LESSON MAKER PRO

Complex Plane Moves

Operate with points, then map the results.

HIGH SCHOOL · MA.912.NSO.2.2

MA.912.NSO.2.2 "Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane."

NAME _____ DATE _____

OPERATIONS AS POINTS

A complex number a+bi is the point (a, b) on the complex plane. For addition and subtraction, combine real parts and imaginary parts. For multiplication, (a+bi)(c+di) is the point (ac-bd, ad+bc), and conjugation reflects a point across the real axis.

WORKED EXAMPLE

Find the sum of z=10+13i and w=-19+16i. Write the result as a complex number and a point.

1. z is (10, 13) and w is (-19, 16).
2. Add the real coordinates: 10+(-19)=-9.
3. Add the imaginary coordinates: 13+16=29.

Answer: -9+29i, point (-9, 29)

PRACTICE 5 problems

1 What point represents (7-2i)+(-3+5i)?

ANSWER _____

2 What point represents (6+4i)-(2-7i)?

ANSWER _____

3 What point represents (3+2i)(4-i)?

ANSWER _____

4 What point represents the conjugate of -5+7i?

ANSWER _____

5 Let z=-4+6i and w=3+2i. What point represents z-w?

ANSWER _____

APPLY IT Show your work

1 In a music-mixing app, a student combines a bass adjustment z=-3+4i with a treble adjustment w=5-2i. The app adds the adjustments. What point represents the combined adjustment?

WORK SPACE

ANSWER _____

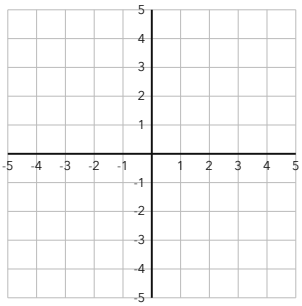
2 A game artist places a sprite at z=6-3i. A mirror effect uses the conjugate of z. What point represents the mirrored sprite?

WORK SPACE

ANSWER _____

CHALLENGE One step up

On the grid, plot z=1+2i, w=2-i, and p=zw. Then explain how multiplying by w changes z to p.



WORK SPACE AND ANSWER

ANSWER KEY

Complex Plane Moves

HIGH SCHOOL · MA.912.NSO.2.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	What point represents (7-2i)+(-3+5i)?	**(4, 3)**
2	What point represents (6+4i)-(2-7i)?	**(4, 11)**
3	What point represents (3+2i)(4-i)?	**(14, 5)**
4	What point represents the conjugate of -5+7i?	**(-5, -7)**
5	Let z=-4+6i and w=3+2i. What point represents z-w?	**(-7, 4)**

PART 2 · APPLY IT

1. **(2, 2)** Add real parts and imaginary parts: (-3+5)+(4-2)i=2+2i. The point is (2, 2).
2. **(6, 3)** Conjugation keeps the real part and changes the sign of the imaginary part. The conjugate is 6+3i, so the point is (6, 3).

CHALLENGE

z is (1, 2), w is (2, -1), and p is (4, 3). Multiplication by w rotates z by the angle of w and scales its distance from the origin by sqrt(5).

Accept a complex number or coordinate pair when it identifies the same point. For the challenge, accept any accurate explanation that multiplication rotates and scales rather than adding coordinates.