Question	Answer	Marks	Guidance
7(b)	$3e^{4t} - e^{2t} - 4 = 0$ or $3\left(e^{2t}\right)^2 - e^{2t} - 4 = 0$	**B1**	
	$\left(3e^{2t} - 4\right)\left(e^{2t} + 1\right) = 0$	**M1**	**FT** *their* 3-term quadratic in e^{2t} oe
	$e^{2t} = \frac{4}{3}$ nfww	**A1**	
	$\frac{1}{2}\ln\frac{4}{3}$ oe, isw or 0.144 or 0.1438[41…] rot to 4 or more dp and no other solutions	**A1**	
7(c)	$6 \times e^{2\left(\frac{1}{2}\ln\frac{4}{3}\right)} + 8 \times e^{-2\left(\frac{1}{2}\ln\frac{4}{3}\right)}$	**M1**	**FT** $pe^{2t} + qe^{-2t}$ where p and q are non-zero constants and *their* **positive** $\frac{1}{2}\ln\frac{4}{3}$ from part (b)
	14 nfww	**A1**	
8(a)	Derivative of sin2x: $2\cos 2x$ soi	**B1**	
	Product rule: $x \times 2\cos 2x$ + [1]sin 2x isw	**B1**	**FT** *their* 2cos2x
8(b)	$y = \frac{\pi}{4}$ soi, isw	**B1**	
	gradient of tangent: 1 soi	**B1**	**dep** on correct derivative
	$y = x$ or $y - x = 0$ or $x - y = 0$	**B1**	**dep** on correct derivative
8(c)	$\left[x\sin 2x + \frac{1}{2}\cos 2x\right]_0^{\frac{\pi}{6}}$ nfww	**M3**	**M2** for $x\sin 2x + k\cos 2x$ where $k > 0$ or $k = -\frac{1}{2}$; nfww or **M1** for $\int 2x\cos 2x\,dx = x\sin 2x - \int \sin 2x\,dx$ or $\frac{-\cos 2x}{2} + \int 2x\cos 2x\,dx = x\sin 2x$
	$\frac{\pi}{6}\sin\frac{\pi}{3} + \frac{1}{2}\cos\frac{\pi}{3} - \frac{1}{2}\cos 0$	**A1**	
	$\frac{\pi\sqrt{3}}{12} - \frac{1}{4}$ or $\frac{\pi\sqrt{3}-3}{12}$	**A1**	

Question	Answer	Marks	Guidance
9(a)	Correct pair of simplified linear equations in a and d with terms collected, e.g., $3a+3d=-36$ isw or $a+d=-12$ isw $3a+30d=72$ isw or $a+10d=24$ isw	**B3**	**B2** for one correct simplified equation or **B1** for $a+a+d+a+2d=-36$ or $\frac{3}{2}\{2a+(3-1)d\}=-36$ or $a+9d+a+10d+a+11d=72$ or $\frac{12}{2}\{2a+(12-1)d\}-\frac{9}{2}\{2a+(9-1)d\}=72$ or $12a+66d-9a-36d=72$ or $\frac{3}{2}\{2(a+9d)+(3-1)d\}=72$
	Solves two linear equations for d or a e.g. $27d=108 \rightarrow d=\ldots$ or $9d=36 \rightarrow d=\ldots$ or $a+10(-12-a)=24 \rightarrow a=\ldots$ $27a=-432 \rightarrow a=\ldots$	**M1**	**FT** *their* linear equations in a and d providing at least **B1** earned and the equations have a solution
	$d=4$ and $a=-16$ nfww	**A1**	
9(b)	1.2^n *101	**B3**	where * is any inequality sign or =; **B2** for $\frac{[1](1.2^n-1)}{(1.2-1)}*500$ or **B1** for $r=1.2$ soi
	$n\log 1.2*\log 101$ or $\log_{1.2}101$ soi	**M1**	**FT** 1.2^n * *their* 101 providing **B2** has been awarded and (*their* 101) >0
	$n=26$	**A1**	**dep** on all previous marks awarded