

Q5, 6, 8 on the sheet

- 5) Specific humidity can be expressed as the grams of water vapour per kilogram of atmospheric gas. The table show the temperature, in celcius, and the specific humidities recorded at different atmospheric temperatures.

- a) Plot a scatter diagram showing $\log h$ against t

you said not to draw any graphs for the homework

- b) comment on the correlation between $\log h$ and t

Positive correlation

- c) Use your answer to part A to explain why an equation of the form $h = kb^t$, where k and b are constants, is likely to be a good model for the relationship t and h

$$h = kb^t$$

$$\log h = \log k + t \log b$$

therefore this is a good model for the data as $\log h$ is the y axis to part A, $\log k$ is the y intercept, and $\log b$ is the gradient

- d) The regression line of $\log h$ on t is given as $\log h = 0.494 + 0.0327t$ Determine the values of the constants k and b in the equation given in part c

$$\log h = \log k + t \log b$$

$$\log h = 0.494 + 0.0327t$$

$$\log_{10} k = 0.494$$

$$10^{0.494} = 3.118...$$

$$k = 3.12, 3sf$$

$$t = 0.0327$$

- 6) Data are collected on the amounts of water, W million gallons per day, used to generate electricity, E million kilowatt hours, from a sample of hydroelectric generators. The data are coded using $x = \log W$ and $y = \log E$. It is found that a linear relationship exists between x and y and that the equation of the regression line of y on x is $y = 1.02x - 1.22$. Find an equation for E in terms of W , giving your answer in the form $E = aW^n$, where a and n are constants to be found.

$$E = aW^n$$

$$\log E = \log a + n \log W$$

$$y = 1.02x - 1.22$$

$$\log_{10} a = 1.22$$

$$a = 10^{1.22} = 16.595..$$

$$a = 16.6, 3sf$$

$$n = 1.02$$

8)

The table shows some data collected on the amounts of nitrogen, kg per hectare, added to an agricultural field and the harvest of grain, kg per hectare.

The data is coded using $x = \log N$ and $y = \log H$

The regression line of y on x is found to be $y = 2.6 + 0.67x$

- a) given that the data can be modelled by an equation of the form $y = ax^n$, where a and n are constants, find the values of a and n .

$$y = ax^n$$

$$\log y = \log a + n \log x$$

$$y = 2.6 + 0.67x$$

$$\log_{10} a = 2.6$$

$$10^{2.6} = 398.107.. = 398, 3sf$$

$$n = 0.67$$

- b) Explain why this model is not reliable for estimating the harvest of a field with a nitrogen input of 900kg/ha

There is not enough data that high, meaning any estimation would be extrapolating the current data and could be inaccurate.