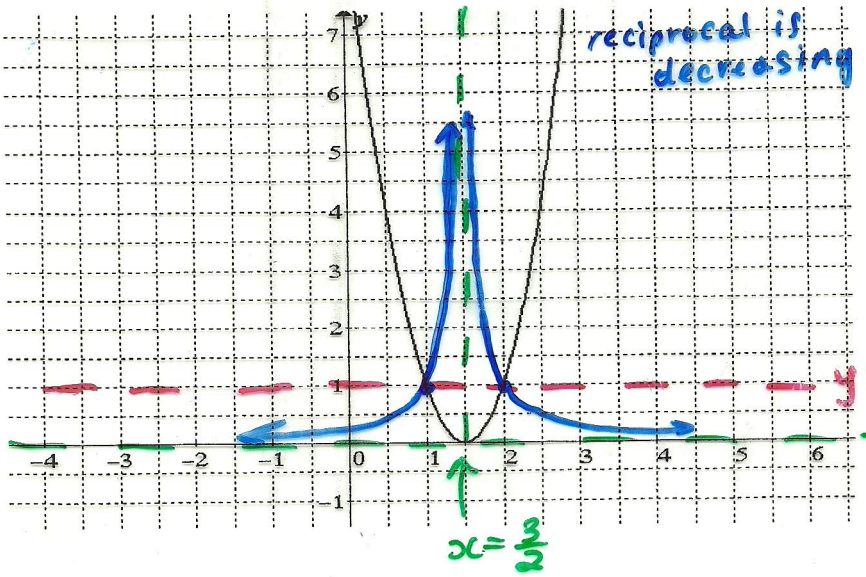
MHF4U **Reciprocals Of Quadratic Functions Continued.**

1. Reciprocal of Quadratics that Are Perfect Square Trinomials.

Example: Sketch a graph of $y = \dfrac{1}{4x^2 - 12x + 9}$ $= \dfrac{1}{(2x-3)^2}$, $2x - 3 \neq 0$, $x \neq \frac{3}{2}$

$4x^2 - 12x + 9 = (2x-3)^2$



Horizontal Asymptotes: (Long-Run)

$1 \neq 0$, $y \neq 0$

$y = 0$ is HA

Vertical Asymptotes:

$x = \frac{3}{2}$ $\quad x \to \frac{3}{2}^+$, $x \to \frac{3}{2}^-$

End Behaviour:

$y = 1$

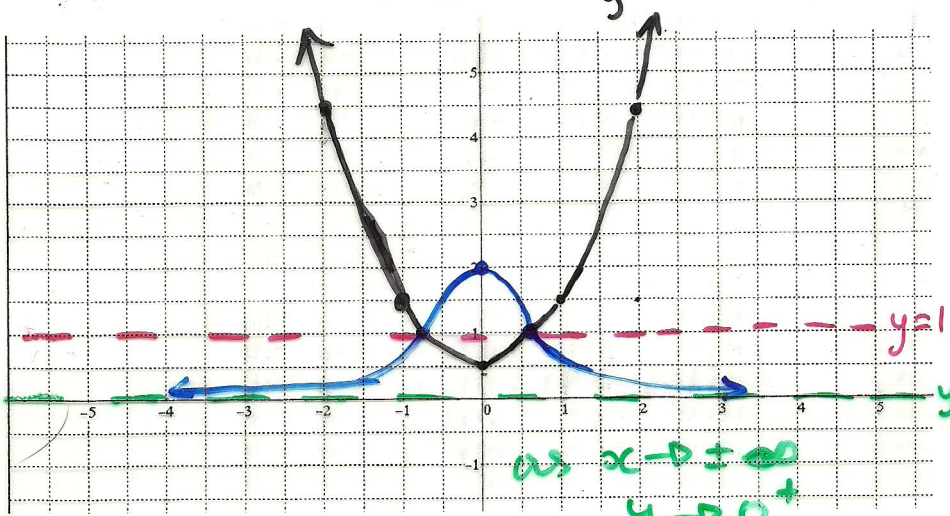
$y = 0$

2. Reciprocal of a (Strictly) Positive Function

Example: Sketch a graph $y = \dfrac{1}{x^2 + 0.5}$ $\neq 0$

$x^2 + 0.5 \neq 0$ for $x \in \mathbb{R}$

$x^2 + 0.5 = 0$ has no real solutions.



Horizontal Asymptotes:

$1 \neq 0$, $y \neq 0$

$\therefore y = 0$

Vertical Asymptotes:

none

End Behaviour:

$y = 0$ as $x \to +\infty$, $y \to 0$

as $x \to -\infty$, $y \to 0$

Summary: $y = \dfrac{k}{ax^2 + bx + c}$

Case 1: denom has 2 real roots		Case 2: denom has no real roots		Case 3: denominator has one real root	
$a > 0$ Diagram:	$a < 0$ Diagram:	$a > 0$ Diagram:	$a < 0$ Diagram:	$a > 0$ Diagram:	$a < 0$ Diagram: