

What are they?

A complex number is expressed as

$a + bi$, where i is an

"imaginary number".

Ex: $2 + 3i$
↑ ↑
real imaginary

But what is i ?
 $i = \sqrt{-1} \Rightarrow$

$$i^2 = (\sqrt{-1})^2 \\ i^2 = -1$$

4 - 2i
↑ ↑
real imaginary

Complex Numbers

Important:

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

$$(i)^2 = (\sqrt{-1})^2$$

$$i^2 = -1$$

* Multiply complex numbers the

same way that you multiply binomials... FOIL most!

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

$$= -6 + 10i - 9i + 15i^2$$

Multiplication

More examples on back!

$$\rightarrow = -6 + i + 15i^2$$

$$= -6 + i - 15$$

$$= -21 + i$$

Addition

① drop the parentheses

② Identify/combine real parts

③ Identify/combine imaginary

* Similar to combining like terms

ex: $(6 + 2i) + (8 + 3i)$

$$6 + 2i + 8 + 3i$$

$$14 + 5i$$

Real: 14

Imaginary: 5

① Distribute the negative

② Same as adding complex numbers!

ex: $(4 - 2i) - (3 - 4i)$

$$4 - 2i - 3 + 4i$$

$$1 + 2i$$

Real: 1

Imaginary: 2

Subtraction

More Multiplying Complex Numbers Examples!

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

$(i)^2 = (\sqrt{-1})^2$

$i^2 = -1$

$$\begin{aligned} \textcircled{1} (5-i)(4i) &= 20i^2 \\ &= 20(-1) \\ &= -20 \end{aligned}$$

$$\begin{aligned} \textcircled{2} (10i)(-4i) &= -40i^2 \\ &= -40(-1) \\ &= 40 \end{aligned}$$

$$\begin{aligned} \textcircled{3} 2(-4i)(-4i) &= (-8i)(-4i) \\ &= 32i^2 \\ &= 32(-1) \\ &= -32 \end{aligned}$$

$$\begin{aligned} \textcircled{4} (6-5i)(4-3i) &= 24-18i-20i+15i^2 \\ &= 24-38i+15(-1) \\ &= 24-38i-15 \\ &= 9-38i \end{aligned}$$

$$\begin{aligned} \textcircled{5} (-3-2i)(5+4i) &= -15-12i-10i-8i^2 \\ &= -15-22i-8(-1) \\ &= -15-22i+8 \\ &= -7-22i \end{aligned}$$