Question	Answer	Marks	Guidance
4(b)	$(-)\frac{\textit{their } V}{15}$	**M1**	Allow omission of negative sign.
	$-\frac{16}{5}\text{ms}^{-2}$ oe	**A1**	**FT** on *their V* but must be negative.
5(a)	$(5\sqrt{3}-6)^2+(5\sqrt{3}+6)^2-2(5\sqrt{3}-6)$ $(5\sqrt{3}+6)\cos 120°$ soi	**M1**	For the correct use of the cosine rule Condone missing brackets if intention is clear
	$75+36-60\sqrt{3}+75+36+60\sqrt{3}+75-36$	**M1**	**M1 Dep** must see sufficient detail to be sure that a calculator is not being used. This is the minimum acceptable $75+36-60\sqrt{3}+75+36+60\sqrt{3}+39$
	261	**A1**	Maybe implied by $\sqrt{261}$
	$3\sqrt{29}$	**A1**	
5(b)	$\frac{2+5\sqrt{5}}{4}=\frac{1}{2}(3+2\sqrt{5})\times QR\times\sin 30°$ soi	**M1**	For the correct use of the area of the triangle. Condone missing brackets if intention is clear
	$\frac{2+5\sqrt{5}}{3+2\sqrt{5}}\times\frac{3-2\sqrt{5}}{3-2\sqrt{5}}$ or $\frac{2+5\sqrt{5}}{3+2\sqrt{5}}\times\frac{-3+2\sqrt{5}}{-3+2\sqrt{5}}$	**M1**	**M1 dep** for a correct attempt to rationalise *their QR* .must be the same two terms in the numerator and denominator to rationalise
	$\frac{6+15\sqrt{5}-4\sqrt{5}-50}{9-20}$ $\frac{11\sqrt{5}-44}{-11}$	**M1**	**M1 dep**, must see sufficient detail to be sure that a calculator is not being used. This is the minimum acceptable $\frac{6+15\sqrt{5}-4\sqrt{5}-50}{-11}$
	$4-\sqrt{5}$	**A1**	

Question	Answer	Marks	Guidance
6(a)	$\dfrac{\dfrac{\cos\theta}{\sin\theta}+\dfrac{\sin\theta}{\cos\theta}}{\dfrac{1}{\cos\theta}}$ soi	**2**	**B1** for $\tan\theta$ and $\cot\theta$ in terms of sin and cos. **B1** for $\sec\theta=\dfrac{1}{\cos\theta}$
	$\dfrac{\cos^2\theta+\sin^2\theta}{\sin\theta\cos\theta}\times\cos\theta$ soi oe	**M1**	For dealing with the fractions in the numerator.
	$\dfrac{1}{\sin\theta}\times\text{cosec}\,\theta$ cso	**A1**	For correct use of $\cos^2\theta+\sin^2\theta=1$ to obtain the given answer.
	$\dfrac{\dfrac{1}{\tan\theta}+\tan\theta}{\dfrac{1}{\cos\theta}}=\dfrac{1+\tan^2\theta}{\tan\theta}\times\cos\theta$ soi oe	**(2)**	**B1** for $\sec\theta=\dfrac{1}{\cos\theta}$ **M1** for dealing with the fractions in the numerator.
	$\dfrac{\sec^2\theta}{\tan\theta}\times\cos\theta$	**(B1)**	For correct use of $\tan^2\theta+1=\sec^2\theta$
	$\dfrac{1}{\sin\theta}\times\text{cosec}\,\theta$ cso	**(A1)**	For correct use of $\tan\theta$ and $\sec^2\theta$ to obtain the given answer.
6(b)	$\left(\dfrac{1}{\sin\frac{\phi}{3}}\right)^2=2$ or $\sin\dfrac{\phi}{3}=\pm\dfrac{1}{\sqrt{2}}$ soi or $\tan\dfrac{\phi}{3}=\pm1$ soi	**B2**	**B1** for ± missing
	–405°, –135°, 135°, 405°	**4**	**M1** for one correct positive or negative solution of *their* $\sin\dfrac{\phi}{3}=k$ **A1** for another correct solution **M1Dep** for one negative or positive solution **A1** for another correct solution and no extras in the range.
7(a)(i)	6435	**B1**	Must be evaluated not just ${}^{15}C_8$
7(a)(ii)	With family of 4: 330	**B1**	Must be evaluated not just ${}^{11}C_4$ or implied by a correct answer
	Without family of 4: 165	**B1**	Must be evaluated not just ${}^{11}C_8$ or implied by a correct answer
	Total: 495	**B1**	