9.1 Exploring Rational Functions Using Transformations (Part 1)

A **rational function** can be written in the form :

$f(x) = \frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are polynomial expressions and $q(x) \neq 0$

Note: $q(x)$ can be a constant

Example:

$f(x) = \frac{3x+5x^2}{\sqrt{3}}, = \frac{3x^3-2x^2}{3x^2+2}$, $g(x) = 3x^3 - 2x^2$ are all rational functions

$y = \frac{3x+5x^2}{\sqrt{3x}}, f(x) = \frac{3x+5x^{1.5}}{\sqrt{3}}$ are not rational functions

An **asymptote** of a curve is a line that the curve approaches.

The **end behaviour** is what happens when x approaches a large positive value or a large negative value $(\pm\infty)$

Example 1:

Graph the function $y = \frac{1}{x}$

Fill in the following chart:

Characteristic	Equation: $y = \frac{1}{x}$
Non-Permissible value	
Behaviour Near non-permissible value	
End Behaviour	
Domain	
Range	
Equation of Vertical Asymptote	
Equation of Horizontal Asymptote	

Example 2:

Consider the function $f(x) = \frac{6}{x-2} + 3$

Graph the function .

Fill in the following chart:

Characteristic	Equation: $f(x) = \frac{6}{x-2} + 3$
Non-Permissible value	
Behaviour Near non-permissible value	
End Behaviour	
Domain	
Range	
Equation of Vertical Asymptote	
Equation of Horizontal Asymptote	

Try:

Sketch the function $f(x) = \frac{4}{x+1} + 5$

Fill in the following chart:

Characteristic	Equation: $f(x) = \frac{4}{x+1} + 5$
Non-Permissible value	
Behaviour Near non-permissible value	
End Behaviour	
Domain	
Range	
Equation of Vertical Asymptote	
Equation of Horizontal Asymptote	