Physics

KS3

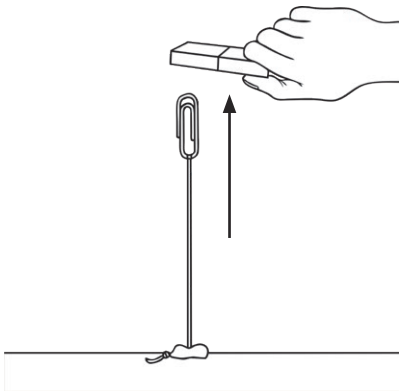
Electricity

H

Higher Tier

Mark Scheme (50 marks)

<table>
<tr><th>1</th><th>Answer</th><th>Marks</th></tr>
<tr><td>(a)</td><td>Any two from the following: The bulb is faulty or is broken/the bulb may not be screwed in correctly/the switch is broken/the battery needs replacing or the battery is flat/the wires are faulty and need replacing.</td><td>(2)</td></tr>
<tr><td>(b)</td><td>Objects that allow electricity to flow through them are called conductors.</td><td>(1)</td></tr>
<tr><td>(c)</td><td>
<table>
<tr><th>Wire</th><th>Must be the same</th><th>Must be different</th></tr>
<tr><td>The type of metal</td><td></td><td>✓</td></tr>
<tr><td>The length of wire</td><td>✓</td><td></td></tr>
<tr><td>The thickness of a wire</td><td>✓</td><td></td></tr>
</table>
</td><td>(3)</td></tr>
<tr><td>(d)</td><td>Students should indicate an increase in voltage e.g. add a cell or battery or use a battery that is more powerful.</td><td>(1)</td></tr>
<tr><td>Total</td><td></td><td>(7)</td></tr>
</table>

<table>
<tr><th>2</th><th>Answer</th><th>Marks</th></tr>
<tr><td>(a)</td><td>  </td><td>(1)</td></tr>
<tr><td>(b)</td><td>As Ellie removes the magnet, the paperclip will fall as there is no magnet for it to be attracted towards.</td><td>(2)</td></tr>
<tr><td>(c)</td><td>steel pin</td><td>(1)</td></tr>
<tr><td>(d)</td><td>The magnet moves away as it is being repelled by the other magnet.</td><td>(1)</td></tr>
<tr><td>(e)</td><td>When the north poles of two magnets are held together, we say that the magnets repel one another.

When the south pole of one magnet is held close to the north pole of another magnet, we say that the magnets attract one another.</td><td>(2)</td></tr>
<tr><td>Total</td><td></td><td>(7)</td></tr>
</table>

<table>
<tr><th>3</th><th>Answer</th><th>Marks</th></tr>
<tr><td>(a)</td><td>Students' answers may vary and they may have more or fewer steps, but their answer should comprise of the steps below.

Equipment list - 1 power pack, 1 large nail, 30cm of insulated copper wire, 2 crocodile clips, 2 wires and 30 paperclips.

Step 1 – Collect the equipment.

Step 2 – Place crocodile clips on two of the wires.

Step 3 – Attach the opposite end of each wire onto the power pack.

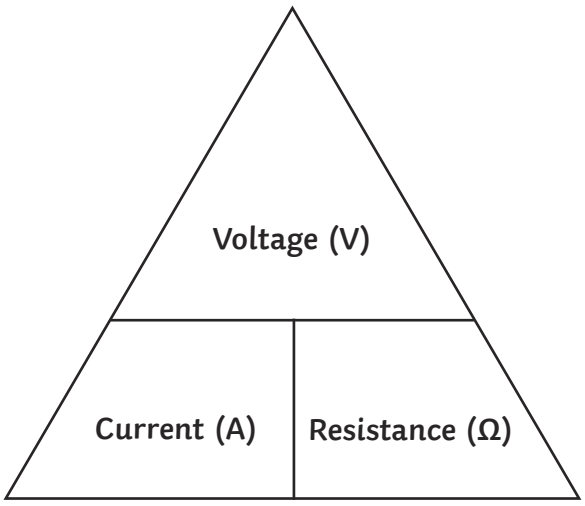
Step 4 – Wrap the copper wire around the nail until you reach the required number of coils. Use a pair of wire strippers to remove some of the insulation. Leave 2cm of exposed wire at each end of the copper wire.

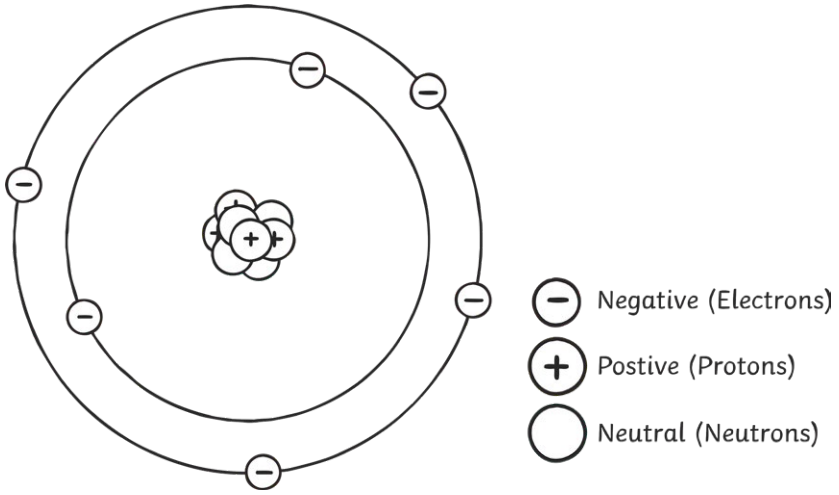
Step 5 – Attach the crocodile clips to the exposed wire.

Step 6 – Lay the paperclips on the bench and hold the insulated wire on either side of the nail.

Step 7 – Hover the nail over the paperclips and record in your table how many paperclips are attracted to the nail.</td><td>(6)</td></tr>
<tr><td>(b)</td><td><table><tr><td>independent</td><td>This is the variable that we change.</td></tr><tr><td>dependent</td><td>This is the variable that we measure.</td></tr><tr><td>control</td><td>This is the variable that we keep the same.</td></tr></table></td><td>(3)</td></tr>
<tr><td>(c)</td><td>For each keyword that is used correctly, award one mark. Students must have written an answer that is in a logical order and that is clear and concise.

When electrical charges flow in a wire, a magnetic field is formed around the wire. The larger the current, the stronger the magnetic field will be. When a current stops flowing, there is no magnetic field.</td><td>(5)</td></tr>
<tr><td>Total</td><td></td><td>(14)</td></tr>
</table>

<table>
<tr><th>4</th><th>Answer</th><th>Marks</th></tr>
<tr><td>(a)</td><td>
<table>
<tr><th>Colour of Bulbs</th><th>Which Switches Must Be Closed?</th></tr>
<tr><td>red</td><td>switch A</td></tr>
<tr><td>red and amber</td><td>switch A and B</td></tr>
<tr><td>green</td><td>switch C</td></tr>
<tr><td>amber</td><td>switch B</td></tr>
</table>
</td><td>(4)</td></tr>
<tr><td>(b)</td><td>Award one mark for amps or amperes. Do not award a mark for writing A as the question asks for the name and not the symbol.</td><td>(1)</td></tr>
<tr><td>(c)</td><td>Most of the current goes through switch A.</td><td>(1)</td></tr>
<tr><td>(d)</td><td>Award one mark for either the written word or unit itself – ohms or Ω.</td><td>(1)</td></tr>
<tr><td>(e)</td><td>
<table>
<tr><th>Length of wire (cm)</th><th>Voltage (V)</th><th>Current (A)</th><th>Resistance (Ω)</th></tr>
<tr><td>20</td><td>5</td><td>1</td><td>5.00</td></tr>
<tr><td>40</td><td>5</td><td>0.75</td><td>6.67</td></tr>
<tr><td>60</td><td>5</td><td>0.23</td><td>21.7</td></tr>
</table>
</td><td>(3)</td></tr>
<tr><td>(f)</td><td>The experiment shows that as the length of the wire increases, so does the resistance. Accept the converse answer.</td><td>(1)</td></tr>
<tr><td>(g)</td><td> 
</td><td>(1)</td></tr>
<tr><td>Total</td><td></td><td>(12)</td></tr>
</table>

5	Answer	Marks
(a)	+1	**(1)**
(b)	0	**(1)**
(c)	-1	**(1)**
(d)		**(2)**
Total		**(5)**

6	Answer	Marks
(a)	When the cloth rubs the insulator, electrons are transferred from the cloth to the insulator. The insulator gains electrons and so becomes negative.	**(2)**
(b)	Students may mention any three of these: 1. Petrol tankers travelling on the roads. 2. Using a mobile phone on a petrol station forecourt. 3. Cleaning an oil tanker. 4. Dust attracted to insulators e.g. the TV screen. 5. Clothes made from synthetic clothing cling to each other.	**(3)**
(c)	When objects **lose** negative charges, they will become **positively charged** overall. When objects **gain** negative charges, they will become **negatively charged** overall.	**(2)**
Total		**(7)**