11	**(a)**		$(OC=)Ut$	**B1**	**1.1**	Applies $s=ut+0.5at^2$ horizontally correctly with a = 0	
			$0=Vt-\frac{1}{2}gt^2 \Rightarrow t=\ldots$	**M1**	**3.3**	$s=ut+0.5at^2$ with s = 0 and a = -g and solves for t or $v = u + at$ vertically with v = 0, u = V and time doubled	vertically – must be a complete method to find t
			$t=\frac{2V}{g}$	**A1**	**1.1**	Correct time	Ignore mention of t = 0
			$(OC=)\frac{2UV}{g}$	**A1** **[4]**	**2.2a**		
11	**(b)**		Horizontal component is $(u_A=)U$	**B1**	**3.4**		
			Vertical component is $(v_A=)\sqrt{V^2-2gh}$	**B1** **[2]**	**3.4**	oe Or $V-gt$ provided t defined as the time of flight from O to A	
11	**(c)**		From A to B the time of flight T is $\frac{d}{U}$	**B1ft**	**1.1**	Allow with their expression for the horizontal component	Or M1 for their $d=\frac{2u_Av_A}{g}$ from **(a)** with their u_A and v_A
			$0=v_AT-\frac{1}{2}gT^2 \Rightarrow v_A-\frac{1}{2}gT=0$ Therefore $\sqrt{V^2-2gh}-\frac{1}{2}gT=0$	**M1**	**3.3**	Applies $s=ut+0.5at^2$ vertically with s = 0 and uses vertical component from **(b)**	M1A1ft for $d=\frac{2u_Av_A}{g}$ with their values (or vice-versa)
			$\sqrt{V^2-2gh}-\frac{1}{2}g\left(\frac{d}{U}\right)=0 \Rightarrow d=\frac{2U}{g}\sqrt{V^2-2gh}$	**A1** **[3]**	**2.2a**	oe	Full marks for correct answer with no working
11	**(d)**		$\frac{1}{2}=\frac{\left(\frac{gd}{2U}\right)}{U}$ or $\frac{1}{2}=\frac{\sqrt{V^2-2gh}}{U}$	**M1***	**3.1b**	Uses $\tan\theta=\frac{v_A}{u_A}$ with their u_A and v_A	
			$U=\sqrt{gd}$ or $U=2\sqrt{V^2-2gh}$	**A1**	**1.1**	A correct expression for U or U^2	
			$\sqrt{gd}=2\sqrt{V^2-2gh}$	**M1dep***	**3.1a**	Eliminate U and correct method to find V	
			$gd=4\left(V^2-2gh\right) \Rightarrow V=\frac{1}{2}\sqrt{g(8h+d)}$	**A1** **[4]**	**2.2a**	oe	