

Complex Moves

Operate with complex numbers and interpret their coordinates.

HIGH SCHOOL • MA.912.NSO.2.4

MA.912.NSO.2.4 "Solve mathematical and real-world problems involving complex numbers represented algebraically or on the coordinate plane."

NAME _____

DATE _____

COMPLEX NUMBER TOOLS

A complex number $a + bi$ matches the point (a, b) , where a is the horizontal coordinate and b is the vertical coordinate. To multiply, use the distributive property, replace i^2 with -1 , and combine like terms. To divide, multiply the numerator and denominator by the conjugate of the denominator, which changes the sign between its terms.

WORKED EXAMPLE

Simplify $(2 + 5i)(3 - 4i)$.

1. Expand: $6 - 8i + 15i - 20i^2$.
2. Replace i^2 with -1 : $6 - 8i + 15i + 20$.
3. Combine like terms: $26 + 7i$.

Answer: $26 + 7i$

PRACTICE 6 problems

1 Simplify $(6 + i) + (1 - 8i)$.

ANSWER _____

2 Simplify $(9 - 6i) - (1 + 7i)$.

ANSWER _____

3 Simplify $(6 + i)(1 - 7i)$.

ANSWER _____

4 Simplify $(9 + i)(1 + 8i)$.

ANSWER _____

5 Simplify $(1 + 15i)/(1 + i)$.

ANSWER _____

6 The point $(-9, 7)$ is plotted on the complex plane. Write the complex number represented by the point.

ANSWER _____

APPLY IT Show your work

1

An augmented-reality app uses complex coordinates for a digital sticker. The sticker is at $8 + i$. A spin-and-scale effect multiplies its coordinate by $1 + 7i$. What complex coordinate does the app show after the effect?

WORK SPACE

ANSWER _____

2

A digital art app stores an icon's location as $-9 + 8i$. The icon shifts by $1 - 7i$. What is the icon's new complex coordinate?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A complex number z is multiplied by $1 - 8i$ to produce $9 + 7i$. Find z in $a + bi$ form.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify $(6 + i) + (1 - 8i)$.	7 - 7i
2	Simplify $(9 - 6i) - (1 + 7i)$.	8 - 13i
3	Simplify $(6 + i)(1 - 7i)$.	13 - 41i
4	Simplify $(9 + i)(1 + 8i)$.	1 + 73i
5	Simplify $(1 + 15i)/(1 + i)$.	8 + 7i
6	The point $(-9, 7)$ is plotted on the complex plane. Write the complex number represented by the point.	-9 + 7i

PART 2 · APPLY IT

1. **1 + 57i** Multiply $(8 + i)(1 + 7i)$, replace i^2 with -1 , and combine like terms.
2. **-8 + i** Add the real parts and add the imaginary parts: $(-9 + 1) + (8 - 7)i$.

CHALLENGE

$$z = -47/65 + 79/65i$$

Accept equivalent $a + bi$ forms with the real part written first, including i instead of $1i$. For the coordinate-plane item, accept $(-9, 7)$ only if the student clearly identifies it as representing $-9 + 7i$.