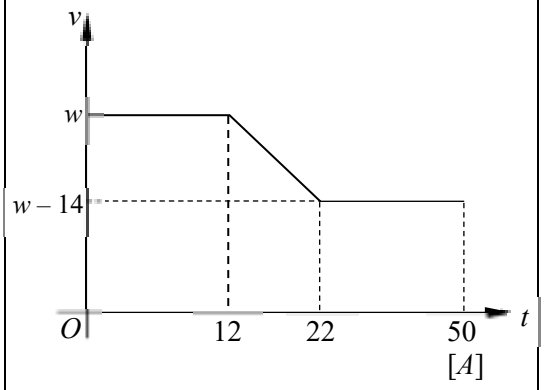
Question	Answer	Marks	Partial Marks
6(b)	${}^{15}C_{12} \times \left(\frac{x^4}{2}\right)^3 \times \left(\frac{2}{x}\right)^{12}$ oe	**M1**	
	232960	**A1**	
7(a)	Uses a valid Pythagorean identity to write in terms of a single trig ratio e.g. $1 + \tan^2\theta = \tan\theta + 3$	**B1**	
	Rearranges and factorises/solves e.g. $\tan^2\theta - \tan\theta - 2 = 0$ $(\tan\theta - 2)(\tan\theta + 1) = 0$	**M1**	
	$\tan\theta = 2 \quad \tan\theta = -1$ soi	**A1**	
	1.11, –2.03, $-\frac{\pi}{4}$, $\frac{3\pi}{4}$ and no extras in range cao	**A2**	**A1** for any 3 correct, ignoring extras
7(b)	Use of $\tan\phi = \frac{\sin\phi}{\cos\phi}$ in a correct expression or correct working	**M1**	
	Use of $1 - \cos^2\phi = \sin^2\phi$ in a correct expression or correct working	**M1**	
	Completion with $\frac{1}{\cos\phi} = \sec\phi$	**A1**	nfww
7(c)	$\cot x = [-]\sqrt{\text{cosec}^2 x - 1}$ soi or $\sin x = -\frac{8}{17}$ and $\tan x = -\frac{8}{15}$ soi or $\sin x = -\frac{8}{17}$ and $\cos x = \frac{15}{17}$ soi or $\frac{1}{\tan\left(\sin^{-1}\left(-\frac{8}{17}\right)\right)}$	**M1**	
	$-\frac{15}{8}$ or –1.875 cao, isw	**A1**	

Question	Answer	Marks	Partial Marks
8(a)	[Area of sector =] $\frac{1}{2}(15)^2\left(\frac{\pi}{6}\right)$ soi	**B1**	
	[Area of triangle =] $\frac{1}{2}(15)(15-a)\sin\left(\frac{\pi}{6}\right)$ soi	**B1**	
	Forms correct equation and attempts to solve for a or $15 - a$ or OC e.g. $\frac{1}{2}(15)^2\left(\frac{\pi}{6}\right)-\frac{15(15-a)}{4}=\frac{15(15-a)}{4}$ or $\frac{75\pi}{8}=\frac{15}{4}OC$ and solves as far as a = ... or $15 - a$ = ... or OC = ...	**M1**	
	$15-\frac{5}{2}\pi$ (cm) or exact equivalent	**A1**	
8(b)	[CA + arc AB + BC =] $\sqrt{15^2+\left(\frac{5}{2}\pi\right)^2-2\times15\times\frac{5}{2}\pi\times\cos\frac{\pi}{6}}$ $+\left(15\times\frac{\pi}{6}\right)+\left(15-\frac{5}{2}\pi\right)$ oe, soi	**M2**	**FT** *their*$(15-\frac{5}{2}\pi)$ and $\frac{5}{2}\pi$ **M1** for $15\times\frac{\pi}{6}$ oe seen or $\sqrt{15^2+\left(\frac{5}{2}\pi\right)^2-2\times15\times\frac{5}{2}\pi\times\cos\frac{\pi}{6}}+\left(15-\frac{5}{2}\pi\right)$ oe seen
	24.1 (cm)	**A1**	

Question	Answer	Marks	Partial Marks
9(a)	Correct *v*-*t* graph soi e.g.  [*A*]	**B1**	
	Equates 'area' and distance e.g. $12w+\frac{1}{2}\times10\times(w+w-14)+28(w-14)=458$	**M2**	implies **B1** **M1** for $12w + ... + 28(w – 14) = 458$ soi or $12w + 70 + 10(w – 14) + ... = 458$ soi or $... + 70 + 10(w – 14) + 28(w – 14) = 458$
	18.4 ($m\,s^{-1}$)	**A1**	
9(b)(i)	$v = t^2 – 9t + 20$, $a = 2t – 9$ or $a = t – 5 + t – 4$ from product rule	**M1**	
	$t = 4.5$	**A1**	
9(b)(ii)	Critical values 4, 5	**M1**	
	$4 < t < 5$	**A1**	
9(b)(iii)	$\int_0^4(t^2-9t+20)\,dt+\left\lvert\int_4^5(t^2-9t+20)\,dt\right\rvert$ oe, soi	**M1**	**FT** *their* $t^2 – 9t + 20$ providing 3 terms
	$\left[\frac{t^3}{3}-\frac{9t^2}{2}+20t\right]_0^4+\left\lvert\left[\frac{t^3}{3}-\frac{9t^2}{2}+20t\right]_4^5\right\rvert$	**B1**	
	$\frac{64}{3}-72+80+\left\lvert\frac{125}{3}-\frac{225}{2}+100-\left(\frac{64}{3}-72+80\right)\right\rvert$	**M1**	**dep** on an attempt to integrate
	$\frac{59}{2}$ oe or 29.5	**A1**	