

Expand this:

$$(x + 5)^2$$
$$x^2 + 10x + 25$$

	x	$+5$
x	x^2	$+5x$
$+5$	$+5x$	$+25$

$(x + 5)^2$ is never just 2 terms!!!

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(x + 5)^2 = (x)^2 + 2(1)(5)x + (5)^2$$
$$= x^2 + 10x + 25$$

Expand:

$$(2x - 3)^2$$

$$4x^2 - 12x + 9$$

Expand this:

$$(1 + 5i)^2$$

$$1 + 10i + 25i^2$$

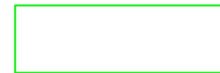
$$1 + 10i + 25(-1) = (-24 + 10i)$$

However,

When you square a complex number you get
another complex number.

In other words $(a + bi)^2$ is ALWAYS
just 2 terms (a binomial)

$$(3 - 4i)^2 =$$



$$9 - 24i + 16i^2$$

$$9 - 24i - 16$$

$$-7 - 24i$$

Expand:

$$(2x - 3)(2x + 3) =$$

$$4x^2 - 9$$

	$2x$	$+3$
$2x$	$4x^2$	$+6x$
-3	$-6x$	-9

Factors such as $(a + b)$ and $(a - b)$ are called **CONJUGATES**

Conjugate

The conjugate is where we **change the sign in the middle** of two terms like this:

$$\begin{array}{c} 3x + 1 \\ \downarrow \\ \text{Conjugate: } 3x - 1 \end{array}$$

The product of Complex Conjugates:

Simplify. $(4 + 2i)(4 - 2i)$

$$16 - 4i^2$$

$$16 - 4(-1)$$

$$16 + 4$$
$$\underline{20}$$

	4	$+2i$
4	16	$+8i$
$-2i$	$-8i$	$-4i^2$

$$(a + b)(a - b) = a^2 - b^2$$

Complex Conjugates: $a + bi$ and $a - bi$

$$(4 + 2i)(4 - 2i) = 20$$

With Imaginary Numbers:

$$(a + bi)(a - bi) = a^2 + b^2$$

$$(a - bi)(a + bi) =$$

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

$$= (2)^2 - (3i)^2$$

$$= 4 - 9i^2$$

$$= 4 - 9(-1)$$

$$= 4 + 9 = 13$$

$$4 + 9 = a^2 + b^2$$

$$(7 + 4i)(7 - 4i) =$$

$$7^2 + 4^2$$

$$49 + 16 = 65$$

The product of complex conjugates is always
a constant

Simplify each.

1. $(9 - 5i)^2$

$$81 - 90i - 25$$

$$56 - 90i$$

2. $(6 - 3i)(6 + 3i)$

$$36 + 9$$

$$45$$

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

$$i^2 = -1$$

$$i^3 = -i$$

Simplify:

$$(7i)(6i)(10i)$$

$$420 i^3$$

$$420(-i) = -420i$$

Hwk #23: Sec 5-6

Due Tomorrow

Pages 278-279

Problems 3-5, 13, 14, 34-36, 40, 57, 59, 65

$$\begin{aligned} i &= \sqrt{-1} = i \\ i^2 &= -1 \\ i^3 &= -i \\ i^4 &= 1 \end{aligned}$$

This pattern repeats every 4 powers of i .

$$\begin{aligned} i^5 &= i \\ i^6 &= -1 \\ i^{25} &= i \end{aligned}$$

take the exponent and divide by 4. The remainder indicates how far into the next 4 you are.

$$\begin{array}{r} 6 \\ 4 \overline{) 25} \\ \underline{24} \\ 1 \end{array} \quad r = 1$$

this indicates that i^{25} has passed through the pattern 6 complete times and the remainder indicates that it is the 1st step into the next pattern. $i^{25} = i^1 = i$

Find ALL solutions using Square Roots:

$$(x + 1)^2 + 21 = 5$$

$$\begin{array}{cc} -21 & -21 \end{array}$$

$$\sqrt{(x+1)^2} = \sqrt{-16}$$

$$\begin{array}{cc} x+1 & = \pm 4i \\ -1 & \end{array}$$

$$x = -1 \pm 4i$$

Now, **all** quadratic equations have solutions.

Some of these solutions may be imaginary.