Advanced Functions Learning Goals and Success Criteria

Chapter 1 – Functions

Learning Goals: We are learning to…

- represent and describe functions and their characteristics.
- compare and contrast the properties and characteristics of various types of functions.
- apply transformations to parent functions and how to use transformations for sketching
- determine the equation of an inverse relation and the conditions for an inverse relation to be a function.
- understand, interpret, and graph situations that are described by piecewise functions; and learning the properties of the absolute value function.

Success Criteria: I can…

- use function notation to represent the values of a function
- apply the vertical line test
- identify the domain and range for different types of functions
- recognize and apply restrictions on the domains of functions
- identify types of functions based on their graphical characteristics
- use different characteristics (intervals of increase/decrease, odd/even, end behaviour, continuity) to help me identify types of functions
- use the value of a to determine if there is a vertical stretch/reflection in the x-axis
- use the value of k to determine if there is a horizontal stretch/reflection in the y-axis
- use the value of d to determine if there is a horizontal translation
- use the value of c to determine if there is a vertical translation
- determine the equation of an inverse function using various methods
- determine whether an inverse relation is a function, and whether or not the domain needs to be restricted
- absolutely understand the absolute value function
- graph the piecewise function by graphing each piece over the given interval
- determine if a piecewise function is continuous or not

Chapter 2 – Polynomial Functions

Learning Goals: We are learning to…

- identify polynomial functions
- determine the turning points and end behaviours of polynomial functions.
- determine the equation of a polynomial function that describes a particular situation or graph and vice-versa
- divide a polynomial by a polynomial using long division
- divide a polynomial by a polynomial using synthetic division
- the connections between a polynomial function and its remainder when divided by a binomial
- to factor a sum or difference of cubes

Success Criteria: I can…

- justify whether a function is polynomial or not
- identify the degree of a polynomial function
- recognize that the domain of a polynomial is the set of all real numbers
- recognize that the range of a polynomial function may be the set of all real numbers, or it may have an upper/lower bound
- identify the shape of a polynomial function given its degree
- differentiate between an even and odd degree polynomial
- identify the number of turning points given the degree of a polynomial function
- identify the number of zeros given the degree of a polynomial function
- determine the symmetry (if present) in polynomial functions
- determine the equation of a polynomial function in factored form
- determine the behaviour of a zero based on the order/exponent of that factor
- use long division to determine the quotient and remainder of polynomial division
- identify a factor of a polynomial if, after long division, there is no remainder
- appreciate that synthetic division is "da bomb"
- use synthetic division to determine the quotient and remainder of polynomial division
- identify a factor of a polynomial if, after synthetic division, there is no remainder (The Remainder Theorem)
- use test values to find the factors of a polynomial function
- factor a polynomial of degree three or greater by using the factor theorem
- recognize when a polynomial function is not factorable

Chapter 3 – Polynomial Equations and Inequalities

Learning Goals: We are learning to…

- solve polynomial equations using a variety of strategies
- solve linear inequalities
- solve polynomial inequalities

Success Criteria: I can…

- solve polynomial equations algebraically (by factoring) AND graphically
- recognize that only SOME polynomial equations can be solved by factoring
- recognize that some solutions may not make sense in the context of the question
- solve a linear inequality by using inverse operations
- recognize that when you multiply/divide by a negative number, you MUST reverse the inequality sign
- recognize that linear inequalities have many solutions
- express the solution to a linear inequality on a number line
- solve polynomial inequalities algebraically by
    1. Moving all terms to one side of the inequality
    2. Factoring to find the zeros of the corresponding polynomial

3. Creating a number line, graph, or an interval chart
4. Determining the intervals on which the polynomial is positive or negative

- solve polynomial inequalities graphically

Chapter 4 – Rational Functions, Equations and Inequalities

Learning Goals: We are learning to…

- identify the asymptotes of rational functions
- sketch the graphs of rational functions
- solve rational equations. Think rationally!
- solve rational inequalities using algebraic and graphical approaches

Success Criteria: I can…

- identify a hole when there is a common factor between *p(x)* and *q(x)*
- identify a vertical asymptote as the zeros of *q(x)*
- identify a horizontal asymptote by studying the degrees of *p(x)* and *q(x)*
- identify an oblique asymptote when the degree of *p(x)* is exactly 1 greater than *q(x)*
- identify the horizontal asymptote as $\frac{a}{c}$
- identify the vertical asymptote as $-\frac{d}{c}$
- identify the y-intercept as $\frac{b}{d}$
- identify the x-intercept as $-\frac{b}{a}$
- recognize that the zeros of a rational function are the zeros of the numerator
- solve rational equations by multiplying each term by the lowest common denominator, then solving the resulting polynomial equation
- identify inadmissible solutions based on the context of the problem
- recognize that an inequality has many possible intervals of solutions
- solve an inequality algebraically, using an interval chart
- solve an inequality graphically