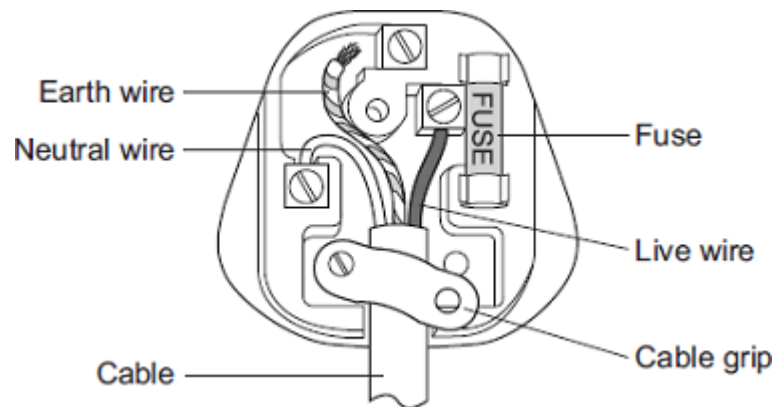


## P5 Electricity – In the home, task 2

### Foundation questions

#### Q1.

- (a) The diagram shows the inside of an incorrectly wired three-pin plug.



- (i) What **two** changes need to be made so that the plug is wired correctly?

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

- (ii) The fuse inside a plug is a safety device.

Explain what happens when too much current passes through a fuse.

\_\_\_\_\_

\_\_\_\_\_

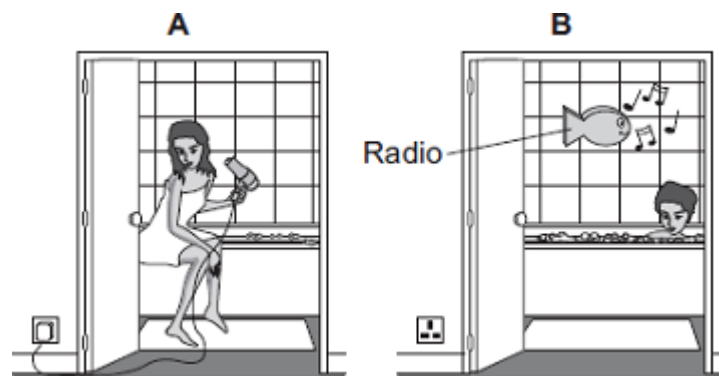
\_\_\_\_\_

\_\_\_\_\_

(2)

- (b) Each of these pictures shows an electrical appliance being used in a bathroom.

## P5 Electricity – In the home, task 2



Using the hairdryer in picture **A** is dangerous. However, it is safe to use the battery-operated radio in picture **B**.

Explain why.

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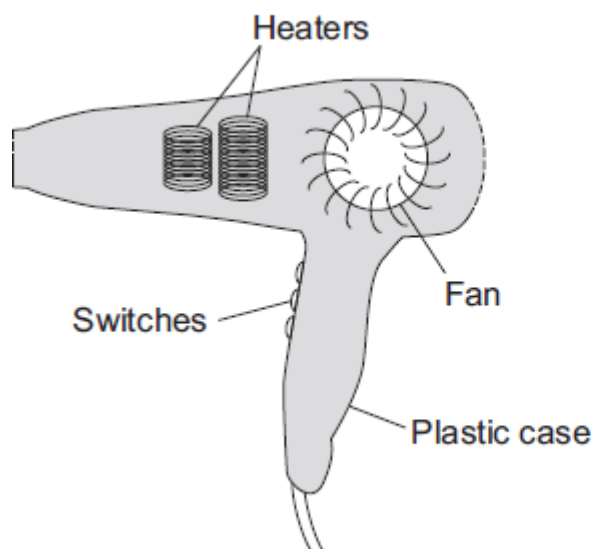
(2)

(Total 6 marks)

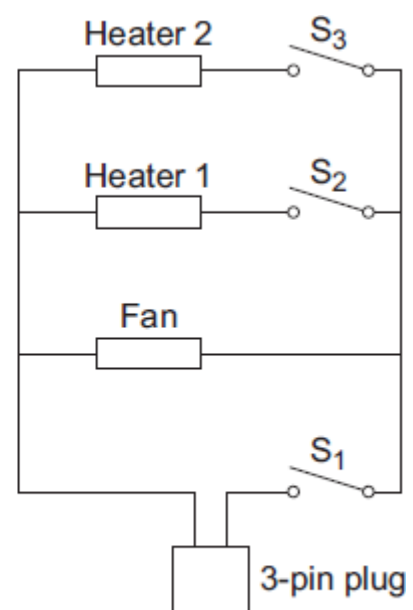
**Q2.**

**Diagram 1** shows a hairdryer.

**Diagram 2** shows how the heaters and fan of the hairdryer are connected to a 3-pin plug. The hairdryer does not have an earth wire.



**Diagram 1**



**Diagram 2**

## P5 Electricity – In the home, task 2

(a) What colour is the insulation around the wire connected to the live pin inside the plug? .....(1)

(b) Why does the hairdryer **not** need an earth wire?

\_\_\_\_\_ [1]  
 \_\_\_\_\_

(c) All the switches are shown in the OFF position.

(i) Which switch or switches have to be ON to make:

(1) only the fan work; \_\_\_\_\_

(2) heater 2 work? \_\_\_\_\_

(2)

(ii) The heaters can only be switched on when the fan is also switched on.

Explain why.

\_\_\_\_\_  
 \_\_\_\_\_ [2]  
 \_\_\_\_\_

(d) The table shows the current drawn from the 230 volt mains electricity supply when different parts of the hairdryer are switched on.

	Current in amps
Fan only	1.0
Fan and heater 1	4.4
Fan and both heaters	6.5

Calculate the maximum power of the hairdryer.

Show clearly how you work out your answer and give the unit.

\_\_\_\_\_  
 \_\_\_\_\_

Maximum power = \_\_\_\_\_

(3)

(Total 9 marks)

## P5 Electricity – In the home, task 2

### Higher Questions

#### Q3.

- (a) A company is developing a system which can heat up and melt ice on roads in the winter. This system is called 'energy storage'.

During the summer, the black surface of the road will heat up in the sunshine.

This energy will be stored in a large amount of soil deep under the road surface. Pipes will run through the soil. In winter, cold water entering the pipes will be warmed and brought to the surface to melt ice.

The system could work well because the road surface is black.

Suggest why.

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(1)

- (b) (i) What is meant by specific latent heat of fusion?

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(2)

- (ii) Calculate the amount of energy required to melt 15 kg of ice at 0 °C.

Specific latent heat of fusion of ice =  $3.4 \times 10^5$  J/kg.

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Energy = \_\_\_\_\_ J

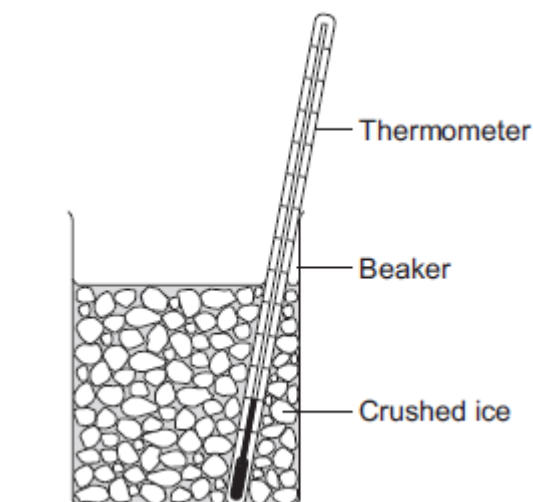
(2)

- (c) Another way to keep roads clear of ice is to spread salt on them. When salt is added to ice, the melting point of the ice changes.

A student investigated how the melting point of ice varies with the mass of salt added.

The figure below shows the equipment that she used.

## P5 Electricity – In the home, task 2



The student added salt to crushed ice and measured the temperature at which the ice melted.

- (i) State **one** variable that the student should have controlled.

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(1)

- (ii) During the investigation the student stirred the crushed ice.

Suggest **two** reasons why.

Tick (✓) **two** boxes.

	Tick (✓)
To raise the melting point of the ice	
To lower the melting point of the ice	
To distribute the salt throughout the ice	
To keep all the ice at the same temperature	
To reduce energy transfer from the surroundings to the ice	

(2)

- (iii) The table below shows the data that the student obtained.

<b>Mass of salt added in grams</b>	0	10	20
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## P5 Electricity – In the home, task 2

Melting point of ice in °C	0	-6	-16
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Describe the pattern shown in the table.

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(1)

- (d) Undersoil electrical heating systems are used in greenhouses. This system could also be used under a road.

A cable just below the ground carries an electric current. One greenhouse system has a power output of 0.50 kW.

Calculate the energy transferred in 2 minutes.

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Energy transferred = \_\_\_\_\_ J

(3)

- (e) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

A local council wants to keep a particular section of a road clear of ice in the winter.

Describe the advantages and disadvantages of keeping the road clear of ice using:

- energy storage
- salt
- undersoil electrical heating.

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## P5 Electricity – In the home, task 2

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Extra space \_\_\_\_\_

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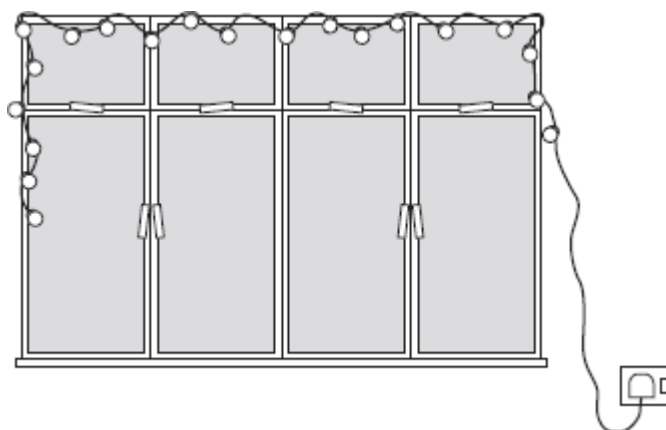
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(6)  
(Total 18 marks)

### Q4.

A set of lights consists of 20 lamps connected in series to the 230 V mains electricity supply.



- (a) When the lights are switched on and working correctly, the current through each lamp is 0.25 A.
- (i) What is the total current drawn from the mains supply?

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(1)

## P5 Electricity – In the home, task 2

- (ii) Calculate the charge passing through **one** of the lamps in 5 minutes.

Show clearly how you work out your answer and give the unit.

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Total charge = \_\_\_\_\_

(3)

- (b) One of the lamps in the set is a fuse lamp. This contains a filament which melts if a fault occurs. A short time after the lights are switched on, a fault causes the filament inside the fuse lamp to melt and all the lamps go out.

The householder cannot find another fuse lamp so connects a piece of aluminium foil across the contacts inside the fuse lamp holder.

When switched on, the nineteen remaining lamps work.

What the householder has done is dangerous.

Explain why.

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(2)

(Total 6 marks)