

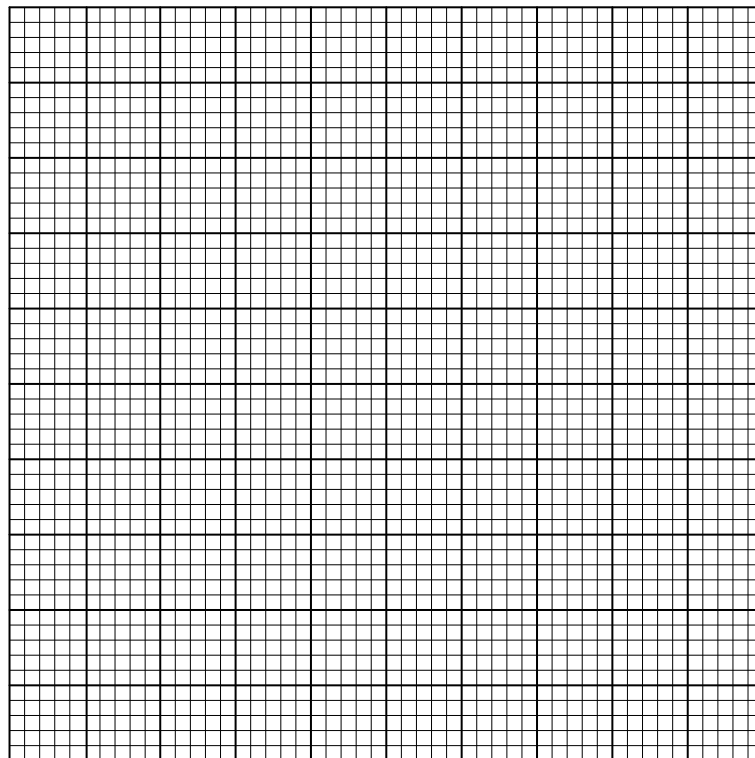


Resistance of a Filament Lamp

A data logging device and a computer were used to measure the current flowing through a filament lamp, during the first few milliseconds after it was switched on. The table shows the results of this observation.

Time (milliseconds)	Current (A)
0.0	1.50
0.5	1.30
1.0	1.12
1.5	0.95
2.0	0.81
2.5	0.69
3.0	0.60
3.5	0.54
4.0	0.50
4.5	0.50
5.0	0.50

Making suitable use of the space available, plot the points on the grid below, and draw a line of best fit.



Questions

1. Describe in detail how the current varies with time.

2. At what level does the current finally rest?

3. How must the resistance of the lamp be changing as the current decreases?

4. What do you think is causing this variation in the resistance of the lamp?

5. The power supply used to light the lamp was set at a potential difference of 12V. Using Ohms law ($V=IR$), calculate the resistance of the lamp at these times.

- a. 0 milliseconds
- b. 2 milliseconds
- c. 4 milliseconds

6. The lamp was replaced by a fixed resistor, and the observation repeated. The results showed that the values for the current were constant. In terms of resistance, how does the fixed resistor differ from the lamp?
