Vocabulary: Fill in the blanks.

1. In the complex plane, the horizontal axis is called the _____ axis and the vertical axis is called the _____ axis.

2. The _____ _____ of a complex number $a + bi$ is the distance between the origin $(0, 0)$ and the point (a, b).

3. The _____ _____ of a complex number $z = a + bi$ is given by $z = r(\cos \theta + i \sin \theta)$, where r is the _____ of z and θ is the _____ of z.

4. Let $z_1 = r_1(\cos \theta_1 + i \sin \theta_1)$ and $z_2 = r_2(\cos \theta_2 + i \sin \theta_2)$ be complex numbers, then the product $z_1 z_2 = $ _____ and the quotient $z_1/z_2 = $ _____ $(z_2 \neq 0)$.

Finding the Absolute Value of a Complex Number   In Exercises 5–10, plot the complex number and find its absolute value.

5. $-6 + 8i$

6. $5 - 12i$

Trigonometric Form of a Complex Number   In Exercises 15–34, represent the complex number graphically. Then write the trigonometric form of the number.

17. $1 - \sqrt{3}i$ 28. $2\sqrt{2} - i$ 29. $-3 - i$

Trigonometric Form of a Complex Number   In Exercises 11–14, write the complex number in trigonometric form.

13.

$z = -3 - 3i$

Writing a Complex Number in Standard Form   In Exercises 35–44, write the standard form of the complex number. Then represent the complex number graphically.

37. $\sqrt{48}[\cos(-30°) + i \sin(-30°)]$

38. $\sqrt{8}(\cos 225° + i \sin 225°)$

43. $5[\cos(198° \, 45') + i \sin(198° \, 45')]$

Writing a Complex Number in Standard Form   In Exercises 45–48, use a graphing utility to write the complex number in standard form.

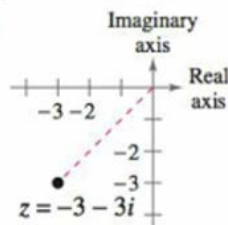45. $5\left(\cos \dfrac{\pi}{9} + i \sin \dfrac{\pi}{9}\right)$

Multiplying or Dividing Complex Numbers   In Exercises 61–68, (a) write the trigonometric forms of the complex numbers, (b) perform the indicated operation using the trigonometric forms, and (c) perform the indicated operation using the standard forms, and check your result with that of part (b).

61. $(2 + 2i)(1 - i)$ 65. $\dfrac{3 + 4i}{1 - \sqrt{3}i}$

Graphing Complex Numbers   In Exercises 69–72, sketch the graph of all complex numbers z satisfying the given condition.

69. $|z| = 2$

72. $\theta = \dfrac{5\pi}{4}$