

CONCEPT AND VOCABULARY CHECK

Fill in each blank so that the resulting statement is true.

- The imaginary unit i is defined as $i = \underline{\hspace{2cm}}$, where $i^2 = \underline{\hspace{2cm}}$.
- The set of all numbers in the form $a + bi$ is called the set of numbers. If $b \neq 0$, then the number is also called a/an number. If $b = 0$, then the number is also called a/an number.
- $-9i + 3i = \underline{\hspace{2cm}}$
- $10i - (-4i) = \underline{\hspace{2cm}}$
- Consider the following multiplication problem:

$$(3 + 2i)(6 - 5i).$$

Using the FOIL method, the product of the first terms is , the product of the outside terms is , and the product of the inside terms is . The product of the last terms in terms of i^2 is , which simplifies to .

- The conjugate of $2 - 9i$ is .

- The division
$$\frac{7 + 4i}{2 - 5i}$$

is performed by multiplying the numerator and denominator by .

- $\sqrt{-20} = \underline{\hspace{1cm}}\sqrt{20} = \underline{\hspace{1cm}}\sqrt{4 \cdot 5} = \underline{\hspace{2cm}}$

EXERCISE SET 1.4

Practice Exercises

In Exercises 1–8, add or subtract as indicated and write the result in standard form.

- $(7 + 2i) + (1 - 4i)$
- $(-2 + 6i) + (4 - i)$
- $(3 + 2i) - (5 - 7i)$
- $(-7 + 5i) - (-9 - 11i)$
- $6 - (-5 + 4i) - (-13 - i)$
- $7 - (-9 + 2i) - (-17 - i)$
- $8i - (14 - 9i)$
- $15i - (12 - 11i)$

In Exercises 9–20, find each product and write the result in standard form.

- $-3i(7i - 5)$
- $-8i(2i - 7)$
- $(-5 + 4i)(3 + i)$
- $(-4 - 8i)(3 + i)$
- $(7 - 5i)(-2 - 3i)$
- $(8 - 4i)(-3 + 9i)$
- $(3 + 5i)(3 - 5i)$
- $(2 + 7i)(2 - 7i)$
- $(-5 + i)(-5 - i)$
- $(-7 - i)(-7 + i)$
- $(2 + 3i)^2$
- $(5 - 2i)^2$

In Exercises 21–28, divide and express the result in standard form.

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

- $\frac{8i}{4 - 3i}$
- $\frac{2 + 3i}{2 + i}$

- $\frac{-6i}{3 + 2i}$
- $\frac{3 - 4i}{4 + 3i}$

In Exercises 29–44, perform the indicated operations and write the result in standard form.

- $\sqrt{-64} - \sqrt{-25}$
- $\sqrt{-81} - \sqrt{-144}$
- $5\sqrt{-16} + 3\sqrt{-81}$
- $5\sqrt{-8} + 3\sqrt{-18}$
- $(-2 + \sqrt{-4})^2$
- $(-5 - \sqrt{-9})^2$
- $(-3 - \sqrt{-7})^2$
- $(-2 + \sqrt{-11})^2$
- $\frac{-8 + \sqrt{-32}}{24}$
- $\frac{-12 + \sqrt{-28}}{32}$
- $\frac{-6 - \sqrt{-12}}{48}$
- $\frac{-15 - \sqrt{-18}}{33}$
- $\sqrt{-8}(\sqrt{-3} - \sqrt{5})$
- $\sqrt{-12}(\sqrt{-4} - \sqrt{2})$
- $(3\sqrt{-5})(-4\sqrt{-12})$
- $(3\sqrt{-7})(2\sqrt{-8})$