

Question Examples from Advance Information for Paper 3 (EdExcel)

Regression lines (change of variable); hypothesis test for correlation

The table below gives the surface area, S , and the volume, V of five different spheres, rounded to 1 decimal place.

S	18.1	50.3	113.1	221.7	314.2
V	7.2	33.5	113.1	310.3	523.6

Given that $S = aV^b$, where a and b are constants,

- a show that $\log S = \log a + b \log V$. (2 marks)
- b copy and complete the table of values of $\log S$ and $\log V$, giving your answers to 2 decimal places. (1 mark)

$\log S$					
$\log V$	0.86				

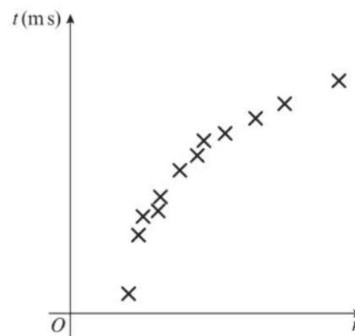
- c plot a graph of $\log V$ against $\log S$ and draw in a line of best fit. (2 marks)
- d use your graph to confirm that $b = 1.5$ and estimate the value of a to one significant figure. (4 marks)

The time, t ms, needed for a computer algorithm to determine whether a number, n , is prime is recorded for different values of n . A scatter graph of t against n is drawn.

- a Explain why a model of the form $t = a + bn$ is unlikely to fit these data.

The data are coded using the changes of variable $y = \log t$ and $x = \log n$. The regression line of y on x is found to be $y = -0.301 + 0.6x$.

- b Find an equation for t in terms of n , giving your answer in the form $t = an^k$, where a and k are constants to be found.



Data are collected on the number of units (c) of a catalyst added to a chemical process, and the rate of reaction (r).

The data are coded using $x = \log c$ and $y = \log r$. 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 $y = 1.31x - 0.41$.

Use this equation to determine an expression for r in terms of c .

The heights, h cm, and masses, m kg, of a sample of Galapagos penguins are recorded. The data are coded using $y = \log m$ and $x = \log h$ and it is found that a linear relationship exists between x and y . The equation of the regression line of y on x is $y = 0.0023 + 1.8x$.

Find an equation to describe the relationship between m and h , giving your answer in the form $m = ah^n$, where a and n are constants to be found.

