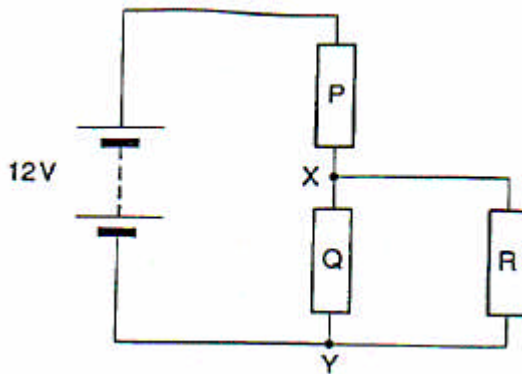


Chapter 2
Multiple choice and quick questions

Three 8Ω resistors P, Q and R are connected across a 12V battery of negligible internal resistance.



1. Which one of A to E below is the value, in V, of the p.d. between X and Y?

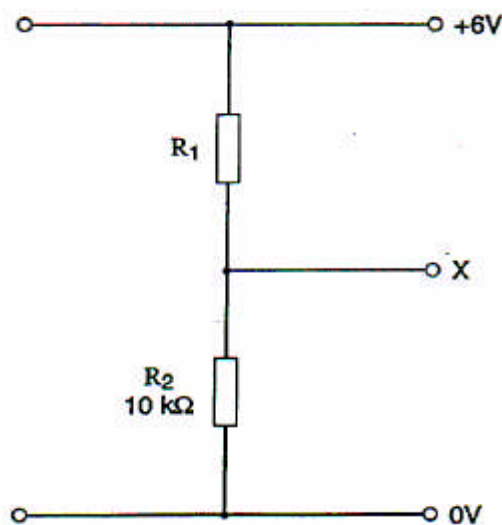
A 3 B 4 ✓ C 6 D 8 E 9

Resistors P, Q and R are all replaced with resistors of value 16Ω .

2. Which of the values A to E below is now the p.d., in V, between X and Y?

A 3 B 4 ✓ C 6 D 8 E 9

- 3.

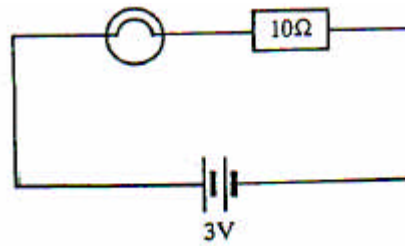
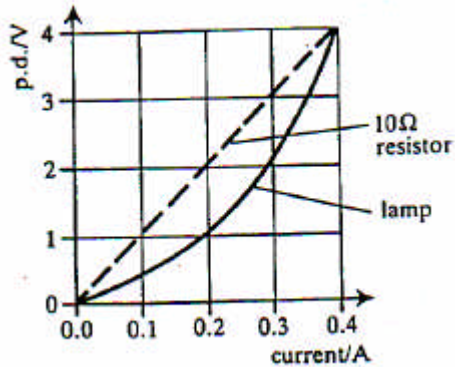


In the above circuit, point X is to be held at a steady potential of +1 V by the resistors R_1 and R_2 connected across the low resistance 6 V power supply. R_2 is a $10\text{ k}\Omega$ resistor.

Which one of **A** to **D** below is the correct value, in $k\Omega$, for the resistor R_1 ?

- A** 10 **B** 50 ✓ **C** 60 **D** 120

4. The graph below shows the relationship between potential difference and current for a particular filament lamp and for a fixed 10Ω resistor.



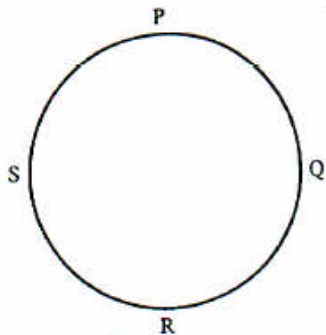
What is the current in the circuit when the lamp is connected as shown above to the 10Ω resistor and a 3 V battery of negligible internal resistance?

- A** 0.10 A **B** 0.20A ✓ **C** 0.30 A **D** 0.35 A **E** 0.65 A

5. A uniform rod of conducting putty has a resistance R between the ends. Which one of **A** to **E** below gives the resistance of the rod when it is reformed to twice its original length?

- A** $4R$ ✓ **B** $2R$ **C** R **D** $R/2$ **E** $R/4$

- 6.



A circle of *circumference* 1.0m is drawn with a pencil.

The pencil line is of uniform width and thickness and has resistance of $100 \text{ k}\Omega \text{ m}^{-1}$. PQRS are equally spaced points around the circumference. A 6 V battery of negligible internal resistance is connected between P and R.

Which one of A to E is the potential difference in V between Q and S?

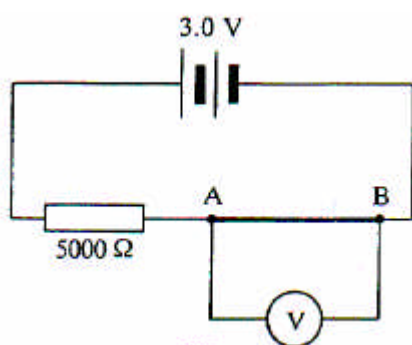
- A zero ✓ B 1.5 C 3.0 D 4.5 E 6.0

7. Which one of A to E is the resistance in $\text{k}\Omega$ between P and R?

- A 25 ✓ B 50 C 100 D 150 E 200

8. In the circuit diagram below, AB is a strip of conducting paper with resistance per unit length of $5.0 \text{ }\Omega \text{ mm}^{-1}$.

The paper strip is 2000 mm long and 30 mm wide.
The battery and connecting wires have negligible resistance.



(a) Calculate

(i) the resistance of the paper strip,

$$R = (50 \Omega \text{ mm}^{-1}) \times (2000 \text{ mm}) = 10 \text{ k}\Omega$$

(ii) the voltmeter reading.

$$V_{AB} = \frac{10}{15} \times 3.0 = 2 \text{ V}$$

9. This question is about the behaviour of a battery under load.

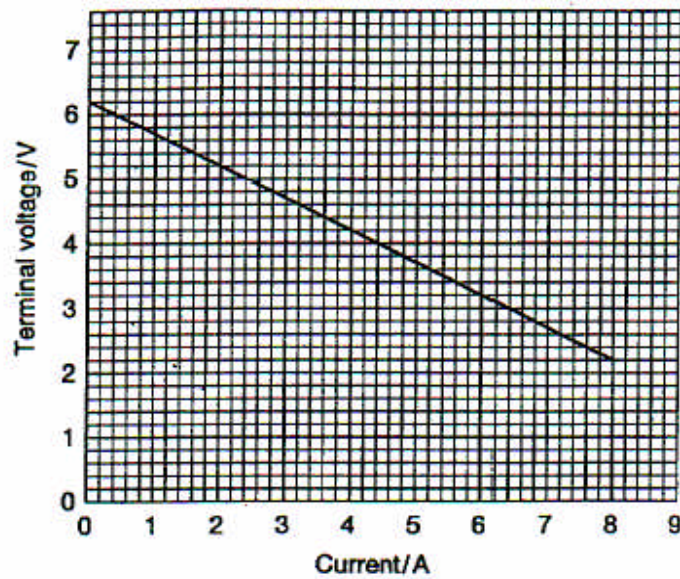
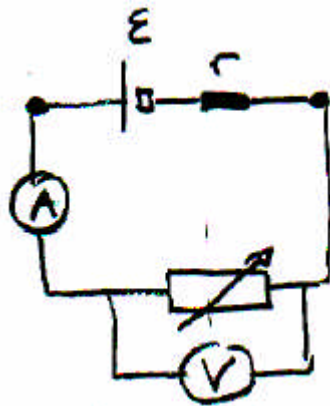


Fig. 7

Fig. 7 shows how the voltage across the battery varies with current.

- (a) Draw a circuit diagram showing an experimental arrangement that could have been used to obtain the data in the graph.



- (b) Show that the data on the graph is consistent with the battery having an e.m.f. of 6.2V and internal resistance of 0.5 Ω .

$$V = -rI + \epsilon$$

When $I = 0$

$$\epsilon = 6.2V$$

$$r = \text{gradient} = 0.5\Omega$$