Physics
Standard Grade

Unit 6
Energy Matters
General & Credit Past Paper Questions

Record Sheet

General - Section	Question	Attempted	RED	AMBER	GREEN
Multiple Choice	1				
1.Supply and Demand	2				
	3				
	4				
	5				
	6				
	7				
2. Generation of Electricity	8				
3. Source to Customer	9				
	10				
	11				
	12				
	13				
4. Heat in the Home	14				
	15				
	16				
	17				
	18				

Credit - Section	Question	Attempted	RED	AMBER	GREEN
2. Generation of Electricity	19				
	20				
	21				
3. Source to Customer	22				
	23				
	24				
	25				
4. Heat in the Home	26				
	27				
	28				
	29				
	30				
	31				
	32				
	33				

RED - I don't understand the question
I NEED HELP!

AMBER - I understand most of the question
I NEED TO REVISE A LITTLE MORE!

GREEN - I got the correct answer first time!!
I UNDERSTAND THIS TOPIC

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

1.

Which of the following is a unit of heat?

A degree celsius

B joule

C joule per kilogram

D joule per kilogram per degree celsius

E watt

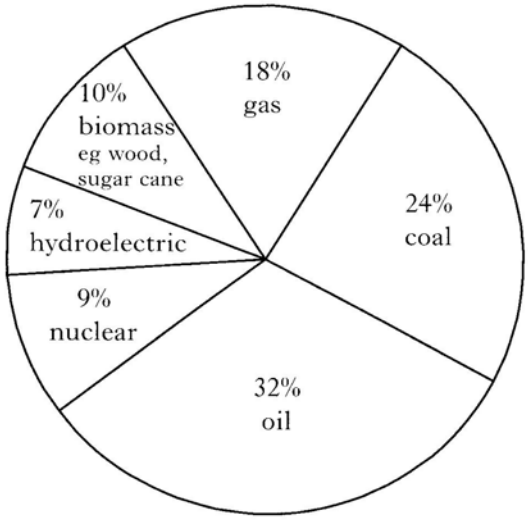
General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

2.

The pie chart shows the estimated use of the world's main energy sources for the year 2000.



(*a*) Use the names of the energy sources given in the pie chart to complete the table.

Fossil fuels	*Other energy sources*

3

(*b*) Use the pie chart to calculate the total percentage of energy supplied by fossil fuels. **1**

(*c*) Why is it important to find sources of energy other than fossil fuels? 1

(*d*) Name **one** renewable source of energy that is not mentioned in the pie chart. **1**

3.

There are many sources of energy at present.

(*a*) (i) What is the main source of energy at present? **1**

(ii) State **one** of the problems with the main source of energy at present. 1

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

3. continued

(*b*) Read the following passage about solar energy.

Some scientists have suggested that solar energy could be a solution to the problems that we have with our present main source of energy.

Solar energy is a free source of energy that is constantly being renewed. Solar energy produces no pollution.

Every year, each square metre of Northern Scotland receives 800 kilowatt hours of solar energy. Many people have rooftop solar panels to make use of solar energy for heating water in their houses.

(i) From the information given **in the passage**, state **one** advantage of solar energy. | | 1

(ii) A rooftop solar panel in Northern Scotland receives 2000 kilowatt hours of solar energy in one year.
Calculate the area of this panel. | 2 |

4.

Heat can be lost from a home in three ways – conduction, convection and radiation.

For each of these ways, state a method by which heat loss can be reduced.

You must give three **different** methods of reducing heat loss.

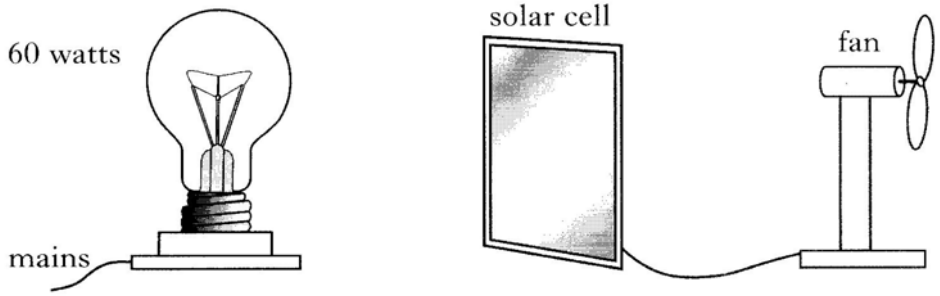
Conduction .....

Convection .....

Radiation..... | | 3

5.

A fan operates using a solar cell and a light bulb.



(*a*) What energy transformation takes place in the **solar cell**? | 1 |

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

5. continued

(*b*) When the lamp is on, the fan turns slowly.

(i) Suggest **two** changes that could be made which would make the fan turn faster. **2**

(ii) The 60 watt lamp operates for 2 minutes.

Calculate how much energy is transformed by the lamp in this time. **2**

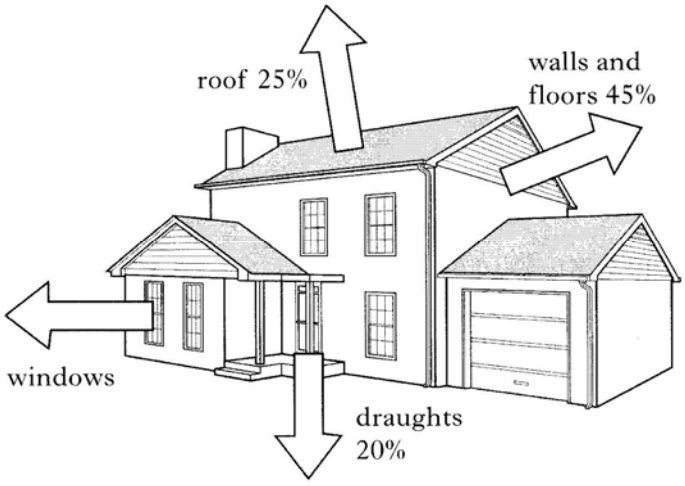
(*c*) Solar energy is a renewable source of energy.

(i) Name **one** other renewable source of energy. **1**

(ii) Name a non-renewable source of energy. **1**

6.

The diagram shows all the ways in which heat is lost from a house.



(*a*) Using information from the diagram, calculate the percentage of heat lost through windows. **2**

(*b*) Various windows of area one square metre are tested for rate of heat loss. The results are shown in the table.

Window	*Rate of heat loss* (joules per second)
single glazed	80
double glazed	60
triple glazed	50

(i) How many joules of heat are lost per square metre from a single glazed window every second? **1**

KU	PS

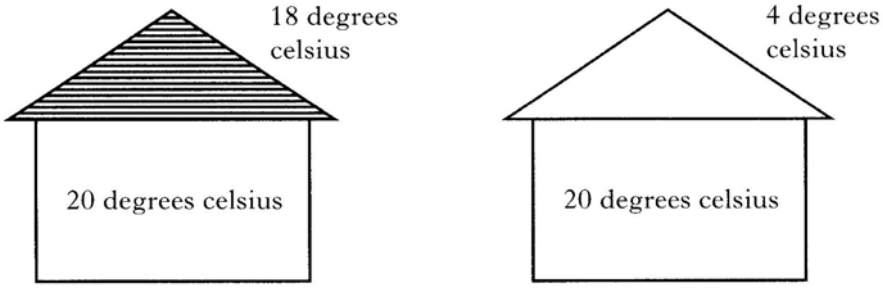
6. (b) continued

(ii) All the windows in a particular house are single glazed. Every second a total of 500 joules of heat is lost through the windows in this house.

(A) Calculate the total area of the windows. **2**

(B) Describe **one** way of reducing heat loss through the windows in this house. **1**

(*c*) A householder keeps the temperature in a house at 20 degrees celsius all year.

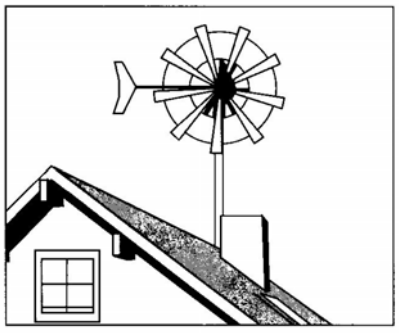


At which time of the year is the rate of heat loss from this house greater?

Explain your answer. **2**

7.

A householder installs a wind turbine electricity generator.



The table gives information about the wind turbine.

Rated power output	1·5 kilowatts
Product life	20 years
Installation cost	£1600

(*a*) In the year 2006, the wind turbine generated electricity for 2000 hours. Calculate the energy generated in kilowatt-hours during 2006. **2**

KU	PS

7. continued

(*b*) An electricity supplier charges 8 pence per kilowatt-hour.

Calculate the cost of buying the same amount of electricity as generated by the wind turbine in 2006. **2**

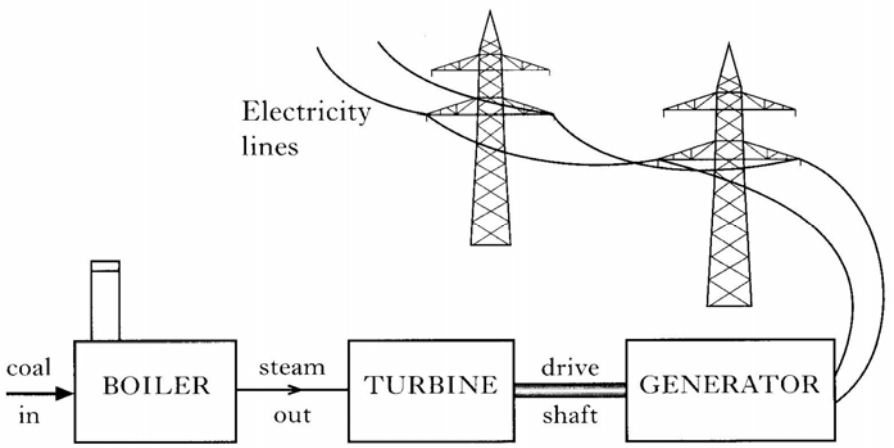
(*c*) The wind turbine costs £1600 to install. It is used to generate energy for 20 years. Each year it generates the same amount of energy as it did in 2006.

Calculate how much money the householder will save if the turbine is used to generate electricity over this time. **2**

8.

Electricity can be generated from different energy sources.

(*a*) Coal is a fossil fuel that is used to generate electricity.



(i) In a coal-fired power station, identify the energy transformation in the boiler, the turbine and the generator.

boiler: .....to.....

turbine: .....to.....

generator: .....to..... **3**

(ii) State **one** disadvantage of using fossil fuels to generate electricity. **1**

(*b*) Electricity can also be generated in nuclear power stations.

State **one** disadvantage of using nuclear fuel. **1**

General Level

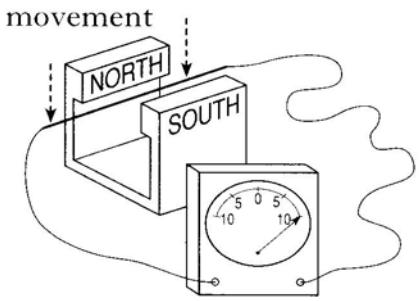
Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

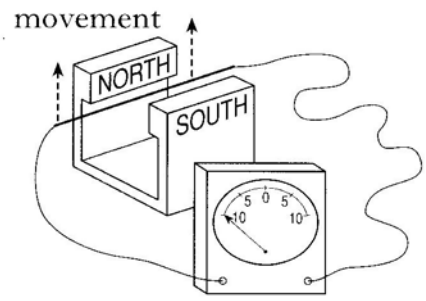
9.

(*a*) A conductor is moved between the poles of a magnet.

The diagrams show the positions of the pointer on a centre-zero voltmeter when the conductor is moved as shown.

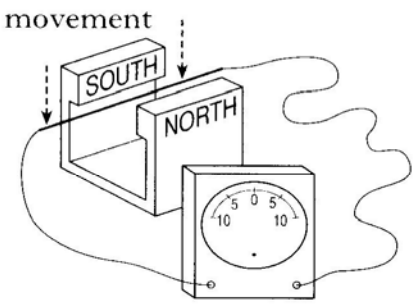


centre-zero voltmeter

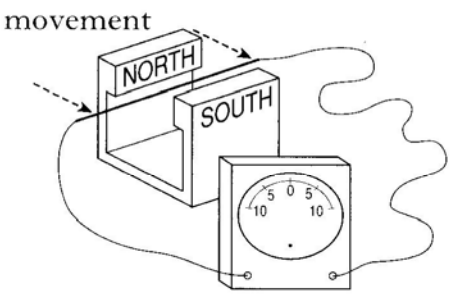


centre-zero voltmeter

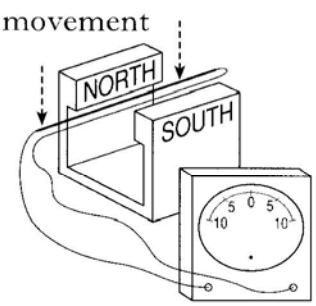
The diagrams below show other situations in which the conductor is moved between the poles of the magnet.



centre-zero voltmeter



centre-zero voltmeter

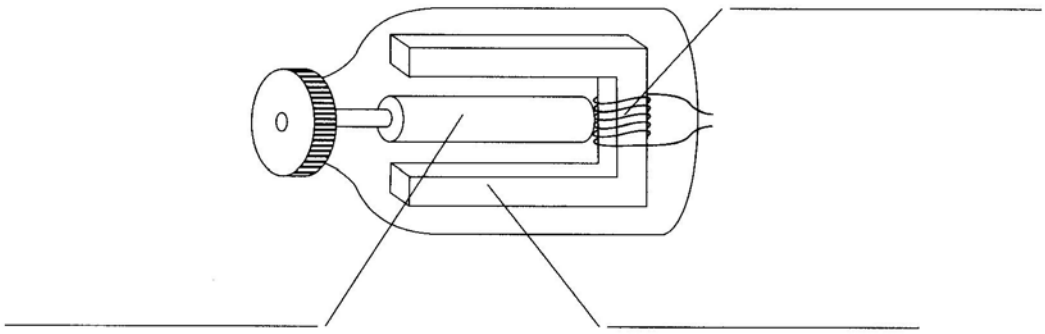


centre-zero voltmeter

In each case, show on the diagram the position of the pointer **while the conductor is moving**.

3

(*b*) The diagram shows how a bicycle dynamo is constructed.



Use the names given below to label the three main parts of the dynamo.

coil **iron core** **magnet**

2

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

10. In a pumped hydroelectric scheme, water is stored in a reservoir 400 metres above the power station.

(*a*) (i) Describe what is meant by a **pumped** hydroelectric scheme. **2**

(ii) Give **one** advantage of a pumped hydroelectric scheme. **1**

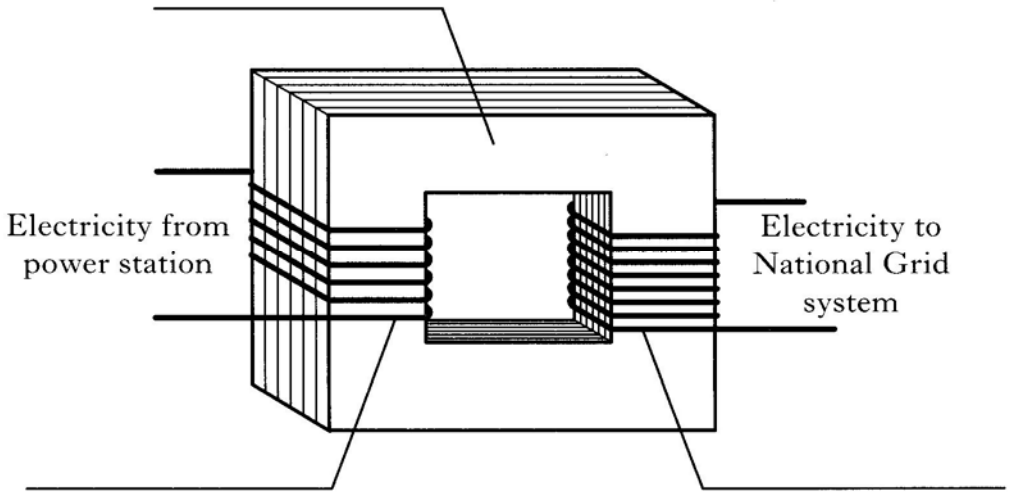
(*b*) Calculate the potential energy transferred by one kilogram of water in moving from the reservoir to the power station. **2**

(*c*) The power station generates electricity at 25 000 volts. This voltage is stepped up to 275 000 volts by a transformer. Electricity at this higher voltage is transmitted across the country using the National Grid system.

(i) A transformer consists of three parts.

Label each of these three parts on the diagram, using the names given.

core **primary coil** **secondary coil** **3**



(ii) The number of turns on the primary coil of the transformer is 15 000.

Calculate the number of turns on the secondary coil. **2**

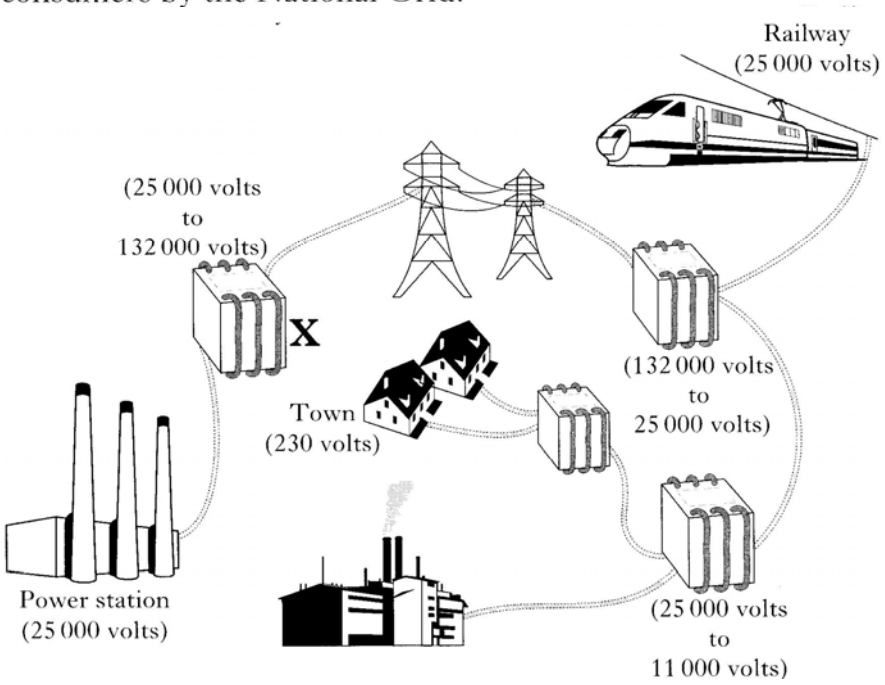
(iii) Why is a very high voltage used by the National Grid system to transmit electrical energy? **1**

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

11. The diagram shows how electricity is distributed from a power station to different consumers by the National Grid.



(*a*) Name the part labelled X in the diagram and state its purpose. **2**

(*b*) Why are high voltages used in the transmission of electrical energy? **1**

(*c*) State the voltage at which electrical energy is used by the railway. **1**

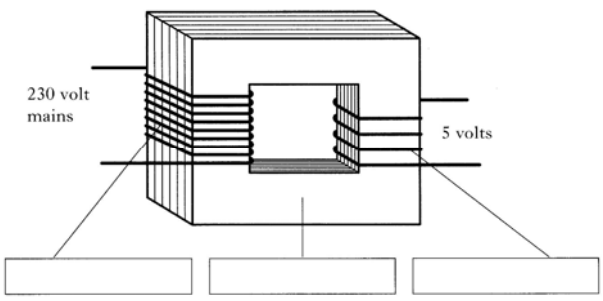
(*d*) Calculate the ratio $\frac{\text{number of turns in primary}}{\text{number of turns in secondary}}$ in the transformer used to supply energy for the railway. **2**

12. A 5 volt battery in a mobile phone is recharged from the mains using a charger containing a step down transformer.

(*a*) The transformer consists of three parts.

Label each of these parts on the diagram below.

core **primary coil** **secondary coil**



3

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

12. continued

(*b*) There are 11 500 turns on the primary coil of the transformer.
Calculate the number of turns on the secondary coil. — KU: 2

(*c*) **Explain** why a transformer cannot be used to step down the voltage from a battery. — PS: 2

13. A mobile phone contains a battery which is charged using a base unit. The base unit contains a transformer and is connected to the a.c. mains supply.

(*a*) What is the purpose of the mains supply? — KU: 1

(*b*) Name the supply mentioned which is d.c. — KU: 1

(*c*) a.c. is short for alternating current.
Explain what is meant by alternating current. — KU: 1

(*d*) State the purpose of a transformer. — KU: 1

(*e*) State **one** advantage of using a mobile phone. — PS: 1

14. A tropical fish tank is filled with water at 18 degrees celsius. The tank holds 120 kilograms of water when it is full. Tropical fish live in water at a temperature of 34 degrees celsius and so the tank has a heater to heat the water. — KU: 1

(*a*) (i) Calculate how much heat energy is needed to heat the water in the tank from 18 degrees celsius to 34 degrees celsius.
[The specific heat capacity of water is 4180 joules per kilogram degree celsius.] — KU: 3

(ii) The heater has a power rating of 200 watts.
Calculate the minimum time it takes to heat the water in the tank. — KU: 2

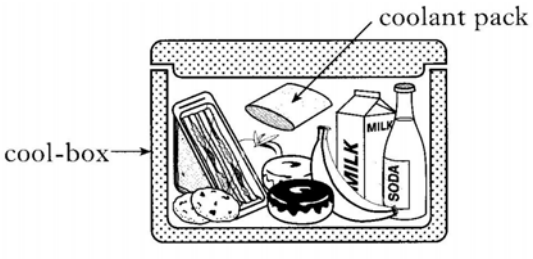
(*b*) Why does the heater need to be switched on at regular intervals to keep the temperature of the water at 34 degrees celsius? — PS: 1

General Level

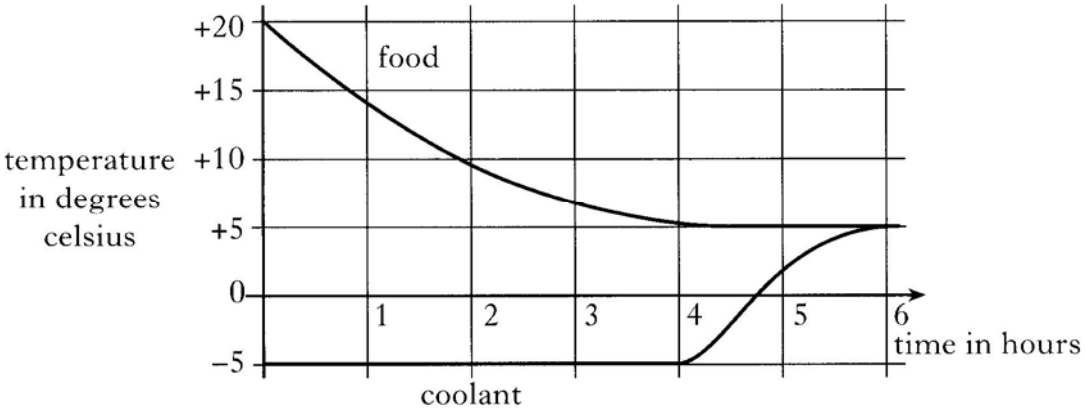
Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

15. A "cool-box" is used to keep food cold for a picnic. The box is well insulated, and has an insulated lid.



Before food is put in the cool-box, a coolant pack is placed in a freezer.
The coolant inside the pack changes from liquid to solid.
The coolant pack is now placed in the cool-box with the food.
The temperature changes of the food and the coolant over time are shown below.



(*a*) What is the final temperature of the food? **1**

(*b*) During the first 4 hours, the temperature of the coolant does not change but the temperature of the food falls.

(i) What happens to the coolant during this time? **1**

(ii) Explain why the temperature of the food falls during this time. **2**

(*c*) Why is the box insulated? **1**

16. The table gives some information about a metal.

melting point	327 degrees celsius
specific heat capacity	126 joules per kilogram per degree celsius
density	11 300 kilograms per cubic metre

General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

16. continued

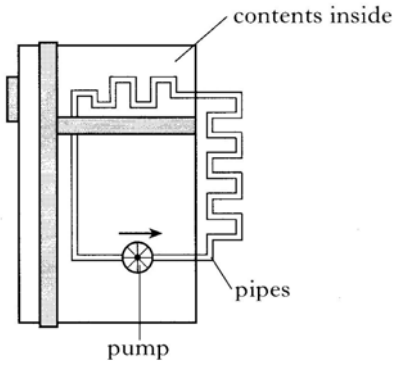
(*a*) Calculate the energy needed to increase the temperature of a 2·5 kilogram block of this metal from 27 degrees celsius to its melting point. **3**

(*b*) (i) Explain why extra heat is needed to **melt** the metal block once it has reached a temperature of 327 degrees celsius. **1**

(ii) What happens to the temperature of the metal **while it is melting**? **1**

17. The contents of a refrigerator are kept cool by removing heat.

This happens because a chemical called a coolant evaporates as it is pumped round pipes in the refrigerator.



(*a*) (i) Which of the following changes of state of the coolant is used to remove heat from the contents?

A Gas to liquid

B Liquid to solid

C Liquid to gas **1**

(ii) Explain why this change of state removes heat from the contents of the refrigerator. **1**

(*b*) A bottle containing 0·75 kilogram of milk at 22 degrees celsius is cooled in the refrigerator to 5 degrees celsius.

Calculate how much energy is removed from the milk.

[The specific heat capacity of milk is 4000 joules per kilogram per degree celsius.] **3**

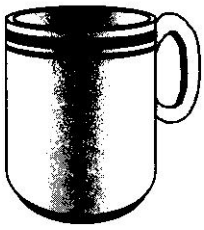
General Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

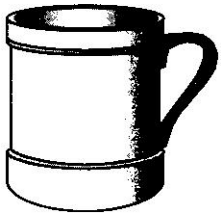
18. A student carries out an experiment to find out which mug is the best at keeping drinks hot.

Each mug is made from a different material.



plastic

metal



ceramic

The same volume of hot water is added to each mug.

(*a*) Describe how the student could carry out the experiment.
Your description should include:

what apparatus would be used;
what measurements are made;
how you reach a conclusion. **3**

(*b*) How could the heat lost from the mugs be reduced? **1**

Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

19. (*a*) The following information relates to two power stations, a fossil fuel power station and a nuclear power station.

Fossil Fuel Power Station	
Heat energy produced per kilogram of fuel	$4{\cdot}5 \times 10^7$ J
Waste produced per year —not radioactive	100 000 kg
Cooling water required	550 kg/s

Nuclear Power Station	
Heat energy produced per kilogram of fuel	$4{\cdot}4 \times 10^{11}$ J
Waste produced per year —radioactive	5 kg
Cooling water required	550 kg/s

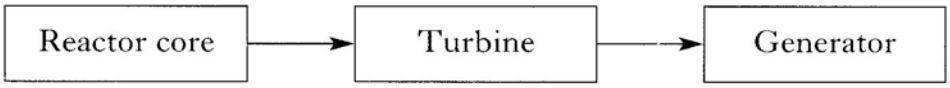
(i) Compare the information given for the two types of power station. State **one** advantage of generating electricity using each type of power station.

Fossil fuel Nuclear **2**

(ii) Using information given, state where both types of power station are likely to be located.

Explain why they are built in these locations. **2**

(*b*) A simple block diagram of a nuclear power station is shown below.

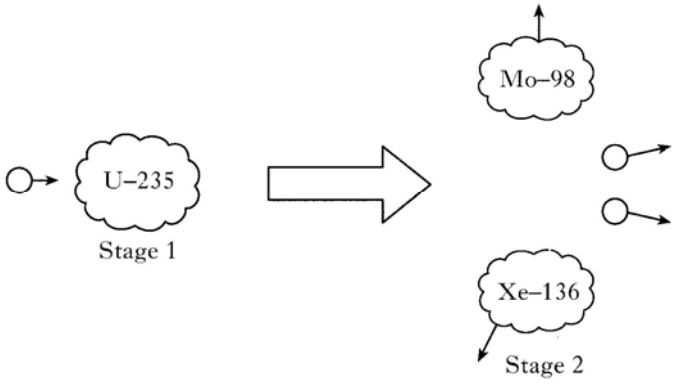


State the energy transformation that takes place in

(i) the reactor core **1**

(ii) the generator. **1**

(*c*) The diagram shows what happens when a uranium nucleus undergoes fission in a nuclear reaction.



Credit Level

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KU	PS

19. (c) continued

(i) Circle **one** word in each set of brackets to describe what happens at each stage.

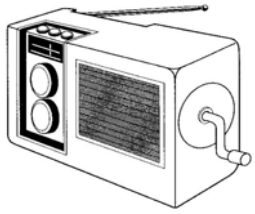
Stage 1: A uranium nucleus is bombarded by a {proton / neutron / electron}.

Stage 2: The uranium nucleus disintegrates, producing fission fragments, two {protons / neutrons / electrons} and {plutonium / heat / electricity}. **3**

(ii) Describe how, in a nuclear reactor, the above process can result in a chain reaction. **3**

20.

A portable radio contains a rechargeable battery and a generator. The battery is charged by turning the handle of the generator.



(*a*) State the purpose of the battery. **1**

(*b*) The battery is fully discharged. The handle of the generator is turned 500 times by a constant force of 9·0 N. For each turn of the handle, the force moves through a distance of 400 mm.

(i) Show that the work done in charging the battery is 1800 J. **2**

(ii) Only 90% of the work done in charging the battery is available as output energy from the battery.

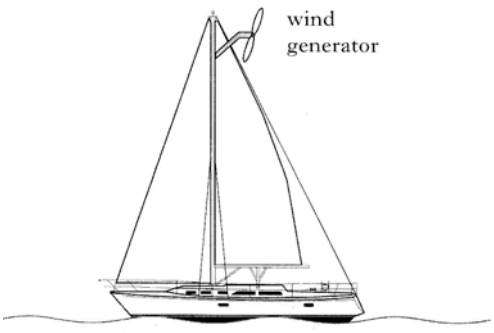
(A) Calculate the output energy available. **2**

(B) When operating, the radio takes a current of 250 mA. The voltage of the battery is 3 V.

Calculate the maximum time for which the radio operates. **2**

21.

A wind generator on a yacht is used to charge a battery at 12 V.



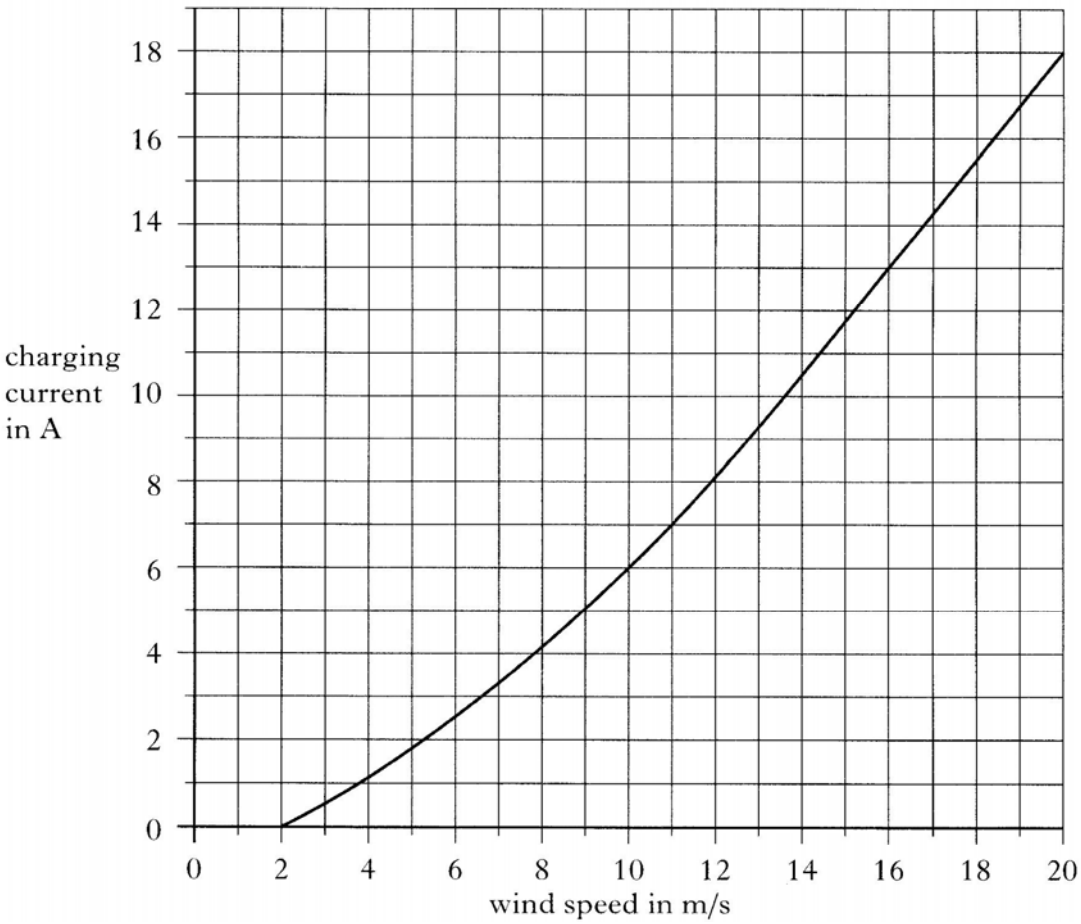
Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

21. continued

The graph shows the charging current at different wind speeds.



(*a*) The wind blows at a speed of 10 m/s.

(i) What is the charging current at this wind speed? **1**

(ii) Calculate the electrical power produced by the generator at this wind speed. **2**

(iii) The wind speed does not change.

Calculate the energy supplied to the battery in 3·5 hours. **2**

(*b*) The yacht has a stand-by petrol powered generator to charge the battery.

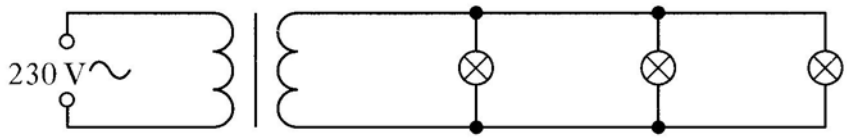
Why is the petrol generator necessary, in addition to the wind generator? **1**

Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

22. A lighting system in a shop window uses three identical 18 W, 12 V filament lamps. The lamps are operated at their correct rating from the 230 V mains supply using a transformer as shown below.



There are 5750 turns on the primary coil of the transformer.

(*a*) Calculate the number of turns on the secondary coil of the transformer. **2**

(*b*) (i) The current in each lamp is 1·5 A.
Calculate the total current in the secondary circuit of the transformer. **1**

(ii) Assuming that the transformer is 100% efficient, calculate the current in the primary coil. **2**

(*c*) (i) Show that the resistance of one of the filament lamps, when it is operating normally, is 8·0 Ω. **2**

(ii) Calculate the combined resistance of the three lamps in parallel. **2**

23. A battery charger with an input voltage of 230 V is used to recharge a car battery. The charger contains a transformer that has an output voltage of 13·8 V.

(*a*) What type of transformer does the battery charger contain? **1**

(*b*) There are 4000 turns in the primary coil of the transformer.
Assuming the transformer is 100% efficient, calculate the number of turns in the secondary coil. **2**

(*c*) (i) When charging the battery, the current in the secondary coil is 4·7 A.

(A) Calculate the power output of the transformer. **2**

(B) In practice, the transformer is only 94% efficient.
Calculate the current in the primary coil. **3**

(ii) State and explain **one** reason why a transformer is not 100% efficient. **2**

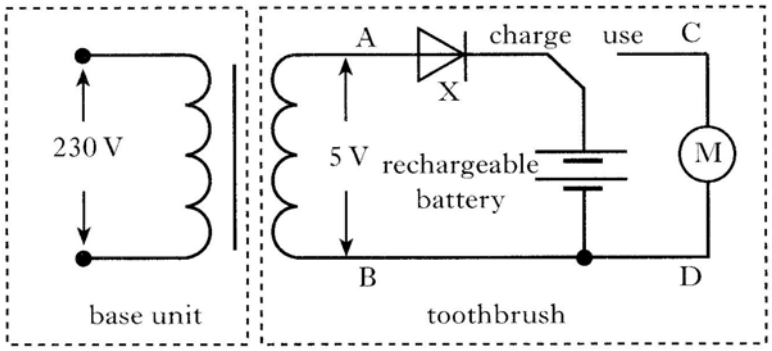
Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

24.

An electric toothbrush contains a rechargeable battery. The battery is recharged using a transformer connected to a 230 V a.c. supply. The primary coil and the core of the transformer are sealed into the base unit. The 5 V secondary coil of the transformer is part of the toothbrush.



To charge the battery, the toothbrush is placed on the base unit, with the switch in the "charge" position.

(*a*) Identify the component labelled X. — KU: 1

(*b*) The primary coil of the transformer has 6440 turns.

(i) Assuming the transformer is 100% efficient, calculate the number of turns on the secondary coil. — KU: 2

(ii) When the toothbrush is charging, the current in the secondary coil is 50 mA.

(A) Calculate the output power of the transformer. — PS: 2

(B) In practice, the transformer is only 40% efficient.

Calculate the current in the primary coil. — PS: 3

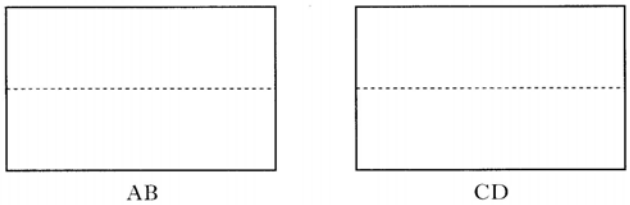
(iii) State **one** reason why a transformer is less than 100% efficient. — KU: 1

(*c*) Sketch the trace seen when an oscilloscope is connected across:

(i) AB when the battery is being charged;

(ii) CD when the toothbrush is removed from the base unit and the switch is in the "use" position.

Values need not be shown on either sketch. — PS: 2



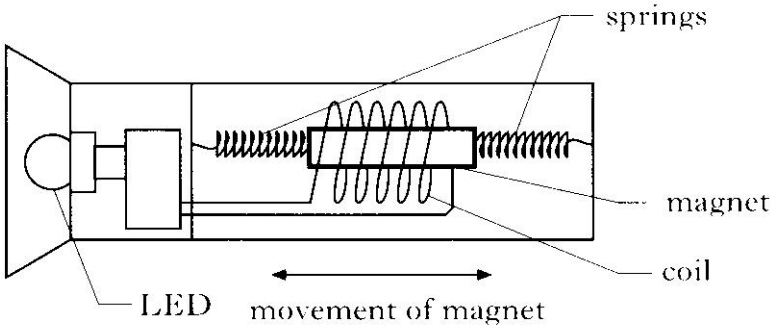
Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

25. The advertisement below is for a new torch.

> Kinetic Torch
> No batteries needed – magnet powered!
> Bright white LED won't burn out!
> 30-40 seconds of gentle shaking produces 10-15 minutes of light!
> Capacitor holds the charge generated by passing the magnet through the coil.



(*a*) (i) Explain how a voltage is induced in the coil. **2**

(ii) What is the effect of shaking the torch faster? **1**

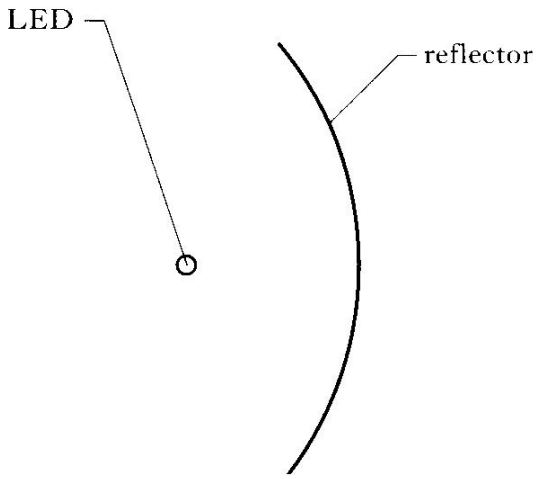
(iii) Draw the circuit symbol for a capacitor. **1**

(*b*) When lit, the current in the LED is 20 mA .

Calculate how much charge flows through the LED in 12 minutes. **2**

(*c*) The torch produces a beam of light.

The diagram shows the LED positioned at the focus of the torch reflector.



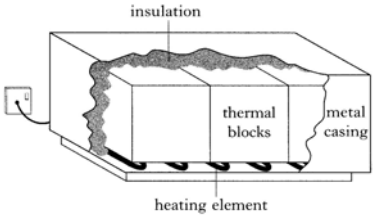
Complete the diagram by drawing light rays to show how the beam of light is produced. **2**

Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

26. An electric storage heater contains a heating element, thermal blocks and insulation as shown in the diagram.



The heating element heats the thermal blocks during the night.

(*a*) Between midnight and 6.00 am, $8{\cdot}64 \times 10^7$ J of energy are supplied to the heating element.

(i) Calculate the power rating of the heating element. **2**

(ii) The total mass of the thermal blocks in the heater is 144 kg and the specific heat capacity of the thermal blocks is 2625 J/kg °C.

Calculate the maximum possible rise in the temperature of the thermal blocks between midnight and 6.00 am.

(iii) Explain why the actual temperature rise of the blocks is less than the value calculated in (*a*)(ii). **2**

(*b*) Why is there insulation between the thermal blocks and the outer casing of the heater? **1**

(*c*) During the day, heat energy stored in the heater is released into the room. State **one** way in which heat is transferred to the surroundings from this heater. **1**

27. Ice cubes are used to cool down water for drinking. Each ice cube has a mass of 12 g and is initially at a temperature of 0 °C. **1**

(*a*) Calculate how much heat is needed to melt an ice cube. **3**

(*b*) When an ice cube is added to water, where does most of the energy come from to melt the ice? **1**

(*c*) (i) An ice cube is added to a glass containing 200 g of water.

The initial temperature of the water is 18 °C. The final temperature when all of the ice has melted is 15 °C.

Calculate the heat removed from the water. **3**

(ii) Suggest a final temperature when an ice cube is added to an insulated bottle of water. The bottle has a lid and contains an equal mass of water as above, and is at the same initial temperature.

Explain your answer. **2**

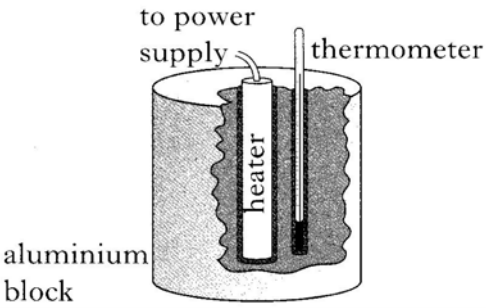
Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

28.

A student sets up the apparatus shown to measure the specific heat capacity of an aluminium block.



The student obtains the following results:

mass of aluminium block $m = 0{\cdot}8\,\text{kg}$
temperature change $\Delta T = 19\,^{\circ}\text{C}$
time taken $t = 5{\cdot}0$ minutes
heater current $I = 4{\cdot}2\,\text{A}$
heater voltage $V = 12\,\text{V}$

(a) Show, by calculation, that 15 120 J of electrical energy are supplied to the heater in 5·0 minutes. **2**

(b) (i) Assuming all of the electrical energy is transferred to the aluminium block as heat energy, calculate the value of the specific heat capacity of aluminium obtained from this experiment. **2**

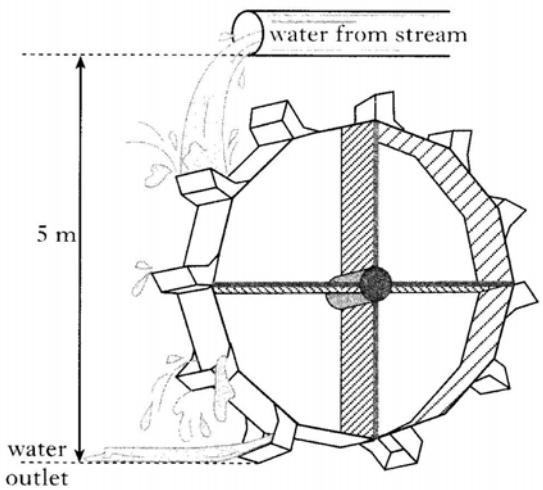
(ii) The accepted value of the specific heat capacity of aluminium is 902 J/kg °C.

(A) Give a reason for the difference between your answer in (b)(i) and this value. **1**

(B) How could the experiment be improved to reduce this difference? **1**

29.

Water from a stream is used to drive a water wheel. The stream provides 6000 kg of water per minute to the wheel. The water falls a vertical height of 5 m.



(a) Show that the maximum power available to the wheel from the water is 5000 W. **3**

Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

29. continued

(*b*) The water wheel turns an electrical generator. The generator produces an output of 2990 W.

(i) Calculate the efficiency of the water wheel and generator system. **2**

(ii) Give **two** reasons why the efficiency of this system is not 100%.

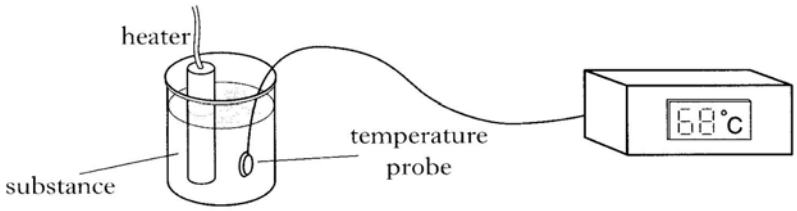
(iii) The generator is connected to a heater in a shed. The heater heats the air in the shed. The mass of air in the shed is 161 kg. The specific heat capacity of air is 1000 J/kg °C.

Calculate the minimum time to increase the temperature of the air in the shed by 13 °C. **3**

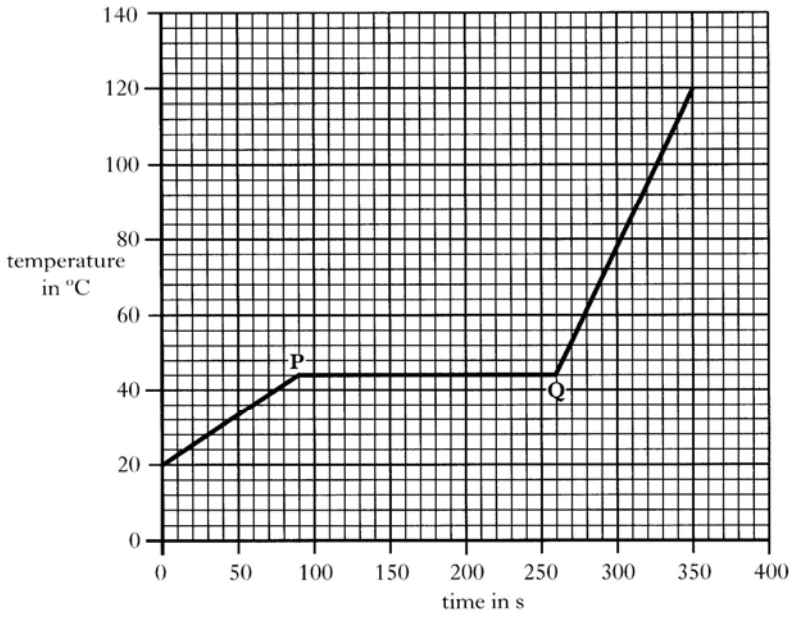
(iv) Give **one** reason why the actual time taken to increase the temperature of the air in the shed is greater than the value calculated in (iii). **1**

30.

A mass of 500 g of a substance is heated with a 30 W heater. A temperature probe is inserted into the substance.



The substance is initially solid and at room temperature. The graph below shows the variation of the temperature of the substance from the time the heater is switched on.



Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

30. continued

(*a*) State the value of room temperature. — PS: 1

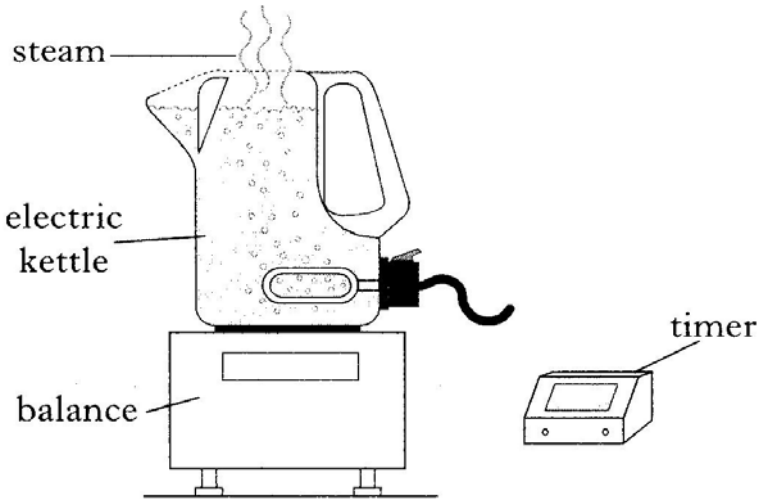
(*b*) (i) Why does the temperature of the substance remain constant between P and Q? — PS: 1

(ii) Calculate the energy transferred by the heater during the time interval PQ. — PS: 3

(iii) Calculate the specific latent heat of fusion of the substance. — KU: 2

31.

The apparatus shown is used to calculate the value of the specific latent heat of vaporisation of water.



The electric kettle is rated at 3·0 kW. The kettle containing water is placed on the balance. The lid of the kettle is removed and the kettle is switched on. Once the water starts to boil, the kettle is left switched on for a further 85·0 s before being switched off.

(*a*) Calculate how much electrical energy is supplied to the kettle in 85·0 s. — KU: 2

(*b*) The reading on the balance decreases by 0·12 kg during the 85·0 s.

(i) Assuming all the electrical energy supplied is transferred to the water, calculate the value of the specific latent heat of vaporisation of water obtained in the experiment. — KU: 2

(ii) The accepted value for the specific latent heat of vaporisation of water is $22{\cdot}6 \times 10^5$ J/kg.

Suggest why there is a difference between this value and the value obtained in (*b*)(i). — PS: 1

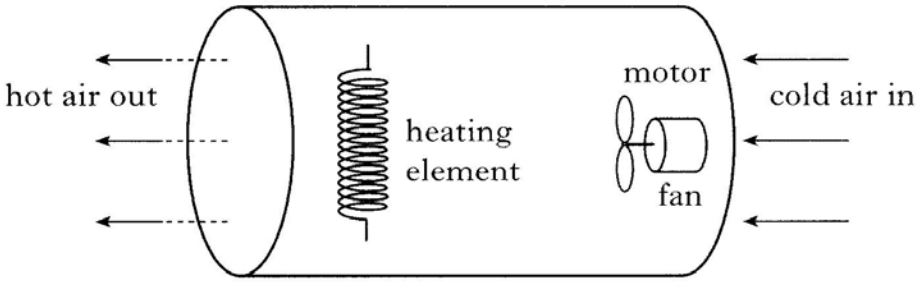
Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

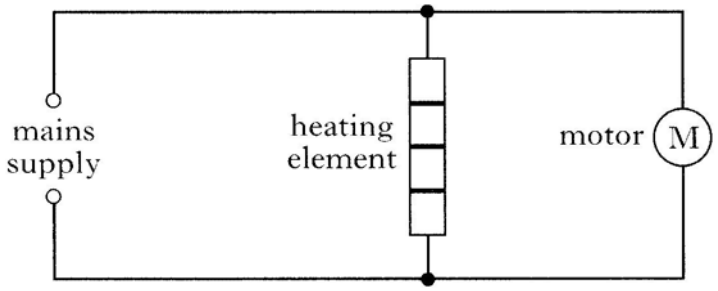
KU	PS

32.

A mains operated air heater contains a fan, driven by a motor, and a heating element. Cold air is drawn into the heater by the fan. The air is heated as it passes the heating element.



The circuit diagram for the air heater is shown.



(*a*) (i) What is the voltage across the heating element when the heater is operating? **1**

(ii) What type of circuit is used for the air heater? **1**

(*b*) The following data relates to the heater when the fan rotates at a particular speed.

mass of air passing through per second	0·2 kg
energy supplied to air per second	2000 J
specific heat capacity of air	1000 J/kg °C

(i) Calculate the increase in air temperature. **2**

(ii) The motor is adjusted to rotate the fan at a higher speed. This draws a greater mass of air per second through the heater. Explain any difference this causes to the temperature of the hot air. **2**

Credit Level

Answer questions in your Homework Jotter.
Show working for each question.

KU	PS

33.

An electric kettle is used to heat 0·4 kg of water.

(*a*) The initial temperature of the water is 15 °C.

Calculate how much heat energy is required to bring this water to its boiling point of 100 °C. — **3**

(*b*) The automatic switch on the kettle is not working. The kettle is switched off 5 minutes after it had been switched on.

The power rating of the kettle is 2000 W.

(i) Calculate how much electrical energy is converted into heat energy in this time. — **2**

(ii) Calculate the mass of water changed into steam in this time. — **3**

SQA Source Papers

General - Section		Paper	Question
Multiple Choice	1	2006	5
1.Supply and Demand	2	2000	15
	3	2002	17
	4	2003	17
	5	2006	16
	6	2006	17
	7	2007	17
2. Generation of Electricity	8	2005	17
3. Source to Customer	9	2000	16
	10	2001	15
	11	2004	17
	12	2006	18
	13	2007	8
4. Heat in the Home	14	2001	14
	15	2002	18
	16	2003	18
	17	2005	18
	18	2007	16

Credit - Section		Paper	Question
2. Generation of Electricity	19	2001	11
	20	2004	3
	21	2006	11
3. Source to Customer	22	2002	11
	23	2003	12
	24	2005	12
	25	2007	12
4. Heat in the Home	26	2000	10
	27	2001	12
	28	2002	12
	29	2003	13
	30	2004	11
	31	2005	13
	32	2006	12
	33	2007	13