MHF 4UI Learning Goals Unit 4 – Polynomial Rational Functions

- determine key features of the graphs of Rational Functions using algebraic analysis
- sketch graphs of Rational Functions by interpreting the results of algebraic analysis
- sketch the Absolute Value of a Rational Function
- sketch the "Reciprocal of a Function"

Topic	I have reviewed it.	I have done questions.
Using Mr. One		
Solving rational equations (state restrictions first!)		
Determining limits to infinity i.e. $\lim_{x\to\infty} \frac{\text{constant number}}{\text{polynomial}} = 0$		
Graphing Rational Functions (Essay style)		
(a) Determine symmetry (replace x with –x, then y with –y)		
(b) Determine x– and y–intercepts		
(c) State Restrictions (can't divide by zero)		
(d) Determine Vertical Asymptote(s) (via restrictions) & test their behaviour using one–sided limits Ex. For the behaviour of the vertical asymptote x = 4: $\lim_{x\to 4^+} f(x) = \infty$ ← $f(4.001) = 3599$ $\lim_{x\to 4^-} f(x) = -\infty$ ← $f(3.999) = -5999$		
(e)(i) Determine the Horizontal Asymptote: $\lim_{x\to\infty} f(x)$ $= \text{C}$ $\therefore$ the horizontal asymptote is $y = \text{C}$ & test its behaviour using $f(100)$ / $f(-100)$ test		
OR (ii) Determine the Slant Asymptote: $\lim_{x\to\infty} f(x)$ → division → $= \lim_{x\to\infty} ax + b + \frac{\text{constant number}}{\text{polynomial}}$ $\therefore$ the slant asymptote is $y = ax + b$ & test behaviour its using $f(100)$ / $f(-100)$ test		
(f) Other Information Ex. $f(6) = 3$, $f(-2) = -3$		
(g) State the Domain and Range		
"**Puzzle Graph**" - create a graph given information only		
"**Hole**" in the graph - always try to factor and reduce a rational function first to check for holes		
Graphing the "**Absolute Value of a Rational Function**" consider the non-absolute value, graph, then reflect everything below the x-axis in the x-axis.		
Graph the "**Reciprocal of a Function**", $y = \frac{1}{f(x)}$ consider $y = f(x)$ and key y values: when $y = 0$, $y = \pm 1$, $y > 1$ / $y < -1$, $0 < y < 1$ / $-1 < y < 0$		