

Electrical Safety

Edexcel International GCSE Physics · Electricity

Understand how to **protect yourself** or **protect your device** in the home.

Protect YOU

*draw a person getting
an electric shock*

Tick which of these protect the user:

- ☐ insulation
 ☐ double insulation
 ☐ earthing
 ☐ fusing
☐ circuit breaker

Protect your DEVICE

*draw a device heating up
and catching fire*

Tick which of these protect the device:

- ☐ insulation
 ☐ double insulation
 ☐ earthing
 ☐ fusing
☐ circuit breaker

The safety features — complete the table

Symbol	Feature	Protects?	How it works (use the key word)
	Insulation	User · Device · Both	key word: non-conductive barrier _____
	Double insulation	User · Device · Both	key word: no earth wire needed _____
	Earthing	User · Device · Both	key word: low-resistance path _____
	Fuse	User · Device · Both	key word: melts _____
	Circuit breaker	User · Device · Both	key word: faster / resettable _____

Exam-style question

[4 marks]

A cook uses a metal-cased electric toaster connected to the mains by a three-pin plug.

(a) A fault makes the live wire touch the metal case. Explain how the **earth wire** and the **fuse** work together to protect the user. (3)

(b) A different toaster has a plastic case and is double insulated. State why it does **not** need an earth wire. (1)



Energy Transfer in Resistors

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Understand how energy is **transferred in resistors** and its **practical uses**.

Mechanism for heat transfer

draw free electrons colliding with vibrating ions

Key words: **resistance** **electrons transfer energy**

electron collisions **(lattice) ions**

Explain the heating effect (use the key words):

- 1 _____
- 2 _____
- 3 _____

Practical application

draw a device that uses resistor heating

Tick the appliances that use resistor (heating-effect) heating:

- | | |
|--|---|
| ☐ kettle | ☐ fridge |
| ☐ toaster | ☐ electric fan |
| ☐ hair dryer | ☐ LED lamp |
| ☐ electric heater | ☐ vacuum cleaner |
| ☐ clothes iron | ☐ filament bulb |

Question 1

[6 marks]

A hair dryer contains a coil of wire (a resistor) which is used to heat the air passing through it.

(a) Explain, in terms of electrons, how the coil transfers energy to heat the air. (3)

(b) The hair dryer is fitted with a fuse. Explain how a fuse protects a domestic appliance. (3)

