

6. Anna is investigating the relationship between exercise and resting heart rate. She takes a random sample of 19 people in her year at school and records for each person

- their resting heart rate, h beats per minute
- the number of minutes, m , spent exercising each week

Her results are shown on the scatter diagram.

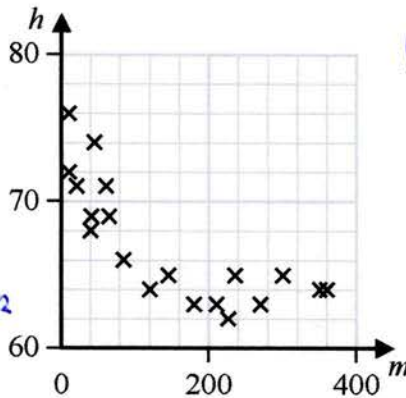
(a) as Anna spends more time exercising, her resting heart beat decreases (1 mark)

(c) $y = -0.05x + 1.92$

$\log_{10} h = -0.05 \log_{10} m + 1.92$
(1 mark)

$\log_{10} h = \log_{10} m^{-0.05} + 1.92$
(1 mark)

$\log_{10} h = \log_{10} m^{-0.05} + \log_{10} (10)^{1.92}$
 $= \log_{10} (10^{-0.05} m^{1.92})$ (1 mark)



(b) $H_0: \rho = 0$ (no correlation)
 $H_1: \rho < 0$ (negative correlation)
(1 mark)

From "Critical Values for Correlation Coefficients" table in Formula Booklet (For Product Moment Coeff.) critical value for sample size 19 at 5% sig level is 0.3887

(a) Interpret the nature of the relationship between h and m

(1)

Anna codes the data using the formulae

$$x = \log_{10} m$$

$$y = \log_{10} h$$

that is for positive correlation. For negative correlation, critical value is -0.3887 (1 mark)

The product moment correlation coefficient between x and y is -0.897

(b) Test whether or not there is significant evidence of a negative correlation between x and y

You should

- state your hypotheses clearly
- use a 5% level of significance
- state the critical value used

the observed correlation of -0.897 is stronger than the critical value of -0.3887 so there is evidence of negative correlation at 5% sig level (1 mark)

(3)

The equation of the line of best fit of y on x is

$$y = -0.05x + 1.92$$

(c) Use the equation of the line of best fit of y on x to find a model for h on m in the form

$$h = am^k$$

(c) contd.

$$\log_{10} h = \log_{10} (10^{1.92} m^{-0.05})$$

$$h = 10^{1.92} m^{-0.05}$$

$$= 83.17 m^{-0.05}$$
 (2 marks)

(5)

where a and k are constants to be found.