

Electricity

Higher Tier

Time Allowed: 50 minutes (50 marks)

Question	Links to Student Progress Sheet	Score	Total Marks Available
1	Circuits		7
2	Magnets		7
3	Electromagnet investigation		14
4	Drawing circuits		11
5	Atoms		5
6	Static electricity		6
Total			50

Name _____

Date _____

1. Finn and Archie are making a series circuit. They close the switch but the bulb does not light and the electricity does not flow around the circuit. All the wires are connected as they should be.

a) Give two reasons why the circuit may not work even though the switch is closed.

(2)

b) Archie and Finn make another circuit. This time they test different types of materials to see which will make the bulb light.

Objects that allow electricity to flow through them are called?

(1)

c) Archie wants to see which metal will make the bulb light most brightly. Finn says that they cannot test different pieces of metal as they will all have different shapes. He suggests using wires instead.

Archie and Finn make three circuits using steel wire, copper wire and aluminium wire. They want to compare their results. What must the boys keep the same about each wire in the three circuits and what must be different?

(3)

Wire	Must be the same	Must be different
The type of metal		
The length of wire		
The thickness of a wire		

d) Archie and Finn changed the wire in their circuit to make the bulb even brighter.

Name one other change that Archie and Finn could make to their circuit to make the bulb brighter as they close the switch.

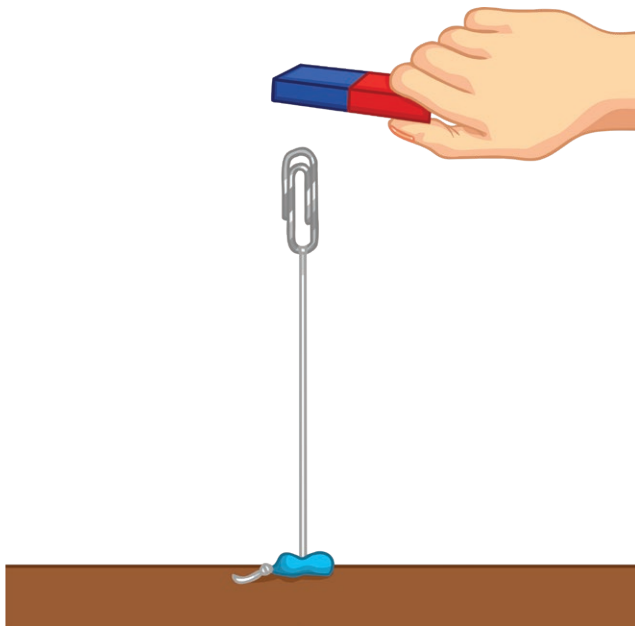
(1)



2. Ellie ties a paperclip to a piece of string. She tapes the string to the table and holds a magnet over the paperclip.

a) On the picture below, draw an arrow to show the direction of the magnetic force.

(1)



b) Ellie removes the magnet, what happens to the paperclip?

(2)

c) Ellie decides to repeat the experiment using a variety of objects.

Tick **one** of the objects below which will act in the same way as the paper clip.

(1)

rubber

☐

plastic pen

☐

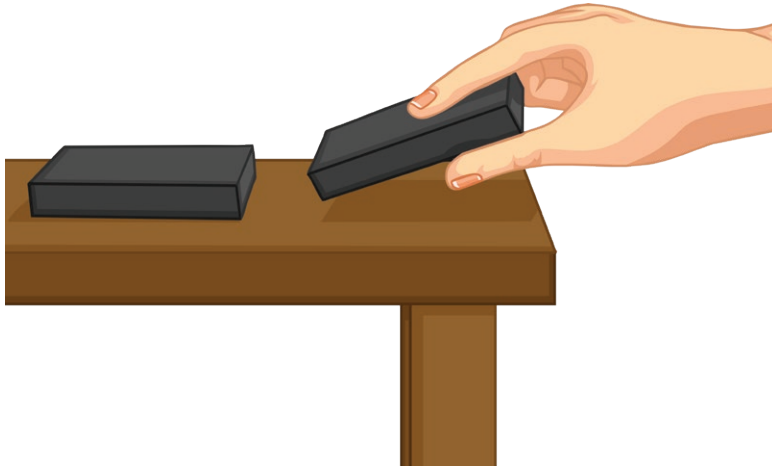
steel pin

☐

wooden matchstick

☐

- d) Harry places two magnets on the table. He picks one of the magnets up and pushes it close to the other.



The magnet on the table moves away as the other magnet is pushed closer to it.

Why does the magnet on the table move away?

(1)

- e) Use the words repel or attract to complete the sentences below.

(2)

When the north poles of two magnets are held together, we say that the magnets _____ one another.

When the south pole of one magnet is held close to the north pole of another magnet, we say that the magnets _____ one another.



3. Charlotte wants to make an **electromagnet**. Charlotte wants to investigate how many nails she can pick up with her electromagnet.

a) Describe a method of how to make an electromagnet. Remember to include an equipment list. (6)

b) There are three variables in Charlotte's investigation. Write a definition for each variable. (3)

independent	
dependent	
control	

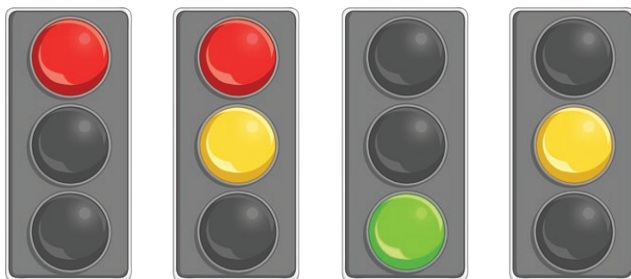
c) Using the keywords in the box, describe what an electromagnet is. (5)

wire	larger	magnetic field	charges	stops
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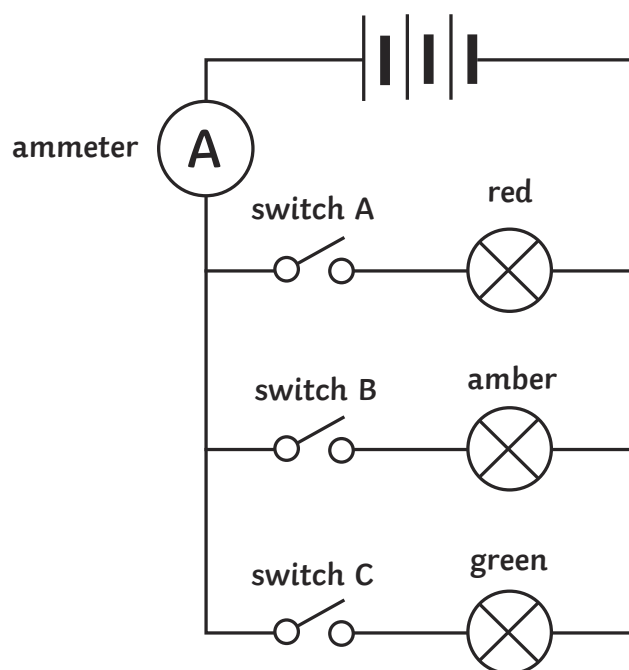


4. George and Emily are using a variety of components to make series and parallel circuits.

a) George is designing electrical circuits. He wants to make a traffic light circuit.



George uses different coloured bulbs to make a circuit:



George must close different switches to show each combination of lights.

Complete the table to show the switches that he must close.

The first one has been done for you.

(4)

Colour of Bulbs	Which Switches Must Be Closed?
red	switch A
red and amber	
green	
amber	



b) George is using an ammeter in the circuit.

What is the name of the units used to measure current?

(1)

c) Emily tries to make a traffic light circuit. When Emily closes switch A, the ammeter reading gets lower. The red bulb is very bright, but the amber and green bulbs go out.

Identify why the red bulb is bright, but the amber and green bulbs go out from the statements below. Tick **one** box.

(1)

Switches B and C are open.

☐

The ammeter reading is zero.

☐

Most of the current goes through switch A.

☐

All the current is used up by the red bulb.

☐

d) Lewis is carrying out an investigation into resistance and is using different lengths of wire. He makes three circuits using a voltmeter, powerpack, ammeter and different lengths of wire. He records the voltage and current of each circuit.

What is the unit of measurement for resistance?

(1)

e) Complete the table below and calculate the resistance in each length of wire.

(3)

Length of wire (cm)	Voltage (V)	Current (A)	Resistance (Ω)
20	5	1	
40	5	0.75	
60	5	0.23	

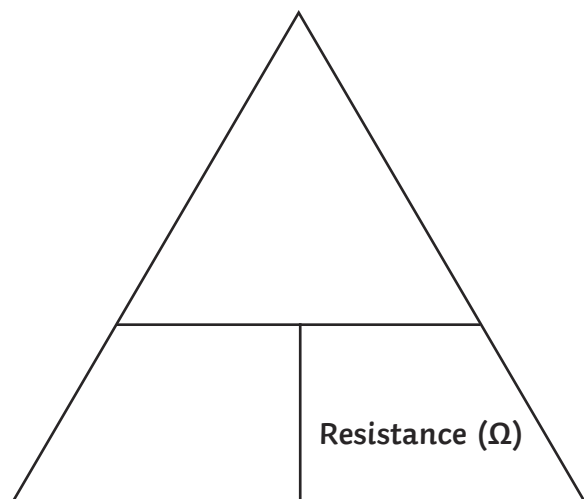
f) What does Lewis' investigation show about resistance and the length of wire?

(1)



g) Complete the resistance triangle using the following words: current (A), and voltage (V).

(1)



5. Emma is learning about the subatomic particles in an atom.

a) What is the charge on a proton?

(1)

b) What is the charge on a neutron?

(1)

c) What is the charge on an electron?

(1)

d) Draw and label an atom with the following words: electron, proton and neutron.

(2)



6. A dry cloth is used to rub an insulator; the insulator becomes negatively charged.

a) Describe why the insulator becomes negatively charged.

(2)

b) Name three ways that static electricity could be a nuisance or dangerous.

(3)

c) Static electricity occurs when an object either loses or gains a negative charge. Identify the charge for each question below.

(2)

When objects **lose** negative charges they will become _____
_____ overall.

When objects **gain** negative charges they will become _____
_____ overall.

