Algebra II **Section 6.4**
Auch **Date:**

Objectives

- Use The Factor Theorem to determine factors of a polynomial
- Factor the sum and differences of two cubes

Factor Theorem	
Theorem	**Example**
For any polynomial *P(x), (x-a)* is a factor of *P(x)* if and only if *P(a)=0.*	Because $P(1)=1^2-1=0,\ (x-1)$ Is a factor of $P(x)=x^2-1.$

Example 1 **Determining Whether a Linear Binomial is a Factor**

Determine whether the given binomial is a factor of the polynomial *P(x).*

a) $(x-3); P(x)=x^2+2x-3$

b) $(x+4); P(x)=2x^4+8x^3+2x+8$

Try it Determine whether the given binomial is a factor of the polynomial *P(x).*

a) $(x+2); P(x)=4x^2-2x+5$

b) $(3x-6); P(x)=3x^4-6x^3+6x^2+3x-30$

Example 2 **Factoring by Grouping.**.

Factor. $x^3 + 3x^2 - 4x - 12$

Try it! Factor each expression.

a) $x^3 - 2x^2 - 9x + 18$

b) $2x^3 + x^2 + 8x + 4$

Factoring the Sum and the Difference of Two Cubes	
Method	**Algebra**
Sum of two cubes	$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
Difference of two cubes	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Example 3 **Factoring the Sum and Difference of Two Cubes**

Factor each expression.

a) $5x^4 + 40x$

b) $8y^3 - 27$

Try it! Factor each expression.

a) $8 + z^6$

b) $2x^5 - 16x^2$