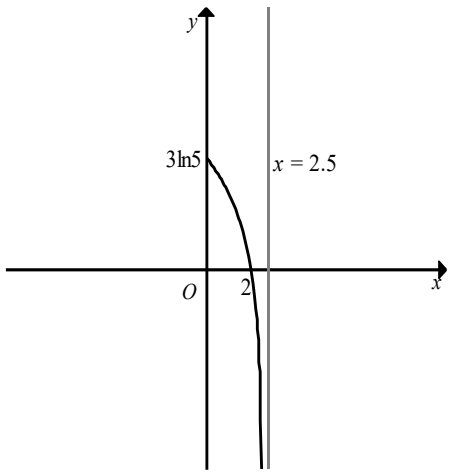
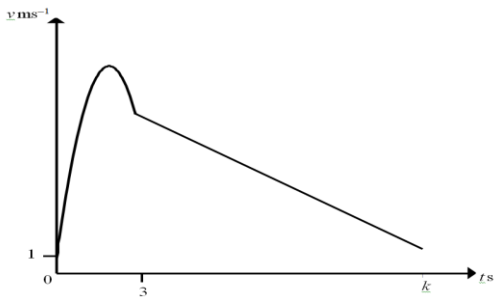
Question	Answer	Marks	Partial Marks
8(b)	Area of trapezium = $\frac{7}{4}$	**B1**	**FT** on *their y* coordinates
	Area under curve = $\int_1^2\left(\frac{3}{x+1}-1+\frac{2}{x}\right)\mathrm{d}x$	**B1**	Condone omission of limits here
	$3\ln(x+1)-x+2\ln x$	**2**	**M1** for at least one correct log term
	$(3\ln 3-2-2\ln 2)-(3\ln 2-1)$	**M1**	**Dep** on previous **M** mark
	$\ln\frac{27}{2}-1$	**M1**	**Dep** on previous **M** mark for simplification using log rules correctly
	$\frac{11}{4}-\ln\left(\frac{27}{2}\right)$	**A1**	
9(a)(i)	$\frac{1}{8}-2\left(x-\frac{9}{4}\right)^2$	**3**	**B2** for $a-2\left(x-\frac{9}{4}\right)^2$ or **B1** for $a+b\left(x-\frac{9}{4}\right)^2$ **B1** for $a=\frac{1}{8}$ oe
9(a)(ii)	Turning point $\left(\frac{9}{4},\ \frac{1}{8}\right)$	**B1**	FT on *their a* and *c*
	f^{-1} does not exist as given domain includes the turning point. oe	**B1**	**Dep** on previous **B** mark, turning point must be correct
9(b)(i)		**3**	**B1** for correct shape ; may not be over correct domain but must have positive *y*-intercept and appear to tend to a vertical asymptote in the 4th quadrant **B1** for (0, 3 ln 5) and (2, 0) stated or marked on graph; must have attempted correct shape **B1** for asymptote at $x = 2.5$

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Question	Answer	Marks	Partial Marks
9(b)(ii)	$g^{-1}(x)=\frac{1}{2}\left(5-e^{\frac{x}{3}}\right)$	**2**	**M1** for an attempt at the full method to find the inverse function with at most one sign or arithmetic slip
9(b)(iii)	Domain: $x \leqslant 3\ln 5$	**B1**	
	Range: $0 \leqslant g^{-1} < 2.5$	**B1**	
10(a)	$\overrightarrow{AB}=\mathbf{b}-\mathbf{a}$	**B1**	
	$\overrightarrow{OC}=\mathbf{a}+3(\mathbf{b}-\mathbf{a})$ or $\mathbf{b}+2(\mathbf{b}-\mathbf{a})$	**B1**	**FT** on *their* $\mathbf{b}-\mathbf{a}$
	$\overrightarrow{OC}=3\mathbf{b}-2\mathbf{a}$	**B1**	
10(b)	$\overrightarrow{OD}=4.5\mathbf{a}$ or $\overrightarrow{AD}=3.5\mathbf{a}$	**B1**	Allow unsimplified
	$\overrightarrow{DC}=their(3\mathbf{b}-2\mathbf{a})-their 4.5\mathbf{a}$ or $\overrightarrow{CD}=their 4.5\mathbf{a}-their(3\mathbf{b}-2\mathbf{a})$	**B1**	**FT** Allow unsimplified
	$\overrightarrow{OE}=their 4.5\mathbf{a}+\mu\times their(3\mathbf{b}-6.5\mathbf{a})$ oe or $\overrightarrow{OE}=their(3\mathbf{b}-2\mathbf{a})+\nu\times their(6.5\mathbf{a}-3\mathbf{b})$	**M1**	
	$\mu=\frac{9}{13}$ oe or $\nu=\frac{4}{13}$ oe	**A1**	
	$\lambda=\frac{27}{13}$	**A1**	
11(a)	$v=1+12t-3t^2$	**B1**	
	$v=12-\frac{2}{3}t$	**B1**	
		**2**	**B1** for correct shape for $0 \leqslant t \leqslant 3$, with v-intercept of 1 and end point (3, 10) soi and maximum point **B1** for a line with negative gradient for $3 \leqslant t \leqslant k$, start point (3, 10) soi and end point above the t-axis

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