3.2 Electricity and Magnetism: 10-minute Pack

Calculator allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A 24 V supply powers a heater rated at 48 W.

(a) Calculate the current drawn by the heater. **(2)**

.....

(b) Calculate the resistance of the heater element. **(1)**

.....

2 An electromagnet is made by wrapping 200 turns of insulated wire around an iron nail and connecting it to a 6 V supply. The pupil then increases the number of turns to 400 while keeping the same current and supply. Explain how increasing the number of turns affects the magnetic field strength and why. Identify one practical safety consideration when using the electromagnet.

(4)

3 A simple circuit uses a 9 V battery, a switch and a lamp. The lamp is dim when connected. Suggest two changes to make the lamp brighter and explain briefly why each change would make it brighter.

(3)

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Mark scheme · 3.2 Electricity and Magnetism: 10-minute Pack

Question 1

(a) use P = V I and rearrange to I = P / V with 48 / 24	**M1**
(a) 2.0 A cao	**A1**

(a) Answer: **2.0 A**

(b) use R = V / I with 24 / 2.0 = 12.0 ohm cao	**B1**

(b) Answer: **12.0 ohm**

Question 2

state that magnetic field strength increases when number of turns increases	**M1**
link to more turns producing a stronger combined magnetic field around the iron core	**M1**
explain that more loops increase magnetic field lines density and the iron core becomes more strongly magnetised	**A1**
give a safety consideration such as the coil heating up, so avoid long use or use insulation and do not touch hot wire	**A1**

Answer: **Increasing the number of turns strengthens the magnetic field because more loops produce a denser field of magnetic lines and the iron core becomes more strongly magnetised. Safety: the coil can heat up, so avoid prolonged use and do not touch the coil or allow bare wires to contact skin.**

Question 3

suggest increasing the voltage (use a higher voltage battery)	**M1**
suggest reducing total resistance (use a lamp with lower resistance, or use thicker/shorter connecting wires, or remove any other resistors from the series circuit)	**M1**
explain that higher voltage or lower resistance increases current so more power reaches the lamp	**A1**

Answer: **Any two from: use a higher voltage battery; reduce resistance in the circuit (use a lamp with lower resistance, use thicker/shorter connecting wires, or remove other resistors from the series circuit). Both increase current so the lamp receives more power and becomes brighter.**

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