Chapter 5 Section 4: Synthetic Division & Factoring

You can use a shortcut for dividing polynomials by a ________________ of the form $x - k$.

Make sure to use the $k$ value when doing synthetic division!!!!!!!

**Example 1:** Divide $-x^3 + 3x^2 + x$ by $x - 2$.

**Example 2:** Divide $3x^4 - 7x^3 + 4x^2 + 2x + 8$ by $x - 1$

- Being able to divide polynomials helps us to ________________ polynomials.
- If the remainder is _____________, the binomial is a factor.

**Determining whether a linear binomial is a factor.**

**Example 3:** Determine whether $x - 3$ is a factor of $f(x) = x^2 + 6x - 12$

**Example 4:** Determine whether $x + 3$ is a factor of $f(x) = 2x^4 + 10x^3 + 11x^2 - x + 6$. 

REVIEW: Factoring a difference of Squares

Example 5: Factor $9x^2 - 16$ completely.

Example 6: Factor $16x^4 - 81$ completely.

NEW!!!: Factoring sum and difference of cubes

Example 7: Factor $x^3 - 64$ completely.

Example 8: Factor $-16x^5 - 250x^2$ completely.

Example 9: Factor $x^3 - 2x^2 - 9x + 18$ completely.

Example 10: Factor $z^4 - z^3 - 64z + 64$ completely.