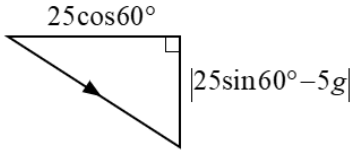
Question number	Scheme	Marks
5		
5(a)	Method to find a relevant vertical displacement	M1
	Eg • Single *suvat* equation $0=(25\sin 60°)^2+2(-g)h$ • Conservation of energy: $\frac{1}{2}m(25)^2-\frac{1}{2}m(25\cos 60°)^2=mgh$	A1
	$h=\frac{1875}{8g}$ (23. 9158..)	A1
	Max height = 144 or 140 (m)	A1
		(4)
5(b)	Horizontal component of velocity = $25\cos 60°$	B1
	Method to find vertical component of velocity when t = 5 s $v=25\sin 60°-5g$	M1
	Use of trig to find relevant angle Eg $\tan^{-1}\left(\frac{\text{their } v}{25\cos 60°}\right)$ or inverse	M1
	 65° below the horizontal or 25° to downward vertical. Direction can be implied from diagram	A1
		(4)
5(c)	Complete method to find the required length of time	M1
	$120=(25\sin 60°)t+\frac{1}{2}gt^2$	A1
	3.2 or 3.21 (s)	A1
		(3)
		(11)

	Notes for question	
(a)		
M1	Complete method to find a relevant vertical displacement using *suvat* or conservation of energy. Requires all terms and no extras. Condone sign errors and sin/cos confusion.	
A1	Correct unsimplified equation(s) in relevant vertical displacement only.	
A1	Correct relevant vertical displacement.	
A1	Correct required height, 2/3sf.	
(b)		
B1	Correct horizontal component of speed. May be seen on a diagram.	
M1	Complete method to find the vertical component of speed $t = 5$. Requires all terms and no extras. Condone sign errors and sin/cos confusion.	
M1	Complete method to find the direction of motion when $t = 5$.	
A1	Correct direction. Accept $65°$ or $65.4°$ and below the horizontal oe, accept if clear from a diagram. Accept $65.4°$ to horizontal, $155°$ to vertical etc with diagram A0 for $155°$ or $15.4°$ without diagram A0 for $-65.4°$ or $65.4°$ above horizontal	
(c)		
M1	Complete method to find the required length of time using *suvat*. Requires all terms and no extras. Condone sign errors and sin/cos confusion. Method may use more than one *suvat* equation. Eg Time to B – Time taken to be level with A FYI: Time from A to ground =7.62871 s Time from A to top =2.2092 s Time from A back to same level =2(2.2092) =4.41849s NB Candidates who only look at $\|\mathbf{v}\| > 25$ will get $t > 4.418$, but for full method need to consider total length of flight (7.62.) and then find difference.	
A1	Correct unsimplified equation(s) in required time only.	
A1	Correct answer and no others, 2/3sf	