MHF 4U

FACTORING POLYNOMIALS

REMAINDER THEOREM:

If the polynomial is divided by $(x - a)$, the remainder is $f(a)$.

$\boldsymbol{P(restriction) = remainder}$

FACTOR THEOREM:

If $\boldsymbol{P(a) = 0}$, then $\boldsymbol{(x - a)}$ is a factor of the polynomial.

EXAMPLES:

1. A) Determine the remainder when $x^3 + 7x^2 + 2x - 5$ is divided by $2x + 3$.

   B) Is $2x + 3$ a factor of the polynomial in part A? Explain why or why not.

2. Factor $f(x) = x^3 - 5x^2 - 2x + 24$. Then sketch and describe its properties.

- To sketch the function, we need to express $f(x)$ in factored form.
- In order to factor $f(x)$, we need to know what linear factor will be used to divide $f(x)$.
- The linear factor that is used should satisfy the ***Factor Theorem*** above.
- To determine the linear factor that satisfies the Factor Theorem, we choose values of x that are factors of the constant term. The value that satisfies the Factor Theorem leads to the linear factor used to begin the factoring process.

3. Sketch $f(x) = 4x^4 + 6x^3 - 6x^2 - 4x$

4. Sketch and describe the properties of $f(x) = x^4 - x^3 - 16x^2 + 4x + 48$.

5. Sketch and describe the properties of $f(x) = x^4 - 8x^2 + 16$.