Rational Functions Quiz Paper 2 KEY

1a. $x = q,\ y = 3$ (must be equations) ***A1A1 N2*** ***[2 marks]***

1b. recognizing connection between point of intersection and asymptote ***(R1)***

eg $x = 1$

$q = 1$ ***A1 N2*** ***[2 marks]***

1c. correct substitution into distance formula ***A1***

eg $\sqrt{(x-1)^2 + (y-3)^2}$

attempt to substitute $y = \frac{3x}{x-1}$ ***(M1)***

eg $\sqrt{(x-1)^2 + \left(\frac{3x}{x-1} - 3\right)^2}$

correct simplification of $\left(\frac{3x}{x-1} - 3\right)$ ***(A1)***

eg $\frac{3x-3x(x-1)}{x-1}$

correct expression clearly leading to the required answer ***A1***

eg $\frac{3x-3x+3}{x-1},\ \sqrt{(x-1)^2 + \left(\frac{3x-3x+3}{x-1}\right)^2}$

$\mathrm{PQ} = \sqrt{(x-1)^2 + \left(\frac{3}{x-1}\right)^2}$ ***AG N0*** ***[4 marks]***

1d. recognizing that closest is when PQ is a minimum ***(R1)***

eg sketch of PQ, $(\mathrm{PQ})'(x) = 0$

$x = -0.73205\ x = 2.73205$ (seen anywhere) ***A1A1***

attempt to find *y*-coordinates ***(M1)***

eg $f(-0.73205)$

$(-0.73205, 1.267949), (2.73205, 4.73205)$

$(-0.732, 1.27), (2.73, 4.73)$ ***A1A1 N4*** ***[6 marks]***