

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

CHALLENGE

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

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 $24/13 + 23/13i$.