LESSON MAKER PRO

Complex Number Moves

Conjugate complex numbers and simplify quotients.

HIGH SCHOOL · PC.T.4.2

PC.T.4.2 "Find the conjugate of a complex number in rectangular forms and quotients of complex numbers."

NAME _____ DATE _____

THE BIG IDEA

The conjugate of a+bi is a-bi: keep the real part and change the sign of the imaginary part. To divide complex numbers, multiply the numerator and denominator by the conjugate of the denominator. Then use $i^2 = -1$ and write the result in a+bi form.

WORKED EXAMPLE

Write (7+3i)/(4-i) in rectangular form.

1. The conjugate of 4-i is 4+i.
2. Multiply: (7+3i)/(4-i) = (7+3i)(4+i)/((4-i)(4+i)).
3. Simplify: $(28+19i+3i^2)/(16-i^2)$ = (25+19i)/17.

Answer: 25/17+19/17i

PRACTICE 6 problems

1 Find the conjugate of -6+9i.

ANSWER _____

2 Find the conjugate of -8i.

ANSWER _____

3 Write (6+8i)/(2+i) in rectangular form.

ANSWER _____

4 Write (9+8i)/(2+5i) in rectangular form.

ANSWER _____

5 Write (8+6i)/(2i) in rectangular form.

ANSWER _____

6 Write (-10+6i)/(3-2i) in rectangular form.

ANSWER _____

APPLY IT Show your work

1 A music app models a sound effect's output as 10+10i and its input as 2+4i. Find the output divided by the input in rectangular form.

WORK SPACE

ANSWER _____

2 In a game, a camera effect divides a marker's complex position -2+6i by 1+i. What is the marker's new position in rectangular form?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let z = -4+8i and w = 2-2i. Find the conjugate of z/w in two ways: divide first and then conjugate, and divide the conjugate of z by the conjugate of w. Show that both methods give the same result.

WORK SPACE AND ANSWER

ANSWER KEY

Complex Number Moves

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the conjugate of -6+9i.	**-6-9i**
2	Find the conjugate of -8i.	**8i**
3	Write (6+8i)/(2+i) in rectangular form.	**4+2i**
4	Write (9+8i)/(2+5i) in rectangular form.	**2-i**
5	Write (8+6i)/(2i) in rectangular form.	**3-4i**
6	Write (-10+6i)/(3-2i) in rectangular form.	**-42/13-2/13i**

PART 2 · APPLY IT

1. **3-i** Multiply (10+10i)/(2+4i) by (2-4i)/(2-4i). The result is (60-20i)/20 = 3-i.
2. **2+4i** Multiply (-2+6i)/(1+i) by (1-i)/(1-i). The result is (4+8i)/2 = 2+4i.

CHALLENGE

Dividing first gives z/w = -3+i, so its conjugate is -3-i. Also, the conjugate of z divided by the conjugate of w is (-4-8i)/(2+2i) = -3-i. Both methods give -3-i.

Accept equivalent simplified rectangular forms, including a+0i when the imaginary part is zero. In the challenge, look for both computations and their matching results.