1 Fig. 1.1 shows a thin coil of cross-sectional area *A* and length l connected to a resistor of resistance *S* and two terminals.

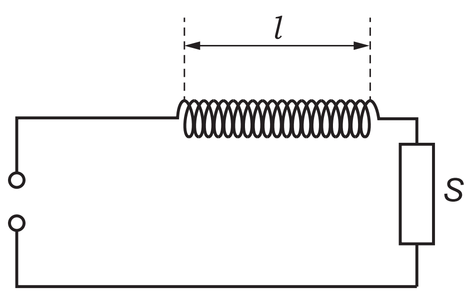

Fig. 1.1

An alternating voltage is applied to the terminals. The peak value of the alternating voltage is *E* and the frequency is *f*. The peak value of the potential difference *V* across the resistor is determined using an oscilloscope.

It is suggested that *V* is related to *f* by the relationship

$$\frac{ES}{V} = \frac{KAN^2f}{l}$$

where *N* is the number of turns on the coil and *K* is a constant.

Plan a laboratory experiment to test the relationship between *V* and *f*.

Draw a diagram showing the arrangement of your equipment.

Explain how the results could be used to determine a value for *K*.

In your plan you should include:

- the procedure to be followed
- the measurements to be taken
- the control of variables
- the analysis of the data
- any safety precautions to be taken.

Diagram

[15]