

Question	Scheme	Marks	AOs
5 (a)	Attempts to use $h^2 = at + b$ with either $t = 2, h = 2.6$ or $t = 10, h = 5.1$	M1	3.1b
	Correct equations $2a + b = 6.76$ $10a + b = 26.01$	A1	1.1b
	Solves simultaneously to find values for a and b	dM1	1.1b
	$h^2 = 2.41t + 1.95$ cao	A1	3.3
		(4)	
(b)	Substitutes $t = 20$ into their $h^2 = 2.41t + 1.95$ and finds h or h^2 Or substitutes $h = 7$ into their $h^2 = 2.41t + 1.95$ and finds t	M1	3.4
	Compares the model with the true values and concludes "good model" with a minimal reason E.g. I Finds $h = 7.08$ (m) and states that it is a good model as 7.08 (m) is close to 7 (m) E.g. II Finds $t = 19.5$ years and states that the model is accurate as 19.5 (years) ≈ 20 (years)	A1	3.5a
		(2)	
			(6 marks)
Notes:			

(a)

M1: For translating the problem into mathematics. Attempts to use the given equation o.e. with either of the pieces of information to form one correct equation.

Award for unsimplified equations as well, such as $2.6^2 = 2a + b$ or $2.6 = \sqrt{2a + b}$

A1: Two correct (and different) equations which may be unsimplified

dM1: Solves simultaneously to find values for a and b . It is dependent upon the previous M

Don't be too concerned with the process here as calculators may be used.

Score if values of a and b are reached from a pair of simultaneous equations

A1: Establishes **the full equation of the model** with values of a and b given to **exactly** 3sf. Award if seen in either (a) or (b). It is not scored for the values of a and b .

Allow either $h^2 = 2.41t + 1.95$ or $h = \sqrt{2.41t + 1.95}$

If they go on to square root each term from $h^2 = 2.41t + 1.95$ then it is A0. E.g. $h = 1.55t + 1.40$

Special case for candidates who mistakenly use $h = at + b$

For $2.6 = 2a + b$, $5.1 = 10a + b \Rightarrow h = 0.3125t + 1.975$ or $h = 0.313t + 1.98$

can score M1 correct equations with attempt to solve and A1 for either correct answer shown above.

These are the only marks available to them for a maximum mark of 1100 00

(b)

M1: A full and valid attempt to

either substitute $t = 20$ into their $h^2 = 2.41t + 1.95$ o.e. and find a value for h or h^2

or substitute $h = 7$ into their $h^2 = 2.41t + 1.95$ o.e. and find a value for t

(to enable the candidate to compare real life data with that of the model.)

The equation of the model must be of the correct form, either $h^2 = at + b$ or $h = \sqrt{at + b}$

Do not be too concerned with the mechanics of the solution but the square or $\sqrt{\quad}$ must have been used appropriately to enable the comparison to be made.

In cases with no working you will need to check the calculation

A1: Compares their $h = 7.08\text{m}$ to 7m o.e using h^2 or their $t = 19.5$ years to 20 years and makes valid conclusion with reason.

For this mark you require

- a statement that it is a "good" or "accurate" model or similar wording
- a reason such as "the values are close", "the values are similar" or "the predicted values are within 5% of the true values."
- a model with equation $h^2 = at + b$ o.e. where $a = \text{awrt } 2.4$ and $b \in [1.9, 2.0]$
- correct calculations

Condone a statement like 'the model is pretty accurate as it predicted 7.08m and the actual value is 7m'

Do not allow incorrect statements such as the model is incorrect as it does not give 7 metres.

Do not allow just "the model gives an underestimate of the true value."

Do not allow 'bad' or 'poor' model