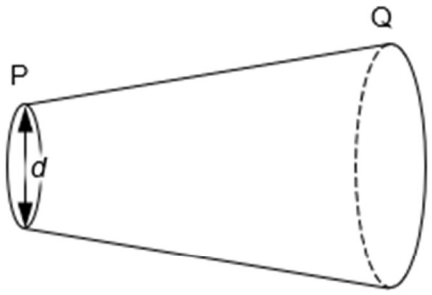
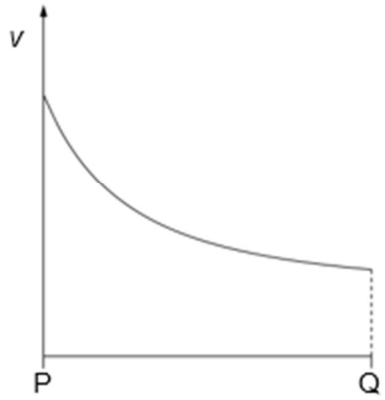
1 The diameter d of a wire PQ increases linearly with distance along the wire from end P to end Q. There is current I in the wire.

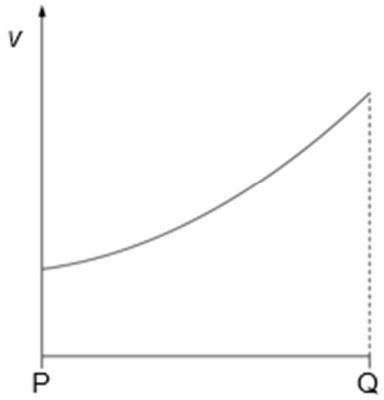


Which graph shows the variation of the average drift speed v with position along the wire between P and Q?

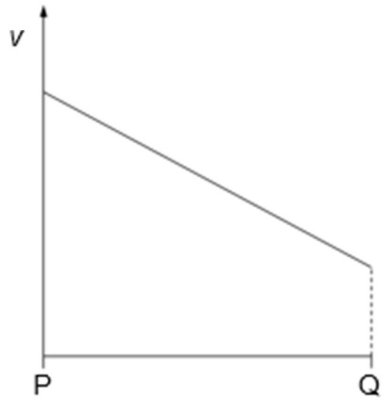
A



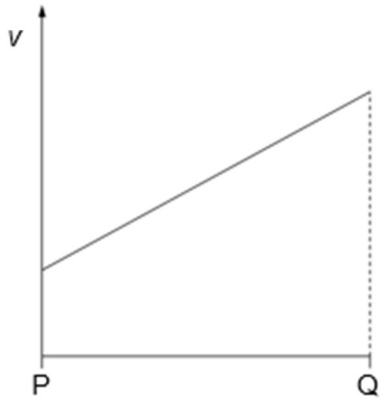
B



C



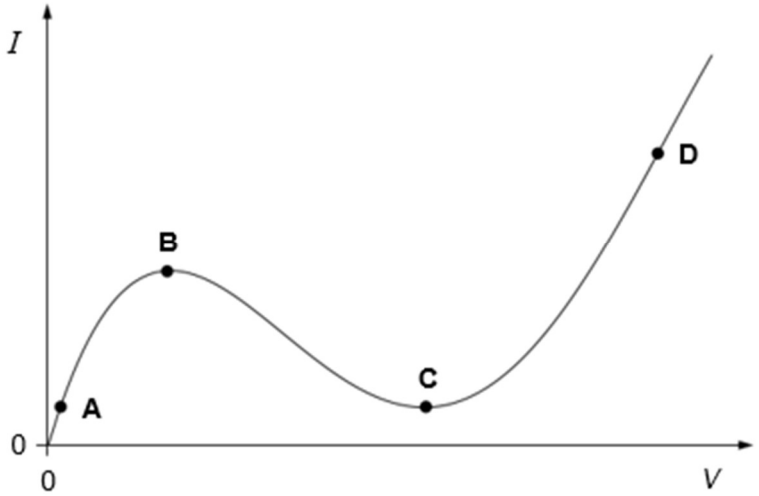
D



2 The current I through an electrical component is measured when a potential difference V is applied across it.

The graph shows the variation of I with V.

At which point is the resistance the greatest?

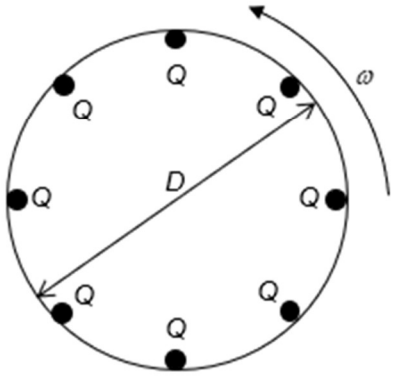


3 Protons in a parallel beam each move at a uniform velocity v, thus forming a current I. the charge on each proton is e.

Which expression represents the number of protons present in unit length of the beam?

A $\frac{I}{e}$ **B** $\frac{I}{ev}$ **C** $\frac{Iv}{e}$ **D** $\frac{I}{v}$

4 Eight small conductors of charge Q are placed at the edge of an insulating disc of diameter D. The angular frequency of rotation of the disc is ω.



What is the electric current at the edge of the disc?

A $\frac{4Q\omega}{\pi}$ **B** $\frac{8Q\omega}{\pi D}$

C $8Q\omega$ **D** $\frac{16Q\pi}{\omega}$

5 A strain gauge consists of a length of wire with uniform cross-sectional area. Its resistance is 2.000 kΩ. It is attached to a gas container. When the container expands, the strain gauge changes its dimensions. Its length increases by 0.40% and diameter reduces by 1.0 %.

What is the new resistance of the strain gauge?

A 1.968 kΩ **B** 2.028 kΩ

C 2.049 kΩ **D** 2.122 kΩ

6 A uniform copper rod of cross-sectional area 8.0 mm^2 has 8.2×10^{28} conduction electrons per cubic metre. A current flows through the rod when a potential difference of 3.0 V is applied across it.

Given that the drift velocity of electrons in the rod is 2.3×10^{-5} m s^{-1}, determine the resistance of the rod?

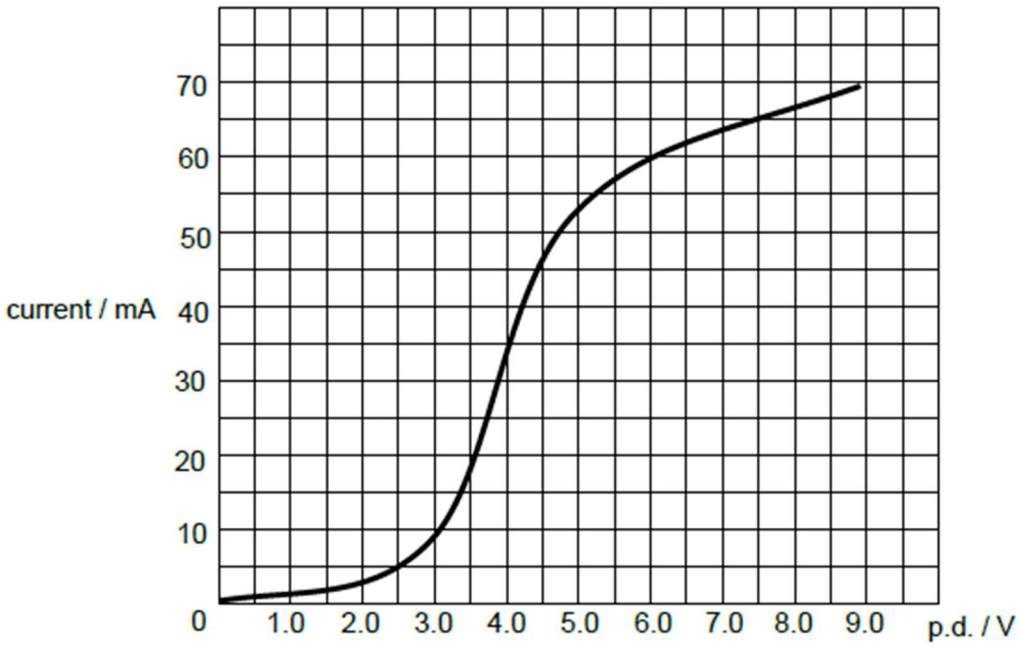
A 0.08 Ω

B 0.16 Ω

C 0.80 Ω

D 1.2 Ω

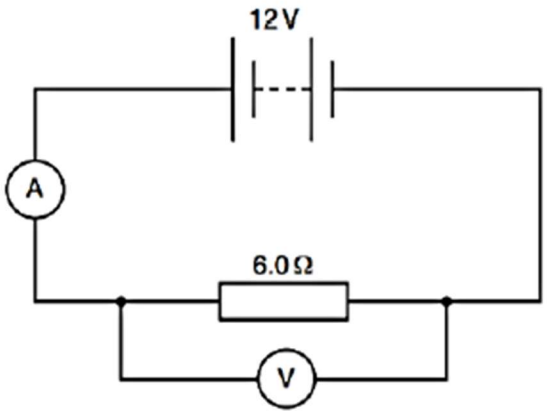
7 A graph of current against potential difference for a component is given below.



What is the potential difference across the component when its resistance is at its lowest?

A 1.5 V **B** 4.0 V **C** 5.0 V **D** 7.0 V

8 In the circuit shown, the battery is ideal but the ammeter and voltmeter are **not** ideal.



The ammeter reads 1.9 A while the voltmeter reads 11 V.

What are the resistances of the ammeter and voltmeter?

	resistance of ammeter / Ω	resistance of voltmeter / Ω
A	0.32	170
B	0.32	8.3
C	0.53	170
D	0.53	8.3

9 An ideal cell is connected across a resistor for an unknown period of time.

Which quantities can be used to calculate the energy supplied by the cell?

A The current in the resistor and the resistance of the resistor.

B The current in the resistor and the potential difference across the resistor.

C The total charge passing through the resistor and the resistance of the resistor.

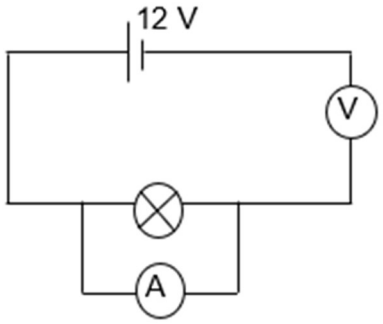
D The total charge passing through the resistor and the potential difference across the resistor.

10 A battery is connected in series with a resistor *R*. The battery drives 1500 C of charge completely round the circuit. During this process, 2500 J of energy is dissipated in the resistor *R* and 500 J is dissipated in the battery.

What is the e.m.f. of the battery?

A 0.50 V **B** 0.33 V **C** 1.7 V **D** 2.0 V

11 An ammeter and a voltmeter are connected to a bulb of resistance 4.0 Ω as shown below.



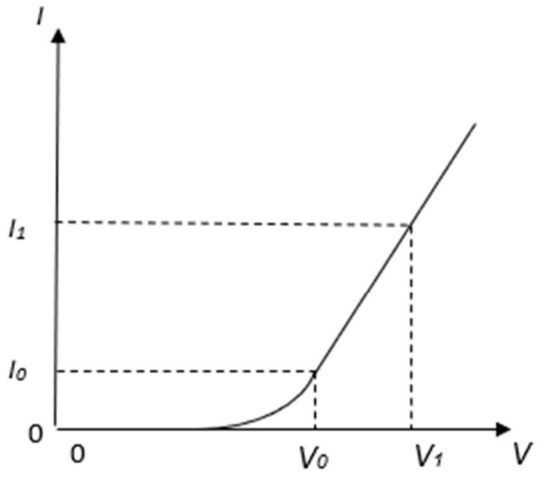
Which of the following situations is most likely to happen?

A Ammeter will fuse.
B Ammeter reads 3.0 A and voltmeter reads 12 V.
C Ammeter reads zero current and voltmeter reads 12 V.
D Both ammeter and voltmeter give zero readings.

12 A new rechargeable battery has the marking *"500 mA h"* printed on it.
Which of the following is correct with regards to the battery?

A The e.m.f. of the battery is 500 V.
B The current from the battery is always 0.5 A.
C The energy stored in the battery is 1800 J.
D The charge stored in the battery is 1800 C.

13 The graph shows the current-voltage (I-V) characteristic of an electrical component.



What is the resistance of the component at potential difference V_1 and how does the resistance change, if at all, when the potential difference increases from V_0 to V_1?

	resistance at V_1	**resistance change from V_0 to V_1**
A	$\frac{V_1 - V_0}{I_1 - I_0}$	no change
B	$\frac{V_1 - V_0}{I_1 - I_0}$	decreases
C	$\frac{V_1}{I_1}$	no change
D	$\frac{V_1}{I_1}$	decreases