

2. Amar is studying the flight of a bird from its nest.

He measures the bird's height above the ground, h metres, at time t seconds for 10 values of t

Amar finds the equation of the regression line for the data to be $h = 38.6 - 1.28t$

(a) Interpret the gradient of this line.

(1)

The product moment correlation coefficient between h and t is -0.510

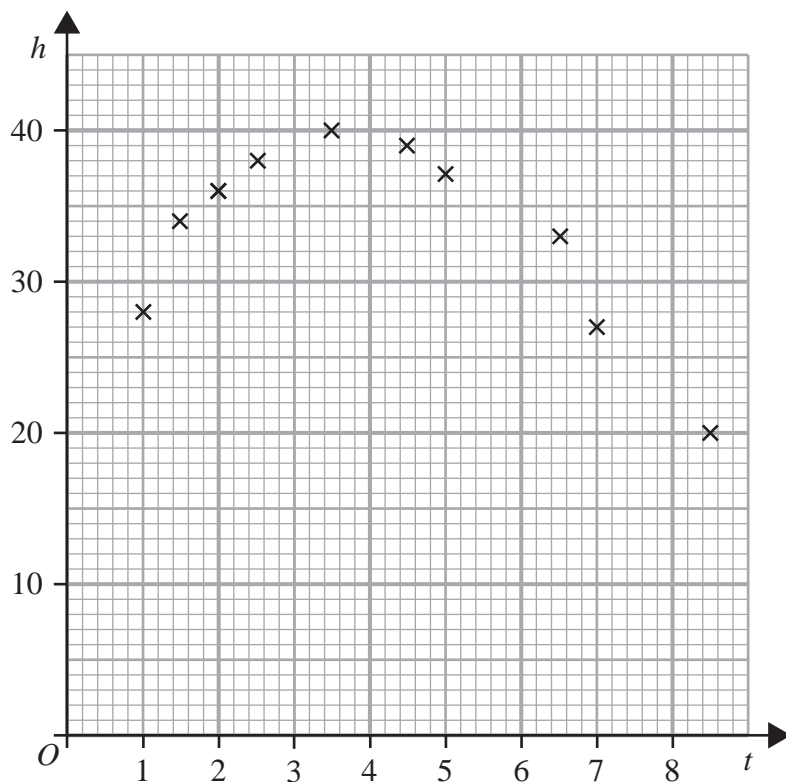
(b) Test whether or not there is evidence of a negative correlation between the height above the ground and the time during the flight.

You should

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

(3)

Jane draws the following scatter diagram for Amar's data.



(c) With reference to the scatter diagram, state, giving a reason, whether or not the regression line $h = 38.6 - 1.28t$ is an appropriate model for these data.

(1)

Jane suggests an improved model using the variable $u = (t - k)^2$ where k is a constant.

She obtains the equation $h = 38.1 - 0.78u$

(d) Choose a suitable value for k to write Jane's improved model for h in terms of t only.

(1)