

Complex Numbers

What complex number operations are adding a complex number. What are real and imaginary the sum of two complex numbers and multiplying them together.

Complex Form

The complex number is the form $a + bi$ where a is the real part and b is the imaginary part. i is the imaginary unit, typically $i^2 = -1$. You can add or subtract complex numbers by adding or subtracting their real parts and their imaginary parts. You can multiply complex numbers by using the distributive property and remembering that $i^2 = -1$.

Complex Plane

The complex plane is a 2D coordinate system where the horizontal axis is the real axis and the vertical axis is the imaginary axis. The origin is $0 + 0i$. The real axis is labeled x and the imaginary axis is labeled y . The complex number $a + bi$ is plotted at the point (a, b) . The distance from the origin to the point (a, b) is the magnitude of the complex number, and the angle it makes with the positive real axis is the argument.

Complex Conjugate

The complex conjugate of a complex number $a + bi$ is $a - bi$. The product of a complex number and its conjugate is a real number. The sum of a complex number and its conjugate is a real number. The magnitude of a complex number is the square root of the product of the number and its conjugate.

Complex Number Operations

What are the rules for adding, subtracting, multiplying, and dividing complex numbers. How do you find the magnitude and argument of a complex number.

	<u>Addition</u>	<u>Subtraction</u>	<u>Multiplication</u>	<u>Division</u>
1.	$(a + bi) + (c + di) = (a + c) + (b + d)i$	$(a + bi) - (c + di) = (a - c) + (b - d)i$	$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$
2.	$(a + bi) - (c + di) = (a - c) + (b - d)i$	$(a + bi) - (c + di) = (a - c) + (b - d)i$	$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$
3.	$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$	$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$	$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$
4.	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$	$\frac{a + bi}{c + di} = \frac{(a + bi)(c - di)}{(c + di)(c - di)}$

Complex Plane

- The real axis is the horizontal axis.
- The imaginary axis is the vertical axis.
- The origin is $0 + 0i$.
- The complex number $a + bi$ is plotted at the point (a, b) .
- The magnitude of a complex number is the distance from the origin to the point (a, b) .
- The argument of a complex number is the angle it makes with the positive real axis.
- The complex conjugate of $a + bi$ is $a - bi$.
- The product of a complex number and its conjugate is a real number.
- The sum of a complex number and its conjugate is a real number.

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