Today's Objectives

- Orally describe the process of long division using the key words quotient, remainder, and dividend. Label each key word in your mathematical work using color-coded notes and visual diagrams.
- Success Criteria
 - Decipher the meaning of the division algorithm
 - Use long division to divide polynomials
- Vocabulary: Quotient, Remainder, Dividend

Division Algorithm for Polynomials

Let f(x) and d(x) be polynomials with the degree of f greater than or equal to the degree of d, and $d(x) \neq 0$. Then there are unique polynomials q(x) and r(x), called the **quotient** and **remainder**, such that $f(x) = d(x) \cdot q(x) + r(x)$ where either r(x) = 0 or the degree of f is less than the degree of f.

The function f(x) in the division algorithm is the **dividend**, and d(x) is the **divisor**. If r(x) = 0, we say d(x) **divides evenly** into f(x).

Long Division

Use long division to find the quotient and remainder when 2635 is divided by 13.

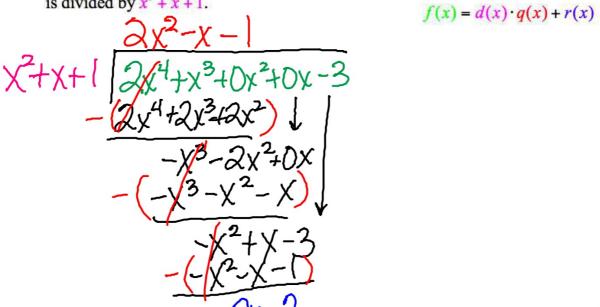
$$\frac{f(x) = d(x) \cdot q(x) + r(x)}{2635} = 202 + \frac{9}{13}$$

$$2635 = 202(13) + 9$$

$$2635 = 202(13) + 9$$

Example Using Polynomial Long Division

Use long division to find the quotient and remainder when $2x^2 + x^3 - 3$ is divided by $x^2 + x + 1$.



Slide 2- 12

Divisor	$d(x) = x^2 + x + 1$
Dividend	$f(x) = 2x^4 + x^3 - 3$
Quotient	G(X)=2x2-X-1
Remainder	r(x)=2x-2
Fraction Form	$\frac{2x^{4}+x^{2}-3}{x^{2}+x+1} = 2x^{2}-x-1+\frac{2x-2}{x^{2}+x+1}$
Polynomial Form	$2x^{4}+x^{3}-3=(2x^{2}-x-1)(x^{2}+x+1)+2x-2$

 $\frac{f(x)}{d(x)} = g(x) + \frac{r(x)}{d(x)}$

Polynomial $f(x) = q(x) \cdot d(x) + r(x)$