Unit 3 Guided Notes: Synthetic Division

- We only know how to solve polynomials with a degree of _____ (______________________________ equations)
- When given a polynomial with a degree >2, you can use ____ to lower the degree
  - The degree of the polynomial decreases by one each time you divide
- When synthetic division is performed, if the there is no remainder, the expression is a _________________ of the polynomial
  - If the remainder is not zero, then the expression is not a factor
- To do synthetic division, you must have a ___________________________________ for every power of x
  - For example, if your equation is missing an x^2 rewrite with a ________
- Synthetic Division can only be used if the coefficient of x= _______

Example #1: $(\boldsymbol{x^3 - 5x^2 - 2x + 24}) \div (\boldsymbol{x - 3})$

Step 1: Change the sign of factor:

Step 2: Write out the coefficients of each term.

Step 3: Bring down the first term. Multiply ___ by this term, then add.

Is $(x - 8)$ a factor of $(x^2 - 7x - 11)$?   YES   or   NO

Example #2: $(\boldsymbol{x^3 - 10x^2 + 20x + 26}) \div (\boldsymbol{x - 5})$

Step 1: Change the sign of factor:

Step 2: Write out the coefficients of each term.

Step 3: Bring down the first term. Multiply ___ by this term, then add.

Is $(x - 5)$ a factor of $x^3 - 10x^2 + 20x + 26$?   YES   or   NO

<u>Example #3:</u> $(\boldsymbol{x^3 - 2x^2 - 11x - 6}) \div (\boldsymbol{x + 2})$

<u>Step 1</u>: Change the sign of factor:

<u>Step 2:</u> Write out the coefficients of each term.

<u>Step 3:</u> Bring down the first term. Multiply ___ by this term, then add.

Is $(x + 2)$ a factor of $x^3 - 2x^2 - 11x - 6$? YES or NO

<u>Example #4:</u> $(\boldsymbol{x^3 - 86x - 45}) \div (\boldsymbol{x + 9})$

<u>Step 1</u>: Change the sign of factor:

<u>Step 2:</u> Write out the coefficients of each term.

<u>Step 3:</u> Bring down the first term. Multiply ___ by this term, then add.

Is $(x + 9)$ a factor of $x^3 - 86x - 45$? YES or NO

<u>Example #5:</u> $(\boldsymbol{2x^3 + 28x^2 + 86x + 60}) \div (\boldsymbol{x + 4})$

<u>Step 1</u>: Change the sign of factor:

<u>Step 2:</u> Write out the coefficients of each term.

<u>Step 3:</u> Bring down the first term. Multiply ___ by this term, then add.

Is $(x + 4)$ a factor of $2x^3 + 28x^2 + 86x + 60$? YES or NO