Question	Answer	Marks	Partial marks
5(b)	$e^{4x+2} - 3e^{2x+1} - 10$ [= 0] or $\left(e^{2x+1}\right)^2 - 3e^{2x+1} - 10$ [= 0]	**B1**	
	Solves or factorises *their* 3-term quadratic in e^{2x+1}	**M1**	**FT** *their* 3-term quadratic in e^{2x+1}
	$e^{2x+1} = 5$ nfww	**A1**	
	$x = \frac{-1+\ln 5}{2}$ oe, isw or 0.305 or 0.3047[18…] isw	**A1**	and no other solution
	Alternative		
	$e(e^{2x})^2 - 3e^{2x} - 10e^{-1}$ [= 0] oe or $e^2(e^{2x})^2 - 3e(e^{2x}) - 10$ [= 0] oe or $e^2(e^x)^4 - 3e(e^x)^2 - 10$ [= 0] oe	**(B1)**	
	Solves or factorises *their* 3-term quadratic in e^{2x} oe	**(M1)**	**FT** *their* 3-term quadratic in e^{2x}
	$e^{2x} = \frac{5}{e}$ or 1.839[…] or $e^x = \sqrt{\frac{5}{e}}$ or 1.356[…] nfww	**(A1)**	
	$x = \frac{1}{2}\ln\frac{5}{e}$ oe, isw or 0.305 or 0.3047[18…] isw	**(A1)**	and no other solution
6	$\frac{5-\sqrt{3}}{\left(\sqrt{6}+\sqrt{2}\right)^2}$ soi	**B1**	
	$\left(\sqrt{6}+\sqrt{2}\right)^2 = 6+2+2\sqrt{12}$ or $8+2\sqrt{12}$	**B1**	
	$\frac{5-\sqrt{3}}{8+4\sqrt{3}} \times \frac{8-4\sqrt{3}}{8-4\sqrt{3}}$ or $\frac{5-\sqrt{3}}{4\left(2+\sqrt{3}\right)} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$ oe	**M1**	**FT** $\frac{a(5-\sqrt{3})}{b+c\sqrt{d}}$ where *a*, *b*, and *c* are non-zero constants and *d* is an integer
	$\frac{40-20\sqrt{3}-8\sqrt{3}+12}{8^2-(4\sqrt{3})^2}$ or $\frac{40-20\sqrt{3}-8\sqrt{3}+12}{64-48}$ or $\frac{10-5\sqrt{3}-2\sqrt{3}+3}{4(2^2-(\sqrt{3})^2)}$ or $\frac{10-5\sqrt{3}-2\sqrt{3}+3}{4}$	**A1**	
	$\frac{13}{4} - \frac{7}{4}\sqrt{3}$ oe, nfww	**A1**	**dep** on all previous marks awarded

Question	Answer	Marks	Partial marks
7(a)(i)	252	**B1**	
7(a)(ii)	56	**B2**	**B1** for ${}^8C_3$ or $\frac{8!}{5!\times 3!}$ oe
7(a)(iii)	140	**B2**	**B1** for ${}^8C_4 \times 2$ oe or ${}^{10}C_5 - {}^8C_5 - {}^8C_3$ oe
7(b)	483 840	**B3**	**B2** for 8! × 6 [× 2] or 241 920 oe or **B1** for 8! or 40 320 or 8! × 2 or 80 640
8	$\text{cosec}^2 2\theta + 3\text{cosec}\, 2\theta - 10$ [= 0] or $10\sin^2 2\theta - 3\sin 2\theta - 1$ [= 0]	**B2**	**B1** for correctly writing the equation in terms of one trigonometric function e.g. $\text{cosec}^2 2\theta - 1 + 3\,\text{cosec}\, 2\theta = 9$ or $\frac{1-\sin^2 2\theta}{\sin^2 2\theta} + \frac{3}{\sin 2\theta} = 9$
	Solves or factorises *their* 3-term quadratic in $\text{cosec}2\theta$ or $\sin 2\theta$ e.g. $(\text{cosec}\, 2\theta - 2)\,(\text{cosec}\, 2\theta + 5)$ [= 0] or $(2\sin 2\theta - 1)(5\sin 2\theta + 1)$ [= 0]	**M1**	**FT** *their* 3-term quadratic in $\text{cosec}2\theta$ or $\sin 2\theta$
	[$\sin 2\theta = \frac{1}{2}$ $\sin 2\theta = -\frac{1}{5}$ θ =] 15 75 −5.8 or –5.76 to –5.77 −84.2 or –84.23 to –84.232 and no other angles in range; nfww	**A3**	**A2** for any 2 correct, ignoring extras in range; nfww or **A1** for one correct angle or one correct double angle; nfww