

# Operations with Complex Numbers Assignment

Write the following as a complex number.

1.  $-143$

2.  $\sqrt{-81}$

3.  $-3 - \sqrt{-45}$

Simplify.

1.  $i^{-10}$

2.  $i^2 + i^8$

3.  $i^{101}$

Simplify.

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

2.  $(7 - 4i) + (3 - 7i)$

3.  $(0.5 + i) + (-1 + 2i)$

4.  $(1 - i) - (1 + 2i)$

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Operations with Complex Numbers Assignment

5.  $(12 + 13i) - (5 - 7i)$

6.  $(1 - i) - (1 + 2i)$

**Simplify.**

1.  $(3 + i)(1 - 4i)$

2.  $(2 + i)(4 + 3i)$

3.  $(6 + 7i)(6 - 7i)$

4.  $\frac{1}{i}$

5.  $\frac{-2}{3+i}$

6.  $\frac{5+i}{2+i}$

# Operations with Complex Numbers Assignment

## Answers

Write the following as a complex number.

1.  $-143$

$$= -143 + 0i$$

2.  $\sqrt{-81}$

$$= \sqrt{81 \times -1} = \sqrt{81} \times \sqrt{-1}$$

$$= 9i$$

3.  $-3 - \sqrt{-45}$

$$= -3 - \sqrt{45 \times -1}$$

$$= -3 - \sqrt{9 \times 5} \times \sqrt{-1}$$

$$= -3 - 3\sqrt{5}i$$

Simplify.

1.  $i^{-10}$

$$i^{-10} = i^{-12+2} = i^{-12} \cdot i^2$$

$$= (i^4)^{-3} \cdot -1$$

$$= (1)^{-3} \cdot -1$$

$$= -1$$

2.  $i^2 + i^8$

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

$$= -1 + (1)^2 = -1 + 1$$

$$= 0$$

3.  $i^{101}$

$$= i^{100} \cdot i$$

$$= (i^4)^{25} \cdot i = (1)^{25} \cdot i$$

$$= i$$

Simplify.

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

$$(3 + (-1)) + (2 + 4)i$$

$$= 2 + 6i$$

2.  $(7 - 4i) + (3 - 7i)$

$$(7 + 3) + (-4 - 7)i$$

$$= 10 + (-11)i$$

$$= 10 - 11i$$

3.  $(0.5 + i) + (-1 + 2i)$

$$(0.5 + (-1)) + (1 + 2)i$$

$$= (-0.5) + (3)i$$

$$= -0.5 + 3i$$

4.  $(1 - i) - (1 + 2i)$

$$= (1 - 1) + (-1 - 2)i$$

$$= 0 + (-3)i$$

$$= -3i$$

**Operations with Complex Numbers** Assignment

5.  $(12 + 13i) - (5 - 7i)$

$$= (12 - 5) + (13 + 7)i$$

$$= 7 + (20)i$$

$$= 7 + 20i$$

6.  $(1 - i) - (1 + 2i)$

$$= (1 - 1) + (-1 - 2)i$$

$$= 0 + (-3)i$$

$$= -3i$$

**Simplify.**

1.  $(3 + i)(1 - 4i)$

$$(3(1) - 1(-4)) + (3(-4) + 1(1))i$$

$$= (3 + 4) + (-12 + 1)i$$

$$= 7 + (-11)i$$

$$= 7 - 11i$$

2.  $(2 + i)(4 + 3i)$

$$(2(4) - 1(3)) + (2(3) + 1(4))i$$

$$= (8 - 3) + (6 + 4)i$$

$$= 5 + (10)i$$

$$= 5 + 10i$$

3.  $(6 + 7i)(6 - 7i)$

$$(6(6) - 7(-7)) + (6(-7) + 7(6))i$$

$$= (36 + 49) + (-42 + 42)i$$

$$= 85 + (0)i$$

$$= 85$$

4.  $\frac{1}{i}$

$$\frac{1}{i} \times \frac{-i}{-i} = \frac{-i}{-i^2}$$

$$= \frac{-i}{-(-1)}$$

$$= -i$$

5.  $\frac{-2}{3+i}$

$$\frac{-2}{3+i} \times \frac{3-i}{3-i} = \frac{-2(3-i)}{3^2-i^2}$$

$$= \frac{-6+i}{9-(-1)} = \frac{-6+i}{10} = \frac{-6}{10} + \frac{i}{10}$$

$$= \frac{-3}{5} + \frac{i}{10}$$

6.  $\frac{5+i}{2+i}$

$$\frac{5+i}{2+i} \times \frac{2-i}{2-i} = \frac{(5+i)(2-i)}{2^2-i^2} = \frac{(10-(-1))+(5(-1)+1(1))i}{4-(-1)}$$

$$= \frac{11-4i}{5} = \frac{11}{5} - \frac{4i}{5}$$

$$= \frac{11}{5} - \frac{4i}{5}$$