

**MHF 4U**  
**Advanced Functions**

**Essential Outcomes**

<b>Outcome Achieved</b>	<b>Essential Outcome</b>
<b>Unit 1: Transformations ( Text: McGraw Hill Ryerson 11 – Chapter 3 )</b>	
	<ul style="list-style-type: none"> <li>- Definition of a function and applications in real life</li> <li>- Function Notation</li> <li>- Domain and Range</li> </ul>
	<ul style="list-style-type: none"> <li>- Graph basic functions like <math>y = x^2</math>, <math>y = x^3</math>, <math>y = \sqrt{x}</math>, <math>y = \frac{1}{x}</math></li> <li>- Horizontal and vertical transformations</li> <li>- Horizontal and vertical stretches</li> </ul>
	<ul style="list-style-type: none"> <li>- Find the inverse of a function algebraically</li> <li>- Sketch a function and it's inverse on the same axes</li> </ul>
<b>Unit 2: Polynomials ( Text: McGraw Hill Calculus – Chapter 2 )</b>	
	<ul style="list-style-type: none"> <li>- Investigate polynomial functions ( cubic, quartic, quintic, 6<sup>th</sup> power ) using the TI 83 graphing calculator )</li> <li>- Establish trends about shape of graph, end behaviour, domain and range and zeroes ( <math>x</math> – intercepts )</li> </ul>
	<ul style="list-style-type: none"> <li>- Graph polynomial functions given the equation in factored form</li> <li>- Transformation of polynomial functions</li> </ul>
	<ul style="list-style-type: none"> <li>- Divide polynomial functions using long division and synthetic division</li> </ul>
	<ul style="list-style-type: none"> <li>- Remainder Theorem</li> </ul>
	<ul style="list-style-type: none"> <li>- Factor Theorem</li> </ul>
	<ul style="list-style-type: none"> <li>- Factor polynomials and solve polynomial equations</li> </ul>
	<ul style="list-style-type: none"> <li>- Solve problems involving remainder theorem and factor theorem</li> </ul>
	<ul style="list-style-type: none"> <li>- Solve polynomial inequalities which are in factored and non factored form using algebra and technology.</li> <li>- Sketch polynomial inequalities after solving</li> </ul>
<b>Unit 2: Rational Functions (Resource Binder)</b>	
	<ul style="list-style-type: none"> <li>- Analyse the characteristics of rational functions ( domain / range, end behaviour, asymptotes, etc )</li> <li>- Understanding the relationship between degrees of numerator and denominator and horizontal asymptotes.</li> <li>- Sketch the graph when expressed in factored form.</li> <li>- Solving rational inequalities, where numerator and denominator are factorable, sketch inequalities.</li> </ul>

	<ul style="list-style-type: none"> <li>- Solving problems graphically and algebraically using remainder and factor theorems.</li> <li>- Make connections between the x intercepts and zeroes of a simple rational function.</li> </ul>
<b>Unit 3: Trigonometric Functions ( Text : McGraw Hill 11, 12, Old Calculus)</b>	
	- Radian measure
	<ul style="list-style-type: none"> <li>- Trig and reciprocal trig functions</li> <li>- Special angles</li> </ul>
	<ul style="list-style-type: none"> <li>- Graph <math>f(x) = \sin x</math>, <math>f(x) = \cos x</math>, <math>f(x) = \tan x</math> using radian measures</li> <li>- Graph reciprocals using radian measures</li> </ul>
	<ul style="list-style-type: none"> <li>- Transformation of trig functions</li> <li>- Analyze transformed functions</li> </ul>
	<ul style="list-style-type: none"> <li>- Determine an equation for a sinusoidal function given the graph / description.</li> <li>- Solve problems involving sinusoidal functions.</li> </ul>
	- Compound angle formulae incl. half angle formulae.
	- Proving trig identities
<b>Unit 4: Exponential and Logarithmic Function (Text: College Tech.)</b>	
	<ul style="list-style-type: none"> <li>- Introduce and graph exponential and logarithmic functions.</li> <li>- Explore features</li> </ul>
	<ul style="list-style-type: none"> <li>- Evaluating simple logs</li> <li>- Change of base</li> <li>- Solve simple exponential equations involving base 10 – rewrite in log. form.</li> </ul>
	<ul style="list-style-type: none"> <li>- Laws of logarithms and exponentials</li> <li>- Evaluating logs using laws</li> </ul>
	<ul style="list-style-type: none"> <li>- Solving exponential equations by finding a common base and using logs.</li> <li>- Solve simple log equations.</li> </ul>
	- Transformations of logs.
	- Problem solving with log and exponential functions
<b>Unit 5: Combining Functions</b>	
	- Explore real world applications involving combined functions.
	<ul style="list-style-type: none"> <li>- Explore and graph families of functions.</li> <li>- Analysing families of functions.</li> </ul>
	<ul style="list-style-type: none"> <li>- Connect transformations with composition of functions</li> <li>- Determine and analyze the composition of functions and its inverse numerically and graphically.</li> </ul>
	- Real life composite functions applications