# Algebra 2

## 3.3 Complex Number Operations

Complex #'s : $a+bi$

$i$ is called the imaginary unit

$\sqrt{i^2} = \sqrt{-1}$ $\quad i = \sqrt{-1}$

### Square Roots of Negative Numbers

1) $i\sqrt{5} = \sqrt{-1 \cdot 5} = \sqrt{-1}\sqrt{5} = \boxed{i\sqrt{5}}$

2) $\sqrt{-6} = i\sqrt{6}$

3) $i\sqrt{100} = 10i$

## Multiplying Pure Imaginary Numbers

Remember $i^2 = -1$

Simplify

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

2) $-6i \cdot -4i = 24i^2 = 24(-1) = \boxed{-24}$

3) $-3i \cdot -2i \cdot 7i = 42i^3 = 42i^2 \cdot i$

$= 42(-1) \cdot i$

$= \boxed{-42i}$

# Simplifying a Power of $i$

remember $i^2 = -1$

Simplify $i^{45}$

$i \cdot i^{44}$

$i \cdot (i^2)^{22}$

$i \cdot (-1)^{22}$

$i \cdot 1$

$\boxed{i}$

Simplify $i^{35}$

$i \cdot i^{34}$

$i \cdot (i^2)^{17}$

$i \cdot (-1)^{17}$

$i \cdot -1$

$\boxed{-i}$

## Adding/Subtracting Complex Numbers

1. $7i + 9i = 16i$

2. $(-5 + 6i) + (2 - 11i)$

$-3 - 5i$

3. $(2 + 3i) - 1(4 + 2i)$

$2 + 3i - 4 - 2i$

$-2 + i$

Try this: Simplify

1) $i^{\frac{144}{2}} = (i^2)^{72}$

72

$(-1)^{72}$

1

2) $(4+3i) - (-2+7i)$

$4+3i+2-7i$

$6-4i$

3) $-4i \cdot 7i$

$-28i^2 = -28(-1)$

$= 28$

4) $i\sqrt{-25}$

$5i$

# Algebra 2

## Imaginary Numbers WS

Name: _____ Date: _____ Hr: __

Simplify

1) $\sqrt{-36}$

2) $(6i)(-2i)$

3) $i^{29}$

4) $i^{38}$

5) $(2-8i)-4i$

6) $\sqrt{-3}$

7) $-2i \cdot -6i \cdot 4i$

8) $-7i + 10i$

9) $3i - (5 - 2i)$

10) $(-2 + 8i) - (7 + 3i)$