Unit 10 Day A – Long Division & Synthetic Division of Polynomials

Division of Polynomials –

1. **Terminology** –

a. Dividend – Polynomial to be divided

b. Divisor – Polynomial divided into the Dividend

c. Quotient – Whole Polynomial Answer when Dividend is

 divided by the Divisor

d. Remainder – Part of the Divisor that remains when division is

completed

1. To Check Division Use Formula:

 Dividend = (Quotient)(Divisor) + Remainder !

1. **Long Division** – Similar method to number division.

\*Remember to distribute the minus sign when you are dividing!

Example 1: Divisor Quotient Dividend

  Remainder

 Solution = 

 3. **Synthetic Division** – Shorter method of dividing a polynomial by a binomial.

\* The binomial must be in the form of **(x – a)**.

\* This method uses the coefficients of the variable terms.

\* Remember to account for missing terms by using 0 as a place holder!

\* Remember write the Polynomial with the variables in **descending**

 exponent order!

 Example 1:

 divided by (x – 6)

(form is **(x – a)** with a = 6 which is moved to the left of the coefficients of

 the variable terms.)

 6 2 4 3 -2

 +12 +96 +594

 x

 2 16 99 592

(The 1st term of the variable of the Quotient is **1** **degree less than** the degree of

the 1st term of the dividend.)

**Solution = **

1. **Remainder Theorem** –

a. If polynomial P(x) is divided by **(x - a)** then the Remainder = **P(a)**.

 b. This theorem is used to Evaluate a polynomial at a given value.

c. Use the Synthetic Substitution Method and the Remainder will be

 the polynomial evaluated at the given value.

 Example 1:

Use Example 1 from 3. above and you will see that the Remainder is 592.

 **Therefore the polynomial  evaluated at x=6 is 592!**

1. **Remainder Theorem & Factoring** –

 **If the Remainder = 0;**

 **Then the Divisor and the Quotient of the Dividend are FACTORS of the Dividend.**

Examples:

1. 
2. 
3. 
4. 
5. 

Unit 10 Day A HW Page:

Use synthetic division for 1-9. Give the quotient and remainder.

1.  2. 

3.  4. 

5.  6. 

7.  8. 

9. 

Use Long Division to find the quotient and remainder. Determine if it is a factor.

10. 

11. 

12. 

13. 