LESSON MAKER PRO

Imaginary Number Lab

Build fluency with complex number operations.

HIGH SCHOOL · MA.912.NSO.2

MA.912.NSO.2 "Represent and perform operations with expressions within the complex number system."

NAME _____ DATE _____

OPERATE WITH I

Add and subtract complex numbers by combining real parts and imaginary parts. When multiplying, distribute every term and use $i^2 = -1$. To divide by a complex denominator, multiply the numerator and denominator by the denominator's conjugate.

WORKED EXAMPLE

Simplify $(4 + 9i)(4 - 9i)$.

1. $(4 + 9i)(4 - 9i) = 16 - 36i + 36i - 81i^2$
2. $= 16 - 81(-1)$
3. $= 16 + 81$

Answer: 97

PRACTICE 6 problems

1 Simplify $(8 + 5i) + (7 + 12i)$.

ANSWER _____

2 Simplify $(13 - 6i) - (5 + 8i)$.

ANSWER _____

3 Simplify $(5 + 7i)(8 - 6i)$.

ANSWER _____

4 Simplify $(18 + 30i) / 6$.

ANSWER _____

5 Simplify i^{15}.

ANSWER _____

6 Simplify $(7 - 5i)(7 + 5i)$.

ANSWER _____

APPLY IT Show your work

1 A game design club represents a character's two movement commands with complex numbers. The first command is 15 + 8i units, and the second command is -7 + 11i units. What is the combined movement command?

WORK SPACE

ANSWER _____

2 A music app represents a sound effect with the complex number 5 - 7i. An audio edit multiplies the sound effect by 6i. What complex number represents the edited sound effect?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Simplify (11 + 7i) / (5 - i). Write your answer in a + bi form.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify (8 + 5i) + (7 + 12i).	**15 + 17i**
2	Simplify (13 - 6i) - (5 + 8i).	**8 - 14i**
3	Simplify (5 + 7i)(8 - 6i).	**82 + 26i**
4	Simplify (18 + 30i) / 6.	**3 + 5i**
5	Simplify i^{15}.	**-i**
6	Simplify (7 - 5i)(7 + 5i).	**74**

PART 2 · APPLY IT

1. **8 + 19i** Add the real parts and add the imaginary parts: 15 + (-7) = 8 and 8i + 11i = 19i.
2. **42 + 30i** Distribute 6i: 6i(5 - 7i) = 30i - 42i^2. Replace i^2 with -1 to get 42 + 30i.

CHALLENGE

24/13 + 23/13i

Accept equivalent forms such as 15 + 17i or 17i + 15. For the challenge, accept (48 + 46i) / 26 as equivalent to 24/13 + 23/13i.