

Complex Numbers

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

* can't have negative under a radical so you take out an i *

i	$\sqrt{-1}$	i
i^2	$i \cdot i \rightarrow \sqrt{-1} \cdot \sqrt{-1} =$	-1
i^3	$i \cdot i \cdot i \rightarrow \sqrt{-1} \cdot \sqrt{-1} \cdot \sqrt{-1} = -1 \cdot i$	$-i$
i^4	$i^2 \cdot i^2 \rightarrow -1 \cdot -1$	1

Operations with complex numbers

<p>Add: $(2 - 4i) + (4 - 3i)$ * Combine Like Terms *</p> <p>$6 - 7i$</p>	<p>Subtract: $(-3 + i) - (-8 + 2i)$ * Distribute negative, then combine like terms.</p> <p>$-3 + i + 8 - 2i$</p> <p>$5 - i$</p>
<p>Multiply: $(3 - 2i)(5 + i)$ * Distribute First () *</p> <p>$15 + 3i - 10i - 2i^2$ (+2) • no i^2 • changes to (-1)</p> <p>$17 - 7i$</p>	<p>Multiply: $(2 + 3i)^2$ * write () twice + multiply</p> <p>$(2 + 3i)(2 + 3i)$ $4 + 6i + 6i + 9i^2$ (-9)</p> <p>$-5 + 12i$</p>

How do we divide complex numbers? Multiply numerator + denominator by conjugate

- Examples of conjugates:
- ① $3 + 4i \rightarrow 3 - 4i$
 - ② $5 - 6i \rightarrow 5 + 6i$
 - ③ $-2 + i \rightarrow -2 - i$

Divide: $\frac{3i \cdot (5 + 2i)}{5 - 2i \cdot (5 + 2i)}$

$\frac{15i + 6i^2(-6)}{25 + 10i - 10i - 4i^2(+4)} = \frac{-6 + 15i}{29}$

$= \frac{-6}{29} + \frac{15}{29}i$

These problems will be on a NON-CALCULATOR skills check

Homework – Textbook page 277 #37-63 Odd