frac{(2+i)}{(3+i)} \cdot \frac{(3-i)}{(3-i)} = \frac{6-2i+3i-i^2}{9-3i+3i-i^2} = \frac{6+i-(-1)}{9-(-1)} = \frac{7+i}{10}$$

REF: 060513b

11 ANS: 3

$$Z_r = \frac{Z_1 Z_2}{Z_1 + Z_2} = \frac{(1+2i)(1-2i)}{(1+2i)+(1-2i)} = \frac{1-2i+2i-4i^2}{2} = \frac{1-4i^2}{2} = \frac{1-4(-1)}{2} = \frac{5}{2}$$

REF: 060509b

12 ANS:
$2+i$

REF: 089612siii