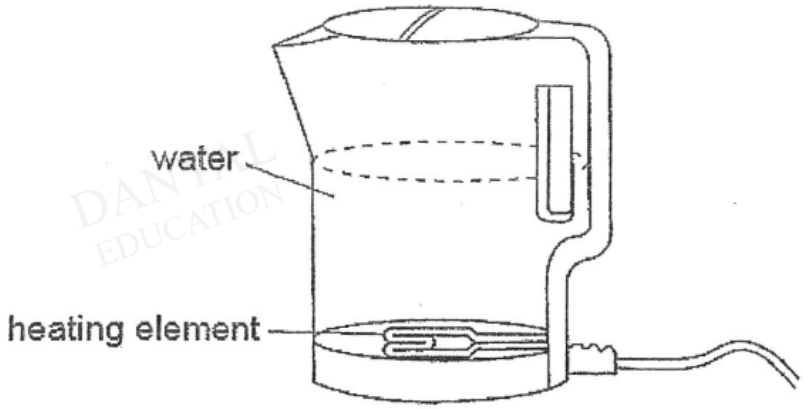
O Level Combined Physics Structured

Practical Electricity Test 2.0

Q1

The figure below shows an electric kettle connected to the mains supply.



(d) Given that the potential difference of the mains supply is 240 V and the current in the heating element of the kettle is 8.0 A, calculate the resistance of the heating element.

Resistance = ... [1]

(e) The kettle is switched on for a period of 20 min per day. Calculate the cost of using this kettle for 25 days if the cost of electricity is 30¢ per kWh.

Cost = ... [3]

Q2

Fig. 8.1 shows an electric iron, which has a label '220 V, 1100 W' marked on it. The electric iron is connected to a 220 V mains supply by the live, neutral and earth wires.

Fig. 8.1

[3]

(a) In Fig. 8.1, draw suitable wires to connect the electric iron to the mains supply, including a fuse and a switch for the electric iron. Label them.

(b) If the electric iron is used for 2 hours daily, calculate the total cost of using the electric iron for a month of 30 days, if 1 unit of electricity costs 30 cents.

cost = $ ..... [2]

Q3

An electric oven, connected to the mains supply, is shown in Fig.11.1.

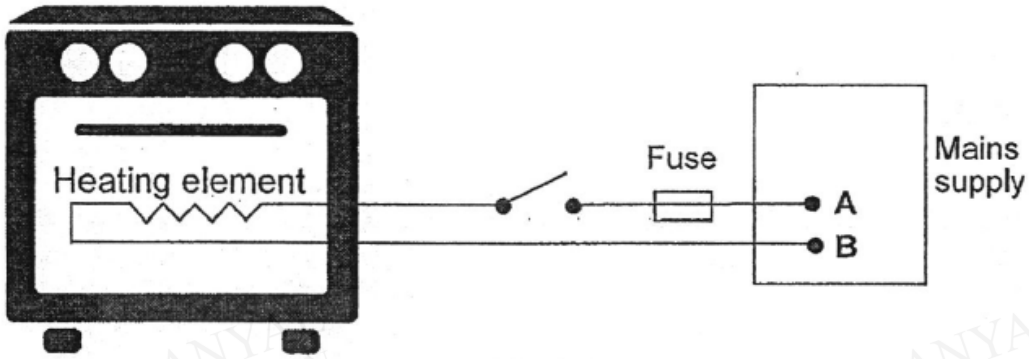


Fig 11.1

(i) State which wire, **A** or **B**, is the live wire of the mains supply. Explain your answer

.....

.....

.....[2]

(i) The oven works at 2000 W and the mains supply is 240 V.
Fuse ratings available are 8 A, 10 A and 13 A. What would be a suitable rating for a fuse to be used? With aid of calculation, explain your answer.

.....

.....

.....[2]

(ii) The oven has a metal casing. It has a third wire which is an added safety feature. Draw, on Fig. 11.1 how this third wire should be connected to the oven, and label the name of this wire. [1]

Q4

An electric kettle with power rating of 2.5 kW is connected to a 240 V mains supply by a flexible cable to a 3-pin plug.

(a) State the names of the 3 wires found in the 3-pin plug and their respective colours.

Name of wire	Colour

[3]

(b) Calculate the current flowing in the circuit when the electric kettle is operating under normal condition.

current = _____ A [2]

(c) Suggest a suitable fuse rating for this circuit. Explain your answer.

_____

_____ [2]

(d) If the cost of electricity is $0.23 per kWh, calculate the total cost of using the electric kettle for 1 hour every day for 1 week.

cost = $ _____ [2]

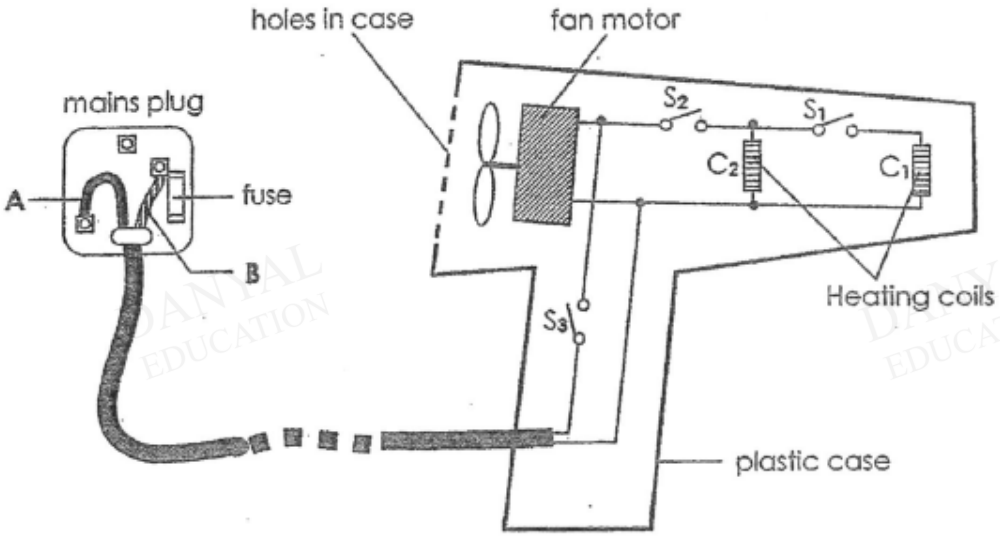
(e) Suggest where a heating element should be placed in the electric kettle so that the water can be heated efficiently.

_____

_____ [1]

Q5

The figure shows a 240 V electric hairdryer with a plastic case.



(a) Label the wires **A** and **B** and their respective colours in a mains plug.

wire	name	colour
A		
B		

[2]

(b) One pin in the plug is not used. Explain whether this will make the hairdryer dangerous when it is switched on.

.....

.....

.....[1]

(c) State the switch(es) that need to be closed to turn on the following:

(i) the fan alone

.....

(ii) the fan and only one of the heating coils

..... [2]

(d) When the hair dryer is working at full power, the voltage is 240 V. The current in each heating coil is 2 A and the fan motor takes a current of 0.5 A.

(i) What is the total current from the supply when both heating coils and the fan are in use?

total current = ... [1]

(ii) Which is the most suitable fuse, 1 A, 3 A, 7 A or 10 A, when both heating coils and fan are in use?

..... [1]

(iii) Why is it dangerous to use a 13 A fuse in the plug?

.....

..... [1]

Answers

Practical Electricity Test 2.0

Q1

(d) Resistance, R = V/I
= 240 / 8
= 30 Ω [1]

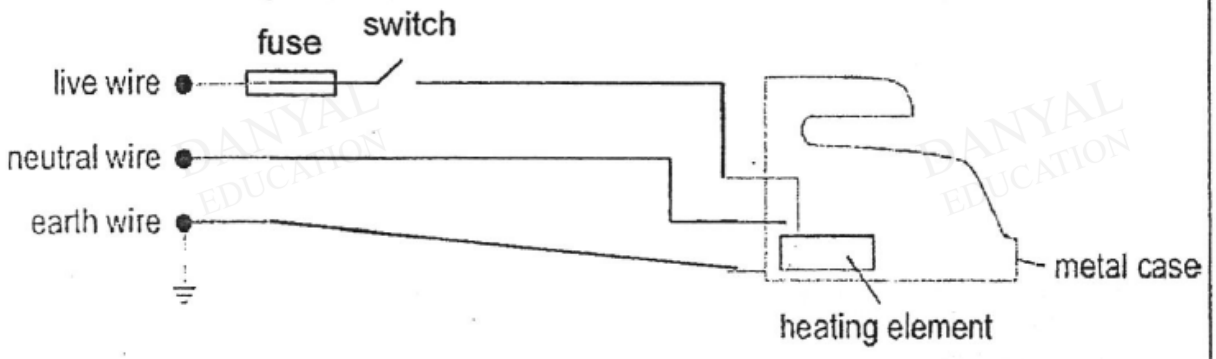
(e) Power, P = V I
= 240 x 8
= 1920 W
= 1.92 kW [1]

Energy, E = P t
= 1.92 kW x $\frac{20}{60}$ h x 25 [1]
= 16 kWh

Cost = 16 x 0.30 = $4.80 [1]

Q2

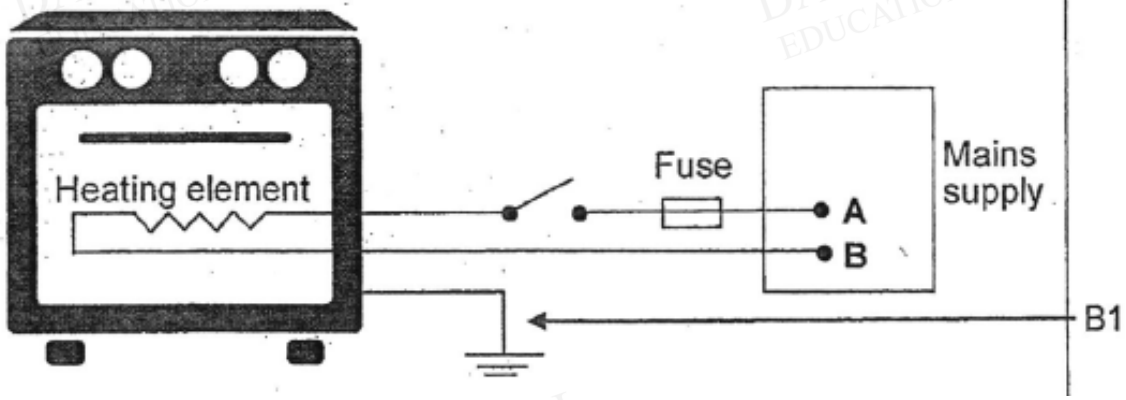
(a) Live wire – [1/2]
Neutral wire – [1/2]
Earth wire – [1/2]
Switch [1/2] and fuse [1/2]
Place on the live wire –[1/2] 3



(b) E = P x t
= 1.1 kW x 2 x 30 hr 1
= 66 kWh

Cost = 66 X 30 1
= $19.80

Q3

(bi)	Wire A The Live wire is connected to the fuse / switch	[B1] [B1]
(bii)	$I = \frac{P}{V} = \frac{2000}{240}$ $= 8.33$ A Fuse rating is **10 A** as it has to be **slighly higher** than the operating current.	[A1] [B1]
(biii)		

Q4

(a) [3]

Name of wire	Colour
Live wire	Brown
Neutral wire	Blue
Earth wire	Green and Yellow

(b) I = 2500/240 [1]
= 10.4 A [1]

(c) Suitable fuse rating = 13 A [1]
The fuse rating should be slightly higher than the current flowing in the circuit for the fuse to work under normal working conditions of the electric kettle. [1]

(d) Total cost = $(0.23 x 2.5 x 7) [1]
= $4.03 [1]

(e) The heating element should be placed at the bottom of the electric kettle. [1]

Q5

<table>
<tr><td>(a)</td><td colspan="2"><table><tr><td>cable</td><td>name</td><td>colour</td></tr><tr><td>A</td><td>neutral</td><td>blue</td></tr><tr><td>B</td><td>live</td><td>brown</td></tr></table></td><td>1
1</td></tr>
<tr><td>(b)</td><td colspan="2">No, as the hairdryer is having double insulation.
Or the hairdryer is made of plastic and no risk of electric shock.</td><td>1</td></tr>
<tr><td>(c)</td><td>(i)</td><td>S_3</td><td>1</td></tr>
<tr><td></td><td>(ii)</td><td>S_2 and S_3</td><td>1</td></tr>
<tr><td>(d)</td><td>(i)</td><td>Total current = 2 X 2 + 0.5
= 4.5 A</td><td>1</td></tr>
<tr><td></td><td>(ii)</td><td>7 A</td><td>1</td></tr>
<tr><td></td><td>(iii)</td><td>A 13A fuse will not able to prevent the hairdryer from overheating.</td><td>1</td></tr>
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