Access Tuition

A-Level Physics

Electricity
(Multiple Choice)

Question Paper

Time available: 20 minutes
Marks available: 20 marks

1. As the temperature of a copper wire increases, its resistance

    A remains constant.

    B increases.

    C decreases.

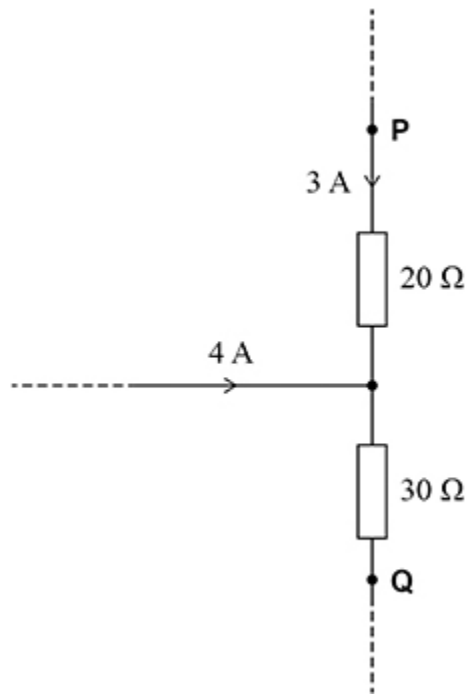   **D** remains constant at first and then decreases.

(Total 1 mark)

2. A $12\ \Omega$ resistor is connected across the terminals of a cell that has an emf of $2.0\ V$ and an internal resistance of $4.0\ \Omega$.

What is the terminal pd?

    A 0.50 V

    B 0.75 V

    C 1.30 V

    D 1.50 V

(Total 1 mark)

3. The diagram shows the currents in part of a circuit.

What is the potential difference between points **P** and **Q**?

A 60 V ⬭

B 70 V ⬭

C 180 V ⬭

D 270 V ⬭

(Total 1 mark)

4. The currents in the four wires obey the relationship $I_1 + I_2 + I_3 + I_4 = 0$
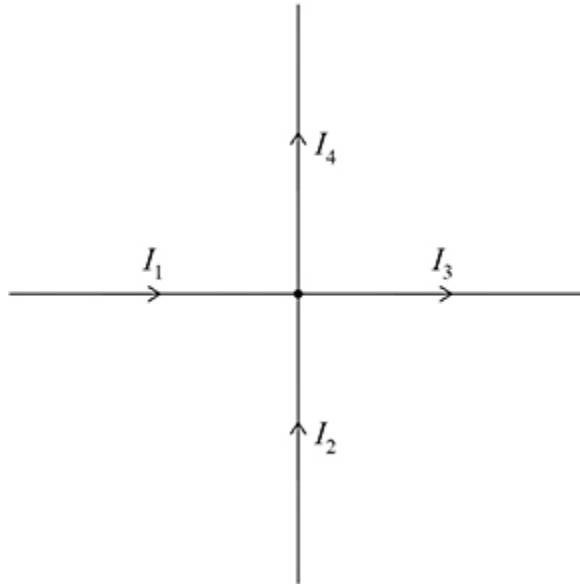
This relationship is an expression of the law of conservation of

A   charge.   ⬭

B   energy.   ⬭

C   potential difference.   ⬭

D   power.   ⬭

(Total 1 mark)

5. Which value of resistance **cannot** be made by combining three $10\ \Omega$ resistors?

A $3.3\ \Omega$ ⬭

B $6.7\ \Omega$ ⬭

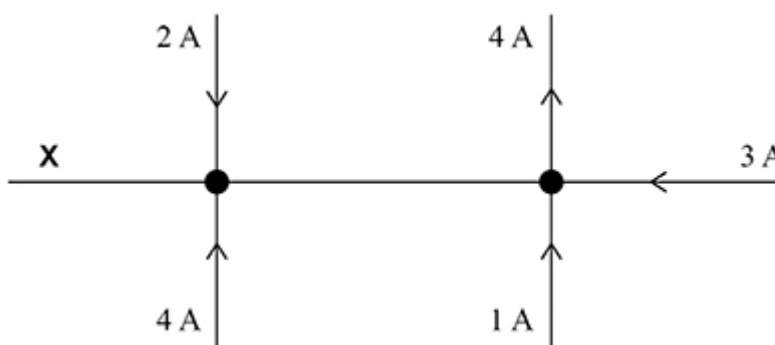**C** $15\ \Omega$ ⬭

D $25\ \Omega$ ⬭

(Total 1 mark)

6. The current in a metallic conductor is 1.5 mA.

How many electrons pass a point in the conductor in two minutes?

A 1.1×10^{18}

B 1.9×10^{19}

C 1.4×10^{20}

D 2.0×10^{29}

(Total 1 mark)

7. The diagram shows the currents in a set of wires.

What is the magnitude of the current at **X**?

A   zero

B   2 A

C   3 A

D   6 A

(Total 1 mark)

8. Resistors of resistance R, R and $3R$ are connected as shown.
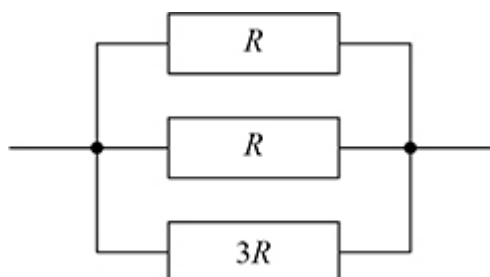
What is the resistance of the arrangement?

A $\dfrac{3R}{7}$ ⬭

B $\dfrac{7R}{3}$ ⬭

C $\dfrac{5R}{6}$ ⬭

D $\dfrac{6R}{5}$ ⬭
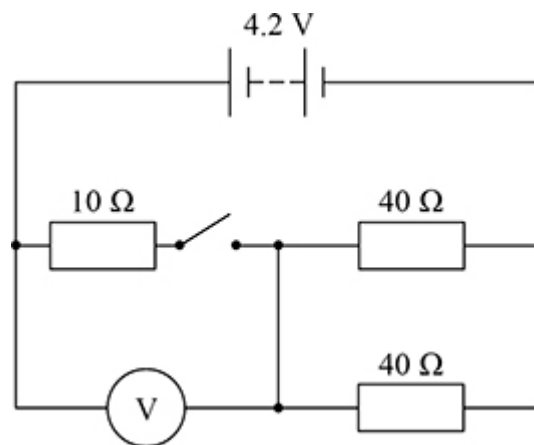
(Total 1 mark)

9. Superconductors are used to

A increase the strength of electricity cables.   ⬭

B make light dependent resistors.   ⬭

C produce strong magnetic fields.   ⬭

D increase the rate of heat energy transfer.   ⬭

(Total 1 mark)

10. The battery in this circuit has an emf of 4.2 V and negligible internal resistance.
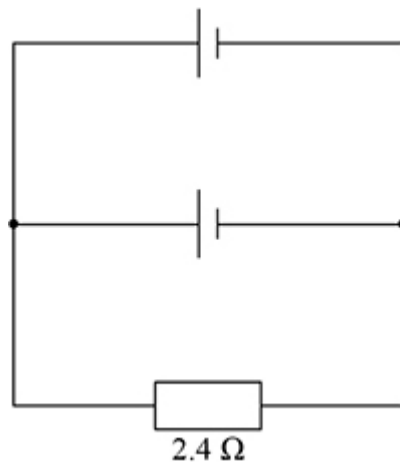
What are the readings on the voltmeter when the switch is open (off) and when the switch is closed (on)?

	Open	Closed	
A	0 V	2.1 V	○
B	4.2 V	2.1 V	○
C	0 V	1.4 V	○
D	4.2 V	1.4 V	○

(Total 1 mark)

11. Two identical batteries each of emf 1.5 V and internal resistance 1.6 Ω are connected in parallel.
A 2.4 Ω resistor is connected in parallel with this combination.
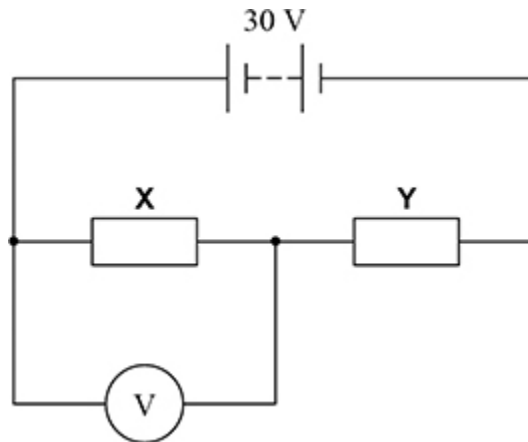

2.4 Ω

What is the current in the 2.4 Ω resistor?

A   0.38 A   ○

B   0.47 A   ○

C   0.75 A   ○

D   0.94 A   ○

(Total 1 mark)

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Two resistors **X** and **Y** are connected in series with a power supply of emf 30 V and negligible internal resistance.

The resistors are made from wire of the same material. The wires have the same length. **X** uses wire of diameter d and **Y** uses wire of diameter $2d$.

What is the reading on the voltmeter?

A   10 V

B   15 V

C   20 V

D   24 V

(Total 1 mark)

The capacity of a portable charger is rated in ampere hours (A h). A charger of capacity 1 A h can provide 1 A for 1 hour at its working voltage.

One charger has a capacity of 1800 mA h at a working voltage of 3.7 V.

What is the energy stored in this charger?

A   6.5 kJ

B   24 kJ

C   400 kJ

D   24 kJ

(Total 1 mark)

14. A filament lamp with resistance 12 Ω is operated at a power of 36 W.

How much charge flows through the filament lamp during 15 minutes?

A 26 C

B 1.6 kC

C 2.7 kC

D 6.5 kC

(Total 1 mark)

15. A resistor with resistance R is made from metal wire of resistivity ρ. The length of the wire is L.

What is the diameter of the wire?

A $\sqrt{\dfrac{2\rho R}{\pi L}}$
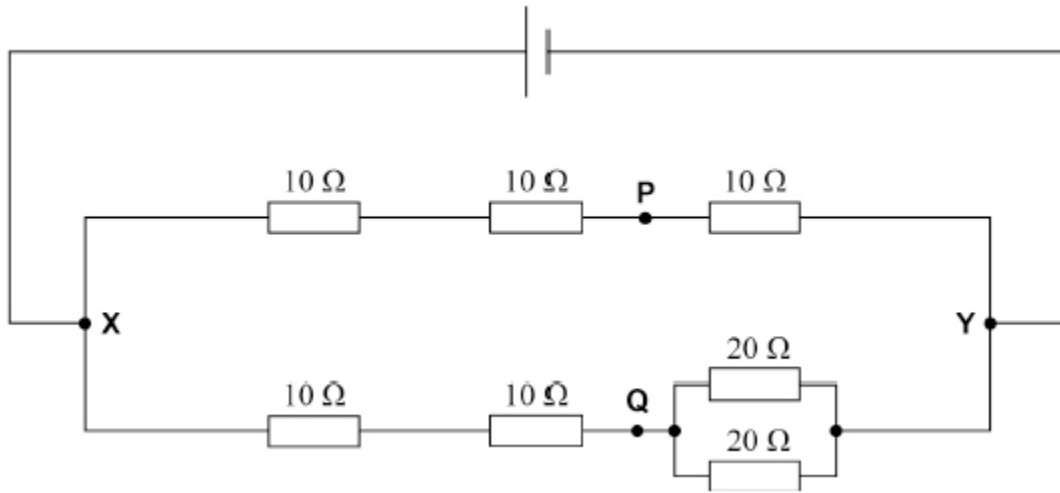
B $\sqrt{\dfrac{2\rho L}{\pi R}}$

C $2\sqrt{\dfrac{\rho L}{\pi R}}$

D $2\sqrt{\dfrac{\rho R}{\pi L}}$

(Total 1 mark)
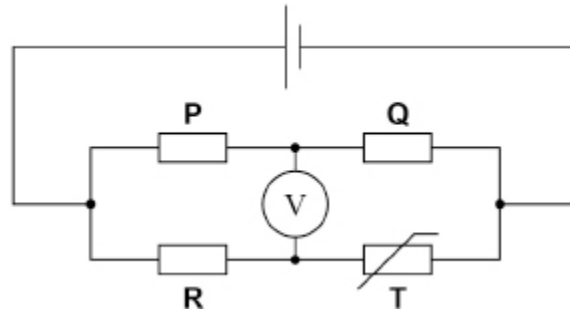
16. The potential difference between points **X** and **Y** is *V*.

What is the potential difference between **P** and **Q**?

A   zero   ⬭

B $\dfrac{V}{3}$ ⬭

C $\dfrac{V}{2}$ ⬭

D $\dfrac{2V}{3}$ ⬭

(Total 1 mark)

In the circuit below, the voltmeter reading is zero.

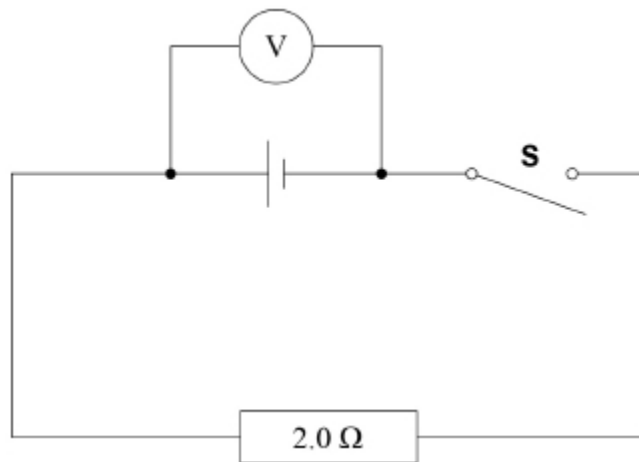When the temperature of the thermistor **T** is increased, the voltmeter reading changes.

Which change to the circuit will restore the voltmeter to zero?

A   a reduction in the emf of the cell

B   a reduction in the resistance of **P**

C   an increase in the resistance of **Q**

D   a reduction in the resistance of **R**

(Total 1 mark)

18. The reading on the voltmeter halves when switch **S** is closed.

What is the internal resistance of the cell?

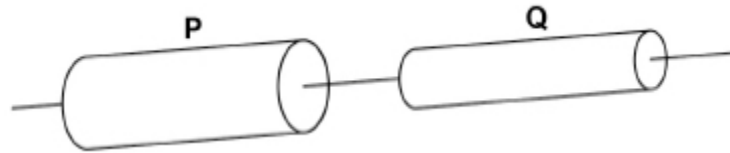**A**   0.50 Ω

B   1.0 Ω

C   2.0 Ω

D   4.0 Ω

(Total 1 mark)

19. Two cylindrical wires **P** and **Q** are of equal length and made of the same material. The diameter of **P** is greater than that of **Q**.

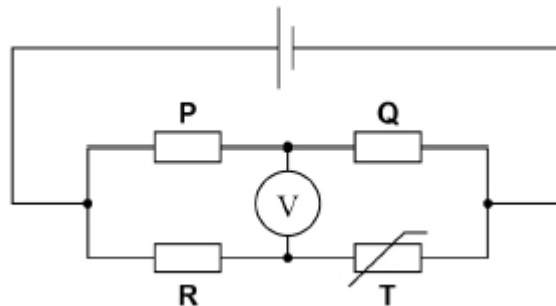P and Q are connected in series and the ends of this arrangement are connected to a power supply.

Which two quantities are the same for **P** and **Q**?

A	potential difference across wire	resistivity	▢
B	resistivity	current	▢
C	current	resistance	▢
D	resistance	potential difference across wire	▢

(Total 1 mark)

20. In the circuit below, the initial voltmeter reading is zero.

The temperature of the negative temperature coefficient thermistor **T** is then increased.

Which change to the circuit could restore the voltmeter reading to zero?

A   Decreasing the resistance of **R**.   ▢

B   Increasing the resistance of **R**.   ▢

C   Decreasing the resistance of **P**.   ▢

D   Increasing the resistance of **Q**.   ▢

(Total 1 mark)