Question	Scheme	Marks	AOs
10(a)	$H = A(x-2.5)^2 + 5.6$	M1	3.3
	$x=0, H=2.1 \Rightarrow 2.1 = A(0-2.5)^2 + 5.6 \Rightarrow A = \left\{-\frac{14}{25}\right\}$	dM1	3.1b
	$H = -\frac{14}{25}(x-2.5)^2 + 5.6$	A1	1.1b
		(3)	
(b)	$\{H=0\} \Rightarrow 0 = -\frac{14}{25}(x-2.5)^2 + 5.6 \Rightarrow x = ...$	M1	3.4
	$x = \text{awrt } 5.66$ which is greater than 5.5	A1ft	3.2a
		(2)	
(c)	Gives a limitation of the model. Accept e.g., • The ground might not be horizontal • The ball is modelled as a particle • The trajectory of the ball may not be a parabola • There may be spin • The model is not valid for $x >$ e.g. 5.67	B1	3.5b
		(1)	
		(6 marks)	

Notes:

(a)

M1: Translates the situation given into a suitable equation for the model.

e.g., uses the turning point $(2.5, 5.6)$ to write $H = A(x-2.5)^2 + 5.6$

dM1: Applies a complete strategy with appropriate constraints to find all constants in their model.

e.g., uses $(0, 2.1)$ on their model and finds $A = \ldots$

A1: Finds a correct equation linking *H* with *x*, i.e., $H = -\frac{14}{25}(x-2.5)^2 + 5.6$ or equivalent.

Condone use of *y* in place of *H* for both the M1 and dM1 marks, but not for A1.

(b)

M1: Substitutes $H = 0$ into their quadratic model and proceeds to a value for *x*

Alternatively, substitutes $x = 5.5$ into their quadratic model and proceeds to a value for *H*

A1ft: Shows that their $x > 5.5$ or their $H > 0$ together with a conclusion.

Allow follow through on their model here. The value for *x* or *H* must be correct for the model.

In the correct model, this requires $x = \text{awrt } 5.66$ or $H = 0.56$

(c)

B1: See main scheme but accept any suitable comment that does not relate to wind or air resistance.