Question	Scheme		Marks	AOs
6(a)	eg As the number of minutes <u>exercise</u> (m) increases the resting <u>heart rate</u> (h) decreases **or** the gradient of the curve is becoming flatter with increasing m: diminishing effect of each <u>additional minute</u> of <u>exercise</u>		B1	2.4
			(1)	
(b)	$H_0 : \rho = 0$ $H_1 : \rho < 0$		B1	2.5
	Critical value – 0.3887 (Allow $\pm$)		M1	1.1b
	There is evidence that the product moment **<u>correlation</u>** is **<u>less than 0</u>/ <u>there is a negative correlation</u>**		A1	2.2b
			(3)	
(c)	$\log_{10} h = -0.05 \log_{10} m + 1.92$	$h = am^k \rightarrow \log_{10} h = \log_{10} am^k$	M1	1.1b
	$\log_{10} h = -\log_{10} m^{0\,05} + 1.92$ or $\log_{10} h = \log_{10} m^{-0\,05} + 1.92$ or $h = 10^{1\,92 - 0\,05 \log_{10} m}$ oe	$\log_{10} h = \log_{10} a + \log_{10} m^k$ or $\log_{10} a = 1.92$	M1	2.1
	$\log_{10} hm^{0\,05} = 1.92$ or $\log_{10}\left(\frac{h}{m^{-0\,05}}\right) = 1.92$ or $h = 10^{1\,92} \times 10^{-0\,05 \log_{10} m}$ oe	$\log_{10} h = \log_{10} a + k \log_{10} m$	M1	1.1b
	$hm^{0\,05} = 10^{1\,92}$ or $\frac{h}{m^{-0\,05}} = 10^{1\,92}$ or $h = 10^{1\,92} \times 10^{\log_{10} m^{-0.05}}$	$\log_{10} a = 1.92$ and $k = -0.05$	M1	1.1b
	$h = 10^{1\,92} m^{-0\,05}$ or $h = 83.17...m^{-0\,05}$ or a = awrt 83.17 **and** $k = -0.05$		A1	1.1b
			(5)	

Notes: **(9 marks)**

(a)	**B1**	eg Idea as one increases the other decreases (in context). Allow use of m and h eg As m increases h decreases. Do not allow negative correlation with no context or $\rho < 0$ Allow there is a negative correlation/association/relationship/exponential between minutes <u>exercise</u>(m) and resting <u>heart rate</u> (h) oe
(b)	**B1**	Both hypotheses correct in terms of ρ (allow p)
	M1	For the cv of -0.3887 or any cv such that $0.3 < \lvert cv \rvert < 0.5$
	A1	Independent of hypotheses. Correct conclusion that implies reject H_0 on basis of seeing – 0.3887 or if they give 0.3887 we must see the comparison $0.3887 < 0.897$ **and** which mentions "pmcc/correlation/relationship" and less than 0/ negative or $\rho < 0$ A contradictory statement scores A0 eg Accept H_0 therefore negative correlation
(c)		**In this part once M0 is scored no more marks can be scored. Condone no base**
	M1	**May be implied by 2nd M1 mark** Method 1: Correct substitution for both x and y Method 2 : Taking the log of both sides
	M1	**May be implied by 3rd M1 mark** Method 1: Correct use of the power log rule **or** making h the subject Method 2 : Correct use of the addition/subtraction log rule
	M1	**This line implies M1M1M1** Method 1: Correct use of the addition/subtraction log rule or eq^n in the form $h = 10^{1\,92} \times 10^{-0\,05 \log m}$ Method 2: A second correct step for correct use of the power log rule
	M1	**This line implies M1M1M1M1** Method 1: Correct removal of logs or $h = 10^{1\,92} \times 10^{\log m^{-0.05}}$ Method 2: Log a (or a) and k correct
	A1	Allow h = awrt $83.2m^{-0\,05}$ NB award 5/5 for a = awrt 83.2 and $k = -0.05$ or h = awrt $83.2...m^{-0\,05}$ or $h = 10^{1\,92} m^{-0\,05}$