LESSON MAKER PRO

Complex Number Moves

Add, subtract, multiply, and divide complex numbers.

HIGH SCHOOL · HSN-CN.A

CCSS.Math.Content.HSN-CN.A "Perform arithmetic operations with complex numbers."

NAME _____ DATE _____

OPERATE WITH I

Add or subtract by combining real parts and i parts. Multiply by distributing, then use i^2 = -1. To divide, multiply the numerator and denominator by the conjugate of the denominator.

WORKED EXAMPLE

Simplify (9 + 10i)(11 - 12i).

1. (9 + 10i)(11 - 12i) = 99 - 108i + 110i - 120i^2
2. = 99 + 2i + 120
3. = 219 + 2i

Answer: 219 + 2i

PRACTICE 6 problems

1 Simplify: (3 + 2i) + (5 - 4i)

ANSWER _____

2 Simplify: (6 - i) - (2 + 3i)

ANSWER _____

3 Simplify: (1 + 4i)(2 - i)

ANSWER _____

4 Simplify: (5 - 3i)(2 + i)

ANSWER _____

5 Simplify: (4 + 2i)/(1 - i)

ANSWER _____

6 Simplify: (-3 + 4i)/(2 + i)

ANSWER _____

APPLY IT Show your work

1 A music production app represents two audio signal settings as 3 - 2i and -1 + 5i. The app combines the settings by adding them. What complex number represents the combined setting?

WORK SPACE

ANSWER _____

2 A game designer uses complex numbers to model a scale-and-turn effect. The first effect is 1 + 2i, and the second effect is 3 - i. What is the combined effect when the designer multiplies the factors?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Simplify: (3 + 4i)/(1 - 2i) + (1 - i)

_____

_____

ANSWER KEY

Complex Number Moves

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify: (3 + 2i) + (5 - 4i)	**8 - 2i**
2	Simplify: (6 - i) - (2 + 3i)	**4 - 4i**
3	Simplify: (1 + 4i)(2 - i)	**6 + 7i**
4	Simplify: (5 - 3i)(2 + i)	**13 - i**
5	Simplify: (4 + 2i)/(1 - i)	**1 + 3i**
6	Simplify: (-3 + 4i)/(2 + i)	**-2/5 + 11/5i**

PART 2 · APPLY IT

1. **2 + 3i** Add the real parts, 3 + (-1), and add the i parts, -2i + 5i. The combined setting is 2 + 3i.
2. **5 + 5i** Distribute to multiply: (1 + 2i)(3 - i) = 3 - i + 6i - 2i^2. Replace i^2 with -1 and combine terms.

CHALLENGE

i

Accept equivalent complex-number forms, including 0 + i for the challenge. For division, students should rationalize the denominator and give the final answer in a + bi form.