5-9 Complex Numbers

Objective: Add, subtract, multiply and divide complex numbers.

Day 1

Where did the imaginary number come from????

$\sqrt{x^2} = \sqrt{-1}$

$x = \pm\sqrt{-1}$

$\sqrt{-1} = i$

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

$-1 = i^2$

So let us take a look at what happens to the i.

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

$i^2 = -1$

$i^3 = i^2 \cdot i = -1 \cdot i = -i$

$i^4 = i^2 \cdot i^2 = -1 \cdot -1 = 1$

$i^5 = i^2 \cdot i^2 \cdot i = -1 \cdot -1 \cdot i = i$

Summary of the things you need to know for today:

Standard Form: $a + bi$, $i^2 = -1$, $i = \sqrt{-1}$

$i^6 = i^2 \cdot i^2 \cdot i^2 = -1 \cdot -1 \cdot -1 = -1$

$i^7 = i^2 \cdot i^2 \cdot i^2 \cdot i = -1 \cdot -1 \cdot -1 \cdot i = -i$

$i^8 = i^2 \cdot i^2 \cdot i^2 \cdot i^2 = -1 \cdot -1 \cdot -1 \cdot -1 = 1$

* "i" to an even power and multiple of 4 gives you +1.

$a + bi$

real part, imaginary

ex) $2 + 3i$

$i^{80} = 1$

$i^{14} = -1$

$i^{24} = 1$

$i^{27} = i^{26} \cdot i = -1 \cdot i = -i$

$i^{29} = i^{28} \cdot i = 1 \cdot i = i$

II. Simplify. $i = \sqrt{-1}$

EX 1. $\sqrt{-18} = i\sqrt{18} = i\sqrt{9}\sqrt{2} = \boxed{3i\sqrt{2}}$

EX 2. $\sqrt{-28} = i\sqrt{28} = i\sqrt{4}\sqrt{7} = \boxed{2i\sqrt{7}}$

EX 3. $\sqrt{-125x^5} = i\sqrt{125x^5} = i\sqrt{25x^4}\sqrt{5x} = \boxed{5x^2 i\sqrt{5x}}$

EX 4. $\sqrt{-32y^3} = i\sqrt{32y^3} = i\sqrt{16y^2}\sqrt{2y} = \boxed{4yi\sqrt{2y}}$

EX 5. $-2i \cdot 7i = -14i^2 = -14(-1) = 14$ $\boxed{i^2 = -1}$

EX 6. $\sqrt{-12} \cdot \sqrt{-2}$

$i\sqrt{12} \cdot i\sqrt{2}$

$i\sqrt{4}\cdot\sqrt{3} \cdot i\sqrt{2}$

$i^2 \cdot 2\sqrt{6}$

$-2\sqrt{6}$ Correct

Wrong Way

$\sqrt{-12} \cdot \sqrt{-2}$

$\sqrt{24}$

$\sqrt{4}\sqrt{6}$

$2\sqrt{6}$

Not equal