

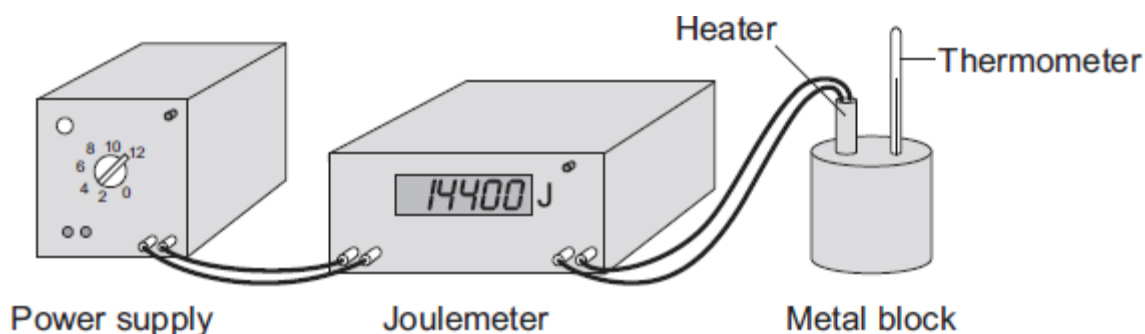
Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

A student used an electric heater to heat a metal block. The student measured the energy input to the heater with a joulemeter.



Before starting the experiment, the student reset the joulemeter to zero. The student switched the power supply on for exactly 10 minutes. During this time, the reading on the joulemeter increased to 14 400.

- (a) (i) Calculate the energy transferred each second from the power supply to the heater.

Show clearly how you work out your answer.

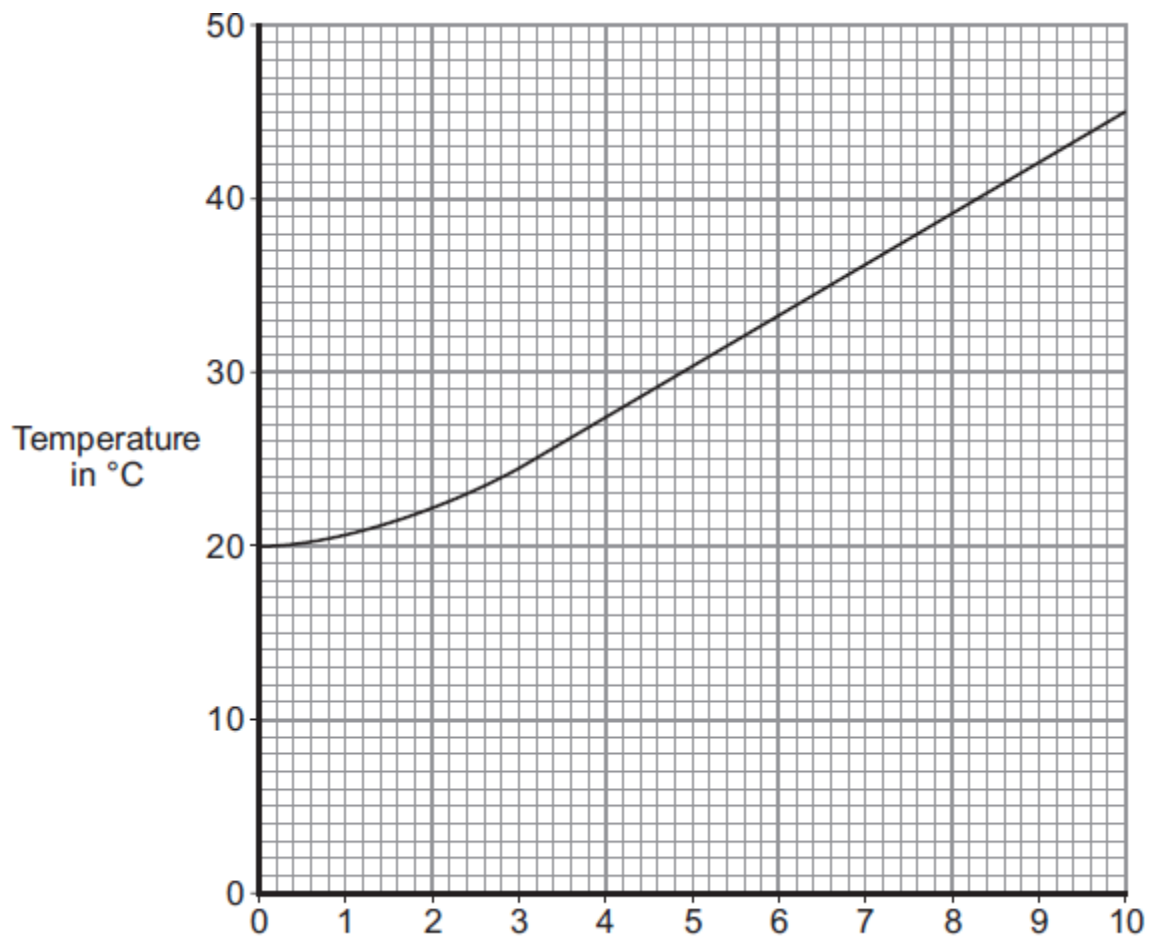
Energy transferred each second = _____ J/s

(2)

- (ii) What is the power of the heater?

(1)

- (b) The student measured the temperature of the metal block every minute. The data obtained by the student is displayed in the graph.



- (i) What range of temperatures did the student measure?

From _____ °C to _____ °C

(1)

- (ii) Before starting the experiment, the student had calculated that the temperature of the block would go up by 36 °C.

The student's data shows a smaller increase.

Which **one** of the following statements gives the most likely reason for this?

Put a tick (✓) in the box next to your answer.

The student does not read the thermometer accurately.

☐

The block transfers energy to the surroundings.

☐

The power supply is not connected correctly to the joulemeter.

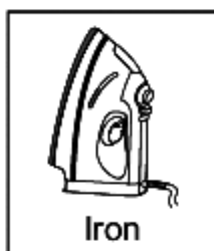
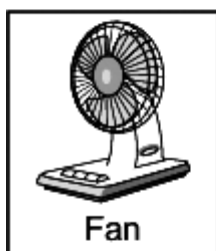
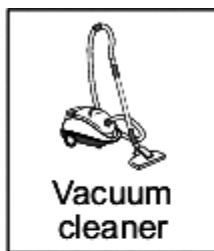
☐

(1)

(Total 5 marks)

Q2.

The appliances shown below transfer electrical energy to other types of energy.



- (a) The vacuum cleaner is designed to transfer electrical energy to kinetic energy.

Three more of the appliances are also designed to transfer electrical energy to kinetic energy. Which **three**?

Draw a ring around each correct appliance.

3

- (b) Which **two** of the following statements are true?

Tick (✓) **two** boxes.

Appliances only transfer part of the energy usefully.

☐

The energy transferred by appliances will be destroyed.

☐

The energy transferred by appliances makes the surroundings warmer.

☐

The energy output from an appliance is bigger than the energy input.



(2)
(Total 5 marks)

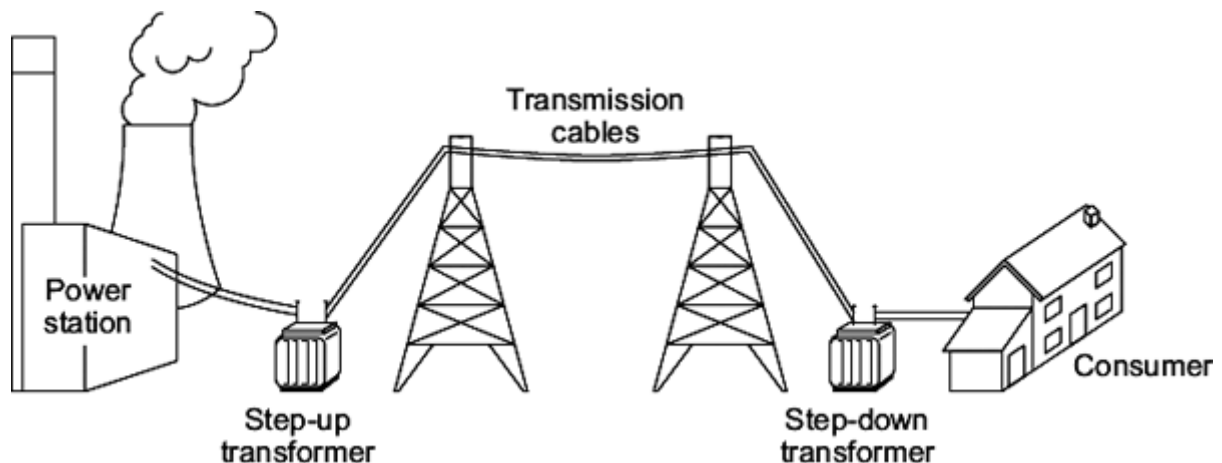
Q3.

In the UK, most electricity is generated in power stations that burn fossil fuels.

- (a) Which type of fossil fuel power station has the shortest start-up time?

(1)

- (b) The diagram shows how electricity is distributed around the UK.



- (i) Which of the parts labelled in the diagram form the National Grid?

(1)

- (ii) A step-up transformer is used near the power station.

Draw a ring around the correct answer in each box to complete each sentence.

A step-up transformer increases the

current.

power.

voltage.

Using a step-up transformer makes the distribution of electricity

less dangerous.

more efficient.

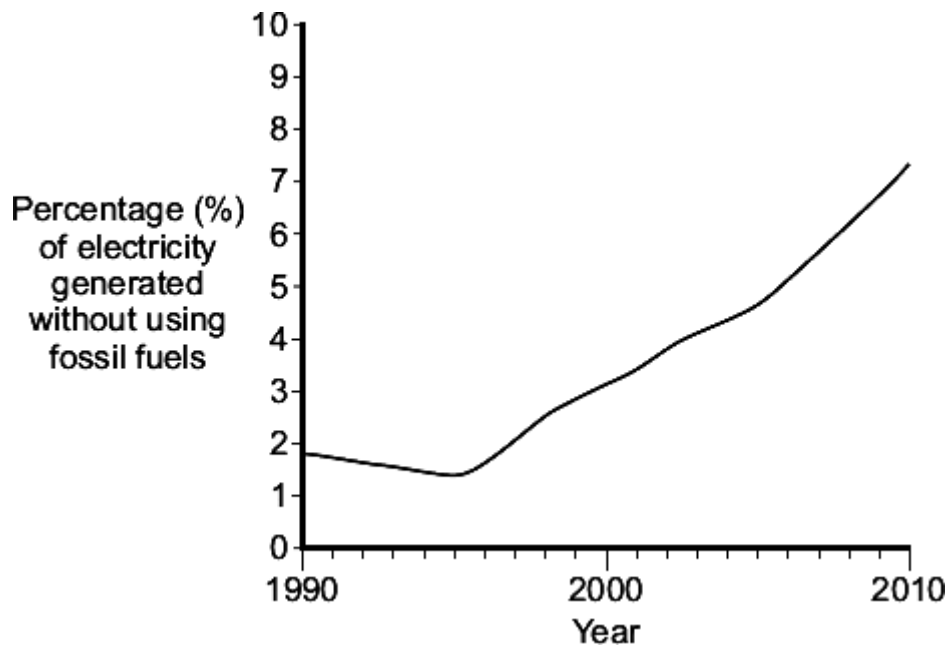
work faster.

(2)

- (c) Electricity in the UK is also generated without using fossil fuels.

The graph shows how the percentage of electricity generated in the UK without using fossil

fuels changed between 1990 and 2010.



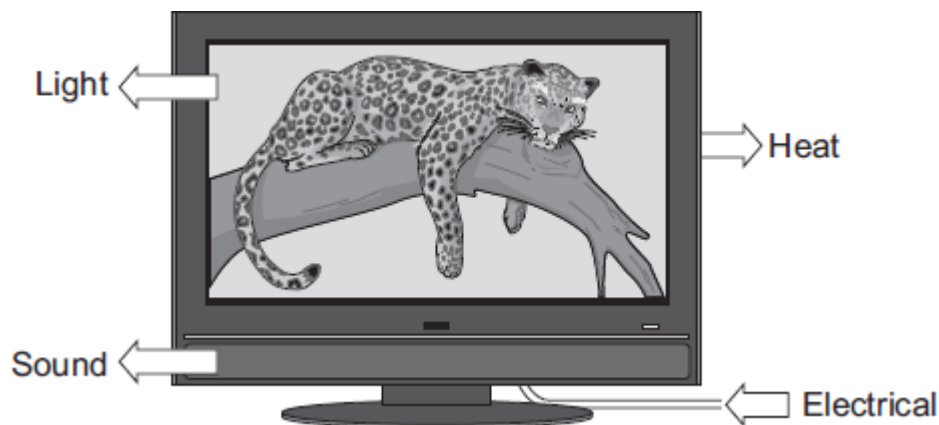
What does the data in the graph suggest will probably happen to the percentage of electricity generated in the UK without using fossil fuels over the next 10 years?

(1)

(Total 5 marks)

Q4.

- (a) The diagram shows the energy transformations produced by a television.



When the television is working, 1200 joules of energy are supplied to the television every second. The useful energy transferred by the television is 720 joules every second.

- (i) Use the equation in the box to calculate the efficiency of the television.

$$\text{efficiency} = \frac{\text{useful energy transferred by the device}}{\text{total energy supplied to the device}}$$

Show clearly how you work out your answer.

Efficiency = _____

(2)

- (ii) Use **one** word from the diagram to complete the following sentence.

The electrical energy that is **not** usefully transformed by the television is
wasted as _____ .

(1)

- (b) A homeowner is sent an electricity bill every 3 months. The total amount of electrical energy used during one 3-month period was 800 kilowatt-hours.
Electrical energy costs 15p per kilowatt-hour.

Use the equation in the box to calculate the cost of the energy transferred from the mains electricity supply.

total cost = number of kilowatt-hours × cost per kilowatt-hour
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Show clearly how you work out your answer and give the unit.

Cost = _____

(2)

(Total 5 marks)