



A Level • OCR • Physics

 9 mins 9 questions

Multiple Choice Questions

# Series & Parallel Circuits

Power / Electrical Energy / Kirchhoff's Second Law / Kirchhoff's Laws in Circuits / Resistors in Series & Parallel Circuits / Series & Parallel Circuits / Circuits with Multiple Sources of e.m.f

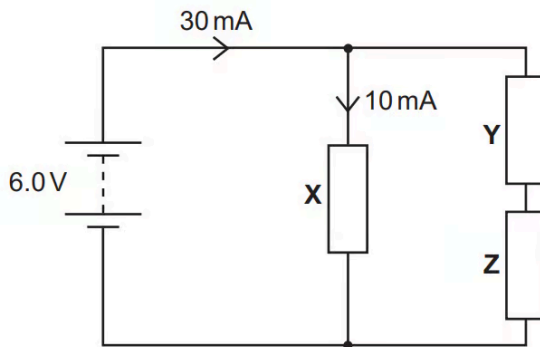
Medium (5 questions)	/5
Hard (4 questions)	/4
<b>Total Marks</b>	<b>/9</b>

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# Medium Questions

- 1 A battery of electromotive force (e.m.f) 6.0 V and of negligible internal resistance is used in the circuit below.



The current from the battery is 30 mA. The current in the resistor **X** is 10 mA. The resistors **Y** and **Z** are identical.

What is the power dissipated in the resistor **Z**?

- A. 30 mW
- B. 60 mW
- C. 120 mW
- D. 180 mW

(1 mark)

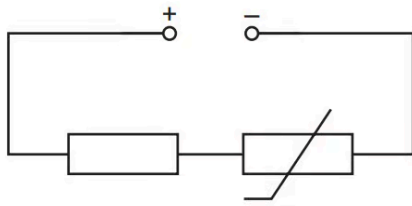
- 2 The current in a lamp is 2.0 mA. The potential difference across the lamp is 6.0 V.

What is the energy transfer in the lamp over a period of 3.0 hours?

- A. 0.012 J
- B. 0.036 J
- C. 2.16 J
- D. 130 J

(1 mark)

3 A circuit with a thermistor is shown below.



The resistance of the resistor is  $R$  and the resistance of the thermistor is  $2.5R$ .

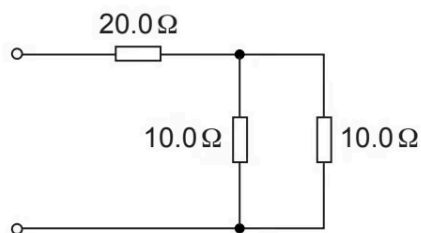
The potential difference (p.d.) across the thermistor is  $5.0\text{ V}$ .

What is the total p.d. across both components?

- A.  $2.0\text{ V}$
- B.  $7.0\text{ V}$
- C.  $12.5\text{ V}$
- D.  $17.5\text{ V}$

(1 mark)

4 Three resistors are connected in a circuit.



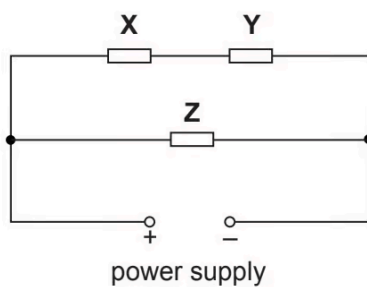
The resistance of each resistor is shown in the circuit diagram.

What is the total resistance of this circuit?

- A.  $10.0\ \Omega$
- B.  $20.2\ \Omega$
- C.  $25.0\ \Omega$
- D.  $40.0\ \Omega$

(1 mark)

5 Three identical resistors **X**, **Y** and **Z** are connected to a power supply.



The power dissipated in the resistor **Z** is 24 W.

What is the power dissipated in the resistor **Y**?

- A.** 6.0 W
- B.** 12 W
- C.** 24 W
- D.** 48 W

(1 mark)

# Hard Questions

- 1 Two identical resistors of resistance  $R$  are connected in parallel. The resistors are connected in series with a third identical resistor and three cells of e.m.f  $\mathcal{E}$ ,  $2\mathcal{E}$  and  $3\mathcal{E}$  respectively. Each cell has an internal resistance of  $r$ .

What is the correct expression for the current passing through the circuit?

- A.  $\frac{4\mathcal{E}}{R + 2r}$
- B.  $\frac{\mathcal{E}}{R + r}$
- C.  $\frac{2\mathcal{E}}{R}$
- D.  $\frac{12\mathcal{E}}{R + 3r}$

(1 mark)

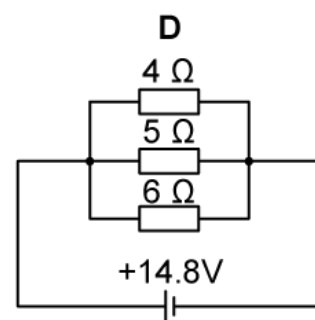
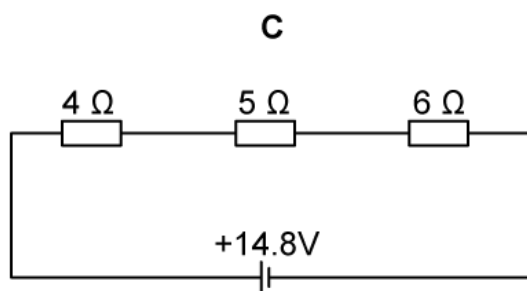
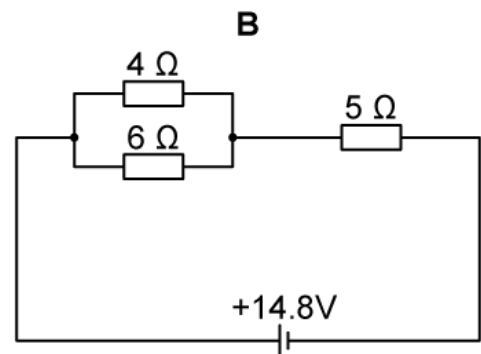
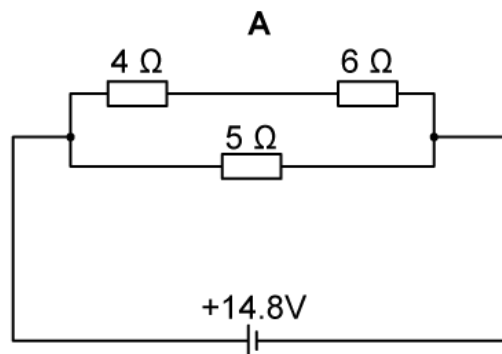
- 2 For what number of identical resistors does the ratio of total resistance in series to total resistance in parallel equal 36?

- A. 1
- B. 6
- C. 18
- D. 36

(1 mark)

- 3 A student has a 14.8 V power supply and 3 resistors of resistance  $4\ \Omega$ ,  $5\ \Omega$  and  $6\ \Omega$  respectively.

Which of the following configurations will allow the student to draw a current of 2 A from the power source?

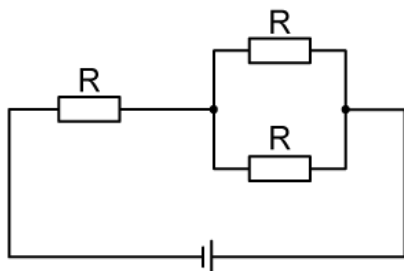


(1 mark)

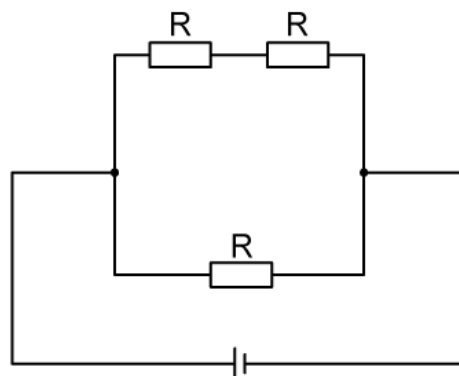
- 4 A student has three identical resistors of resistance  $R$  and a cell.

Which of the following circuit configurations should the student choose in order to draw the smallest possible current from the cell?

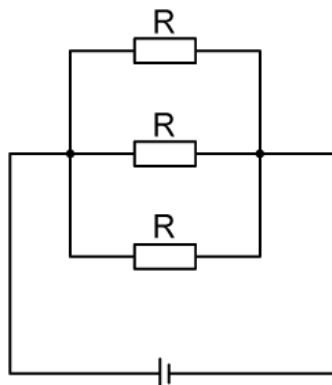
**A**



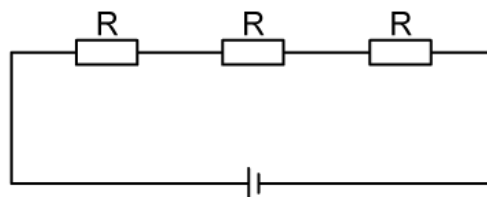
**B**



**C**



**D**



(1 mark)