

Strand 4: Force and energy

4.1: Electrical energy

Section A

1. B
2. C
3. C
4. C
5. C
6. B
7. C
8. B
9. C
10. C

Section B

1.
 - (a) Battery/dry cells.
 - (b) Converts electrical energy into light energy, providing light.
 - (c) A switch opens or closes the circuit, controlling the flow of electric current.
2.
 - (a) Solar panels/ Solar energy (sunlight).
 - (b) It is a renewable source of energy.
3.
 - (a) B
 - (b) A
 - (c)

Series circuit	Parallel circuit
Bulbs are connected one after another in a single path.	Bulbs are connected in separate branches/paths.
If one bulb is removed, all bulbs go off.	If one bulb is removed, the other bulbs remain lit.
The bulbs generally glow less brightly when several are connected to the same source.	Each bulb receives the full potential difference of the supply and generally glows brighter.

4.
 - (a) Electric current continues to flow in the other parts of the circuit.
 - (b) Bulb 1 will still light. Bulb 2 will go off.
 - (c) When one cell or bulb is damaged in one part of the circuit, electric current continues to flow in the other parts of the circuit.

5.
 - (a) It can damage the cable or expose the wires, increasing the risk of electric shock or a short circuit.
 - (b) Switch off the appliance and the power supply. Hold the plastic plug firmly and pull it out of the socket, not the cable.
 - (c) Do not use electrical appliances with wet hands.
6.
 - (a) Cell, bulb, switch
 - (b) The switch was open, so the circuit was incomplete. The cell was exhausted.
7.
 - (a) The gap in the circuit between the two terminals, so that the material completes the circuit.
 - (b) The bulb lights up when the material is connected in the circuit.
 - (c) Conductors: Steel nail; Aluminium foil; Copper wire. Non-conductors: Paper; Wood; Plastic spoon
8. Pressure cooker – used for cooking food quickly using steam pressure. Television – used for entertainment and broadcasting news.
9.
 - (a) Inserting electrical nail in a socket; handling electrical items with wet hands.
 - (b) Water conducts electricity, so wet hands can allow electric current to pass through the body, causing an electric shock.

4.2: Magnetism

Section A

1. B
2. B
3. A
4. A
5. C
6. C
7. B
8. B
9. D
10. A
11. B

Section B

1.
 - (a) The filings are more closely packed near the poles.
 - (b) Magnetic force is strongest at the poles, where the iron filings are most concentrated.
- 2.

- (a) Nails.
- (b) Magnetic materials. (1 mark)
- (c) It helps to recover useful metals for recycling, reducing waste and conserving resources

3.

- (a) North–south direction.
- (b) A freely suspended magnet always aligns itself in the north–south direction.
- (c) North pole; South pole.

4.

- (a) Repulsive force.
- (b) The magnets would attract each other. (1 mark)
- (c) Like poles repel each other while unlike poles attract each other.

5.

- (a) The magnet aligns itself in the north–south direction.
- (b) A freely suspended magnet always aligns itself in the north–south direction.

6.

- (a) There was attraction in set 1 and repulsion in set 2.
- (b) Like poles repel; unlike poles attract.

7.

- (a) The refrigerator door contains a magnetic strip that is attracted to the metal frame of the refrigerator. This magnetic attraction pulls the door towards the frame and helps it close and seal tightly.
- (b) The magnetic attraction between the strip and the metal frame holds the door firmly against the frame. Therefore, a greater force is needed to overcome the magnetic attraction and pull the door open.
- (c) Advantage: A stronger magnet would provide a stronger seal, reducing the entry of warm air into the refrigerator. Disadvantage: A stronger magnet would make the door harder to open.

8. The poles of the magnet attracted the iron bar. This is because the magnetic force of a bar magnet is strongest at its poles and weakest near the centre.