Algebra 2

Unit 1- Quadratics Revisited

Complex Numbers

Name_____ Date_____

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

Examples:

1. $\sqrt{-16} = \sqrt{-1 \cdot 16}$ $4i$

2. $\sqrt{-81}$ $9i$

3. $\sqrt{-45}$ $3i\sqrt{5}$

4. $\sqrt{-200} = 10i\sqrt{2}$

Powers of *i*

"I won, I won!" (Negatives in the middle)

	ANSWER	Divide by 4 =
i^1	i	.25
i^2	-1	.5
i^3	$-i$	.75
i^4	1	No Decimal

$i^5 = i$, $i^6 = -1$, $i^7 = -i$, $i^8 = 1$

Always divide the exponent by 4.

- If you get a decimal of 0.25, then the answer is *i*.
- If you get a decimal of 0.50, then the answer is – 1
- If you get a decimal of 0.75, then the answer is –*i*.
- If it divides evenly, then the answer is 1.

Examples:

5. i^{75} $i^{75} = -i$

6. i^{29} $i^{29} = i$

7. $i^{251} = i^{251} = -i$

8. i^{9536} $i^{9536} = 1$

$\frac{75}{4} = 18.75$ $\frac{29}{4} = 7.25$ $\frac{251}{4} = 62.75$ $\frac{9536}{4} = 2384$

Complex Numbers

The Complex Numbers consist of all sums $a + bi$, where a and b are real numbers and "i" is the imaginary unit. The real part is a and the imaginary part is bi.

Add and Subtract Complex Numbers

- Add or subtract the real parts, and then, add or subtract the imaginary parts.
- Simplify. No powers of i higher than 1.
- Write your answer in standard form (real 1^{st} imaginary 2^{nd}).

9. $(3+2i)-(7+6i)$

$10+8i$

10. $(6-5i)-(1-2i)$

$6-5i-1-2i$

$5-7i$

11. $(9-4i)-(2+3i)$

$9-4i-2-3i$

$7-7i$

12. $9-(10+2i)-5i$

$9-10-2i-5i$

$-1-7i$

13. $(11i^4+4i^3)-(2i^4-6i^3)$

$11i^4+4i^3-2i^4+6i^3$

$9i^4+10i^3$

$9(1)+10(-i)$

$9-10i$

i^1 i

i^2 -1

i^3 $-i$

i^4 1

Multiply and Divide Complex Numbers

- Remember that $i * i = i^2 = -1$
- When dividing, rationalize the denominator by multiplying by the conjugate.

14. $7(2i)(2+3i)$

15. $(2-6i)(4+5i)$

16. $(-7-5i)(6+8i)(5+5i)$

17. $\dfrac{-6-4i}{7i}$

18. $\dfrac{1+7i}{2+10i}$