IGCSE PHYSICS • EXERCISE SHEET

4.4 Electrical safety

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

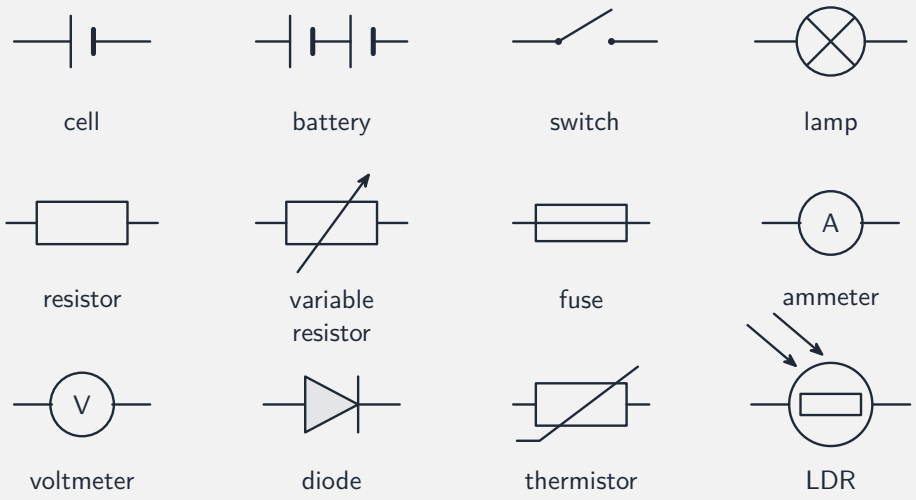
Build the skills to answer exam questions on **electrical safety** 电气安全—mains **hazards** 危险, the live/neutral/earth wires, and **fuses** 保险丝 and **earthing** 接地.

You must be able to:

- state mains hazards (damaged insulation, overheating, damp, overloading)
- name the three mains wires and the role of each
- explain how a fuse and earthing protect the user

1 Worked examples

■ Fuses and earthing



A fuse is a thin wire that melts and breaks the circuit if the current is too large

- **wires:** live (high voltage), neutral (0 V), earth (safety wire to ground).
- the switch and fuse go in the **live** wire.
- **earthing:** if a live wire touches a metal case, a large current flows to earth and blows the fuse.
- choose a fuse rating just **above** the normal working current.

2 Practice

2.1 Name the three wires in a mains cable. [2]

2.2 State one hazard of using mains electricity in damp conditions. [1]

3 Exam-style questions

3.1 A fuse should be fitted in the: [1]

- **A** earth wire
- **B** neutral wire
- **C** live wire
- **D** casing

3.2 An appliance normally draws a current of 8 A. Fuses are available rated 3 A, 5 A, 10 A and 13 A.

(a) State which fuse should be used, and why. [2]

(b) Explain how the fuse protects the cable. [2]

3.3 Explain how earthing a metal-cased appliance keeps the user safe if a fault makes the case live. [3]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **4.4 Electrical safety** past-paper sheet in the Library, or practise mains-safety questions in **Practice mode** (these appear throughout the Extended theory papers).

Solutions

2.1 live, neutral and earth.

2.2 water lets current pass into a person, increasing the risk of an electric shock.

3.1 C. The fuse (and switch) must be in the live wire.

3.2 (a) the 10 A fuse; it is just above the normal working current of 8 A, so it carries normal current but blows on a fault.
(b) if the current gets too large, the thin fuse wire melts and breaks the circuit before the cable overheats.

3.3 if a live wire touches the metal case, the earth wire provides a low-resistance path to the ground; a large current flows to earth; this blows the fuse, cutting off the supply so the case cannot give a shock.