Question	Answer	Marks	Guidance
5(b)	$x^3 - 7x^2 + 12x - 5 = their(-x + 2)$	**B1**	**FT** *their* $y = ax + b$ where a is a non-zero constant
	Uses the correct linear factor $x - 1$ and the correct cubic $x^3 - 7x^2 + 13x - 7[=0]$ to find a quadratic factor with at least two terms correct	**M1**	
	$x^2 - 6x + 7$	**A1**	
	Correct use of formula or completing the square on *their* 3-term quadratic, e.g., $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4[1](7)}}{2[1]}$ or $x = \frac{6 \pm \sqrt{36 - 4[1](7)}}{2}$	**M1**	**FT** *their* 3-term quadratic providing it is from an attempt at finding a quadratic factor and the discriminant is not negative
	$x = 3 \pm \sqrt{2}$	**A1**	
6	$\left[\frac{(x+2)^2}{x} =\right] \quad x + 4 + \frac{4}{x}$ soi	**B2**	**B1** for two terms correct or for $\frac{x^2 + 4x + 4}{x}$
	$\left[\frac{x^2}{2} + 4x + 4\ln x\right]_2^3$	**B2**	**B1** for $\left[\frac{x^2}{2} + ... + 4\ln x\right]_2^3$ or $\left[... + 4x + 4\ln x\right]_2^3$ or $\left[\frac{x^2}{2} + 4x + k\ln x\right]_2^3$ with $k \neq 0$
	$\left[\frac{9}{2} + 12 + 4\ln 3\right] - \left[\frac{4}{2} + 8 + 4\ln 2\right]$	**M1**	**dep** on at least previous **B1** for integration
	$6.5 + 4\ln\left(\frac{3}{2}\right)$ or exact equivalent	**A1**	
7(a)	Velocity: $3e^{2t} - 4e^{-2t} - 1$ isw	**B2**	**B1** for $3e^{2t}$ or $-4e^{-2t}$
	Acceleration: $6e^{2t} + 8e^{-2t}$ isw	**B1**	**FT** $me^{2t} + ne^{-2t} + k$ where m, n and k are constants

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**	