

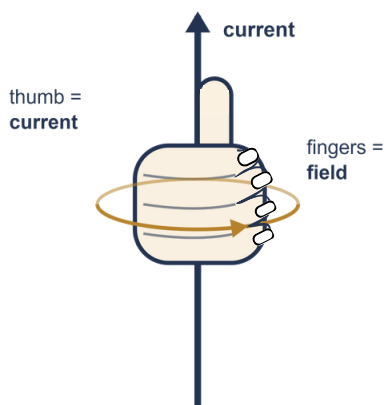
Electromagnets and Magnetic Fields

1 · Add the magnetic field

draw field lines with arrows

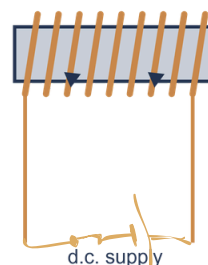
A straight wire

Right-hand grip rule: thumb = current, fingers = field



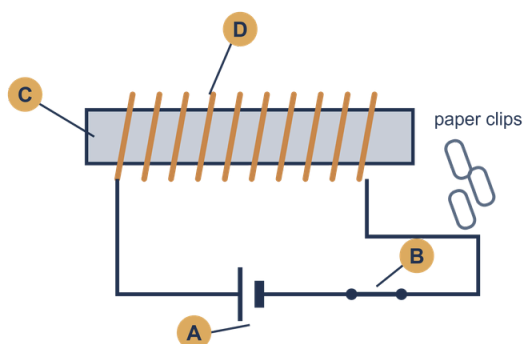
A solenoid with an iron core

Current flows down the front of each turn. Draw the field; label N and S.



2 · Building an electromagnet

4.7.2.1



(a) Label parts A–D. [4]

A

B

C

D

(b) Describe the construction of an electromagnet. [3]

TICK AS YOU WRITE

- ☐ A **coil of wire** (a solenoid)
- ☐ wrapped around a **soft iron core**
- ☐ with a **current** flowing through the coil (switch closed)

3 · Questions on electromagnets

9 marks

(a) Name a suitable metal for the core of an electromagnet. [1]

(b) State what must be done to the coil to produce a magnetic field. [1]

(c) Explain why the core is made of soft iron and not steel. [2]

(d) Give **two** ways to make the electromagnet stronger. [2]

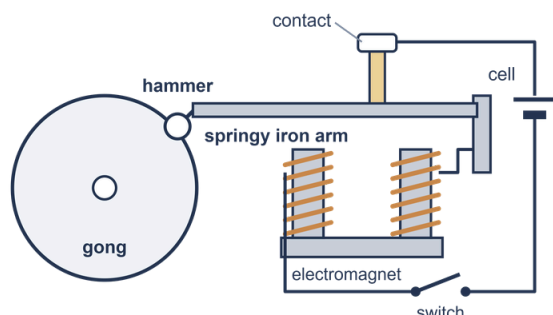
(e) The current in the coil is reversed. State what happens to the poles of the electromagnet. [1]

(f) Two soft iron rods are placed side by side inside a solenoid. When the current is switched on, the rods move apart. Explain why. [2]

Electromagnetic Devices *Triple only*

1 · Electric bell

describe how it works



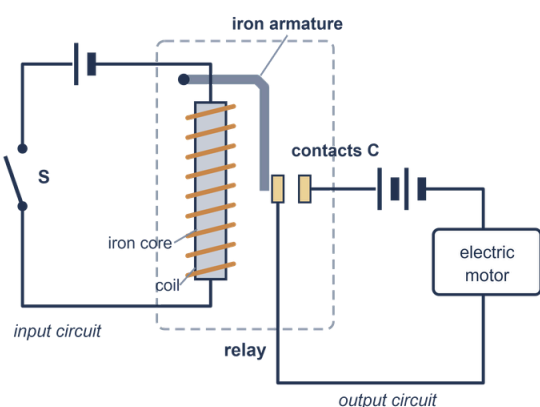
Describe how the electric bell works. [6]

- | | |
|---|--|
| ☐ close the switch | ☐ current flows |
| ☐ solenoid and iron core become an electromagnet | ☐ a magnetic field is created |

THEN USE: **attracts the iron arm** **hammer hits the gong**
breaks the circuit **field stops** **arm springs back up**

2 · Relay

describe how it works



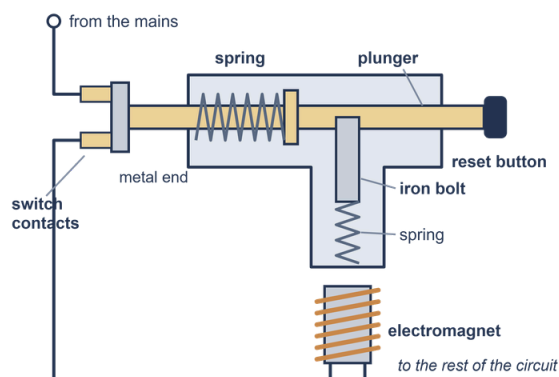
Describe how the relay works. [5]

- | | |
|---|--|
| ☐ close the switch | ☐ current flows |
| ☐ solenoid and iron core become an electromagnet | ☐ a magnetic field is created |

THEN USE: **attracts the iron armature** **contacts C close**
completes the output circuit **motor turns**

3 · Circuit breaker

describe how it works



Describe how the circuit breaker works. [5]

- | | |
|---|--|
| ☐ close the switch | ☐ current flows |
| ☐ solenoid and iron core become an electromagnet | ☐ a magnetic field is created |

THEN USE: **current increases** **electromagnet gets stronger**
attracts the iron bolt **reset button released** **circuit breaks**