4-8 Complex Numbers

Standard

A2.A.REI.B.3 Solve quadratic equations and inequalities in one variable.
Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, knowing and applying the quadratic formula, and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.

Key Concepts

_____ - the imaginary unit defined as the number whose square is -1. $i = \sqrt{-1}$

_____ = -1

_____ - a number defined as $a + bi$, where a is real and bi is imaginary.

_____ -number pairs of the form $a + bi$ and $a - bi$

Examples

1. (I do) Simplify
   a. $\sqrt{-16}$　　　　　b. $\sqrt{-11}$　　　　　c. $\sqrt{-20}$　　　　　d. $\sqrt{-125}$

2. (We do) Graph each complex number and find its absolute value.
   a. $-5 + 3i$

   b. $2i$

3. (You do) Simplify using addition or subtraction.
   a. $(4 - 3i) + (-4 + 3i)$　　　　b. $(5 - 3i) - (-2 + 4i)$　　　　c. $(7 - 2i) + (3 + i)$
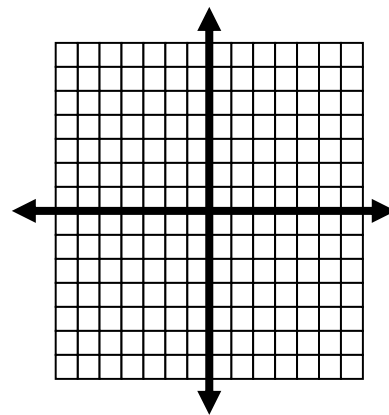
4. (They do) Simplify using multiplication.
   a. $(6i)(1 - 5i)$　　　　b. $(7i)(3i)$　　　　c. $(4 + 3i)(-1 - 2i)$

d. $(2 - 4i)^2$ e. $(-4 + 5i)(-4 - 5i)$

5. (I do) Divide.

     a. $\dfrac{9+12i}{3i}$ b. $\dfrac{2+3i}{1-4i}$

6. (We do) Solve.

     a. $9x^2 + 54 = 0$ b. $x^2 + 5 = 4x$ c. $3x^2 - x + 2 = 0$

You do Practice 4-8: Complete your assignment on a separate sheet of paper. Show work.

1. Simplify

     a. $\sqrt{-75}$ **b.** $\sqrt{-216}$ **c.** $(4 - 2i) - (3 + i)$

     d. $(2 + i)(4 - 5i)$ **e.** $\dfrac{4-i}{6i}$ **f.** $(9 + 4i)^2$

2. Find the absolute value of $4 - 3i$.

3. Solve

     a. $x^2 + 16 = 0$ **b.** $2x^2 - 4x = -7$

4. Error Analysis. Describe and correct the error made in simplifying $(4 + 7i)(4 - 7i)$.

$$(4 + 7i)(4 - 7i) = 16 + 28i - 28i + 49i^2$$
$$= 16 - 49$$
$$= -33$$