Assignment

LESSON 6: *i* Want to Believe

Write

Match each definition to the corresponding term.

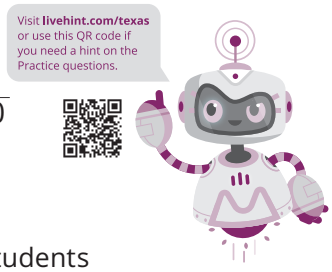
1. the set of all numbers written in the form $a + bi$, where a and b are real numbers
2. the set of all numbers written in the form $a + bi$, where a and b are real numbers and b is not equal to 0
3. the term bi in a complex number written as $a + bi$
4. a number equal to $\sqrt{-1}$
5. solutions to functions and equations that have a negative value for the discriminant
6. a number of the form bi where b is a real number and is not equal to 0
7. the term a in a complex number written as $a + bi$

a. imaginary roots (imaginary zeros)
b. the number i
c. imaginary numbers
d. pure imaginary number
e. complex numbers
f. real part of a complex number
g. imaginary part of a complex number

Remember

The set of complex numbers is the set of all numbers written in the form $a + bi$, where a and b are real numbers. Imaginary numbers are complex numbers where b is not equal to 0 and real numbers are complex numbers where b is equal to 0.

Practice



1. Rewrite each radical using i.
   a. $\sqrt{-16}$ b. $\sqrt{-27}$ c. $\sqrt{-200}$ d. $5 + \sqrt{-20}$
2. Classify each number according to its most specific number set.
   a. $\frac{-4}{\sqrt{9}}$ b. $\frac{\sqrt{-4}}{9}$ c. $9 - \sqrt{-4}$ d. $-4 - \sqrt{9}$
3. Mr. Hilbert writes the expression $(3 + i)(7 - i)$ on the board and asks his students to rewrite it using the Distributive Property. The work of two students is shown below. Which student simplified the expression correctly? What mistake did the other student make?

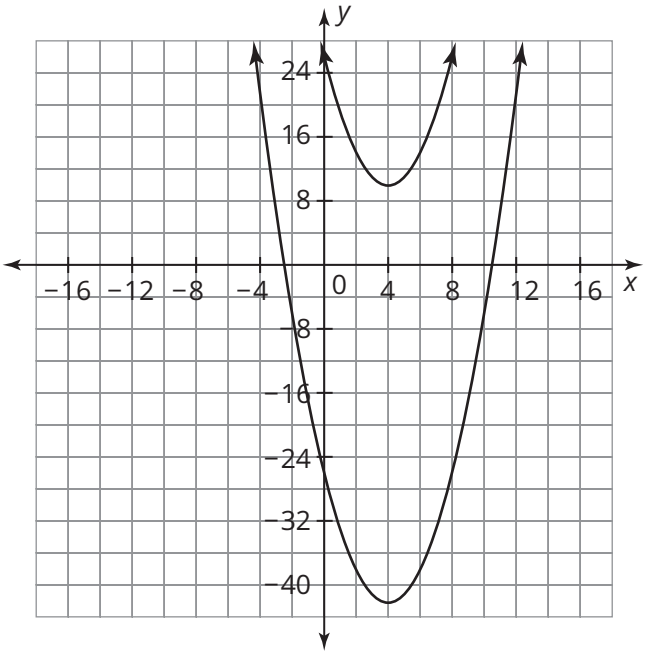
Student 1

$$(3 + i)(7 - i) = 21 - 3i + 7i - i^2$$
$$= 21 + 4i + 1$$
$$= 22 + 4i$$

Student 2

$$(3 + i)(7 - i) = 21 - 3i + 7i - i^2$$
$$= 21 + 4i - 1$$
$$= 20 + 4i$$

4. Francois claims that $\sqrt{-16} \cdot \sqrt{-4}$ is equal to 8. Jeanette claims that $\sqrt{-16} \cdot \sqrt{-4}$ is equal to -8. Who is correct? What mistake did the other student make? Support your answer with work.
5. Erika identifies $\frac{6i}{4}$ as an imaginary number and a rational number. Is Erika correct? Explain how you determined your answer.
6. Consider the functions $g(x) = x^2 - 8x - 26$ and $h(x) = x^2 - 8x + 26$ and their graphs.
   a. Describe each function. Be sure to include the number of zeros, the x-intercept(s), the y-intercept, the axis of symmetry, and the vertex.
   b. Compare the functions and their graphs. Identify any similarities and differences.
   c. Determine the zeros of both functions. Show your work.
   d. How do your answers in parts (a) and (c) compare?



Stretch

How could you use your knowledge of quadratic functions to solve for a quadratic inequality by graphing?

Review

1. Factor each trinomial.
   a. $x^2 - 2x - 15$ b. $x^2 + 2x - 15$
2. Write each function in factored form and determine its zeros.
   a. $f(x) = 4x^2 + 8x - 12$ b. $g(x) = 15x^2 - 35x + 20$
3. Consider the function $f(x) = 3x^2 - 4$.
   a. How many zeros does the function have?
   b. What are the zeros of the function?