This marking key is constructed so that it can be used for summative purposes. Possible answers to each question are provided in italics. The allocation of marks to student answers enables a test score out of 35 to be calculated, which can be used for grading and reporting. Teachers may wish to modify the electronic version of the test and marking key to suit local outcomes and assessment policies.

1. The following diagram shows torch batteries connected to torch globes in different ways.

Complete the following table to show which of the above globes will light and explain why. (10 marks)

<table>
<thead>
<tr>
<th>Globe</th>
<th>Will it light?</th>
<th>Say why</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No (1)</td>
<td>Wrong connection points on globe. (1) OR Incomplete circuit. (1)</td>
</tr>
<tr>
<td>B</td>
<td>Yes (1)</td>
<td>Connected up correctly. (1) OR Complete circuit. (1)</td>
</tr>
<tr>
<td>C</td>
<td>No (1)</td>
<td>Needs another wire. (1) OR Incomplete circuit. (1)</td>
</tr>
<tr>
<td>D</td>
<td>Yes (1)</td>
<td>Connected up correctly. (1) OR Complete circuit. (1)</td>
</tr>
<tr>
<td>E</td>
<td>No (1)</td>
<td>The lower wire should connect to bottom of the battery. (1) OR Incomplete circuit. (1)</td>
</tr>
</tbody>
</table>
2. a. Give two examples of conductors. (2 marks)
   Copper, iron, Nichrome, mercury, carbon rod, etc. (1 + 1)

b. Give two examples of insulators. (2 marks)
   Plastic, wood, etc. (1 + 1)

c. Why do some materials conduct electricity while other materials do not? (2 marks)
   Only metals conduct electricity. (1)
   OR
   The electrons in conductors are free to flow through them, whereas in insulators the electrons are not free to flow through them. (2)

3. The torch globe is connected to the torch battery and it is glowing.

   a. Put arrows on wire A and wire B to show the direction in which the electric current is flowing. Why does the current flow in that direction? (3 marks)
   Arrows show a flow of (conventional) current in a circuit out of the top of the battery through the globe back to the bottom of the battery or a flow of electrons from the base of the battery (negative terminal) through the globe back to the top (positive terminal) of the battery. Arrows show a circuit (1) and reason is consistent with direction of current. (1)

   b. How much current is flowing in each wire: more in A than B, the same in A and B; or less in A than B? Explain why.
   There is the same amount of current in each wire. (1)

4. Is a battery: (2 marks)
   a. a store of electricity?
   b. a store of electrical energy?
   c. a store of chemicals?
   d. a store of chemical energy?
   A battery is a store of chemicals. (1)
   OR
   A battery is a store of chemical energy. (2)
5. How does a battery cause an electrical current to flow through a circuit? (2 marks)
   A battery pushes electricity round a circuit like a pump pushes water. (1)
   OR
   The voltage pushes electrons round the circuit. (1)
   OR
   The chemical reaction in the battery creates a excess of electrons at the negative
terminal which pushes the electrons round the circuit to the positive terminal where
there is a deficit of electrons. (2)

6. Why does a battery go flat? (2 marks)
   The battery runs out of chemicals. (1)
   OR
   All of the chemical potential energy has been converted to electrical energy. (2)

7. In the following circuit circuits, all of the batteries are the same type and size, and all of
   the globes are of the same type and size. The brightness of the globe in diagram A is
   normal. Will the globes in the other circuits be brighter, dimmer or the same as in Diagram A?
   Explain why in each case. (6 marks)
   **Diagram B:** Brighter. (1)
   Because there are two batteries for one globe OR because there is twice the voltage
   applied to the globe. (1)
   **Diagram C:** Dimmer. (1)
   Because there are two globes for the one battery OR because the voltage of the one
   battery is shared between two globes OR the extra globe increases the resistance. (1)
   **Diagram D:** Normal brightness or the same brightness as in Diagram A. (1)
   Because each lamp is effectively connected directly back to the battery/connected in
   parallel, so each lamp gets the same full voltage and thus should be at the same full
   brightness. (1)

8. In this Electricity module you have been discussing four important electricity concepts;
   voltage, current, resistance and power. (4 marks)
   a. What is the difference between current and power?
      Current is the flow of electricity and power is a property/rating of an electrical
      appliance. (1)
      OR
      Current is the flow of electricity/electrons/electrical energy round a circuit, and
      power is the rate at which an appliance consumes electrical energy. (2)
   b. Explain how you could increase current by varying voltage and resistance.
      Current can be increased by using more batteries or by reducing the number of
      globes in a circuit. (1)
      OR
      Current can be increased by increasing voltage or by decreasing resistance. (2)