

The Basics

Definition: $i = \sqrt{-1}$

Powers of i

The pattern: $i^0 = 1$ $i^1 = i$ $i^2 = -1$ $i^3 = -i$
 $i^4 = 1$ $i^5 = i$ $i^6 = -1$ $i^7 = -i$

To determine the value of an arbitrary power of i , such as i^{247} :

- 1 Divide the exponent by 4 and examine the remainder
 e.g., for i^{247} : $247 \div 4 = 61$, remainder 3
- 2 Use the remainder in the above pattern to get the final value
 e.g., for i^{247} : our remainder was 3; $i^3 = -i$, so $i^{247} = -i$

Arithmetic

Addition & Subtraction

Add the real and imaginary parts separately

e.g., $(6 + 2i) + (4 - 5i) = 10 - 3i$
 $(6 + 2i) - (4 - 5i) = 2 + 7i$

Multiplication

FOIL the two complex values

e.g., $(6 + 2i)(4 - 5i) = 24 - 30i + 8i - 10i^2$
 $= 34 - 22i$

Division

Multiply the top and bottom of the fraction by the conjugate of the denominator:

e.g., $\frac{6 + 2i}{4 - 5i} = \frac{6 + 2i}{4 - 5i} \times \frac{4 + 5i}{4 + 5i} = \frac{14 + 38i}{16 - 25i^2} = \frac{14 + 38i}{41}$