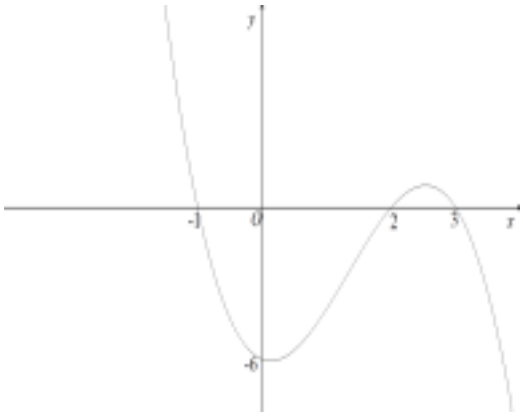
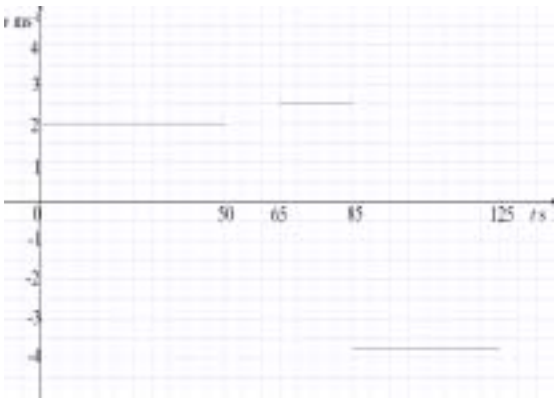
Question	Answer	Marks	Guidance
1(a)		**3**	**B1** for a well-drawn cubic graph in correct orientation Both arms extending beyond x-axis Maximum above x-axis **B1** for x-intercepts **B1** for y-intercept
1(b)	$x < -1$	**B1**	Dep on a cubic curve in the correct orientation and -1 correct on x-axis
	$2 < x < 3$ or $3 > x > 2$	**B1**	Dep on a cubic curve in the correct orientation and 2 and 3 correct on x-axis
2(a)	$\frac{dy}{dx} = \frac{(x^2+1)2e^{2x-3} - 2xe^{2x-3}}{(x^2+1)^2}$ oe or $\frac{dy}{dx} = \frac{2e^{2x-3}}{(x^2+1)} - \frac{2xe^{2x-3}}{(x^2+1)^2}$ oe	**3**	**B1** for $\frac{d}{dx}(e^{2x-3}) = 2e^{2x-3}$ seen in a quotient rule or product rule expression **M1** for correct method for differentiating a quotient or equivalent product **A1 FT** from *their* $2e^{2x-3}$
2(b)	When $x = 2$, $\frac{dy}{dx} = \frac{6e}{25}$	**M1**	For evaluation of *their* $\frac{dy}{dx}$ when $x = 2$
	$\frac{6e}{25} \times \frac{dx}{dt} = 2$ oe	**M1**	For correct substitution of *their* evaluated $\frac{dy}{dx}$ and $\frac{dy}{dt} = 2$ in a correct rates of change equation
	$\frac{dx}{dt} = \frac{25}{3e}$, $\frac{50}{6e}$	**A1**	
3(a)(i)	$x > \frac{1}{2}$	**B1**	Must be using x

Question	Answer	Marks	Guidance
3(a)(ii)	$x = 4\ln(2y-1)$ $e^{\frac{x}{4}} = 2y-1$ $y = \frac{1}{2}\left(1+e^{\frac{x}{4}}\right)$	**M1**	For full method for inverse using correct order of operations
	$f^{-1}(x) = \frac{1}{2}\left(1+e^{\frac{x}{4}}\right)$ or $f^{-1}(x) = \frac{1}{2}\left(1+\sqrt[4]{e^x}\right)$	**A1**	Must be using correct notation
	$x \in \mathbb{R}$	**B1**	
3(b)	$\sqrt{2x-3}+5=7$	**M1**	For correct order
	$x = \frac{2^2+3}{2}$	**M1**	Dep on previous M mark, for obtaining x by simplifying and solving using correct order of operations, including squaring
	$x = \frac{7}{2}$ or 3.5	**A1**	
4(a)(i)		**3**	**B1** For $v = 2$ for $0 \leqslant t \leqslant 50$ **B1** For $v = 2.5$ for $65 \leqslant t \leqslant 85$ **B1** For $v = 3.75$ for $85 \leqslant t \leqslant 125$ and $v = 0$ for $50 \leqslant t \leqslant 65$
4(a)(ii)	300	**B1**	
4(b)	$\frac{dx}{dt} = -18\sin\left(3t+\frac{\pi}{3}\right)$	**M1**	$\pm 18\sin\left(3t+\frac{\pi}{3}\right)$
	$\frac{d^2x}{dt^2} = -54\cos\left(3t+\frac{\pi}{3}\right)$	**M1**	$\pm 54\cos\left(3t+\frac{\pi}{3}\right)$
	−27 nfww	**A1**	