Operations with Complex Numbers

R=1 $i^1 = \sqrt{-1}$

R=2 $i^2 = -1$

R=3 $i^3 = -i$

R=0 $i^4 = 1$

$i^{53} \rightarrow 53 \div 4$

$13\frac{1}{4}$ ← This tells me that it will be i^1

$i^{53} = i$

$i^{19} \rightarrow 19 \div 4 = 4\frac{3}{4}$

$i^{19} = -i$

$i^{19} = i^3 = -i$

$i^{53} = \sqrt{-1} = i$

$i^{14} =$

$= i^2$

$= -1$

$14 \div 4 =$

$3\frac{2}{4}$

$\sqrt{-1}$

A complex number, written as $a+bi$, is a real number a with an imaginary number bi.

$3+2i$ $5+6i$

real

imaginary

$\frac{1}{2}-\frac{1}{7}i$

Add Complex Numbers -
Combine like terms!

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

$$=3+i$$

Subtract Complex numbers -

- Distribute the - to the 2nd set of ( )
- Combine like terms

$$(10-2i)-(14-6i)$$

$$10-2i-14+6i$$

$$\boxed{-4+4i}$$

Multiply Complex Numbers

- FOIL
- Remember $i^2 = -1$

$(2-3i)(7-4i)$

$14 - 8i - 21i + 12i^2$

$14 - 8i - 21i + 12(-1)$

$14 - 8i - 21i - 12$

$\boxed{2 - 29i}$

$$i^{53} = \left(i^4\right)^{13} \cdot i^1$$

$$1^{13} \cdot i$$

$$= i$$

$$(-2-i)^2$$

$$=(-2-i)(-2-i)$$

$$i^3 + i^{20}$$

$$-i + 1$$

$$\downarrow$$

$$\boxed{1 - i}$$