

4. Figure 5a represents a circuit that Cherise constructed to test the conductivity of various objects in her home. Figure 5b shows how she connected the objects to be tested across terminals X and Y with the switch closed.

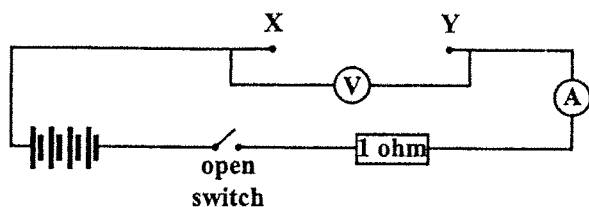


Figure 5a. Open circuit

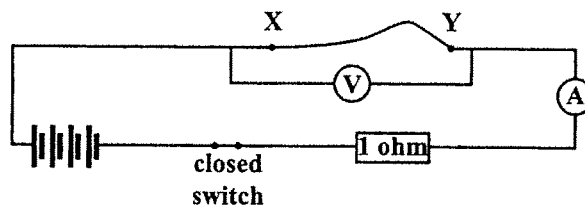


Figure 5b. Closed circuit

- (a) Consider the following list of materials: aluminium, carbon, copper, plastic, rubber and wood.

- (i) Choose TWO very good conductors from the list above.

Copper and aluminium

( 2 marks)

- (ii) Choose ONE very good insulator from the list above.

rubber

( 1 mark)

- (b) (i) If ONE dry cell provides a voltage of 1.5 volts, what is the voltage of the battery made up of four dry cells as shown in Figure 5a?

6v

( 1 mark)

- (ii) What is the reading of the ammeter in Figure 5a when the switch is open?

0 A

( 1 mark)

- (iii) How will the value of the ammeter reading change when Cherise places a piece of conducting wire between X and Y as shown in Figure 5b?

The ammeter will not show aA

( 1 mark)

- (iv) When Cherise places a 2 ohm resistor between X and Y in Figure 5a and closes the switch, the voltmeter reads 4V. What formula can she use to calculate the current?

~~E~~ Current (I), Ohm (A), Voltage (V)  $\therefore I = \frac{V}{R}$

( 1 mark)

GO ON TO THE NEXT PAGE

- (v) From (iv) calculate the current in the circuit. Include the correct unit in your answer.

$$I = \frac{V}{R} = \frac{4}{2} = 2 \text{ A}$$

(2 marks)

- (vi) Give ONE reason why it is beneficial to use a fuse in this circuit.

Because fuse is an electric device which protects the circuit from overload of current

(1 mark)

- (c) Cherise has a radio which can be powered either by batteries or electricity from the mains. State TWO precautions that Cherise can take to prevent electrical shock or fire when this radio is connected to the electrical outlets.

(i) To ensure that the plug or the cord is well insulated and it doesn't have any wires exposed.

(1 mark)

(ii) To ensure that the plug and her hands are not wet when she is plugging it into the outlets.

(1 mark)

- (d) Identify the MOST appropriate fire extinguisher to put out an electrical fire.

A class C fire extinguisher, which has carbon dioxide

(1 mark)

- (e) Name TWO items of protective gear that firemen wear when fighting fires.

(i) Helmet

(1 mark)

(ii) Gloves

(1 mark)

Total 15 marks

4. Figure 5a represents a circuit that Cherise constructed to test the conductivity of various objects in her home. Figure 5b shows how she connected the objects to be tested across terminals X and Y with the switch closed.

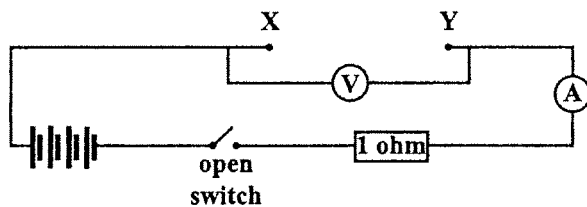


Figure 5a. Open circuit

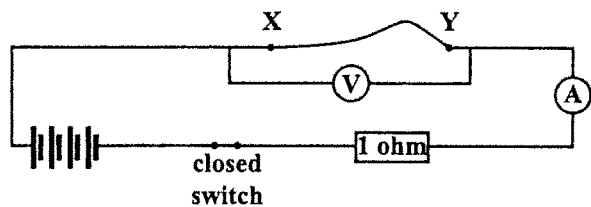


Figure 5b. Closed circuit

- (a) Consider the following list of materials: aluminium, carbon, copper, plastic, rubber and wood.

- (i) Choose TWO very good conductors from the list above.

Two good conductors are copper and aluminium (2 marks)

- (ii) Choose ONE very good insulator from the list above.

one good insulator is rubber. (1 mark)

- (b) (i) If ONE dry cell provides a voltage of 1.5 volts, what is the voltage of the battery made up of four dry cells as shown in Figure 5a?

Total Voltage of battery of four cells =  $1.5V \times 4$   
= 6V (1 mark)

- (ii) What is the reading of the ammeter in Figure 5a when the switch is open?

the reading of the ammeter is zero since no current is passing through. (1 mark)

- (iii) How will the value of the ammeter reading change when Cherise places a piece of conducting wire between X and Y as shown in Figure 5b?

the value of the ammeter will change because the circuit will be closed so current <sup>electrons</sup> will flow. (1 mark)

- (iv) When Cherise places a 2 ohm resistor between X and Y in Figure 5a and closes the switch, the voltmeter reads 4V. What formula can she use to calculate the current?

Formula Voltage = current  $\times$  Resistance  
 $\therefore$  Current = Voltage  $\div$  Resistance. (1 mark)

GO ON TO THE NEXT PAGE

- (v) From (iv) calculate the current in the circuit. Include the correct unit in your answer.

$$\begin{aligned}\text{Current} &= \frac{\text{Voltage}}{\text{Resistance}} \\ &= \frac{4V}{2\Omega} \\ &= 2A\end{aligned}$$

(2 marks)

- (vi) Give ONE reason why it is beneficial to use a fuse in this circuit.

i) Fuse help to regulate the flow of current in a circuit and thus, preventing a fire.

(1 mark)

- (c) Cherise has a radio which can be powered either by batteries or electricity from the mains. State TWO precautions that Cherise can take to prevent electrical shock or fire when this radio is connected to the electrical outlets.

(i) she must ensure that she does not touch the electrical socket with wet hands.

(1 mark)

(ii) Ensure that there are no exposed wires.

(1 mark)

- (d) Identify the MOST appropriate fire extinguisher to put out an electrical fire.

The most appropriate fire extinguisher is carbon dioxide.

(1 mark)

- (e) Name TWO items of protective gear that firemen wear when fighting fires.

(i) A help helmet - to prevent them from head injury.

(1 mark)

(ii) A respirator - to protect help them to breath better.

(1 mark)

Total 15 marks

Example →

4. Figure 5a represents a circuit that Cherise constructed to test the conductivity of various objects in her home. Figure 5b shows how she connected the objects to be tested across terminals X and Y with the switch closed.

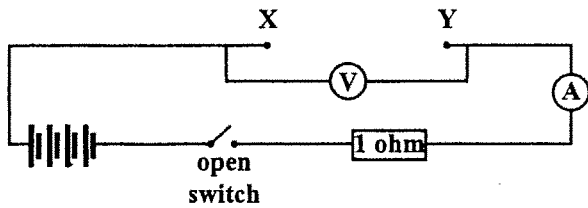


Figure 5a. Open circuit

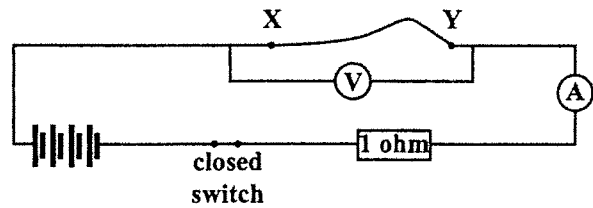


Figure 5b. Closed circuit

- (a) Consider the following list of materials: aluminium, carbon, copper, plastic, rubber and wood.

- (i) Choose TWO very good conductors from the list above.

Aluminium and copper.

( 2 marks )

- (ii) Choose ONE very good insulator from the list above.

Rubber.

( 1 mark )

- (b) (i) If ONE dry cell provides a voltage of 1.5 volts, what is the voltage of the battery made up of four dry cells as shown in Figure 5a?

6 Volts.

( 1 mark )

- (ii) What is the reading of the ammeter in Figure 5a when the switch is open?

0. Amps

( 1 mark )

- (iii) How will the value of the ammeter reading change when Cherise places a piece of conducting wire between X and Y as shown in Figure 5b?

It will increase.

( 1 mark )

- (iv) When Cherise places a 2 ohm resistor between X and Y in Figure 5a and closes the switch, the voltmeter reads 4V. What formula can she use to calculate the current?

$$I = \frac{V}{R}$$

( 1 mark )

GO ON TO THE NEXT PAGE

11-17

33

- (v) From (iv) calculate the current in the circuit. Include the correct unit in your answer.

if  $V = IR$  then  $I = \frac{V}{R}$   
 $I = \frac{4V}{2\Omega}$   
 $= 2 V/\Omega$   
 $= 2 A$

(2 marks)

- (vi) Give ONE reason why it is beneficial to use a fuse in this circuit.

If there is a problem (current) <sup>increase too high</sup>  
 the use will stop <sup>most</sup> any damage to components.  
 (1 mark)

- (c) Cherise has a radio which can be powered either by batteries or electricity from the mains. State TWO precautions that Cherise can take to prevent electrical shock or fire when this radio is connected to the electrical outlets.

(i) Make sure the voltage required is not <sup>110V</sup> ~~220V~~ when  
 plugging <sup>in</sup> the radio into a 220V outlet.  
 (1 mark)

(ii) Do not place radio ~~over~~ or in a pool of water  
 when plugged in shock <sup>will</sup> ~~may~~ occur if contact is made <sup>with water.</sup>  
 (1 mark)

- (d) Identify the MOST appropriate fire extinguisher to put out an electrical fire.

Carbon dioxide.  
 (1 mark)

- (e) Name TWO items of protective gear that firemen wear when fighting fires.

(i) Helmet.  
 (1 mark)

(ii) fire-proof suit. and boots.  
 (1 mark)

Total 15 marks

GO ON TO THE NEXT PAGE

**Integrated Science**  
**Paper 02 – June 2011**

Comments

Question 4: Exemplar 1, 2 and 3

- Part (a)      These candidates were awarded full marks for this part because the candidates demonstrated their knowledge of conductors and insulators as required in (i) and (ii).
- Part (b)      These candidates were awarded six to seven marks out of a total of seven marks for this part; the candidates were able to make accurate calculations for (i) and (v); for (ii), the candidates understood that with the switch open no current would be flowing; (iii) proved to be challenging as only one of the three candidates accurately stated that the value of the ammeter reading would increase. For (iv), the candidates correctly stated the formula as required and for (vi) the candidates demonstrated that they understood the importance of a fuse in a circuit.
- Part(c)      These candidates were awarded full marks for this part because the candidates demonstrated knowledge of the precautions to be taken to prevent electrical shocks.
- Part(d)      These candidates were awarded full marks for this part because the candidates were able to identify the fire extinguisher that most appropriate.
- Part (e)      These candidates were awarded full marks for this part because the candidates were able to correctly identify protective gear that firemen used.