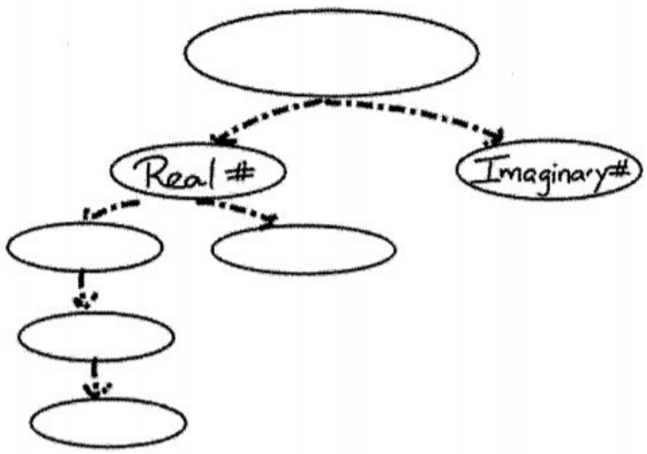
Honors Algebra 2 **Name ___________________**

4.6 Perform Operations with Complex Numbers

How do you solve: $x^2 + 16 = 0$?



The **imaginary unit,** i, can be used to describe the square roots of negative numbers.

$i = \sqrt{-1}$

$i^2 =$

When there is a negative radicand under a square root, you must take out i before simplifying or performing operations!

Simplify:

1. $\sqrt{-9}$	2. $\sqrt{-12}$	3. $\sqrt{-72}$
4. $-3i \cdot 8i$	5. $\sqrt{-6} \cdot \sqrt{-10}$	6. $\left(3\sqrt{-5}\right)^2$

Solve.

7. $4x^2 + 36 = 0$	8. $3x^2 + 40 = -x^2 - 56$	9. $(x-3)^2 = -12$

A **complex number** is a number that can be written in the form a + b*i*, where a & b are real numbers and *i* is the imaginary unit.

- **a** is called the real part and **b*i*** is called the imaginary part of the complex number.
- When writing complex numbers, the real part should be written first (standard form).
- When adding of subtracting complex numbers, combine the real parts and the imaginary parts. For example, (a + bi) - (c + di) = (a - c) + (b - d)i.

Simplify.

10. (8 - 5i) + (2 + i)	11. (4 + 7i) - (2 + 3i)	12. (4 + 2i)(3 - 5i)

When dividing, an imaginary number cannot be left in the denominator (remember *i* is the square root of –1 and we have a rule to not leave any roots in a denominator). **To eliminate the imaginary number in the denominator, multiply by the complex conjugate.**

The complex conjugate of a + bi is: ________________.

Simplify.

13. $\frac{5}{1+i}$	14. $\frac{5+2i}{3-2i}$	15. $\frac{2+i}{3i}$