Lesson Title 3.2 Complex Numbers NOTES **Algebra 2** **Date** _____

OBJECTIVE 1: Square Root of a Negative Number

The Square Root of a Negative Number

Property	Example
1. If r is a positive real number, then $\sqrt{-r} = i\sqrt{r}$.	$\sqrt{-3} = i\sqrt{3}$
2. By the first property, it follows that $(i\sqrt{r})^2 = -r$.	$(i\sqrt{3})^2 = i^2 \cdot 3 = -3$

1 4 9 16 25 36 49 64 81 100 121

TASK 1: Simplify the square roots.

a) $\sqrt{-25}$

$\sqrt{-1 \cdot 5 \cdot 5}$

$5i$

b) $\sqrt{-72}$

$\sqrt{-1 \cdot 36 \cdot 2}$

$6i\sqrt{2}$

c) $-5\sqrt{-9}$

$-5\sqrt{-1 \cdot 3 \cdot 3}$

$-5 \cdot i \cdot 3$

$-15i$

d) $-7\sqrt{-12}$

$-7\sqrt{-1 \cdot 4 \cdot 3}$

$-7 \cdot i \cdot 2\sqrt{3}$

$-14i\sqrt{3}$

OBJECTIVE 2: Complex Numbers (a + bi)

A complex number written in standard form is a number a + bi.

- *"a" is the real part*
- *"bi" is the imaginary part*
- *$b \neq 0$, then a + bi is an imaginary number*

Task 2: Operations with Complex Numbers

Adding & Subtracting

a) $(8 - i) + (5 + 4i)$

$13 + 3i$

b) $(7 - 6i) - (3 - 6i)$

$7 - 6i - 3 + 6i$

4

c) $13 - (2 + 7i) + 5i$

$13 - 2 - 7i + 5i$

$11 - 2i$

Complex Numbers (a + bi)

Real Numbers (a + 0i)	Imaginary Numbers (a + bi, b ≠ 0)
-1 $\frac{5}{3}$ π $\sqrt{2}$	$2 + 3i$ $9 - 5i$
	Pure Imaginary Numbers (0 + bi, b ≠ 0): $-4i$ $6i$

Task 3: Operations with Complex Numbers $i^2 = -1$ $\sqrt{-1} = i$

Multiplying

a) $4i(-6 + i)$

$-24i + 4i^2$

$-24i + 4(-1)$

$-24i - 4$

$-4 - 24i$

b) $(9 - 2i)(-4 + 7i)$

$-36 + 63i + 8i - 14i^2$

$-36 + 71i - 14(-1)$

$-36 + 71i + 14$

$-22 + 71i$

c) $15i(-1 + 2i)$

$-15i + 30i^2$

$-15i + 30(-1)$

$-30 - 15i$

d) $(4 - 12i)(11 + 8i)$

$44 + 32i - 132i - 96i^2$

$44 - 100i - 96(-1)$

$140 - 100i$

OBJECTIVE 3: **Complex Solutions/Zeros**

Solve the following quadratic equations.

Don't forget the ±

SADMEP

a) $x^2 + 8 = 0$

$-8 \quad -8$

$\sqrt{x^2} = \sqrt{-8}$

$x = \pm\sqrt{-1 \cdot 4 \cdot 2}$

$x = \pm 2i\sqrt{2}$

b) $2x^2 - 11 = -47$

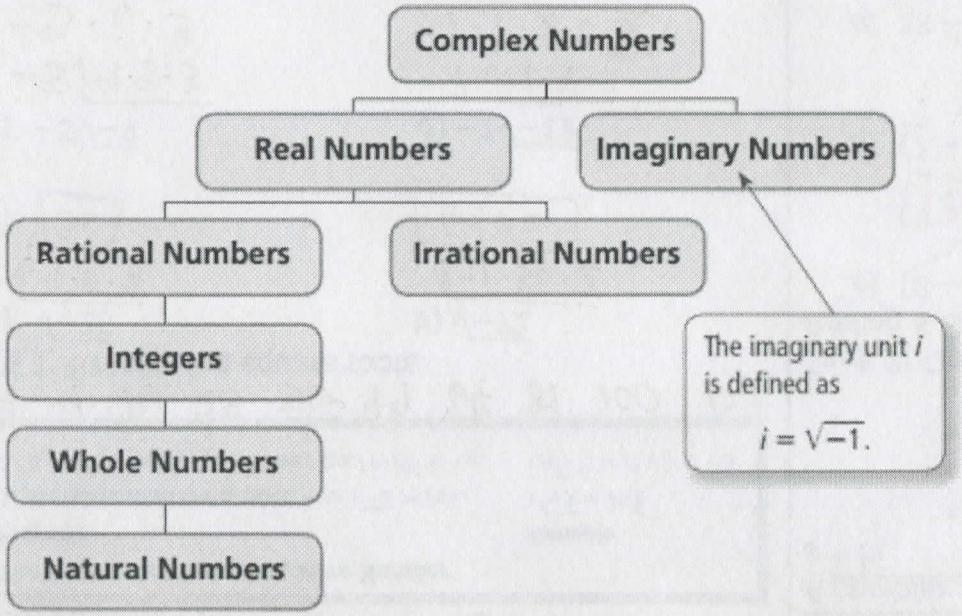
$+11 \quad +11$

$\frac{2x^2}{2} = \frac{-36}{2}$

$\sqrt{x^2} = \sqrt{-18}$

$x = \pm\sqrt{-1 \cdot 9 \cdot 2}$

$x = \pm 3i\sqrt{2}$



Still need help with: