Question	Scheme	Marks	AOs
10(a)	$T = al^b \Rightarrow \log_{10} T = \log_{10} a + \log_{10} l^b$	M1	2.1
	$\Rightarrow \log_{10} T = \log_{10} a + b\log_{10} l\,*$ or $\Rightarrow \log_{10} T = b\log_{10} l + \log_{10} a\,*$	A1*	1.1b
		(2)	
(b)	$b = 0.495$ or $b = \dfrac{45}{91}$	B1	2.2a
	$0 = "0.495" \times -0.7 + \log_{10} a \Rightarrow a = 10^{0.346}$ or $0.45 = "0.495" \times 0.21 + \log_{10} a \Rightarrow a = 10^{0.346}$	M1	3.1a
	$T = 2.22l^{0.495}$	A1	3.3
		(3)	
(c)	The time taken for one swing of a pendulum of length 1 m	B1	3.2a
		(1)	
		(6 marks)	

Notes

(a)

M1: Takes logs of both sides and shows the addition law.

Implied by $T = al^b \Rightarrow \log_{10} a + \log_{10} l^b$

A1*: Uses the power law to obtain the given equation with no errors. Allow the bases to be missing in the working but they must be present in the final answer.
  Also allow t rather than T and A rather than a.

Allow working backwards e.g.

$$\log_{10} T = b\log_{10} l + \log_{10} a \Rightarrow \log_{10} T = \log_{10} l^b + \log_{10} a$$
$$\Rightarrow \log_{10} T = \log_{10} al^b \Rightarrow T = al^b\,*$$

M1: Uses the given answer and uses the power law and addition law correctly
A1: Reaches the given equation with no errors as above

(b)

B1: Deduces the correct value for b (Allow awrt 0.495 or $\dfrac{45}{91}$)

M1: Correct strategy to find the value of a.

E.g. substitutes one of the given points and their value for b into $\log_{10} T = \log_{10} a + b\log_{10} l$
and uses correct log work to identify the value of a. Allow slips in rearranging their equation but must be correct log work to find a.

Alternatively finds the equation of the straight line and equates the constant to $\log_{10} a$ and uses correct log work to identify the value of a.

E.g. $y - 0.45 = "0.495"(x - 0.21) \Rightarrow y = "0.495"x + 0.346 \Rightarrow a = 10^{0.346} = \ldots$

A1: Complete equation $T = 2.22l^{0.495}$ or $T = 2.22l^{\frac{45}{91}}$

  (Allow awrt 2.22 and awrt 0.495 or $\dfrac{45}{91}$)

Must see the <u>equation</u> not just correct values as it is a requirement of the question.

(c)
B1: Correct interpretation