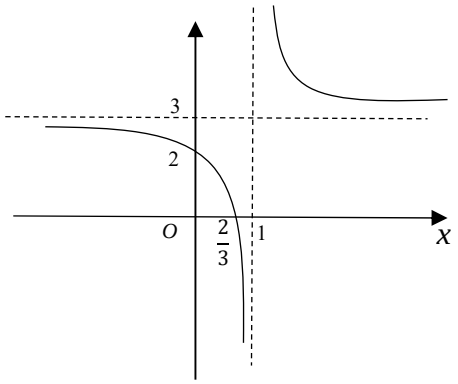
Question Number	Scheme	Marks
9(a)(i)	$\frac{2}{p} = 2$ so $p = 1$ *	M1A1cso
(ii)	$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{q(x-1)-(qx-2)}{(x-1)^2}$	M1A1
	When $x = 0$ $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{-q+2}{1} = -1,\ \Rightarrow q = 3$	M1A1,A1 (7)
(b)		B1ft B1ft B1 B1ft B1ft (5)
(c)	$x + 2 = \frac{3x-2}{x-1}$	M1
	$x^2 - 2x = 0$	M1
	$x(x-2) = 0$ $x = 2$	dM1A1cao(4) **[16]**

(a)(i)M1	Set $x = 0$ in the curve equation and equate result to 2. Obtain a value for p.
A1cso	Correct value of p obtained from a correct equation.
(ii)M1	Attempt the quotient rule. (formula is given on formula page). Denominator must be $(x-1)^2$. Numerator to be $q(x-1)-(qx-2)$ or $(qx-2)-q(x-1)$ **Must use $p = 1$ now or later.**
A1	Fully correct derivative
ALT	Use product rule: $\frac{\mathrm{d}y}{\mathrm{d}x} = q(x-1)^{-1} - (qx-2)(x-1)^{-2}$ M1 for attempt with 2 terms similar to above, either term to be correct A1 Both terms correct
M1	Set $x = 0$ in their derivative and equate to -1
A1	Correct equation
A1	$q = 3$

Question Number	Scheme	Marks
(b)	**No value for *q***: B0B1B0B1B1 available. **Incorrect *q*:** B1B1B0B1B1 available.	
B1ft	Equations of asymptotes seen or lines parallel to axes passing through $x = 1$, $y = 3$ drawn. $y = 3$ or their q. **Must have a value for *q*.**	
B1ft	Coordinates of crossing points seen explicitly or marked on the sketch. Must have $y = 2$; may have $x = 2 / q$ (value for q not needed)	
B1	Two branches in the correct "quadrants" Must have $q = 3$ for this mark. Asymptotes drawn.	
B1ft	There must be at least one branch of the curve drawn and 2 asymptotes drawn and labelled on the diagram by showing the coords of the points where they cross the axes or with their equations. The curve must not touch (or cross) either asymptote. ft their asymptotes**, inc *y* = *q***	
B1ft	Both crossing points clearly marked on their diagram. ft their crossing points .	
(c)		
M1	Eliminate y between the line and the curve equation. May use q or their value for q	
M1	Obtain a 2 or 3 term quadratic. May use q or their value for q.	
dM1	Solve their equation to obtain 1 or 2 values of x Depends on both M marks above.	
A1cao	$x = 2$ from a correct equation. If $x = 0$ is seen it must be clear that $x = 2$ is the only answer If x is eliminated: M1 elimination M1 obtain quadratic in y M1 solve for y A1 complete to a single value of x	