

**Algebra 2**  
**Lesson 6-4: Solving Polynomial Equations**  
**Mrs. Snow, Instructor**

Sum and difference of cubes are two important and useful factoring formulas that you will need to understand and use.

**The Sum and Differences in Cubes:**

$$\begin{aligned}a^3 + b^3 &= (a + b)(a^2 - ab + b^2) \\a^3 - b^3 &= (a - b)(a^2 + ab + b^2)\end{aligned}$$

Factor:

$$x^3 + 64$$

$$8x^3 - 1$$

To solve a polynomial equation:  $f(x)=0$ , we can use the same techniques we used in Ch. 5.

1. identify the **Sum of cubes**
2. **Zero-Product Property**
3. use the quadratic formula to solve

$$x^3 - 125 = 0$$

$$8x^3 - 1 = 0$$

When solving higher-degree polynomials, consider using substitution to make factoring easier:

$x^4 + 11x^2 + 18 = 0,$	<ol style="list-style-type: none"><li>1. Substitute: <i>let</i> <math>u = x^2 \therefore u^2 =</math> ????</li><li>2. factor using “u”</li><li>3. now put back into the <math>x</math> <i>form</i> and solve for <math>x</math></li></ol>
Factor and then solve: $2x^4 + 9x^2 + 12$ (use substitution)	Factor and solve: $x^4 + 8x^2 - 9 = 0$
Solve by factoring: $2x^4 + 18x^3 = 0$	$x^3 = 4x^2 + 12x$