<table>
<tr><th>Question</th><th colspan="2">Scheme</th><th>Marks</th><th>AOs</th></tr>
<tr><td rowspan="4">13 (a)</td><td>$\log_{10} h = 2.25 - 0.235\log_{10} m$
$\Rightarrow h = 10^{2\ 25-0\ 235\log_{10} m}$
$\Rightarrow h = 10^{2\ 25} \times m^{-0\ 235}$</td><td>$h = pm^{q}$
$\Rightarrow \log_{10} h = \log_{10} p + \log_{10} m^{q}$
$\Rightarrow \log_{10} h = \log_{10} p + q\log_{10} m$</td><td>M1</td><td>1.1b</td></tr>
<tr><td>Either one of
$p = 10^{2\ 25}$ $q = -0.235$</td><td>Or either one of
$\log_{10} p = 2.25$ $q = -0.235$</td><td>A1</td><td>1.1b</td></tr>
<tr><td colspan="2">$\Rightarrow p = 178$ and $q = -0.235$</td><td>A1</td><td>2.2a</td></tr>
<tr><td colspan="2"></td><td>(3)</td><td></td></tr>
<tr><td rowspan="4">(b)</td><td>$h = "178" \times 5^{"-0\ 235"}$</td><td>$\log_{10} h = "2.25" - "0.235"\log_{10} 5$</td><td>M1</td><td>3.1b</td></tr>
<tr><td>$h = 122$</td><td>$h = 122$</td><td>A1</td><td>1.1b</td></tr>
<tr><td colspan="2">Reasonably accurate (to 2 sf) so suitable</td><td>A1ft</td><td>3.2b</td></tr>
<tr><td colspan="2"></td><td>(3)</td><td></td></tr>
<tr><td rowspan="2">(c)</td><td colspan="2">"p" would be the (resting) heart rate (in bpm) of a mammal with a mass of 1 kg</td><td>B1</td><td>3.4</td></tr>
<tr><td colspan="2"></td><td>(1)</td><td></td></tr>
<tr><td colspan="5" align="right">(7 marks)</td></tr>
</table>

Notes

(a)

M1: Establishes a link between $h = pm^{q}$ and $\log_{10} h = 2.25 - 0.235\log_{10} m$.
May be implied by a correct equation in p or q

A1: For a correct equation in p or q

A1: $p = 178$ and $q = -0.235$

(b)

M1: Uses either model to set up an equation in h (or m)

A1: h = awrt 122. Condone h = awrt 122 bpm

A1ft: Comments on the suitability of the model. Follow through on their answer.

Requires a comment consistent with their answer from using the model.

E.g. It is a suitable model as it is only "3" bpm away from the real value ✓
Do not allow an argument stating that it should be the same.
It is an unsuitable model as "122" bpm is not equal to 119 bpm ✗

(c)

B1: "p" would be the (resting) heart rate of a mammal with a mass of 1 kg