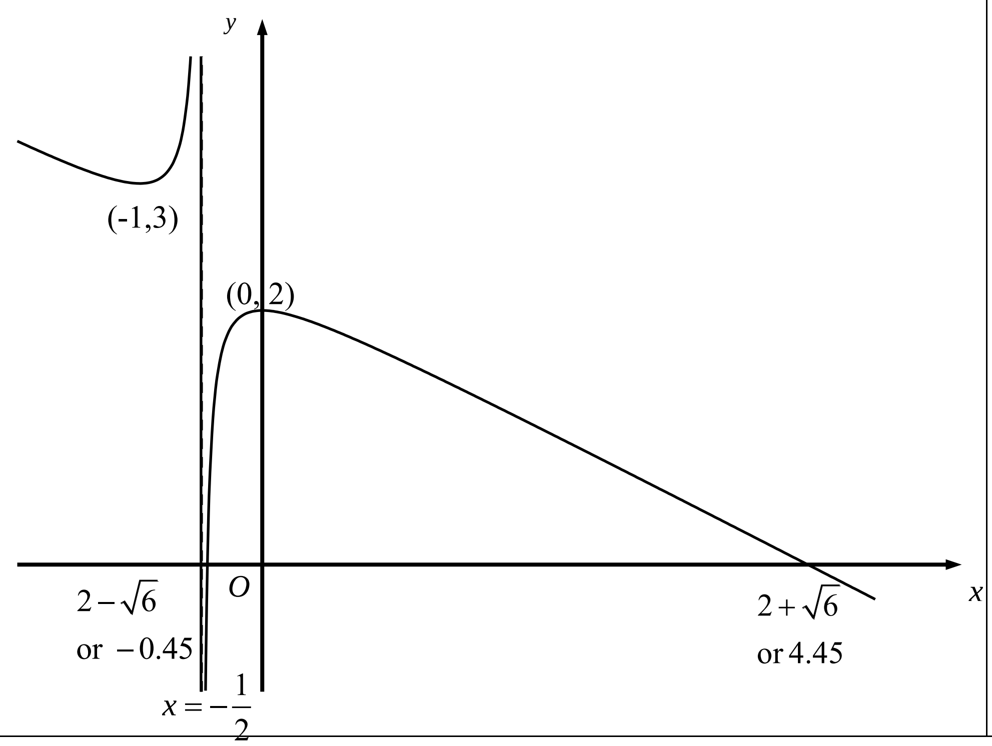
Question Number	Scheme	Marks
9(a)	$y=\dfrac{2+4x-x^2}{2x+1}\Rightarrow x^2-4x-2+2yx+y\ \ (=0)$	
	$x^2+(2y-4)x+(y-2)=0$	M1A1A1 (3)
(b)	$(2y-4)^2\geq 4(y-2)$	M1
	$4y^2-16y+16=4y-8\Rightarrow 4y^2-20y+24=0$	M1A1
	$y\leq 2$ or $y\geq 3$ *	A1cso (4)
(c)	$y=\dfrac{2+4x-x^2}{2x+1}$	
	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{(4-2x)(2x+1)-2\left(2+4x-x^2\right)}{(2x+1)^2}$ **See notes for product rule method**	M1A1A1
	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=0\Rightarrow(4-2x)(2x+1)-2\left(2+4x-x^2\right)=0$	
	$2x(x+1)=0\Rightarrow x=0,\ -1$	M1 A1
	stationary points are $(0,2)\ (-1,3)$	A1 (6)
ALT	$x^2+(2y-4)x+(y-2)=0\Rightarrow 2x+(2y-4)+2\dfrac{\mathrm{d}y}{\mathrm{d}x}x+\dfrac{\mathrm{d}y}{\mathrm{d}x}=0$	M1A1A1
	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=0\Rightarrow x+y=2$	M1
	(using (b)) stationary points are $(0,2)\ (-1,3)$	A1A1
(d)		B1 curve (i) M1A1 (M1 finding coords, A1 correct (oe or min 2dp) and on diagram (ii) B1 (iii) B1ft (5) [18]

(a)M1	Re-write the equation of *C* without fractions and rearrange to the required form.
A1	Correct value for *a* and either *b* or *c*. These values need not be stated explicitly.
A1	Fully correct equation. Values of *a*, *b* and *c* need not be stated explicitly. Condone missing brackets round "$y-2$". Award this mark when the equation is reached – isw any listing of values with incorrect signs.
(b)	
M1	Use "$b^2 \geqslant 4ac$" for their equation
M1	Re-arrange their inequality to a 3TQ in *y*. Allow an equation here.
A1	Correct 3TQ, as shown or any equivalent
A1cso	Deduce the CVs (need not be shown explicitly) and state the (given) inequalities. There must be no errors in the working but the equation, if correct, can be solved easily so no working need be shown. Condone use of "and" instead of "or".
(c)	
M1	Differentiate the equation of *C* using the quotient rule. The denominator must be correct and the numerator must consist of the difference of 2 terms of the type shown. The product rule can be used.
A1	Either numerator term correct
A1	Fully correct numerator
ALT:	**Product Rule** $y=\left(2+4x-x^2\right)\left(2x+1\right)^{-1}$
M1A1 **A1**	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=\left(4-2x\right)\left(2x+1\right)^{-1}-2\left(2+4x-x^2\right)\left(2x+1\right)^{-2}$ M1: rewrite without denominator and attempt product rule. Difference of 2 terms of the form shown needed (Difference because of the negative power) A1 Either term correct A1 Second term correct
M1	Equate the numerator of their derivative to 0 and solve to $x=$ ...(any valid method of solving a quadratic with 2 or 3 terms) If product rule used must multiply through by $\left(2x+1\right)^2$
A1	Both *x* values correct
A1	Both stationary points correct
ALT	
M1	Use implicit differentiation on the re-arranged equation
A1	Correct derivative of $\left(2y-4\right)x$ (inc use of product rule)
A1	Fully correct derivative
M1	Set $\dfrac{\mathrm{d}y}{\mathrm{d}x}=0$ and use the result from (b) to obtain solutions
A1	One correct stationary point
A1	Both correct stationary points
(d)	
B1	Shape: Two parts, one above $y = 3$ and the other below $y = 2$
(i)M1	Attempt to find the *x* coordinates of the crossing points
A1	Correct coordinates shown on their sketch, 2 crossing points only. $y = 0$ need not be seen. There must be a curve through these points.
(ii)B1	The asymptote must be drawn and labelled (by its equation or by showing the *x* coordinate of the point where it crosses the *x*-axis). There must be at least one part of the curve which is asymptotic to the line $x=-\dfrac{1}{2}$. No part of the curve should touch/cross the asymptote or curve dramatically away from the line.
(iii)B1ft	Label the stationary points with their coords. Follow through provided the result is sensible.