Name: _____Algebra II

Date: ______ Lesson 1-9

Polynomial Long Division

When we divide two polynomials, we get another polynomial, q(x) and a remainder, r(x). Recall the **quotient-remainder form:**

$$\frac{a(x)}{b(x)} = q(x) + \frac{r(x)}{b(x)}$$

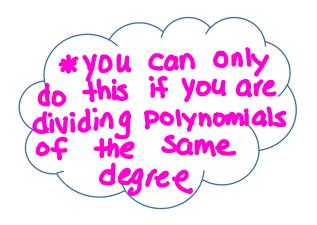
When dividing two first degree polynomials both the quotient and remainder are constants.

Do Now: Consider the expression $\frac{x+8}{x+3}$.

a. Perform long division and write the result in quotient-remainder form.

b. Re-write the expression in quotient-remainder form by simplification.

$$\frac{x+8}{x+3}$$
 $\frac{x+3+5}{x+3}$
 $\frac{x+3}{x+3}$
 $\frac{x+3}{x+3}$
 $\frac{5}{x+3}$
 $\frac{5}{x+3}$



Exercise #1: Given $\frac{4x+13}{x+2}$, state the quotient and remainder.

Exercise #2: Given $f(x) = 3x^4 + 2x + x^3 - 5x^2 + 3$ and $g(x) = x^2 + 2x + 2$, state the quotient and remainder * Needs to

of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

$$3x^{2} - 5x - 1$$
be in standard
$$-(3x^{4} + 6x^{3} + 6x^{2}) \downarrow$$

$$-5x^{3} - 11x^{2} + 2x$$

$$-(-5x^{3} - 10x^{2} - 10x)$$

$$-1x^{2} + 12x + 3$$

$$-(-1x^{2} - 2x - 2)$$

$$14x + 5$$

$$3x^2 - 5x - 1 + \frac{14x + 5}{x^2 + 2x + 2}$$

Need to fill in missing terms

Exercise #3: Given $f(x) = 4x^4 + 5x - 4$ and $g(x) = x^2 + 3x - 2$, state the quotient and remainder of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

$$4x^2 - 12x + 44 - \frac{151x + 84}{x^2 + 3x - a}$$

Reminder...

Check for standard form & for missing terms!

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Algebra II

POLYNOMIAL LONG DIVISION PRACTICE

1. Given $\frac{3x-5}{x-4}$, state the quotient and remainder.

$$\begin{array}{r} 3 \\ x-4)3x-5 \\ -(3x-12) \\ 7 \end{array}$$

$$\frac{3x}{x} = 3$$

$$3+\frac{7}{X-4}$$

L Put into standard form!

2. Given $f(x) = x^4 + 3x^3 + x - 4x^2 - 7$ and $g(x) = x^2 + 3x - 1$, state the quotient and remainder of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

$$\begin{array}{r} x^{2} - 3 \\ x^{2} + 3x - 1) x^{4} + 3x^{3} - 4x^{2} + x - 7 \\ - (x^{4} + 3x^{3} - x^{2}) \sqrt{1} \\ \hline - 3x^{2} + x - 7 \\ - (-3x^{2} - 9x + 3) \\ \hline 10x - 10 \end{array}$$

$$x^{2}-3+\frac{10x-10}{x^{2}+3x-1}$$

Fill in Missing +ams

3. Given $f(x) = 2x^4 + 3x^3 + 5x - 1$ and $g(x) = x^2 + 3x + 2$, state the quotient and remainder of $\frac{f(x)}{g(x)}$, in the form $q(x) + \frac{r(x)}{g(x)}$.

$$2x^{2}-3x+5+\frac{-4x-11}{x^{2}+3x+2}$$

ANSWERS

1.
$$3 + \frac{7}{x-4}$$

2.
$$x^2 - 3 + \frac{10x - 10}{x^2 + 3x - 1}$$

3.
$$2x^2 - 3x + 5 + \frac{-4x - 11}{x^2 + 3x + 2}$$