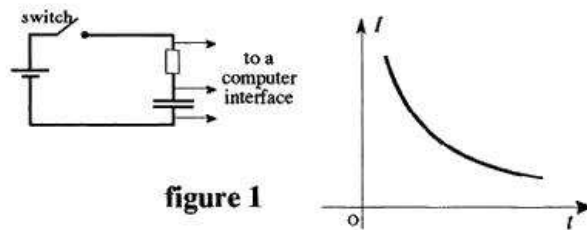
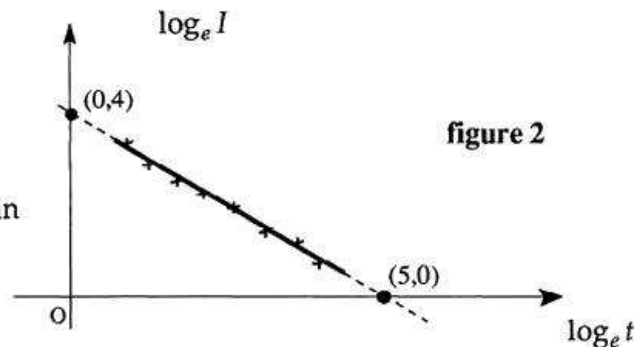


experimental data

- [SQA] 1. When the switch in this circuit was closed, the computer printed out a graph of the current flowing (I microamps) against the time (t seconds). This graph is shown in fig. 1.



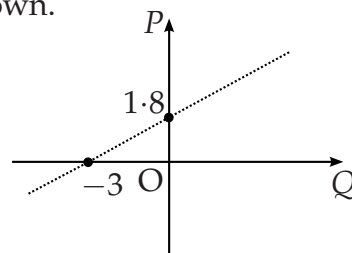
In order to determine the equation of the graph shown in figure 1, values of $\log_e I$ were plotted against $\log_e t$ and the best fitting straight line was drawn as shown in figure 2.



- (a) Find the equation of the line shown in figure 2 in terms of $\log_e I$ and $\log_e t$. (3)
- (b) Hence or otherwise show that I and t satisfy a relationship of the form $I = kt^r$ stating the values of k and r . (4)

- [SQA] 2. The results of an experiment give rise to the graph shown.

- (a) Write down the equation of the line in terms of P and Q .



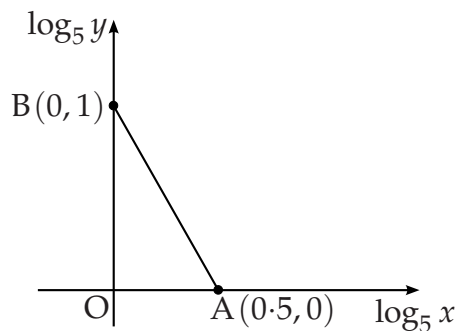
It is given that $P = \log_e p$ and $Q = \log_e q$.

- (b) Show that p and q satisfy a relationship of the form $p = aq^b$, stating the values of a and b . (4)

[SQA]

3. The graph illustrates the law $y = kx^n$.

If the straight line passes through A(0.5, 0) and B(0, 1), find the values of k and n .

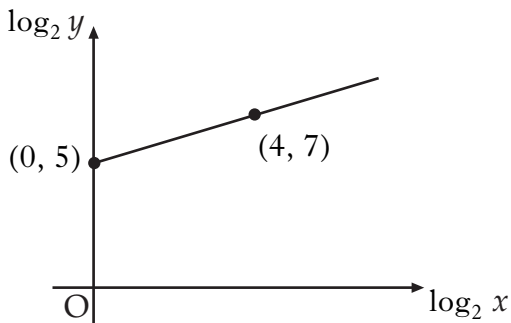


4

4. Variables x and y are related by the equation $y = kx^n$.

The graph of $\log_2 y$ against $\log_2 x$ is a straight line through the points (0, 5) and (4, 7), as shown in the diagram.

Find the values of k and n .



5

[SQA]

5. (a) The variables x and y are connected by a relationship of the form $y = ae^{bx}$ where a and b are constants. Show that there is a linear relationship between $\log_e y$ and x .

(3)

(b) From an experiment some data was obtained. The table shows the data which lies on the line of best fit.

x	3.1	3.5	4.1	5.2
y	21 876	72 631	439 392	11 913 076

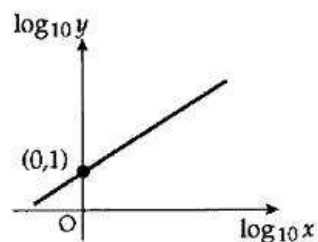
The variables x and y in the above table are connected by a relationship of the form $y = ae^{bx}$. Determine the values of a and b .

(6)

[SQA]

6. As shown in the diagram, a set of experimental results gives a straight line graph when $\log_{10} y$ is plotted against $\log_{10} x$. The straight line passes through (0, 1) and has a gradient of 2.

Express y in terms of x .



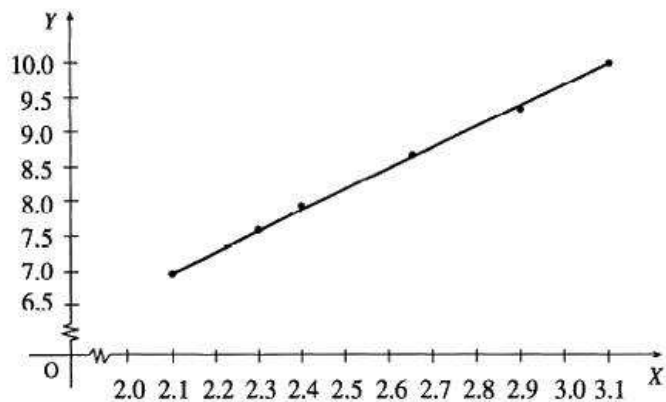
6

[SQA]

7. Six spherical sponges were dipped in water and weighed to see how much water each could absorb. The diameter (x millimetres) and the gain in weight (y grams) were measured and recorded for each sponge. It is thought that x and y are connected by a relationship of the form $y = ax^b$.

By taking logarithms of the values of x and y , the table below was constructed.

X ($=\log_e x$)	Y ($=\log_e y$)
2.10	7.00
2.31	7.60
2.40	7.92
2.65	8.70
2.90	9.38
3.10	10.00



A graph was drawn and is shown above.

(a) Find the equation of the line in the form $Y = mX + c$. (3)

(b) Hence find the values of the constants a and b in the relationship $y = ax^b$. (4)

[END OF QUESTIONS]