Why divide?!

$$2x^7 - 3x^5 + 2x^2 - 9$$

Division will help you determine all roots of non-factorable polynomials! :)

Feb 13-8:16 AM

Name: ______________________ Date: ________________ **Unit 6 Class Work**

Polynomial Division Class Work

Objective: *You will be able to divide polynomial expressions.*

Quick Review: Divide using long division. Also state if the divisor is a factor.

a. $1328 \div 8$

b. $23590 \div 18$

$$\begin{array}{r} 166 \\ 8\overline{)1328} \\ -8 \\ \hline 52 \\ -48 \\ \hline 48 \\ 48 \\ \hline 0 \end{array}$$

multiply
subtract

8 is a factor b/c no remainder

★ We can also divide polynomials using long division!

Guided Example: $x^5 - 3x^3 + 5x^2 - 10x - 20 \div (x - 5)$

$x^4 + 5x^3 + 22x^2 + 115x + 565 + \frac{2805}{x-5}$

$x - 5 \overline{) x^5 + 0x^4 - 3x^3 + 5x^2 - 10x - 20}$

multiply
subtract

$-(x^5 - 5x^4)$

$5x^4 - 3x^3 + 5x^2 - 10x - 20$

$-(5x^4 - 25x^3)$

$22x^3 + 5x^2 - 10x - 20$

$-(22x^3 - 110x^2)$

$115x^2 - 10x - 20$

$-(115x^2 - 575x)$

$565x - 20$

$-(565x - 2825)$

2805

x-5 is not a factor

Name: ______________________ Date: ________________ **Unit 6 Class Work**

Practice:
Divide each pair of polynomials using long division.

1. $3r^4 + 6r^3 - 8r + 12 \div (r + 2)$

Also state if the zero of the divisor is a factor.

$3r^3 - 8 + {}^{28}/_{r+2}$

$r + 2 \overline{) 3r^4 + 6r^3 + 0r^2 - 8r + 12}$

$-(3r^4 + 6r^3)$

$0 + 0 + 0 - 8r + 12$

$-(-8r - 16)$

28

r+2 is not a factor

2. $6s^4 + 21s^3 - 9s^2 - 21s + 3 \div (s^2 - 1)$

$$6s^2 + 21s - 3$$

$$s^2 - 1 \,\overline{)\, 6s^4 + 21s^3 - 9s^2 - 21s + 3}$$

$$-(6s^4 \quad - 6s^2)$$

$$\cancel{21s^3} - 3s^2 - 21s + 3$$

$$-(\cancel{21s^3} \quad - 21s)$$

$$-3\cancel{s^2} + 3$$

$$-(-\cancel{3s^2} + 3)$$

$$0$$

$s^2 - 1$ is a factor

From here, we would know s = 1 and s = -1, and could solve $6s^2 + 21s - 3$ to find two other solutions!

3. $12m^5 - 4m^4 - 6m^3 + 5m^2 + 8m - 3 \div (3m - 1)$

$$4m^4 - 2m^2 + m + 3$$

$$3m - 1 \,\overline{)\, 12m^5 - 4m^4 - 6m^3 + 5m^2 + 8m - 3}$$

$$-(12m^5 - 4m^4)$$

$$-6m^3 + 5m^2 + 8m - 3$$

$$-(-6m^3 + 2m^2)$$

$$3m^2 + 8m - 3$$

$$-(3m^2 - m)$$

$$9m - 3$$

$$-(9m - 3)$$

$$0$$

$3m - 1$ is a factor

4. $2b^4 + 5b^2 - 22b + 15 \div (b - 1)$

$$
\begin{array}{r}
2b^3 + 2b^2 + 7b - 15 \\
b-1 \overline{)\, 2b^4 + 0b^3 + 5b^2 - 22b + 15} \\
-(2b^4 - 2b^3) \\
\hline
2b^3 + 5b^2 \\
-(2b^3 - 2b^2) \\
\hline
7b^2 - 22b \\
-(7b^2 - 7b) \\
\hline
-15b + 15 \\
-(-15b + 15) \\
\hline
0
\end{array}
$$

b-1 is a factor

Name: ______________________ Date: ________________ **Unit 6 Class Work**

Practice: Divide each pair of polynomials using long division. Also state if the zero of the divisor is a factor.

1. $3r^4 + 6r^3 - 8r + 12 \div (r + 2)$

2. $6s^4 + 21s^3 - 9s^2 - 21s + 3 \div (s^2 - 1)$

3. $12m^5 - 4m^4 - 6m^3 + 5m^2 + 8m - 3 \div (3m - 1)$ $= 4m^4 - 2m^3 + m + 3$ 3m-1 is a factor

4. $2b^4 + 5b^2 - 22b + 15 \div (b - 1)$
$2b^3 + 2b^2 + 17b - 15$
b-1 is a factor

***The polynomial**
$m(x) = 2x^3 + 13x^2 + 17x - 12$
has x + 4 as a factor.
Factor the polynomial completely.
State the x-intercepts and y-intercepts of the graph of m(x).

We will save as a review for after the break!