LESSON MAKER PRO

Complex Number Moves

Add, subtract, multiply, and divide with i.

HIGH SCHOOL · MA.912.NSO.2.1

MA.912.NSO.2.1 "Extend previous understanding of the real number system to include the complex number system. Add, subtract, multiply and divide complex numbers."

NAME _____ DATE _____

OPERATE WITH COMPLEX NUMBERS

Add or subtract by combining real terms with real terms and i terms with i terms. For multiplication, distribute and replace i^2 with -1. For division, multiply the numerator and denominator by the conjugate of the denominator.

WORKED EXAMPLE

Simplify (13 + 12i) / (8 - 7i).

1. Multiply by (8 + 7i) / (8 + 7i).
2. ((13 + 12i)(8 + 7i)) / ((8 - 7i)(8 + 7i))
3. (20 + 187i) / 113
4. 20/113 + 187/113i

Answer: 20/113 + 187/113i

PRACTICE 6 problems

1 (4 - 9i) + (6 + 5i)

ANSWER _____

2 (16 + 5i) - (2 - 9i)

ANSWER _____

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

ANSWER _____

4 (-6 + 4i)(3 + i)

ANSWER _____

5 (9 + 6i) / (1 - 4i)

ANSWER _____

6 (9 - 2i) / (4 + i)

ANSWER _____

APPLY IT Show your work

1 A music app represents the sound components of two audio tracks as 6 + 5i and -4 + 6i. What complex number represents the combined sound components?

WORK SPACE

ANSWER _____

2 A game designer applies a filter with complex multiplier 2 - i to an image value z. The filtered value is 11 + 3i. What was the original value z?

WORK SPACE

ANSWER _____

CHALLENGE One step up

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

WORK SPACE AND ANSWER

ANSWER KEY

Complex Number Moves

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	(4 - 9i) + (6 + 5i)	**10 - 4i**
2	(16 + 5i) - (2 - 9i)	**14 + 14i**
3	(4 + 2i)(5 - 3i)	**26 - 2i**
4	(-6 + 4i)(3 + i)	**-22 + 6i**
5	(9 + 6i) / (1 - 4i)	**-15/17 + 42/17i**
6	(9 - 2i) / (4 + i)	**2-i**

PART 2 · APPLY IT

1. **2 + 11i** Add the real components, then add the imaginary components. The total is (6 - 4) + (5 + 6)i.
2. **19/5 + 17/5i** Divide 11 + 3i by 2 - i. Multiply the numerator and denominator by 2 + i, then simplify.

CHALLENGE

11/10 + 3/10i

Accept equivalent forms, including (20 + 187i)/113 for the worked example and (-15 + 42i)/17 for problem 5. Answers should be simplified so the denominator is real.