Simplify each.

1. $\sqrt{10} \cdot \sqrt{10}$

$= \sqrt{10 \cdot 10}$

$= \sqrt{100}$

$= \boxed{10}$

2. $(\sqrt{13})^2$

$= \sqrt{13} \cdot \sqrt{13}$

$= \boxed{13}$

$i = \sqrt{-1}$

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

Simplify each.

1. 4x(3 + 6x)

$\boxed{12x + 24x^2}$

2. (2 + 3x)(1 - 5x)

	2	+3x
1	2	3x
-5x	-10x	$-15x^2$

$\boxed{-15x^2 - 7x + 2}$

Simplify each.

1. $4i(3 + 6i)$

$= 12i + 24i^2$

$= 12i + 24(-1)$

$= \boxed{12i - 24}$

2. $(2+3i)(1-5i)$

	2	$+3i$
1	2	$3i$
$-5i$	$-10i$	$-15i^2$ $-15(-1)$ $+15$

$17-7i$

Simplify each:

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

	1	$+5i$
1	1	$5i$
$+5i$	$5i$	$25i^2$ $=-25$

$-24+10i$

$(3+2i)^2 =$

	3	$+2i$
3	9	$6i$
$+2i$	$6i$	$4i^2$ $=-4$

$5+12i$

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

	4	$+2i$
4	16	$+8i$
$-2i$	$-8i$	$-4i^2$ $-4(-1)$ $=4$

$= 20$

Expand. $(x + 5)^2$

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

$= x^2 + 10x + 25$

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

$(a+b)^2 = a^2 + 2ab + b^2$ It's always a trinomial!

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

$= x^2 + 10x + 25$

However.....

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

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

-25

$-24 + 10i$

When you square a Complex Number $(a + bi)^2$
you get Another Complex Number $(a + bi)$....a binomial!

$(3 - i)^2 =$

	3	$-i$
3	9	$-3i$
$-i$	$-3i$	$+i^2$ $= -1$

$= 8 - 6i$

$(4 + 3i)^2 =$

	4	$+3i$
4	16	$12i$
$3i$	$12i$	$+9i^2 = -9$

$7 + 24i$

When dealing with Real Numbers only:

(x + 5)(3x + 2) is a Trinomial

When dealing with Imaginary Numbers only:

(5 + i)(2 + 3i) is a Binomial

Expand.

(5 + i)(2 + 3i)

	5	$+i$
2	10	$+2i$
$+3i$	$+15i$	$+3i^2 = -3$

$= 7 + 17i$

Expand.

(7 + 2i)(2 - 3i)

	7	$+2i$
2	14	$+4i$
$-3i$	$-21i$	$-6i^2 = +6$

$= 20 - 17i$

Expand. $(x + 13)(x - 13) = x^2 - 169$

Expand.

$(2x - 3)(2x + 3) = 4x^2 - 9$

Expand.

$(13 - i)(13 + i) = 169 + 1 = 170$

	13	$-i$
13	169	$-13i$
$+i$	$+13i$	$-i^2 = +1$

Expand.

$(2 - 3i)(2 + 3i) = 4 + 9 = 13$

	2	$-3i$
2	4	$-6i$
$+3i$	$+6i$	$-9i^2 = +9$

When a and b are REAL #'s

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

With Imaginary Numbers:

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

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:

$3x + 1$

Conjugate: $3x - 1$

Complex Conjugates: a + bi and a - bi

$(7 + 4i)(7 - 4i) = 49 + 16 = 65$

$a^2 + b^2$

	7	+4i
7	49	+28i
-4i	-28i	$-16i^2 = 16$

The product of complex conjugates is always a constant

Simplify each.

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

	9	-5i
9	81	-45i
-5i	-45i	$+25i^2 = -25$

$= 56 - 90i$

2. $(6 - 3i)(6 + 3i) \rightarrow a^2 + b^2$

$= 36 + 9 = 45$

Hwk #16: Sec 5-6

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Problems 35, 37-40, 57, 62-64