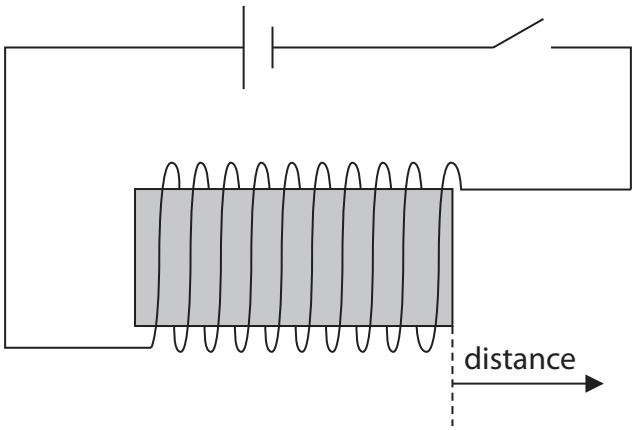
4 A student investigates how the strength of the magnetic field from a solenoid changes with distance from the end of the solenoid.

The diagram shows the solenoid connected to a power supply.



(a) The student uses a device called a Hall probe, which can be placed anywhere in the magnetic field to measure its strength at that point.

Design a suitable method for the investigation.

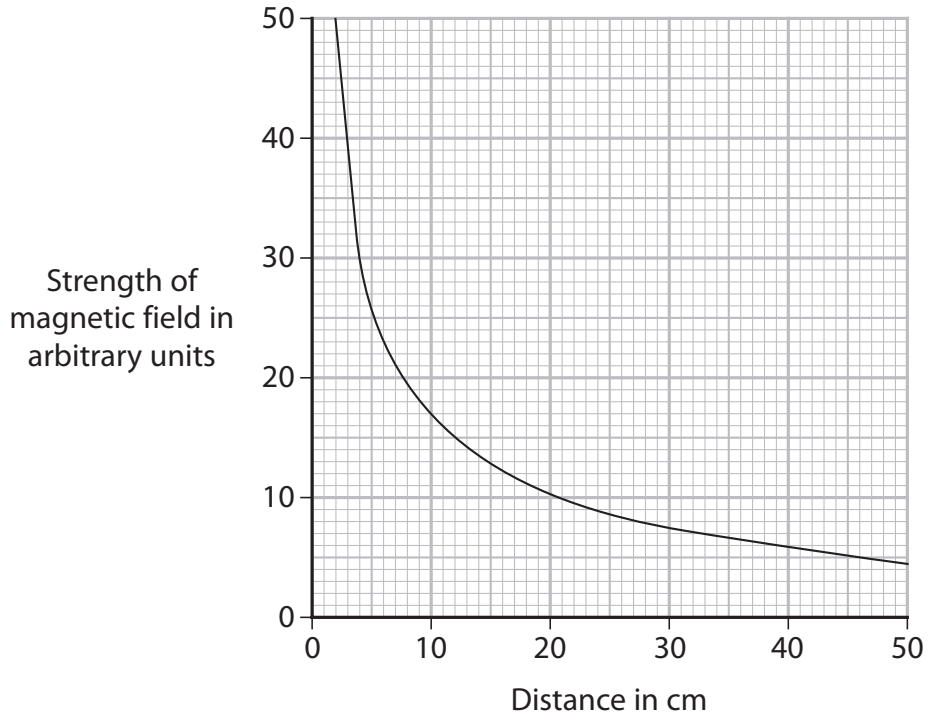
Your answer should include

- any extra measuring equipment needed
- details of the independent variable, dependent variable and any control variables

You may include a diagram to help your answer.

(5)

(b) The graph shows the results of the student's investigation.



The student suggests that the relationship linking the strength of the magnetic field and the distance from the end of the solenoid is

$$\text{strength of magnetic field} \times (\text{distance})^3 = \text{constant}$$

Use readings from the graph to deduce whether the results of the student's investigation support this relationship.

(4)

(Total for Question 4 = 9 marks)

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