

Current at a Junction

Edexcel International GCSE Physics · Electricity

Voltage in Parallel Circuits

Series and Parallel

In a circuit, current and voltage behave differently depending on whether components are in series or in parallel.

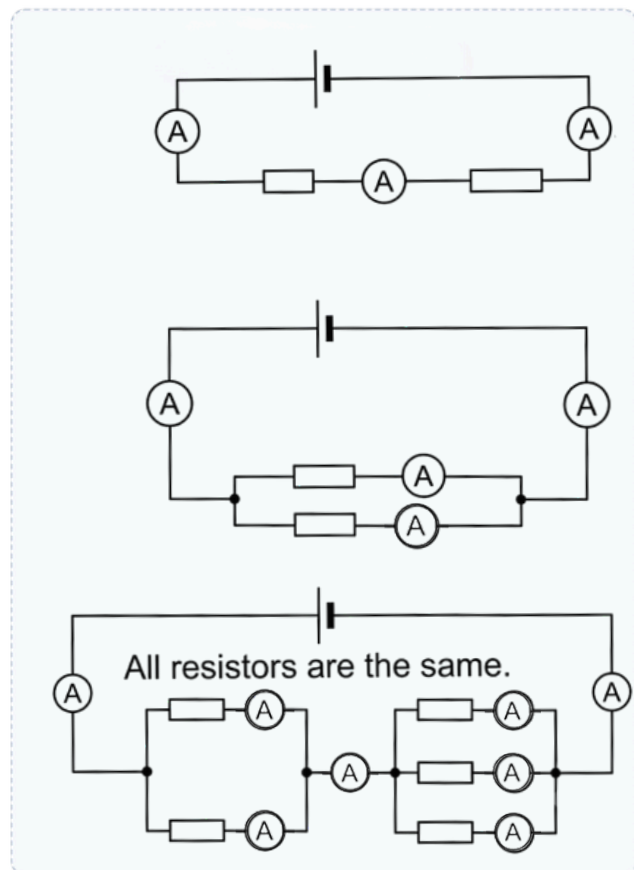
The rules — write “same” or “split” in each box

	SERIES	PARALLEL
Current		
Voltage		

Example

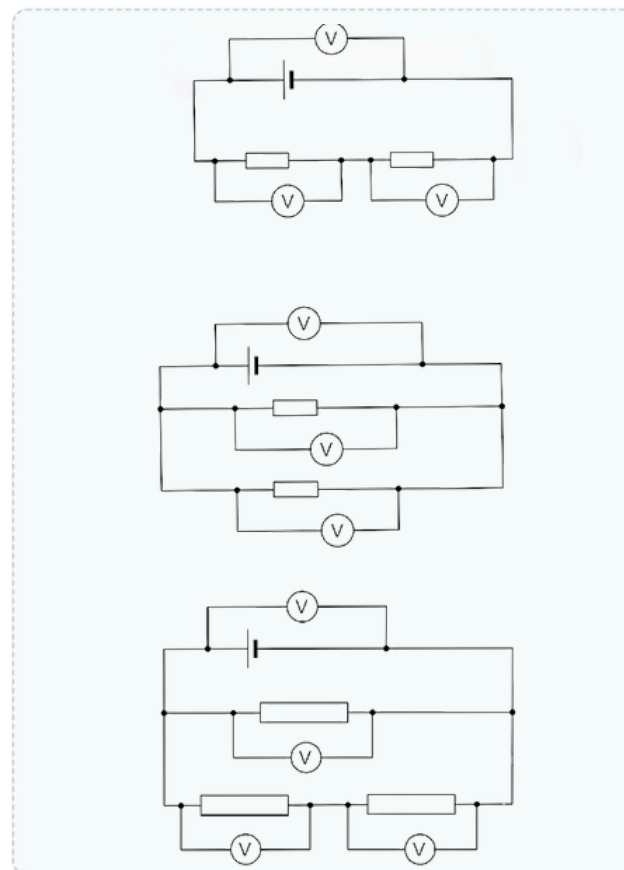
Current

Make up a sensible current reading for **each ammeter (A)** so that it obeys the rules. All the resistors are the same.



Voltage

Make up a sensible voltage reading for **each voltmeter (V)** so that it obeys the rules.



Series and Parallel Circuits

Edexcel International GCSE Physics · Electricity

In a circuit, current and voltage behave differently depending on whether components are in series or in parallel.

The rules — write “same” or “split” in each box

	SERIES	PARALLEL
Current		
Voltage		

Draw the circuits — a cell and three bulbs

Three bulbs in SERIES

*draw a cell and three bulbs
connected in series*

Three bulbs in PARALLEL

*draw a cell and three bulbs
connected in parallel*

Advantages & disadvantages — fill in the table

	Advantages	Disadvantages
SERIES		
PARALLEL		

Remember

Series: the same current everywhere; the voltage is **shared** between the bulbs; if one bulb breaks, they all go out. **Parallel:** each branch gets the **full** voltage; the current splits; if one bulb breaks, the others stay on. — then try the exam-style question on the next page.

Current in Series Circuits

Edexcel International GCSE Physics · Electricity

Draw a circuit for the question below

Question

A decorative lamp, Lamp X, runs from the mains. It has seven identical bulbs connected in **series**.

(a) Give one **disadvantage** of connecting the bulbs in series. (1)

(b) Suggest one **advantage** of connecting the bulbs in series. (1)

(c) Each bulb has a working resistance of **390 Ω** and the voltage across each bulb is **33 V**.

(i) State the equation that links voltage, current and resistance. (1)

(ii) Calculate the current in each bulb. (3)

current = _____ A

(iii) Calculate the energy transferred to Lamp X when it is switched on for 2.5 hours. (4)

energy transferred = _____ J

(d) A second lamp, Lamp Y, uses **five** of the same 390 Ω bulbs connected in series. Both lamps run from the mains. Explain how the brightness of **one bulb** in Lamp Y compares with the brightness of one bulb in Lamp X. (3)

Calculating Currents, Voltages and Resistances

Edexcel International GCSE Physics · Electricity

Exam-style questions. Each is worth **6 marks** — answer parts (a), (b) and (c). Use $V = IR$ and show your working on the right.

1 [6 marks]

An LDR is in series with a $1000\ \Omega$ fixed resistor and a 6 V battery. The output across the LDR switches on a security light when it gets dark.

(a) The light intensity decreases. State what happens to the current and to the p.d. across the LDR. [2 marks]

Current _____ p.d. across LDR _____

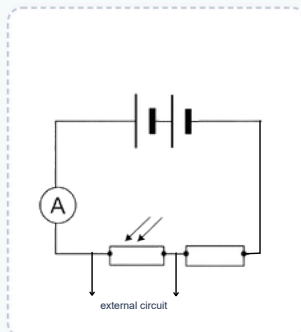
(b) The p.d. across the LDR is 4 V . Calculate its resistance and give a reason. [2 marks]

Resistance = _____ Ω

(c) Calculate the current when the LDR's resistance is $5000\ \Omega$. Give your answer to 2 s.f. [2 marks]

Current = _____ A

CIRCUIT



Battery = 6 V
Fixed resistor = $1000\ \Omega$

WORKING & ANSWERS

2 [6 marks]

A thermistor is in series with a $2000\ \Omega$ fixed resistor and a 12 V battery. The output across the thermistor switches on a cooling fan when it gets hot.

(a) The temperature increases. State what happens to the current and to the p.d. across the thermistor. [2 marks]

Current _____ p.d. across thermistor _____

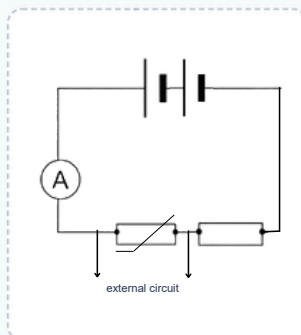
(b) The p.d. across the thermistor is 4 V . Calculate its resistance and give a reason. [2 marks]

Resistance = _____ Ω

(c) Calculate the current when the thermistor's resistance is $4000\ \Omega$. Give your answer to 2 s.f. [2 marks]

Current = _____ A

CIRCUIT



Battery = 12 V
Fixed resistor = $2000\ \Omega$

WORKING & ANSWERS

3 [6 marks]

A variable resistor is in series with a $300\ \Omega$ fixed resistor and a 9 V battery. It is used to control the current in the circuit.

(a) The variable resistor's resistance is increased. State what happens to the current and to the p.d. across the fixed resistor. [2 marks]

Current _____ p.d. across fixed R _____

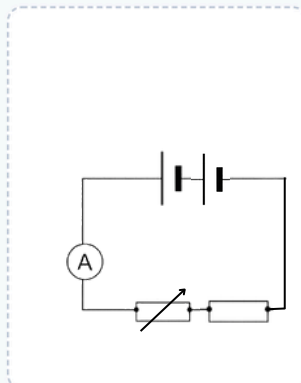
(b) The p.d. across the fixed resistor is 3 V . Calculate the resistance of the variable resistor and give a reason. [2 marks]

Resistance = _____ Ω

(c) Calculate the current when the variable resistor is set to $1500\ \Omega$. Give your answer to 2 s.f. [2 marks]

Current = _____ A

CIRCUIT



Battery = 9 V
Fixed resistor = $300\ \Omega$

WORKING & ANSWERS
