

1 Over the next 15 years, some of the older nuclear power stations will be closed down, and the process of *decommissioning* will start. In the same period, several countries plan to build a number of new nuclear power stations.

- (a) (i) What does it mean to *decommission* a nuclear power station?

.....

(1)

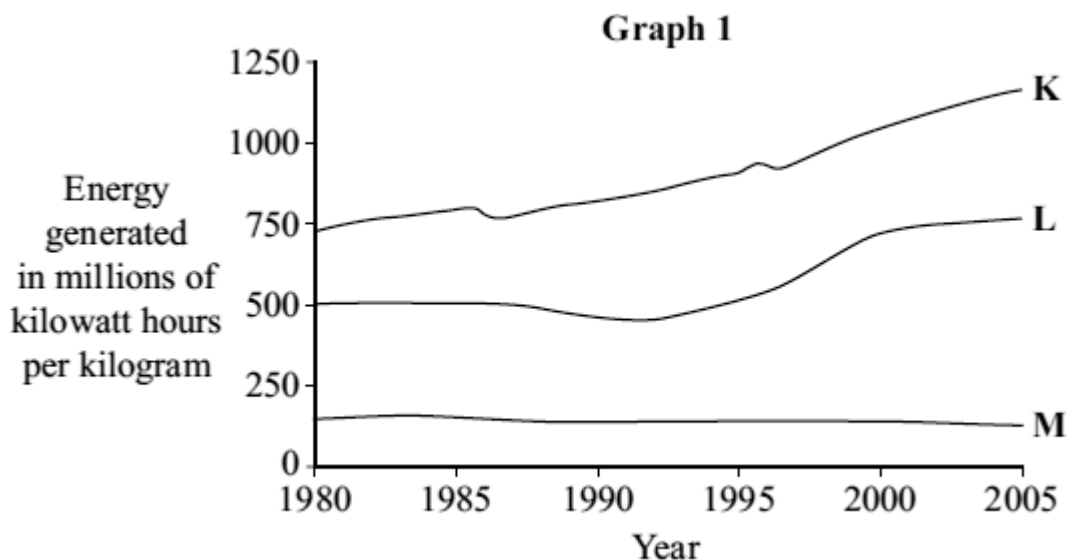
- (ii) How does *decommissioning* affect the overall cost of electricity generated using nuclear fuels?

.....

(1)

- (b) Uranium is a fuel used in nuclear power stations to generate electricity.

Graph 1 compares how the electricity generated from one kilogram of nuclear fuel changed between 1980 and 2005 in three different types of nuclear power station.

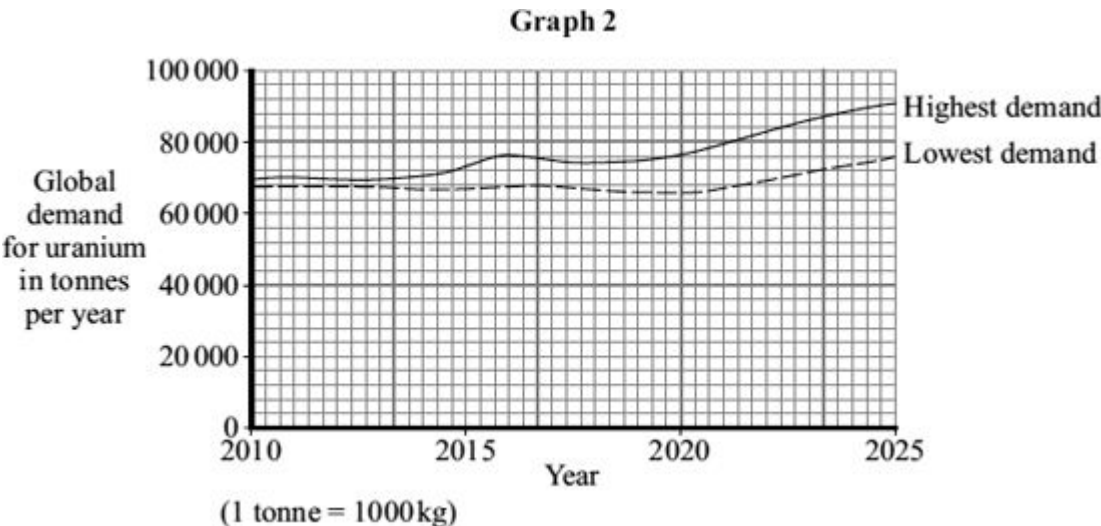


- (i) Compare the efficiency of the three types of power station, **K**, **L** and **M**, between 1980 and 2005.

.....

(2)

Graph 2 shows two different predictions for the global growth in uranium demand over the next few years.



- (ii) Suggest reasons why it is **not** possible to predict accurately how much uranium will be needed in 2025.

.....

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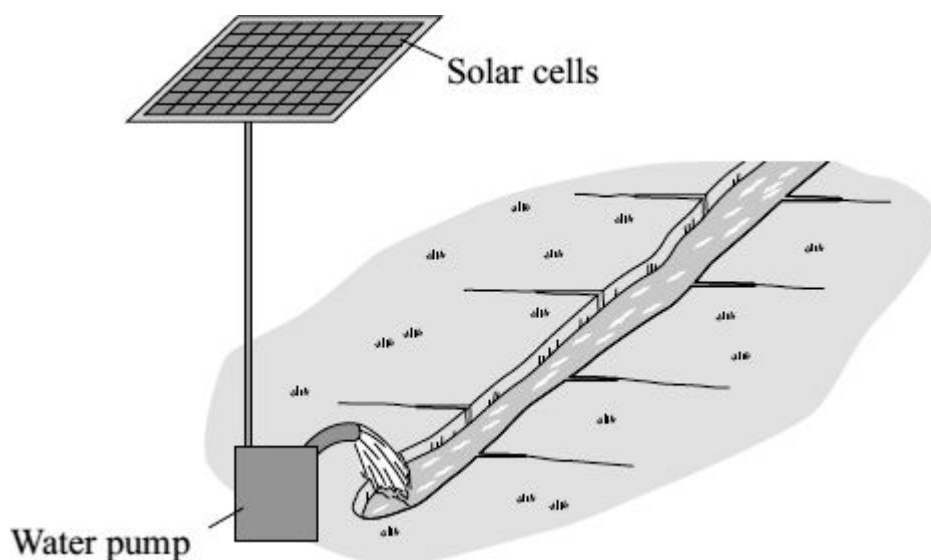
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.....

(2)
(Total 6 marks)

2

The farmers in a village in India use solar powered water pumps to irrigate the fields.



On average, a one square metre panel of solar cells receives 5 kWh of energy from the Sun each day.

The solar cells have an efficiency of 0.15

- (a) (i) Calculate the electrical energy available from a one square metre panel of solar cells.

Show clearly how you work out your answer.

.....

Electrical energy = kWh

(2)

- (ii) On average, each solar water pump uses 1.5 kWh of energy each day.

Calculate the area of solar cells required by one solar water pump.

Area = square metres

(1)

- (b) Give **one** reason why the area of solar cells needed will probably be greater than the answer to part (a)(ii).

.....

(1)

(Total 4 marks)

3

Four students are talking about the different energy sources used to generate electricity in the areas where they live.

- (a) Draw **one** line from where each student lives (**List A**) to the energy source in their area (**List B**).

Draw only **four** lines.

List A

Where each student lives

Where I live is the sunniest part of the country.

Where I live, the land is very flat and it always seems to be windy.

Where I live, it is not safe to swim. The sea is always too rough.

Where I live, you can see steam coming out of the ground.

List B

Energy source

Wind

Waves

Solar

Tides

Geothermal

(4)

- (b) All of the energy sources given in part (a) can be used to generate electricity.

What else do all these energy sources have in common?

.....

.....

(1)

- (c) In a hydroelectric power station, the energy from falling water is used to generate electricity.

Which **one** of the following gives a **disadvantage** of a hydroelectric power station?

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

has a fast start-up time

☐

large areas of land are flooded

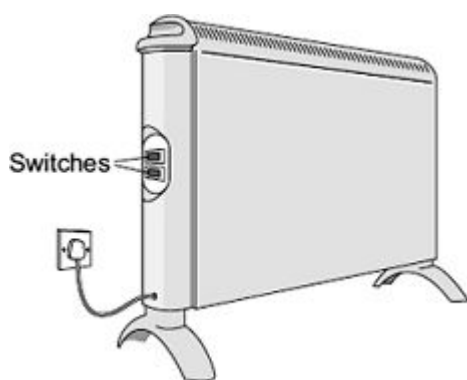
☐

polluting gases are produced

☐

(1)
(Total 6 marks)

- 4** (a) The diagram shows two switches on a room heater. The heater has three power settings. The power produced by two of the settings is given in the table.



Setting	Power in watts
Low	700
Medium	1400
High	

- (i) When both switches are on, the heater works at the high power setting.

What is the power of the heater, in kilowatts, when it is switched to the **high** power setting?

.....

Power = kilowatts

(1)

- (ii) The heater is used on the **high** power setting. It is switched on for $1\frac{1}{2}$ hours.

Calculate the energy transferred from the mains to the heater in $1\frac{1}{2}$ hours.

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

.....

.....

.....

Energy transferred =

(3)

- (iii) This type of heater is a very efficient device.

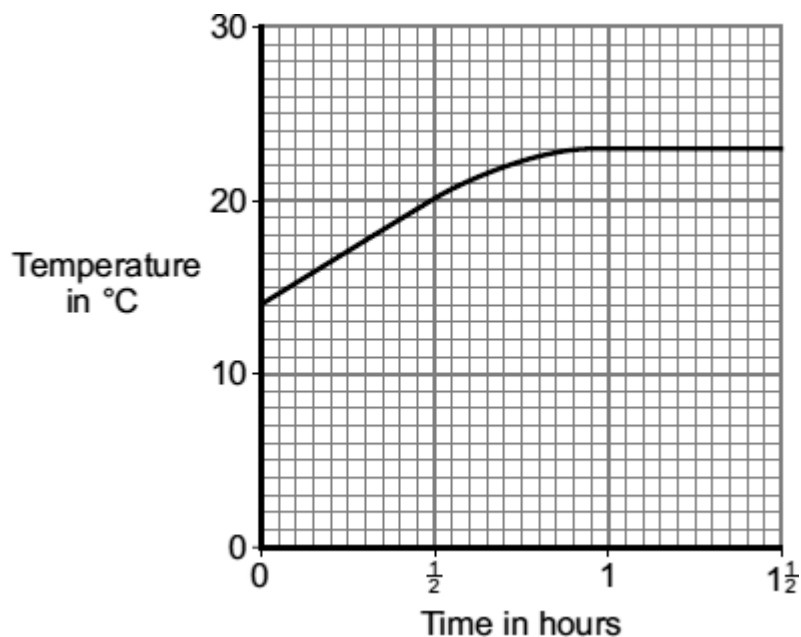
What is meant by a device being very efficient?

.....

.....

(1)

- (b) The graph shows how the temperature of a room changes during the $1\frac{1}{2}$ hours that the heater is used.



After 1 hour, the temperature of the room has become constant, even though the heater is still switched on.

Explain why.

.....

.....

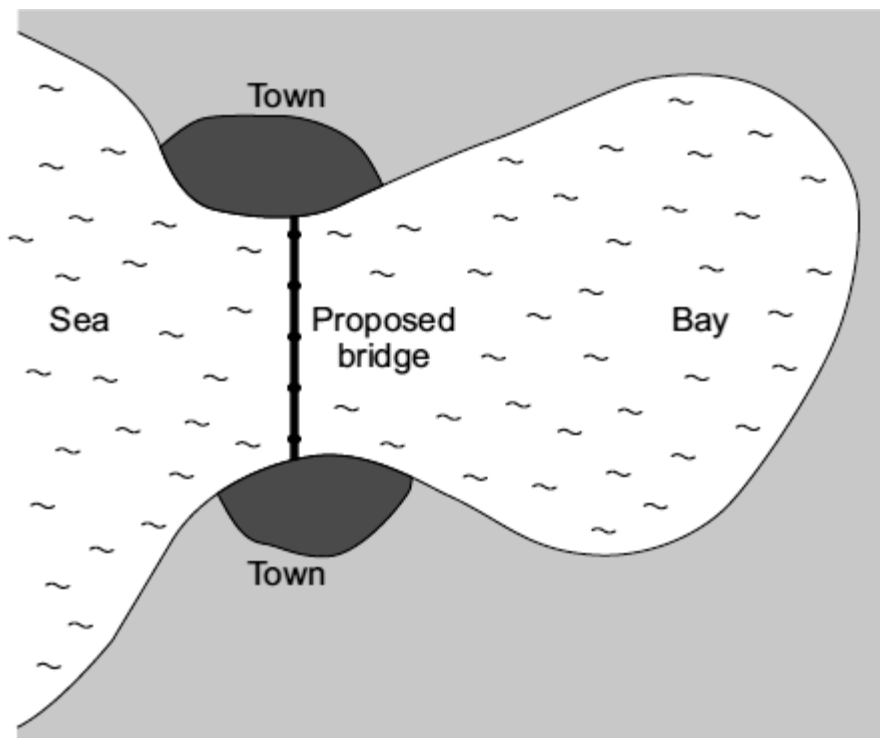
.....

.....

(2)
(Total 7 marks)

5

The map shows the positions of two towns on either side of a very large coastal bay in England. The map also shows where a bridge may be built to link the towns. The road journey from one town to the other is about 60 kilometres at present.



- (a) It is estimated that building turbines and generators inside the legs of the bridge would produce enough electricity for both towns. In addition, enough electricity would be generated to run electric buses over the bridge between the two towns.

- (i) If the bridge is built, what form of renewable energy will be used to generate the electricity?

.....

(1)

- (ii) Most people living in the area are in favour of the proposed bridge.

Suggest **three** reasons why people would be in favour of building the bridge and the associated electricity generating scheme.

Reason 1

.....

Reason 2

.....

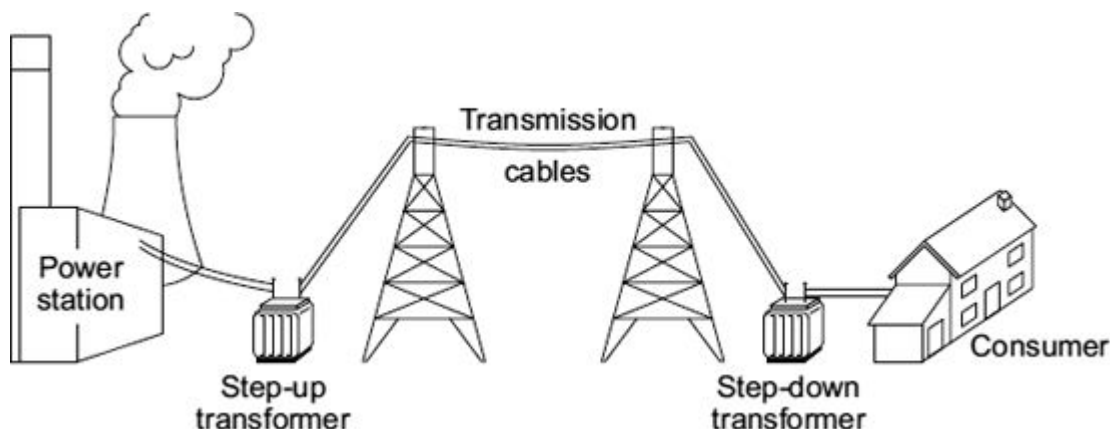
Reason 3

.....

(3)

- (b) Even with the proposed bridge, the two towns will need to stay connected to the National Grid.

The diagram shows part of the National Grid.



- (i) Give **one** reason why the towns need to stay connected to the National Grid.

.....

(1)

- (ii) Explain how the step-up transformer increases the efficiency of the National Grid.

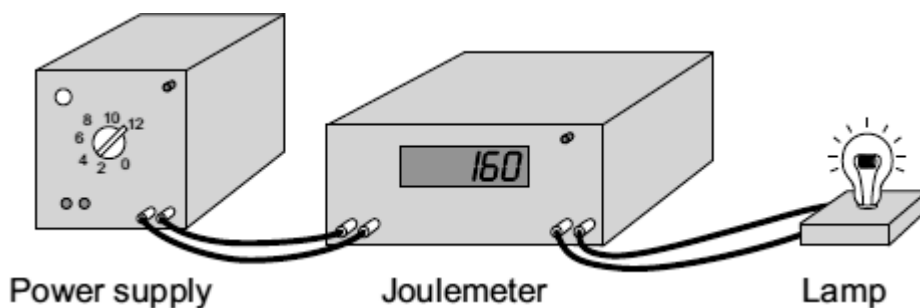
.....

(2)

(Total 7 marks)

6

A student used a joulemeter to measure the energy transformed by a lamp.



The student set the joulemeter to zero, and then switched on the power supply.

After 120 seconds (2 minutes), the reading on the joulemeter had increased to 2880.

(a) In the space below, draw the circuit symbol used to represent a lamp.

(1)

(b) (i) Use the equation in the box to calculate the power of the lamp.

$\text{power} = \frac{\text{energy transformed}}{\text{time}}$
--

Show clearly how you work out your answer.

.....

.....

Power =

(2)

(ii) Which **one** of the following is the unit of power?

Draw a ring around your answer.

joule

newton

watt

(1)

- (c) Complete the following sentence using one of the phrases from the box.

larger than	the same as	smaller than
-------------	-------------	--------------

If the lamp was left switched on for 10 minutes, the amount of energy transformed would be the amount of energy transformed in 2 minutes.

(1)
(Total 5 marks)

7

The picture shows a solar-powered aircraft. The aircraft has no pilot.



Photo by NASA.

- (a) On a summer day, 175 000 joules of energy are supplied to the aircraft's solar cells every second. The useful energy transferred by the solar cells is 35 000 joules every second.
- (i) Use the equation in the box to calculate the efficiency of the solar cells.

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

Show clearly how you work out your answer.

.....

Efficiency =

(2)

- (ii) What happens to the energy that is **not** usefully transferred by the solar cells?

.....

(1)

- (b) The aircraft propellers are driven by electric motors. As well as the solar cells, there are fuel cells that provide additional power to the electric motors.

- (i) Suggest **one** advantage of the aircraft having fuel cells as well as the solar cells.

.....

(1)

- (ii) Give **one** environmental advantage of using electric motors to drive the aircraft propellers rather than motors that burn a fuel.

.....

.....

(1)

- (iii) Eventually, the designers want to produce an unmanned aircraft that can fly at twice the height of a passenger jet for up to six months.

Suggest **one** possible use for an aircraft such as this.

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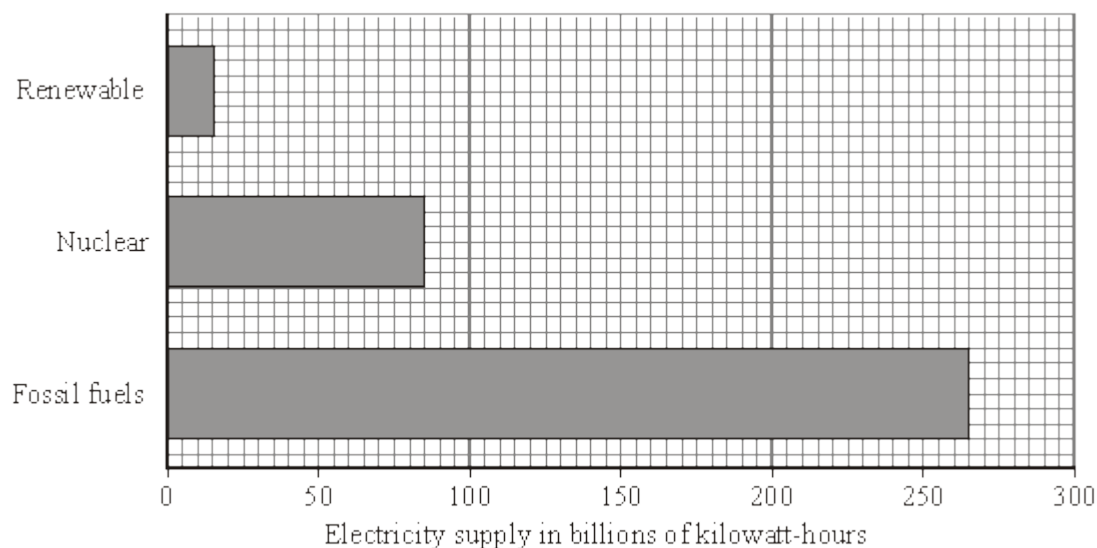
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(1)

(Total 6 marks)

8

The bar chart shows the different energy sources used to generate the UK's electricity in 2007.



- (a) (i) The wind is a renewable energy source.

Name **one** more renewable energy source used to generate electricity.

.....

(1)

- (ii) Complete the following sentence by drawing a ring around the correct line in the box.

Using less fossil fuels to generate electricity will

decrease

not change

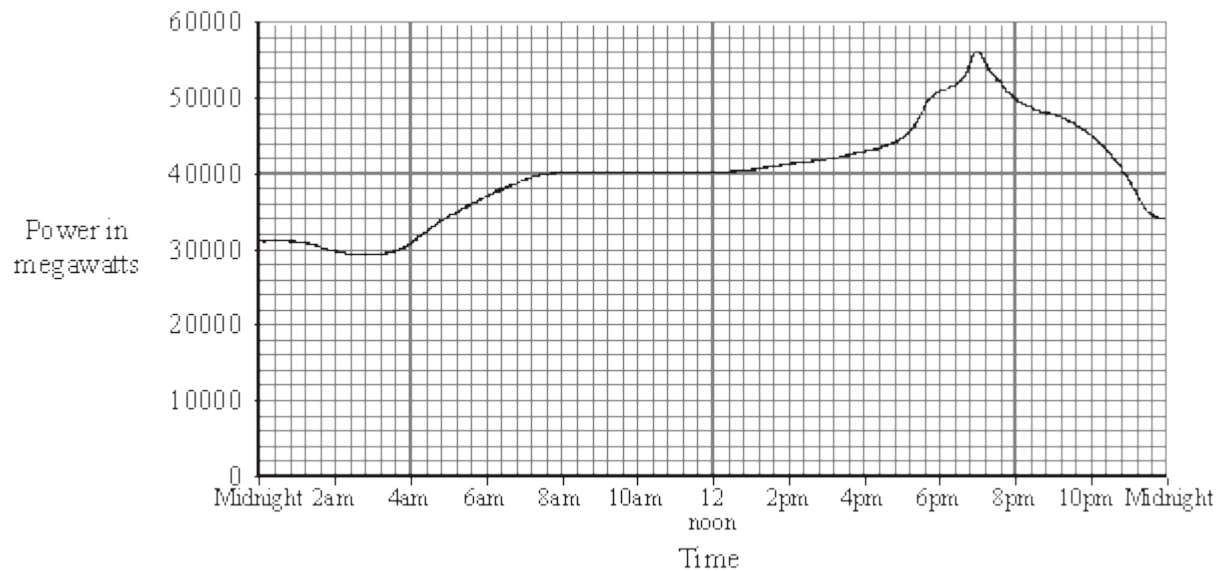
increase

the

amount of carbon dioxide emitted into the atmosphere.

(1)

- (b) The graph shows how the demand for electricity in the UK varied over one day in the winter.



- (i) Describe how the demand for electricity varied between 4.00 am and 10.00 am.

.....

.....

.....

.....

(2)

- (ii) Which type of power station has the fastest start-up time?

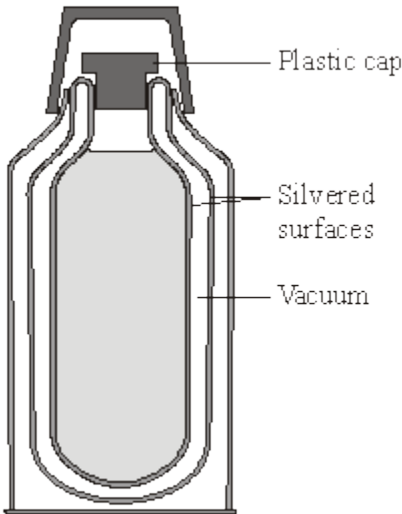
Draw a ring around your answer.

coal **natural gas** **nuclear** **oil**

(1)
(Total 5 marks)

9

A vacuum flask is designed to reduce the rate of heat transfer.



- (a) (i) Complete the table to show which methods of heat transfer are reduced by each of the features labelled in the diagram.

The first row has been done for you.

Feature	Conduction	Convection	Radiation
vacuum	*	*	
silveredsurfaces			
plastic cap			

(2)

- (ii) Explain why the vacuum between the glass walls of the flask reduces heat transfer by conduction and convection.

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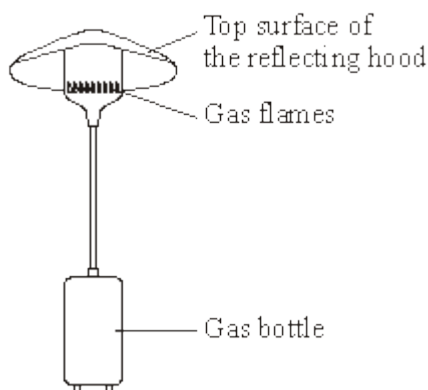
.....

.....

.....

(2)

- (b) The diagram shows a gas flame patio heater.



- (i) Explain why the top surface of the reflecting hood should be a light, shiny surface rather than a dark, matt surface.

.....

.....

.....

(2)

- (ii) Most of the chemical energy in the gas is transformed into heat. A **small** amount of chemical energy is transformed into light.

Draw and label a Sankey diagram for the patio heater.

(2)

- (iii) State why the total energy supplied to the patio heater must always equal the total energy transferred by the patio heater.

.....

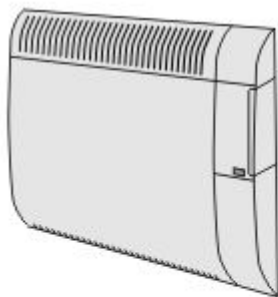
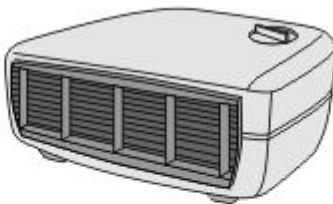

.....

(1)

(Total 9 marks)

10

The pictures show three different types of electric heater.

 <p>400W oil-filled panel heater (wall mounted)</p> <ul style="list-style-type: none"> • 3 heat settings • Efficient background heat • Safety overheat cut-out 	 <p>3kW fan heater</p> <ul style="list-style-type: none"> • 2 heat settings • Power indicator light • Cool air fan setting 	 <p>1800W ceramic heater</p> <ul style="list-style-type: none"> • 2 heat settings • 8 hour timer • Power indicator light • Safety overheat cut-out
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- (a) The ceramic heater is run on full power for 5 hours.

Use the following equation to calculate, in joules, the amount of energy transferred from the mains to the heater.

$$\text{energy transferred} = \text{power} \times \text{time}$$

Show clearly how you work out your answer.

.....

Energy transferred = joules

(2)

- (b) Which heater will be the most expensive to run on its highest heat setting?

.....

(1)

- (c) A heater is needed for a small office.

Comparing each type of heater with the other two, give **one** advantage of using each type of heater in the office.

oil-filled panel heater

.....

fan heater

.....

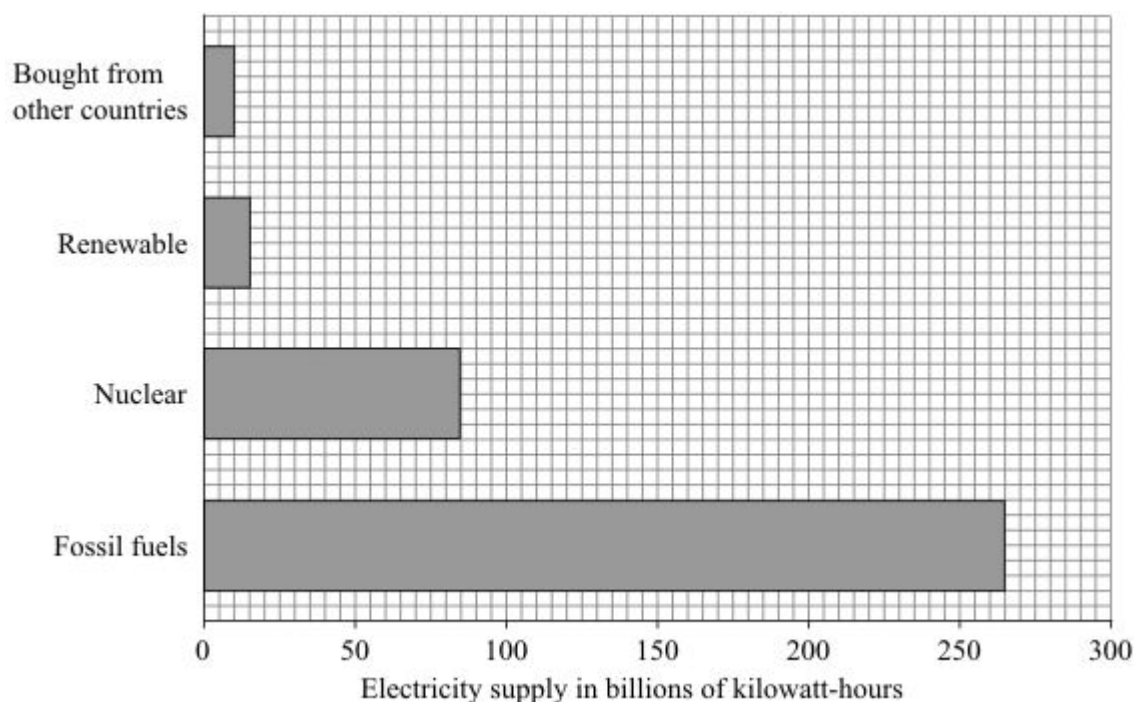
ceramic heater

.....

(3)
(Total 6 marks)

11

The bar chart shows how the UK's electricity demands in 2007 were met.



- (a) What proportion of electricity was generated using renewable energy sources?

Show clearly how you work out your answer.

.....

.....

.....

.....

(2)

- (b) By 2020, most of the UK's nuclear reactors and one-third of coal-fired power stations are due to close, yet the demand for electricity is expected to increase.

Four students, **A**, **B**, **C** and **D**, were asked how a demand of 380 billion kilowatt-hours could be met. They made the suggestions given in the table.

Student	Fossil fuels	Nuclear	Renewable	Bought from other countries
A	200	100	40	40
B	80	240	40	20
C	160	80	100	40
D	280	0	100	0

- (i) Which student has made the suggestion most likely to result in the lowest carbon dioxide emissions?

.....

Give a reason for your answer.

.....

.....

(2)

- (ii) Suggest **one** realistic way in which a householder could help to reduce the annual electricity demand.

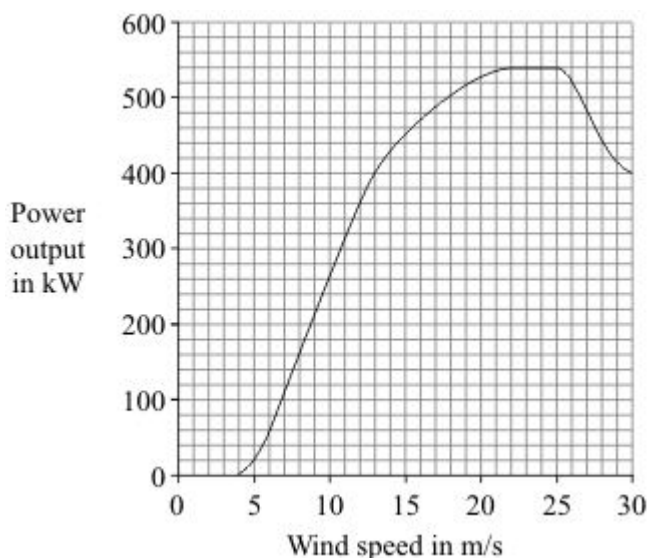
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.....

(1)

- (c) To increase the amount of electricity generated using renewable energy resources would probably involve erecting many new wind turbines.

The graph shows the power curve of a wind turbine.



- (i) Describe, in detail, how the power output of the turbine varies with the wind speed.

.....

.....

.....

.....

.....

.....

(3)

- (ii) Give **one** disadvantage of using wind turbines to generate a high proportion of the electricity required in the UK.

.....

.....

(1)
(Total 9 marks)

12

Electricity is generated in power stations. It is then sent to all parts of the country through a network of cables.

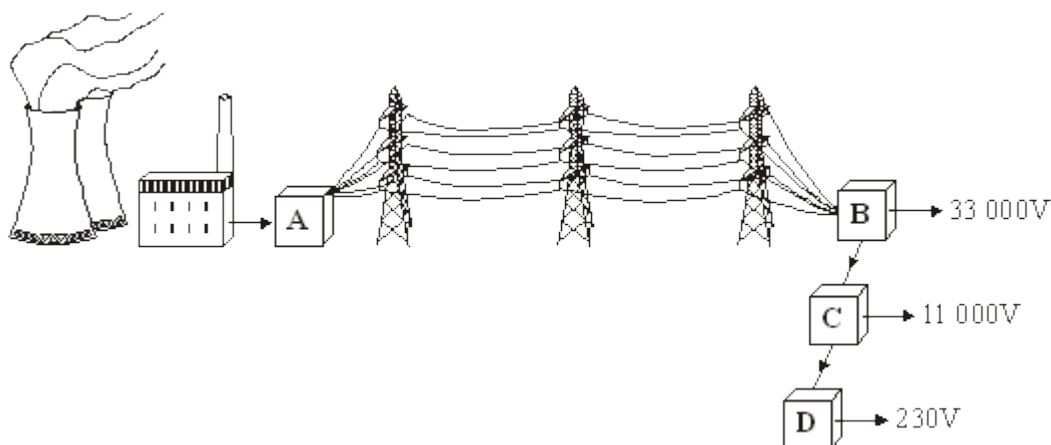
- (a) Complete the following sentence by using **one** of the words in the box.

Grid	Power	Supply
-------------	--------------	---------------

The network is called the National

(1)

- (b) In the diagram, **A**, **B**, **C** and **D** are transformers.



- (i) Which transformer, **A**, **B**, **C** or **D**, is a step-up transformer?

Transformer

(1)

- (ii) Which transformer, **A**, **B**, **C** or **D**, will supply homes, offices and shops?

Transformer

(1)

- (c) Complete the following sentence by drawing a ring around the correct line in the box.

In a step-down transformer, the potential difference (p.d.) across the

primary coil is

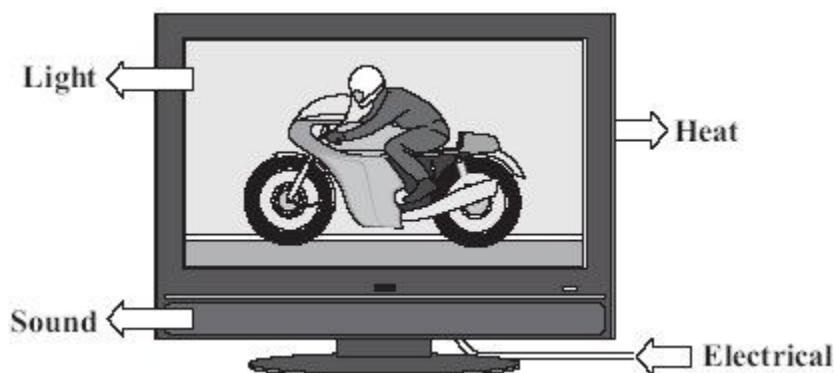
less than
the same as
more than

the p.d. across the secondary coil.

(1)
(Total 4 marks)

13

The diagram shows the energy transformations produced by a TV.



- (a) Use words from the diagram to complete the following sentence.

The TV is designed to transform energy into
light and energy.

(2)

- (b) Which **one** of the following statements is **false**?

Put a tick (✓) in the box next to the **false** statement.

The energy transformed by the TV makes the surroundings warmer.

☐

The energy transformed by the TV becomes spread out.

☐

The energy transformed by the TV will be destroyed.

☐

(1)

- (c) Two different makes of television, **A** and **B**, transform energy at the same rate. Television **A** wastes less energy than television **B**.

Complete the following sentence by drawing a ring around the correct line in the box.

Television **A** has

a higher efficiency than the same efficiency as a lower efficiency than

television **B**.

(1)
(Total 4 marks)

14

Wind and tides are renewable energy sources that are used to generate electricity.

- (a) Complete each sentence by putting a tick (✓) in the box next to the correct answer.

- (i) The wind is:

a predictable energy source.

☐

a constant energy source.

☐

an unreliable energy source.

☐

(1)

- (ii) The tides are:

a predictable energy source.

☐

a constant energy source.

☐

an unreliable energy source.

☐

(1)

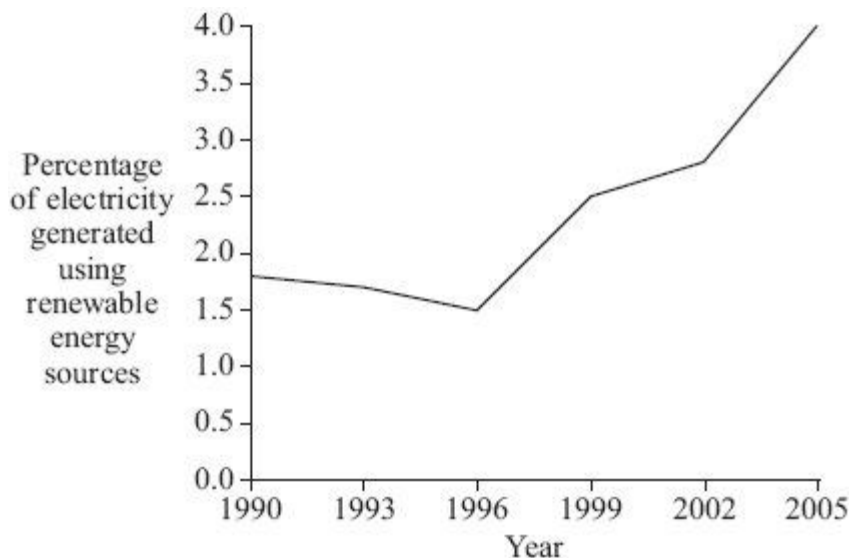
- (b) If wood is to be used as a renewable energy source, what must be done each time a tree is chopped down?

.....

.....

(1)

- (c) In the UK, electricity is generated using renewable and non-renewable energy sources. The graph shows the percentage of electricity generated using renewable energy sources between 1990 and 2005.



Complete the following sentence by drawing a ring around the correct line in the box.

In 2015, the percentage of electricity generated using renewable energy sources is most

likely to be

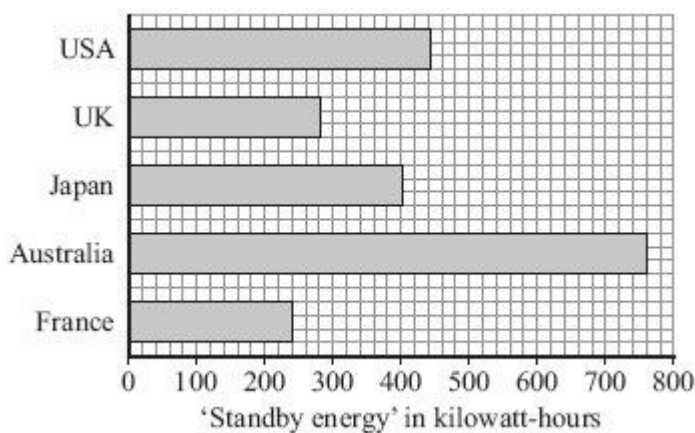
greater than 4%
equal to 4%
less than 4%

(1)
(Total 4 marks)

15

Electrical appliances that are left on standby still use energy.

The bar chart compares the *average* amount of 'standby energy' wasted each year in every home in five countries.



- (i) In which country are the homes that waste, on average, the smallest amount of 'standby energy'?

Draw a ring around your answer.

Australia France Japan UK USA

(1)

- (ii) Suggest a reason why an *average* value is used for the 'standby energy' wasted in the homes.

.....

(1)

- (b) (i) Australia has one of the lowest electricity prices in the world.

How does this low price seem to affect the amount of 'standby energy' wasted?

.....

(1)

- (ii) In Australia, most electricity is generated in coal-burning power stations. The Australian government wants less electricity to be wasted.

Wasting less electricity would be good for the Australian environment.

Explain why.

.....

(2)

- (c) Energy is not usually measured in kilowatt-hours.

Which **one** of the following units is usually used to measure energy?

Draw a ring around your answer.

hertz joule watt

(1)

- (d) (i) Electricity in Japan costs the equivalent of 17 pence per kilowatt-hour.

Use the information in the bar chart and the equation in the box to calculate how much the 'standby energy' used in an average Japanese home costs each year.

$$\text{total cost} = \text{number of kilowatt-hours} \times \text{cost per kilowatt-hour}$$

Show clearly how you work out your answer.

Give your answer in pence.

.....

.....

Cost = pence

(3)

- (ii) In Japan, the largest proportion of electricity is generated using nuclear fuels.

Which **one** of the following statements gives a good reason for using nuclear fuels to generate electricity?

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

A nuclear power station is very expensive to build.

☐

A small amount of nuclear fuel generates a large amount of electricity.

☐

It is easy to store nuclear waste safely.

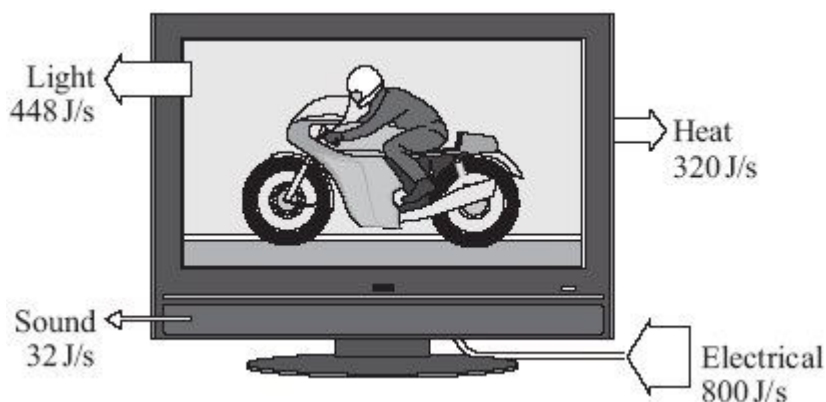
☐

(1)

(Total 10 marks)

16

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



- (i) Calculate the efficiency of the TV, using the information in the diagram..

Show clearly how you work out your answer.

.....

Efficiency =

(2)

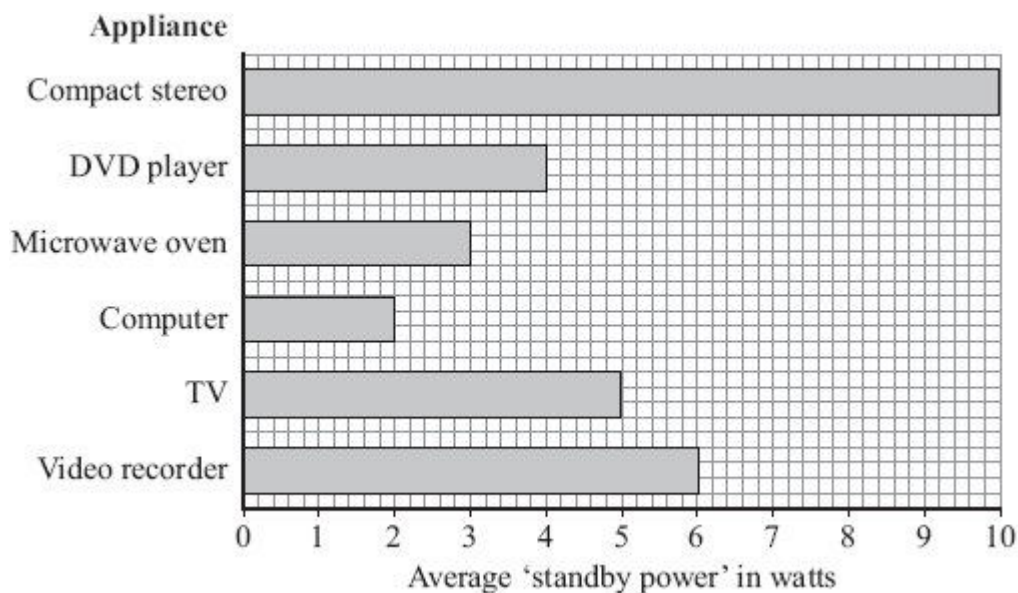
- (ii) What eventually happens to the useful energy transferred by the TV?

.....

(1)

- (b) Electrical appliances left on standby use energy.

The bar chart shows the power for the appliances that one family leaves on standby when they go on holiday.



The family is on holiday for a total of 175 hours.

- (i) Use the information in the bar chart and the equation in the box to calculate the energy wasted by leaving the compact stereo on standby while the family is on holiday.

energy transferred (kilowatt-hour, kWh)	=	power (kilowatt, kW)	×	time (hour, h)
--	---	-------------------------	---	-------------------

Show clearly how you work out your answer.

.....

Energy wasted = kilowatt-hours

(2)

- (ii) Electricity costs 12 p per kilowatt-hour.

Use the equation in the box to calculate the cost of leaving the compact stereo on standby while the family is on holiday.

total cost = number of kilowatt-hours × cost per kilowatt-hour
--

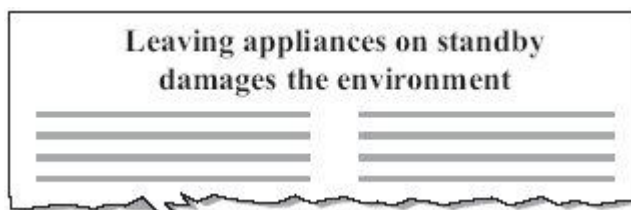
Show clearly how you work out your answer.

.....

Cost = p

(1)

- (c) A headline from a recent newspaper article is shown below.



Explain why leaving appliances on standby damages the environment.

.....

.....

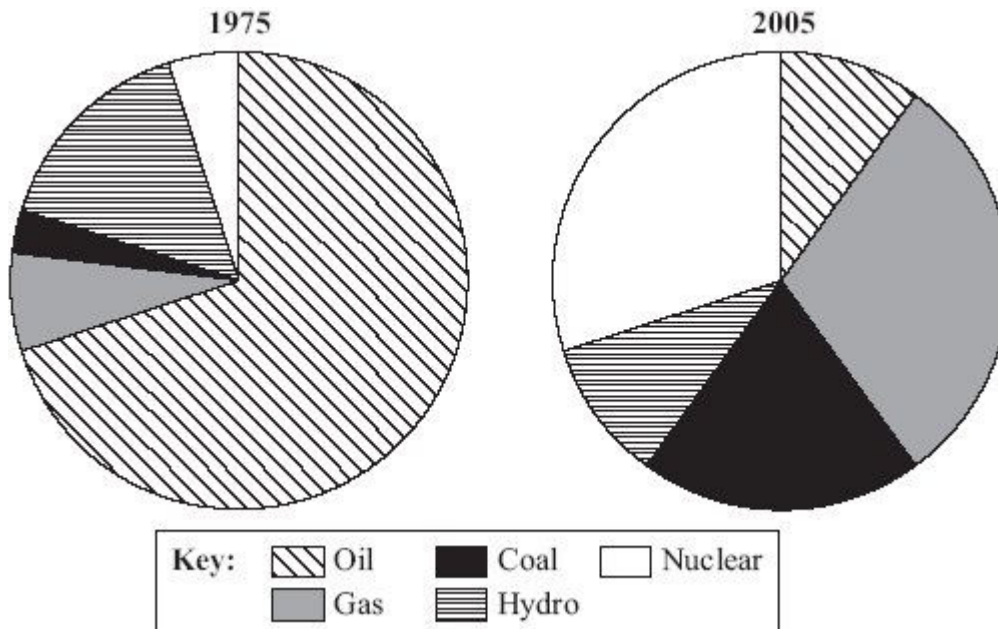
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.....

(2)
(Total 8 marks)

17

The pie charts show the relative proportions of electricity generated in Japan from different energy sources in 1975 and 2005.



- (a) Describe the main differences in the energy sources used in 2005 compared with 1975.

.....

.....

(1)

(b) In the UK, nuclear fuels are used to generate about 21% of the total electricity supply.

(i) What is the name of the process by which a nuclear fuel produces heat?

.....

(1)

(ii) Explain how the heat released from a nuclear fuel is used to generate electricity in power stations.

.....

.....

.....

.....

(2)

(iii) Some people have suggested that more nuclear power stations should be built in the UK.

Give **two** reasons to support this suggestion.

1

.....

2

.....

(2)

(iv) Nuclear power stations create dangerous waste.

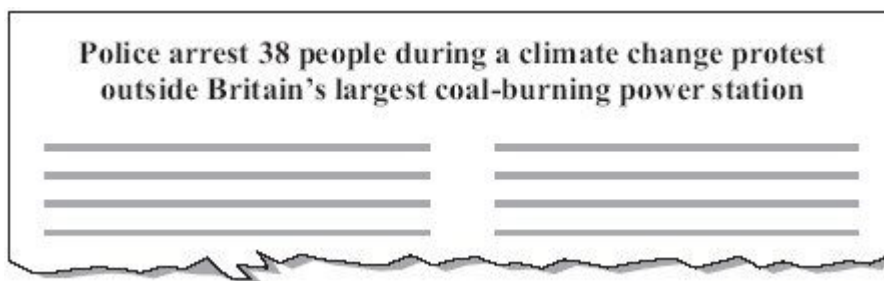
Why is the waste from a nuclear power station dangerous?

.....

.....

(1)

- (c) A headline from a newspaper article is shown below.



Explain the possible link between *climate change* and *coal-burning power stations*.

.....

.....

.....

.....

(2)
(Total 9 marks)

18

- (a) Water waves are a renewable energy source.

The government wants more electricity to be generated from renewable energy sources. Some people do not think this is a good idea.

What reasons could a government scientist give to show people that using more renewable energy sources is a good idea?

.....

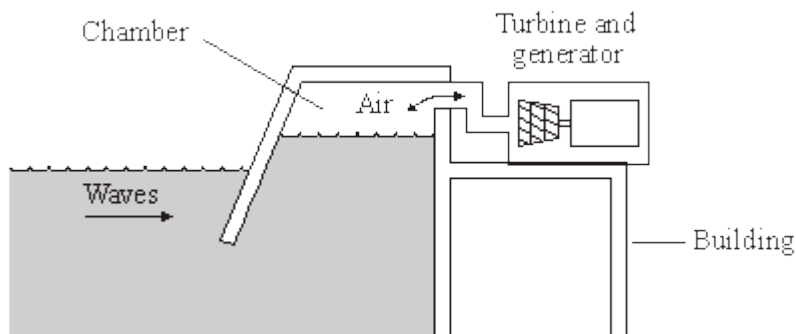
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.....

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(2)

- (b) The diagram shows a wave-powered generator. The generator transforms kinetic energy from the waves to electrical energy.



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The following sentences describe how the wave generator works. The sentences are in the wrong order.

- R** Waves push air up and down a chamber inside the building.
- S** The turbine turns the generator.
- T** The generator transforms kinetic energy to electrical energy.
- U** The air rushes through a turbine making it spin.
- V** Strong waves move towards the wave-powered generator.

Arrange these sentences in the correct order. Start with letter **V**.

V
→

→

→

→

(3)
(Total 5 marks)

19

- (a) Electricity is distributed from power stations to consumers along the National Grid.

- (i) Transformers are part of the National Grid. Transformers are *efficient* devices. What is meant by a device being *efficient*?

.....

.....

(1)

- (ii) When electricity flows through a cable, some energy is transformed into heat.

Explain how the National Grid system reduces the amount of energy lost as heat.

.....

.....

.....

.....

(2)

- (b) Read this information taken from a recent newspaper article.

- Researchers have found that children living close to overhead power cables are more likely to develop leukaemia.
- The researchers studied two groups of children. One group had developed leukaemia, the other group was healthy.
- Although the researchers found a link, they are unable to explain why it happened. They say that the results may have happened by chance.
- Other factors that have not been investigated, such as the environment, the geographical area or the children's genes, could be important.
- A cancer research charity said that childhood leukaemia was most likely to be caused by factors that parents were unable to control.

- (i) Why did the researchers study a group of healthy children?

.....

.....

(1)

- (ii) The information does not say how many children were studied.

Why should this data have been included in the article?

.....

.....

(1)

- (iii) The researchers could not be certain that the overhead power cables were responsible for the increased chance of children developing leukaemia.

Explain why.

.....

.....

.....

.....

(2)

- (iv) The results of the research carried out by scientists may worry some people.

What do you think scientists should do?

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

Scientists should publish their research findings straight away.

☐

Scientists should not publish their research findings until they have found out as many facts as possible.

☐

Give a reason for your choice.

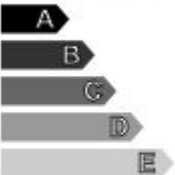

.....

.....

(1)
(Total 8 marks)

20

The diagram shows the label from a new freezer.

Model Energy A	SALE See inside for details
More efficient  Less efficient	
Energy consumption per year	225 kWh

- (a) An old freezer has an energy consumption per year of 350 kWh.

Use the equation in the box to calculate the extra cost of using the old freezer for one year compared with using a new 'A' rated freezer.

$\text{total cost} = \text{number of kilowatt-hours} \times \text{cost per kilowatt-hour}$
--

Assume 1 kilowatt-hour (kWh) of energy costs 12 p.

Show clearly how you work out your answer.

.....

Extra cost per year = £

(2)

- (b) The price of the new freezer was reduced in a sale.

Reducing the price reduces the payback time for replacing the old freezer from 12 years to 9 years.

Calculate, in pounds, how much the new freezer was reduced in the sale.

Show clearly how you work out your answer.

.....

Price reduced by = £

(2)

- (c) An advertisement in a shop claims that:

'Replacing an old freezer with a new 'A' rated freezer will benefit the environment.'

Do you agree that replacing the freezer will benefit the environment?

Answer yes or no.

Explain the reasons for your answer.

.....

.....

.....

.....

(2)
(Total 6 marks)

21

- (a) In winter, energy is transferred from the warm air inside a house to the air outside.

- (i) What effect will the energy transferred from the house have on the air outside?

.....

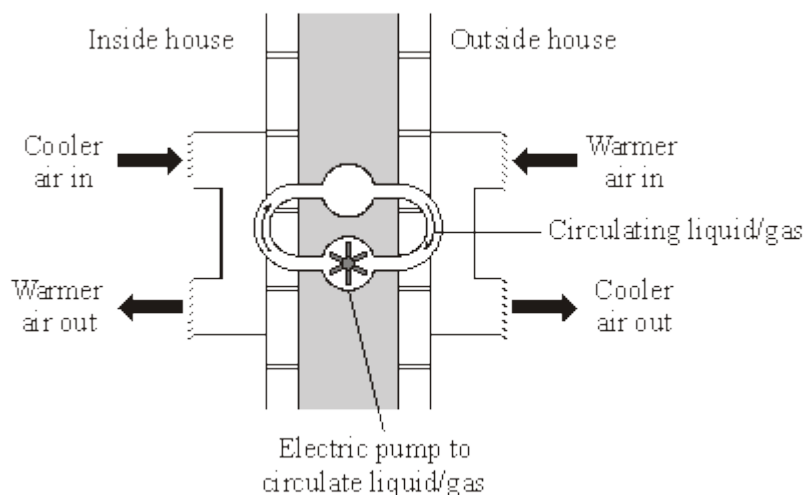
(1)

- (ii) What would happen to the energy transfer if the temperature inside the house were reduced? Assume the temperature outside the house does not change.

.....

(1)

- (b) To increase energy efficiency, a householder installs a heat exchanger to an outside wall of the house. The heat exchanger uses heat from the air outside to warm the inside of the house. The diagram shows the idea of the heat exchanger.



Physics Through Applications edited by J Jardine et al (OUP, 1989), copyright © Oxford University Press, reprinted by permission of Oxford University Press.

- (i) Why does the heat exchanger cost money to run?

.....

(1)

- (ii) The heat exchanger is cost effective in reducing energy consumption. Explain why.

.....

.....

.....

.....

(2)

(Total 5 marks)

22

The pictures show six different household appliances.

Fan heater

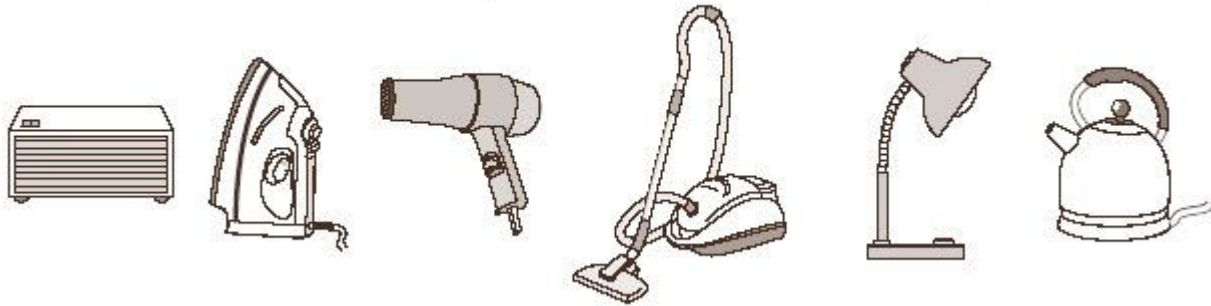
Iron

Hairdryer

Vacuum cleaner

Table lamp

Kettle



- (a) Four of the appliances, including the fan heater, are designed to transform electrical energy into heat.

Name the other **three** appliances designed to transform electrical energy into heat.

1

2

3

(3)

- (b) Complete the following sentence using **one** of the words from the box.

chemical

heat

kinetic

sound

Energy that is not usefully transformed by the fan heater is wasted as

..... energy.

(1)

- (c) The table gives information about two different fan heaters.

	Useful energy transferred each second in joules	Wasted energy transferred each second in joules
Fan heater L	1200	10
Fan heater M	1200	20

Complete the following sentence by drawing a ring around the line in the box that is correct.

Fan heater **L**

<p>is more efficient than</p> <p>has the same efficiency as</p> <p>is less efficient than</p>

fan heater **M**.

(1)
(Total 5 marks)

23

- (a) Different energy sources are used to generate electricity.

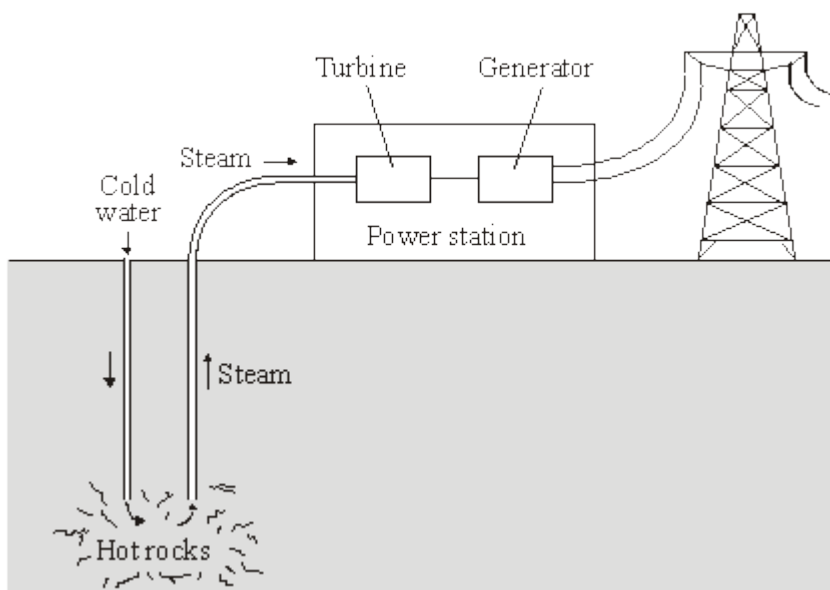
Which **two** of the energy sources in the box are likely to be used up first?

Draw a ring around each of your answers.

gas	oil	Sun	tides	waves	wind
-----	-----	-----	-------	-------	------

(2)

- (b) The diagram shows a geothermal power station. Hot rocks in the Earth's crust heat water to produce steam. The steam is used to drive turbines that turn electrical generators.



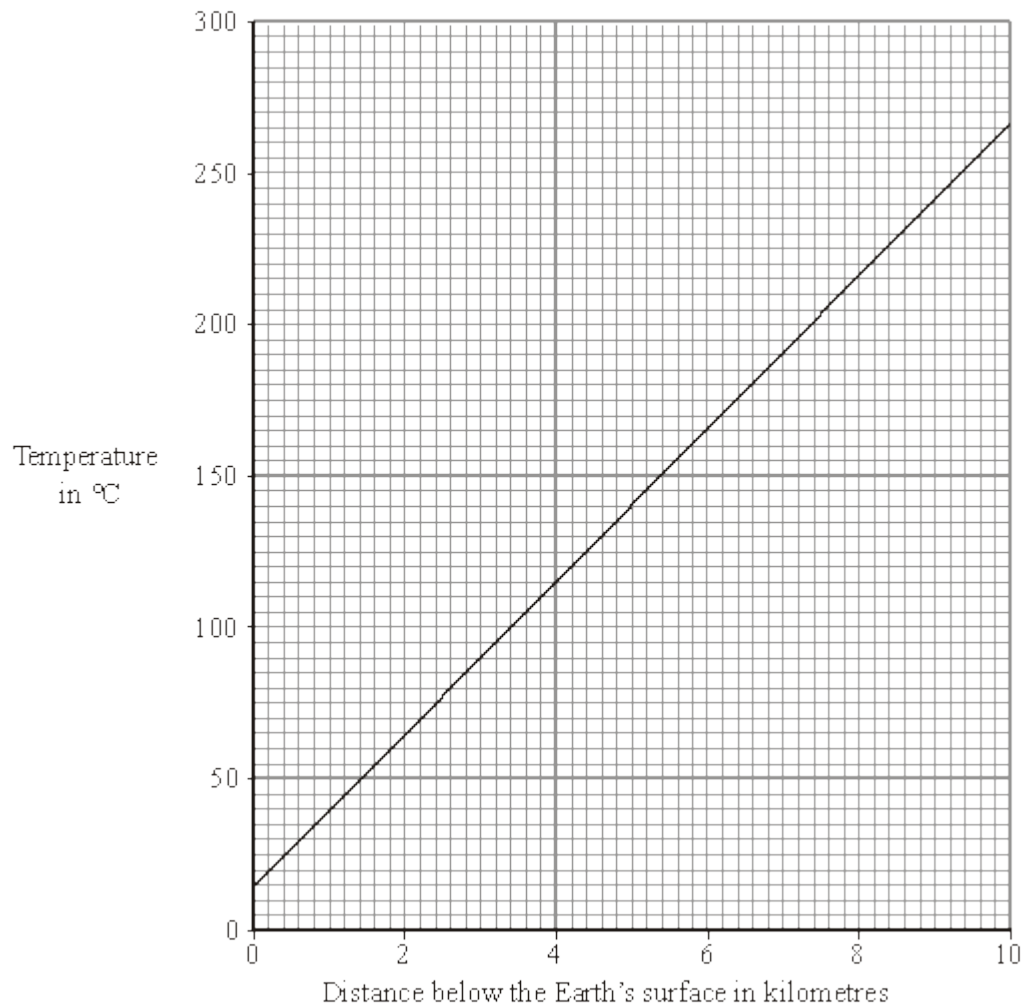
How is the way in which a geothermal power station generates electricity the same as the way in which a coal burning power station generates electricity?

.....

.....

(1)

- (c) The graph shows how the temperature of the rocks in the Earth's crust depends on how far the rocks are below the Earth's surface.



Estimate the temperature of the rocks 5 kilometres below the Earth's surface.

Show clearly how you have used the graph to get your answer.

.....

.....

Temperature = °C

(2)

- (d) Scientists have estimated that one quarter of the world's electricity could be generated using geothermal energy.

Give **one** reason that scientists might use to persuade a government to spend large amounts of money building geothermal power stations.

.....

.....

(1)

(Total 6 marks)

24

- (a) Solar energy is a *renewable* energy source that can be used to generate electricity.

- (i) What is meant by an energy source being *renewable*?

.....

(1)

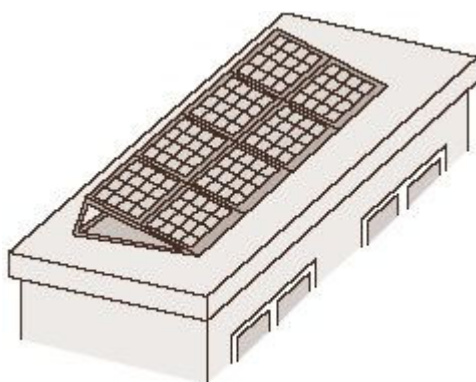
- (ii) Name **two** further renewable energy sources used to generate electricity.

1

2

(1)

- (b) A householder uses a bank of solar cells to generate electricity for his home. The solar cells are tilted to receive the maximum energy input from the Sun.



The data in the table gives the average energy input each second (in J/s), to a 1 m^2 area of solar cells for different angles of tilt and different months of the year.

Month	Angle of tilt			
	20°	30°	40°	50°
February	460	500	480	440
April	600	620	610	600
June	710	720	680	640
August	640	660	640	580
October	480	520	500	460
December	400	440	420	410

- (i) Use the data in the table to describe how the average energy input to the solar cells depends on the angle of tilt.

.....

.....

.....

.....

(2)

- (ii) The bank of solar cells used by the householder has an area of 8 m^2 .

The efficiency of the solar cells is 0.15

Calculate the average **maximum** electrical energy available from the bank of solar cells each second in June.

Show clearly how you work out your answer.

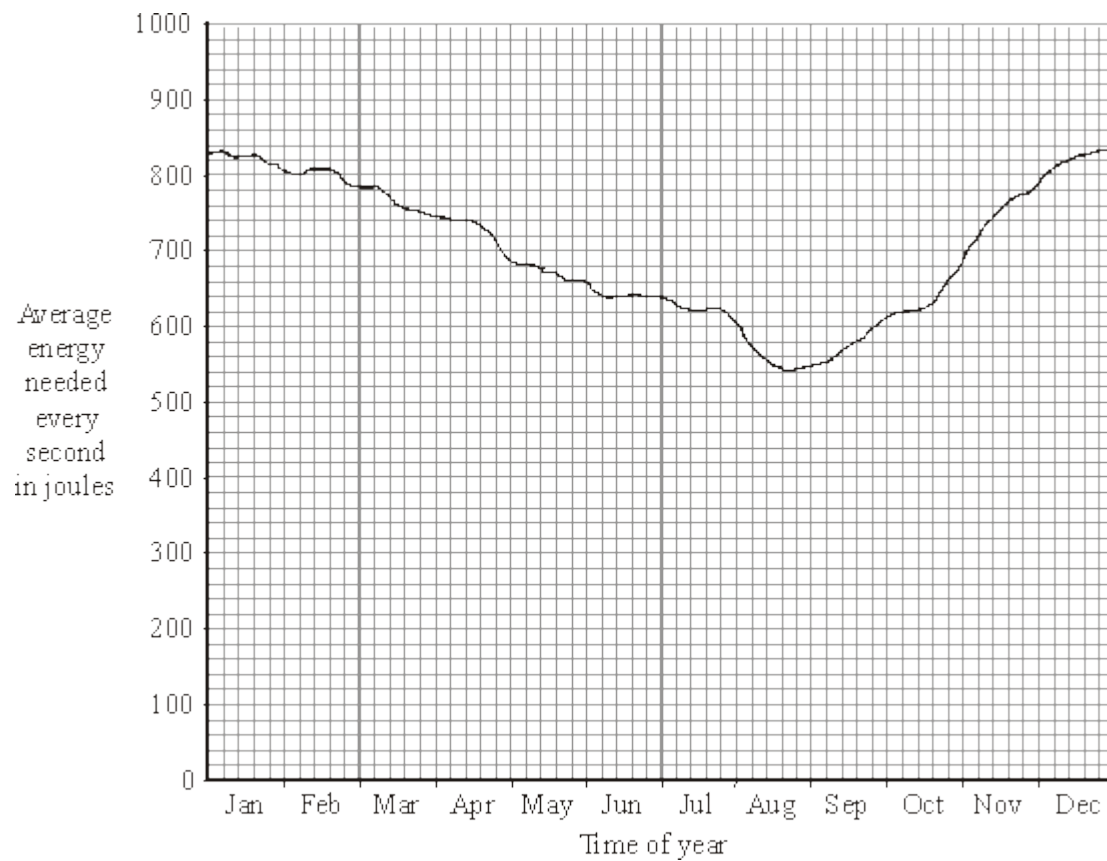
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.....

Maximum energy = joules/second

(3)

(c) The graph shows how the householder's electrical energy needs change over one year.



Why would it be advisable for the householder to remain connected to the National Grid?

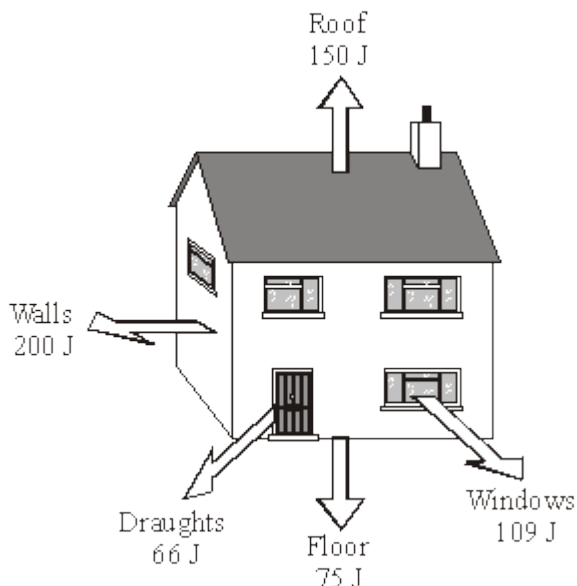
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(1)
(Total 8 marks)

25

- (a) The diagram shows how much heat is lost each second from different parts of an uninsulated house.



- (i) Each year, the house costs £760 to heat.

How much money is being wasted because of heat lost through the roof?

Show clearly how you work out your answer.

.....

(2)

- (ii) Insulating the loft would cut the heat lost through the roof by 50 %.

The loft insulation has a payback time of $1\frac{1}{2}$ years.

How much did the loft insulation cost to buy?

.....

Cost of loft insulation = £

(1)

- (b) What happens to the wasted energy?

.....

(1)**(Total 4 marks)**

26

- (a) The picture shows a new washing machine.



Complete the following sentence using **one** of the words in the box.

kinetic

light

sound

A washing machine is designed to transform electrical energy into heat and
 energy

(1)

- (b) The instruction booklet for the washing machine contains the following information.

Wash cycle	Average power during cycle	Time taken to run cycle
HOT	1.5 kW	2 hours
COOL	1.1 kW	1½ hours
FAST	1.0 kW	¾ hour

- (i) Use the following equation to calculate the energy transferred, in kilowatt-hours, to the washing machine during the HOT wash cycle. Show how you work out your answer.

$$\text{energy transferred} = \text{power} \times \text{time}$$

.....

$$\text{Energy transferred} = \text{..... kWh}$$

(2)

- (ii) Why does it cost more to use the washing machine on the HOT cycle than on the COOL or FAST cycle?

.....

(1)

- (iii) Before buying a washing machine, a householder researched several makes to find out which washing machine was the most energy efficient.

Write down **one** way that he could have done this research.

.....

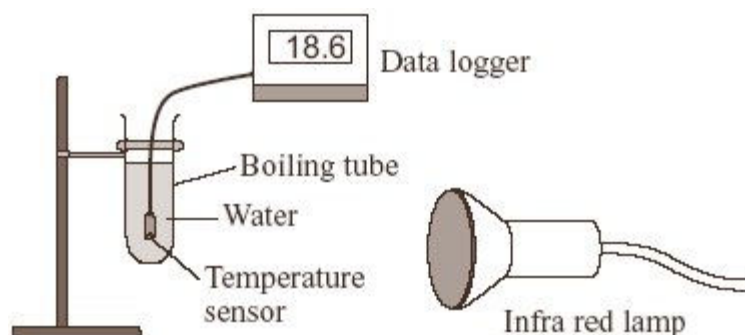
(1)

(Total 5 marks)

27

A student had read about a glacier that had been covered in insulating material. The idea was to slow down the rate at which the glacier melts in the summer.

She investigated this idea using the apparatus shown in the diagram.



- (a) These are the steps taken by the student.

- Measure 30 cm³ of cold water into a boiling tube.
- Place the boiling tube 25 cm from an infra red lamp.
- Record the temperature of the water.
- Switch on the infra red lamp.
- Record the temperature of the water every minute for 5 minutes.
- Repeat with boiling tubes covered in different insulating materials.

- (i) Why did she use an infra red lamp?

.....

(1)

- (ii) Name **one** control variable in this investigation.

.....

(1)

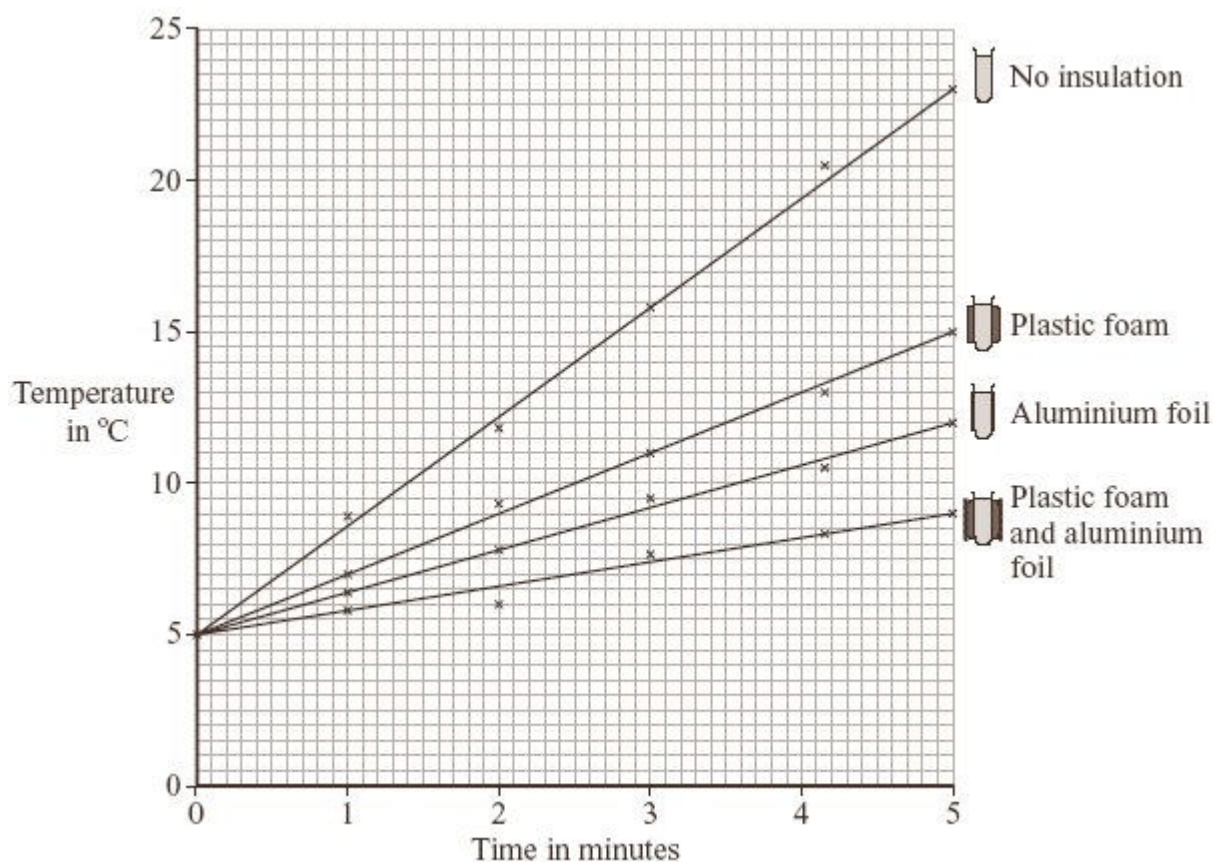
- (iii) Give **one** advantage of using a temperature sensor and data logger instead of a glass thermometer to measure temperature.

.....

.....

(1)

- (b) The results of the investigation are shown in the graph.



- (i) Why did the student use a boiling tube with no insulation?

.....

.....

(1)

- (ii) From her results, what should she recommend is used to insulate the glacier?

.....

(1)

- (iii) Explain why the insulation recommended by the student will reduce the heat transfer from the Sun to the glacier.

.....

.....

.....

.....

.....

(2)

- (c) Explain, in terms of particles, how heat is transferred through the glass wall of a boiling tube.

.....

.....

.....

.....

(2)

(Total 9 marks)

28

There is an increasing demand for electricity and the reserve of fossil fuels is decreasing. A way to meet increasing demand for electricity is to build new nuclear power stations. Some people feel that no new nuclear power stations should be built because of the risks associated with nuclear fuels.

- (a) Outline the arguments that a scientist working in the nuclear power industry could use to justify the building of more nuclear power stations in the future.

.....

.....

.....

.....

.....

(3)

- (b) Nuclear waste is a problem that must be dealt with. One possible solution would be to bury the waste deep underground.

Suggest **one** reason why some people are against burying nuclear waste.

.....

.....

(1)

- (c) Electricity can also be generated using renewable energy sources.

Look at this information from a newspaper report.

- The energy from burning bio-fuels, such as woodchip and straw, can be used to generate electricity.
- Plants for bio-fuels use up carbon dioxide as they grow.
- Farmers get grants to grow plants for bio-fuels.
- Electricity generated from bio-fuels can be sold at a higher price than electricity generated from burning fossil fuels.
- Growing plants for bio-fuels offers new opportunities for rural communities.

Suggest why, apart from the declining reserves of fossil fuels, power companies should use more bio-fuels and less fossil fuels to generate electricity.

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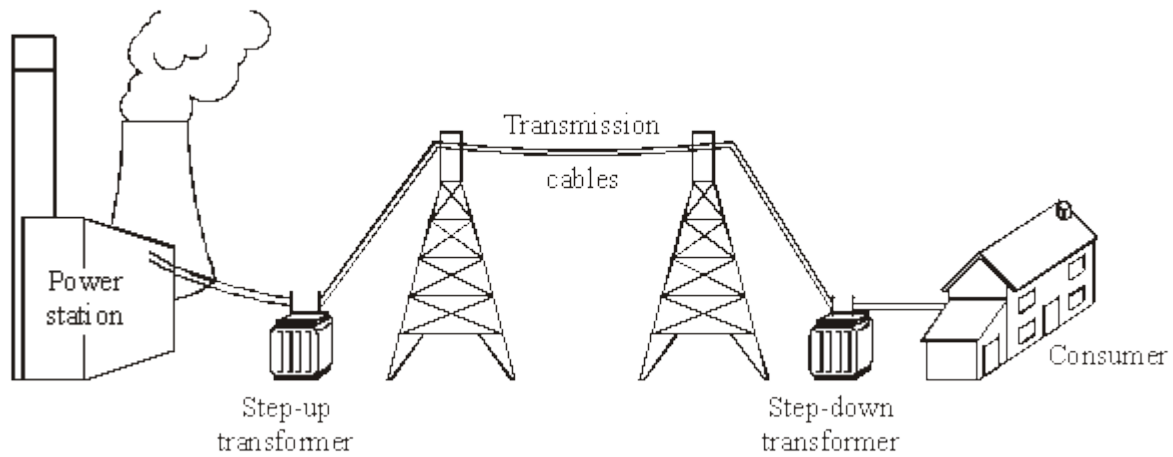
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(3)

(Total 7 marks)

29

The diagram shows how electricity gets from power stations to consumers.



- (a) Complete the following sentences by drawing a ring around the correct line in each box.

- (i) The network of cables and transformers linking power stations to consumers is

called the national

grid
line
network

(1)

- (ii)

A step-up transformer

decreases voltage
increases current
increases voltage

(1)

- (iii)

Electricity is supplied to
consumers' homes at

230 V
25 000 V
400 000 V

(1)

- (iv)

Making the current in the
cables smaller will

increase
make no difference to
reduce

the energy lost in
the cables.

(1)

- (b) Transformers always waste some energy.

- (i) What effect does the waste energy from a transformer have on the air around the transformer?

.....

(1)

- (ii) Which **one** of the following describes the efficiency of a transformer?

Draw a ring around your answer.

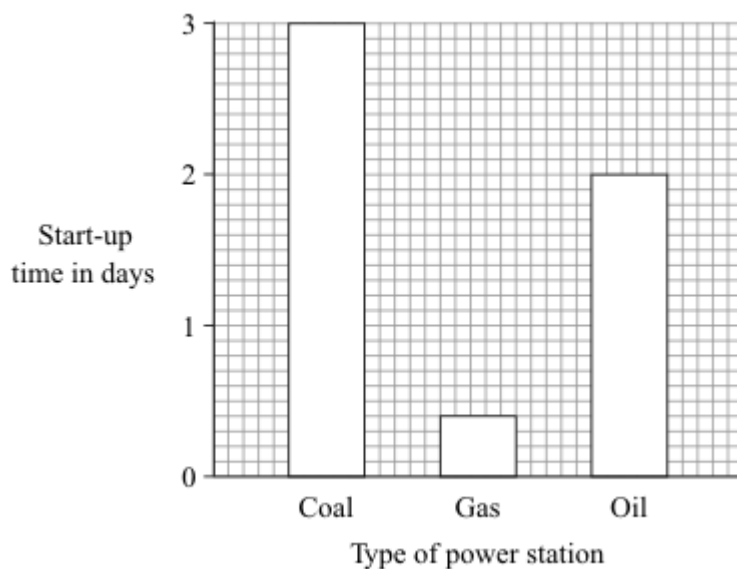
always 100 % less than 100 % more than 100%

(1)
(Total 6 marks)

30

Much of the world's electricity is generated in power stations that burn fossil fuels.

- (a) The bar chart shows the start-up times for the three types of fossil fuel power station.



Which of these power stations would take the longest to start generating electricity?

.....

(1)

- (b) Which **two** of the following statements are good reasons for using fossil fuels to generate electricity?

Put a tick (✓) in the box next to each of your choices.

Supplies of fossil fuels are limited.

☐

Fossil fuels can be used to generate electricity at any time.

☐

Fossil fuels are non-renewable.

☐

A few large power stations can generate the electricity for a million homes.

☐

Burning fossil fuels produces carbon dioxide.

☐

(2)

- (c) Electricity can be generated using energy from the wind.

- (i) Why does a wind-powered generator **not** produce carbon dioxide?

.....

.....

(1)

- (ii) Which form of energy is transferred from the wind to generate electricity?

Draw a ring around your answer.

heat

kinetic

light

sound

(1)

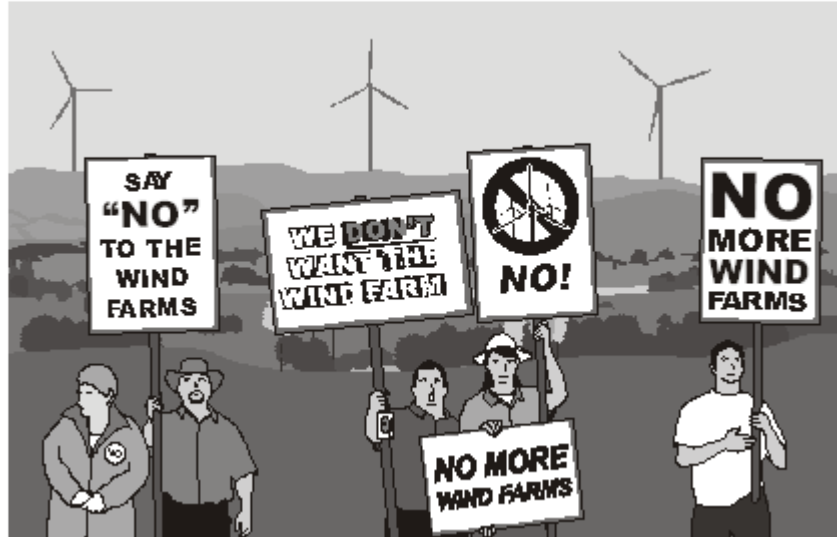
- (iii) Many people say that wind-powered generators are a good idea because:

“when the wind blows they generate electricity”

“they produce no pollution”

“they generate electricity cheaply”

But not everyone wants more wind-powered generators to be built.



What reasons may be given by the people who think that wind-powered generators are **not** a good idea?

.....

.....

.....

.....

(2)
(Total 7 marks)

What reasons may be given by the people who think that wind-powered generators are **not** a good idea?

.....

.....

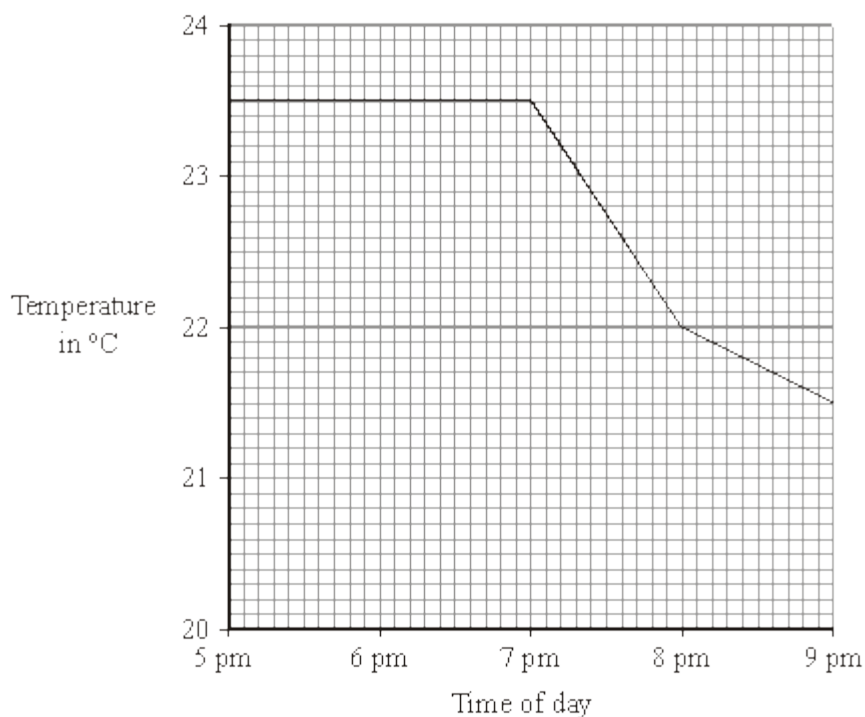
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.....

(2)
(Total 7 marks)

31

- (a) The graph shows the temperature inside a flat between 5 pm and 9 pm. The central heating was on at 5 pm.



- (i) What time did the central heating switch off?

.....

(1)

- (ii) Closing the curtains reduces heat loss from the flat.

What time do you think the curtains were closed?

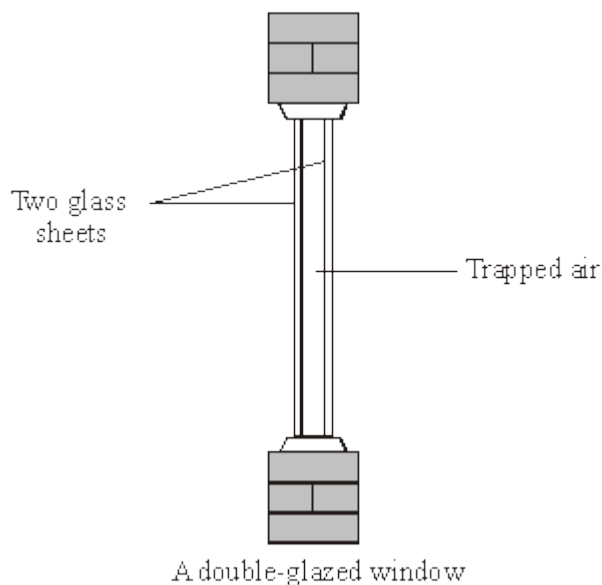
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Give a reason for your answer.

.....

(2)

- (b) Less heat is lost through double-glazed windows than through single-glazed windows.



Complete the following sentences by choosing the correct words from the box. Each word may be used once or not at all.

conduction	conductor	convection	evaporation	insulator	radiation
-------------------	------------------	-------------------	--------------------	------------------	------------------

Air is a good When trapped between two sheets of glass it reduces heat loss by and

(3)

- (c) The table gives information about three types of house insulation.

Type of insulation	Cost to install	Money save each year on heating bills	Payback time
Double glazing	£4000	£200	20 years
Loft insulation	£300	£100	3 years
Cavity wallinsulation	£600	£150	

- (i) Use the information in the table to calculate the payback time for cavity wall insulation.

.....

(1)

- (ii) Explain why people often install loft insulation before installing double glazing or cavity wall insulation.

.....

.....

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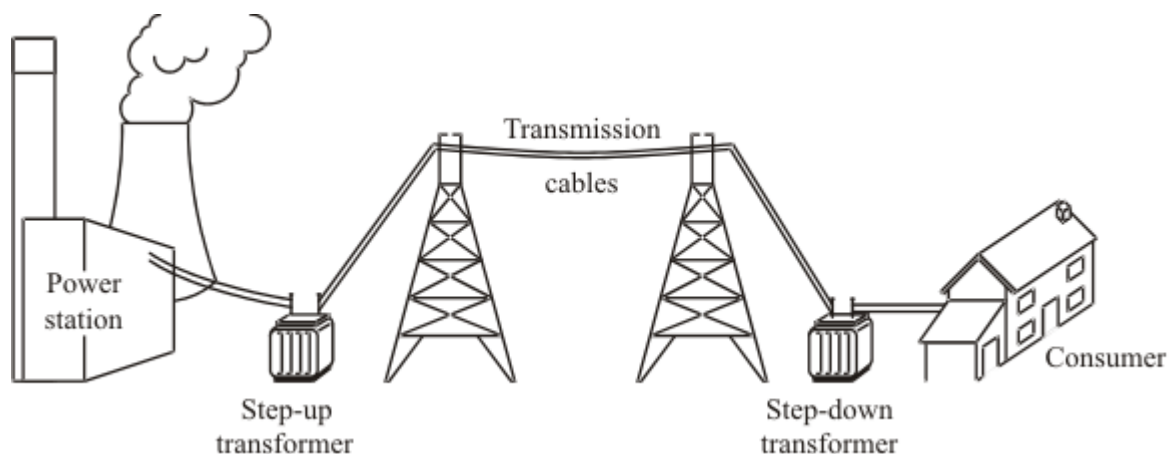
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(2)

(Total 9 marks)

32

The diagram shows how electricity is distributed from power stations to consumers.



- (a) (i) What name is given to the network of cables and transformers that links power stations to consumers?

.....

(1)

- (ii) What does a step-up transformer do?

.....

(1)

- (iii) Explain why step-up transformers are used in the electricity distribution system.

.....

.....

.....

.....

(2)

- (b) Most of the world's electricity is generated in power stations that burn fossil fuels.

State **one** environmental problem that burning fossil fuels produces.

.....

.....

(1)

- (c) Electricity can be generated using energy from the wind. A company wants to build a new wind farm. Not everyone thinks that this is a good idea.



- (i) What arguments could the company give to persuade people that a wind farm is a good idea?

.....

.....

.....

.....

(2)

- (ii) What reasons may be given by the people who think that wind farms are **not** a good idea?

.....

.....

.....

.....

(2)
(Total 9 marks)

33

- (a) The table gives information about some ways of reducing the energy consumption in a house.

Method of reducing energy consumption	Installation cost in £	Annual saving on energy bills in £
Fit a new hot water boiler	1800	200
Fit a solar water heater	2400	100
Fit underfloor heating	600	50
Fit thermostatic radiator valves	75	20

Which way of reducing energy consumption is most cost effective over a 10-year period?

To obtain full marks you must support your answer with calculations.

.....

.....

.....

.....

.....

.....

(3)

- (b) Explain why using an energy-efficient light bulb instead of an ordinary light bulb reduces the amount of carbon dioxide emitted into the atmosphere.

.....

.....

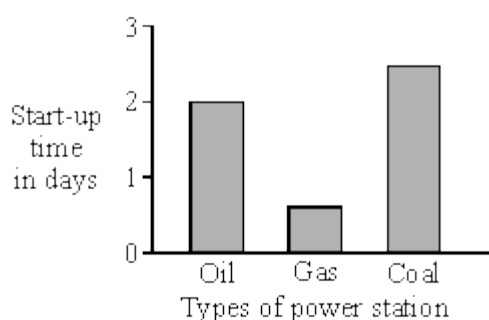
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(2)
(Total 5 marks)

34

- (a) The bar chart shows the start-up time for different types of fuel-burning power stations.



Which type of power station would be the quickest to start producing electricity?

.....

(1)

- (b) A fuel-burning power station is more reliable than a wind generator at producing electricity. Explain why.

.....

.....

.....

.....

(2)

- (c) Fuel-burning power stations may produce air pollution. Why does a wind generator not produce any air pollution?

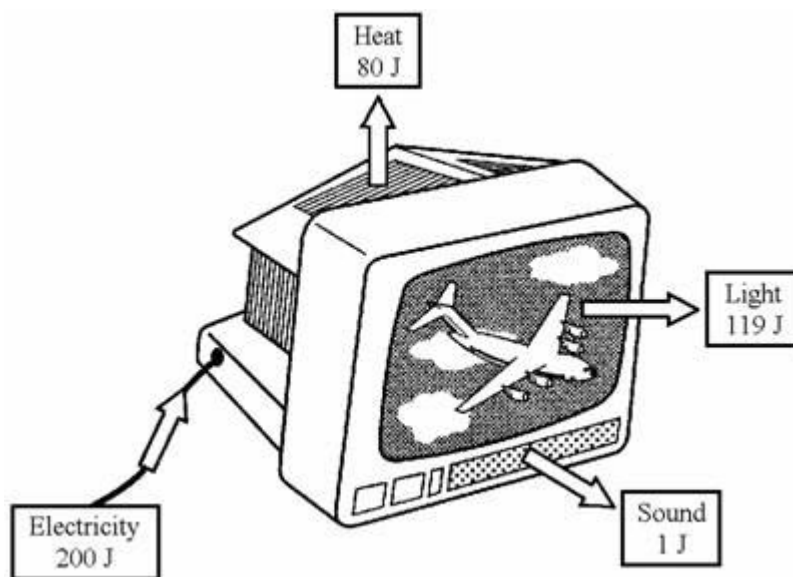
.....

.....

(1)
(Total 4 marks)

35

- (a) The drawing shows the energy transferred each second by a television set.



- (i) What form of energy is transferred as waste energy by the television set?

.....

(1)

- (ii) What effect will the waste energy have on the air around the television set?

.....

(1)

- (iii) Calculate the efficiency of the television set.

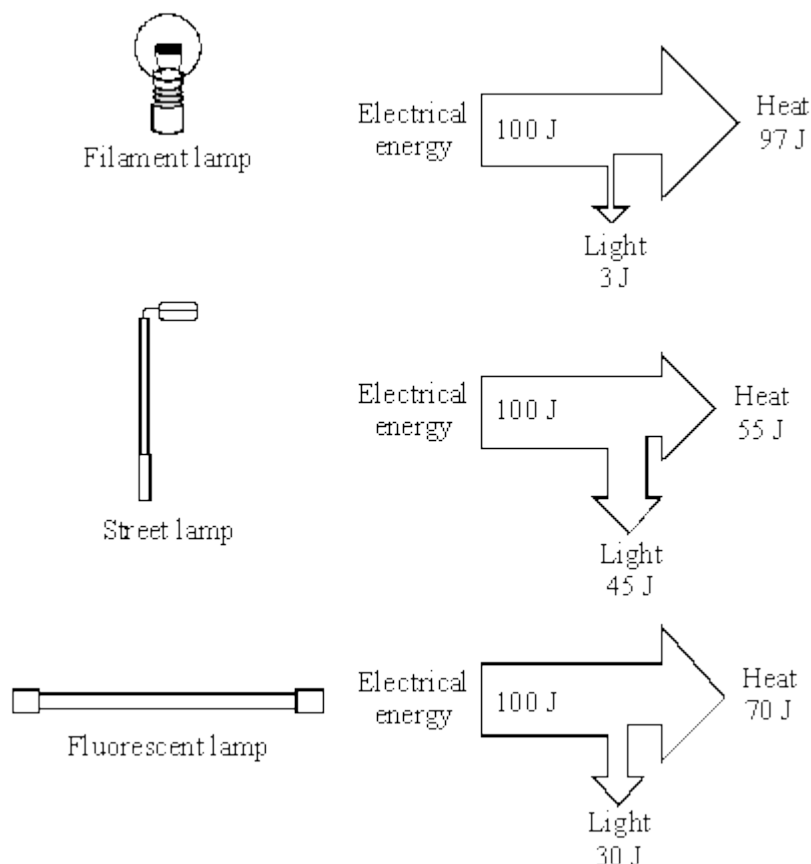
.....

.....

Efficiency =

(2)

- (b) The diagrams show the energy transferred each second for three different types of lamp. For each lamp the electrical energy input each second is 100 joules.



Which type of lamp is the most efficient?

.....

Give a reason for your choice.

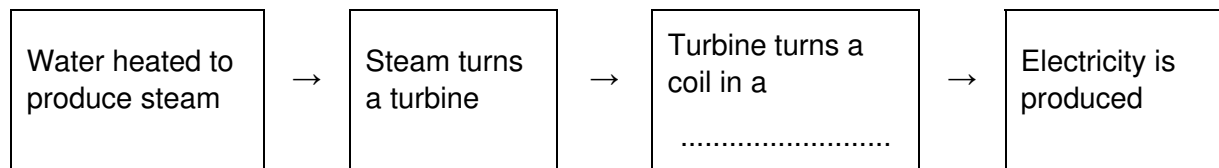
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(2)
(Total 6 marks)

36

- (a) In Britain most power stations burn fuel to produce heat. The diagram shows the stages by which the heat is transferred into electrical energy. Complete the diagram by filling in the missing word.



(1)

- (b) A fuel burning power station uses 2000 joules of fuel energy to generate 600 joules of electrical energy. The rest of the fuel energy is wasted as heat.

- (i) For every 600 joules of electrical energy generated, how much fuel energy is wasted as heat?

.....

(1)

- (ii) Calculate the efficiency of the power station.
 Show clearly how you work out your answer.

.....

efficiency =

(2)

- (c) List **A** gives three energy resources used to generate electricity. List **B** gives environmental problems that may be caused by using different energy resources. Draw a straight line from each energy resource in List A to the environmental problem it may cause in List B. Draw **three** lines only.

List A
Energy resource

Wind

Tides

Falling water
(hydroelectricity)

List B
Environmental problem that may be caused

Destroys the habitat of wading birds in river estuaries

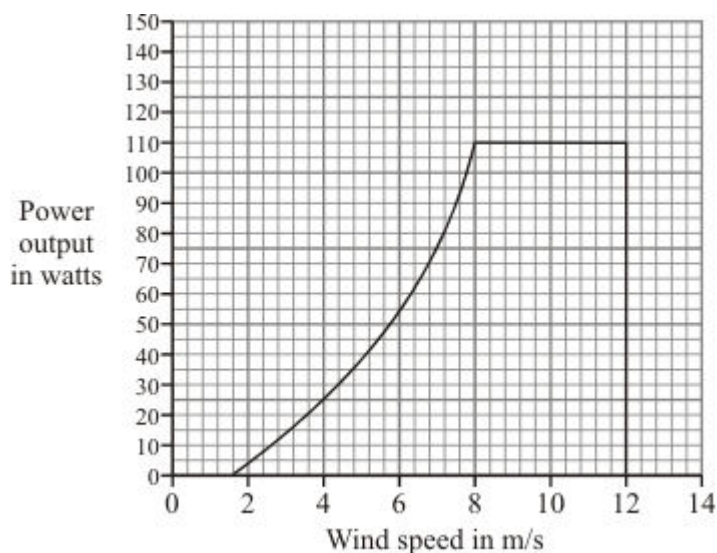
Produces a lot of noise

Produces the gas sulphur dioxide

Floods land used for farming or forestry

(3)

- (d) A small wind generator is used to charge a battery. The graph shows the power output of the generator at different wind speeds.



- (i) What is the maximum power produced by the generator?

..... watts

(1)

- (ii) The generator is designed to stop if the wind speed is too high.

At what wind speed does the generator stop working?

..... m/s

(1)

- (iii) Give **one** disadvantage of using a wind generator to charge a battery.

.....

.....

(1)

(Total 10 marks)

37

- (a) Explain how energy is produced in the Sun.

.....

.....

.....

.....

(3)

- (b) Read the following article that appeared in a magazine.

“Conservation of energy is important in today’s society. Energy sources, such as oil and coal, which have been used for the development of an industrial society, cannot be relied upon as heavily in the future. Renewable energy sources cannot provide such large quantities of energy for society without causing problems.”

- (i) Give **two** reasons why oil should not be relied on as a major source of energy for the future.

1

.....

2

.....

(2)

- (ii) Energy from the wind is a renewable energy resource. State **three** problems which may arise if the wind were to be used to meet the energy requirements of a large industrial city in Britain.

1

.....

.....

2

.....

.....

3

.....

.....

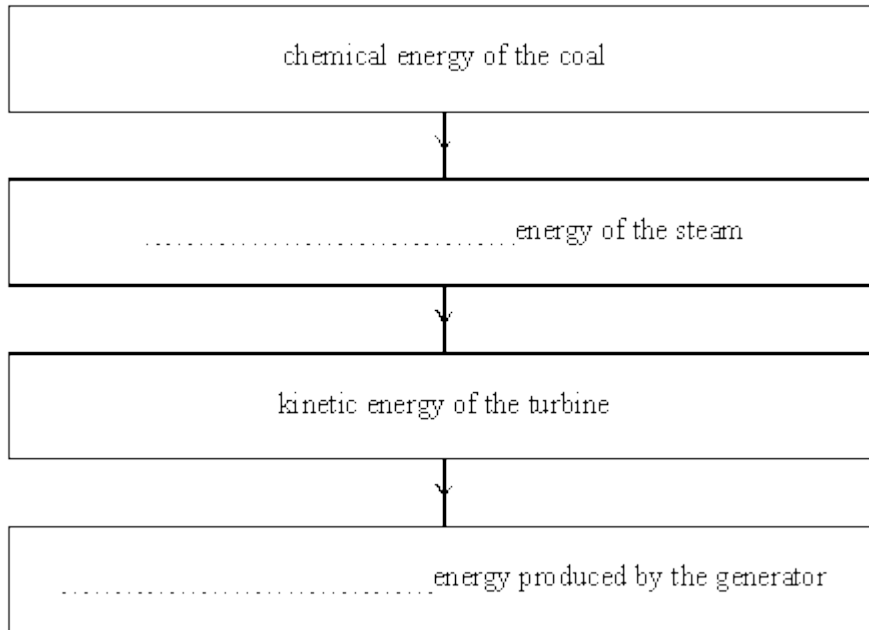
(3)

(Total 8 marks)

38

- (a) Most electricity in Britain is generated by coal fired power stations.

Complete the sequence of useful energy transfers which take place in the power station.

**(1)**

- (b) The diagram shows a wind turbine which is used to produce electricity using energy from the wind.



- (i) What is the source of energy which creates winds?

.....

(1)

- (ii) Explain the advantage of using a wind turbine to produce electricity.

.....

.....

.....

(2)
(Total 4 marks)

39

- (a) A swimming pool has a wave making machine. The diagram shows the water wave pattern for 3 seconds.



- (i) How many water waves are shown in the diagram?

.....

(1)

- (ii) What is the frequency of the water waves?

.....

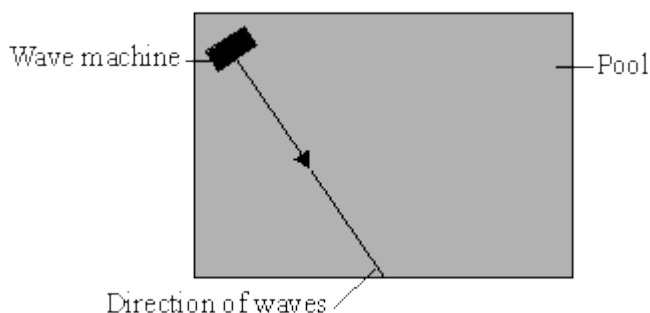
(1)

- (iii) Which **one** of the units below is used to measure frequency? Underline your answer.

hertz joule watt

(1)

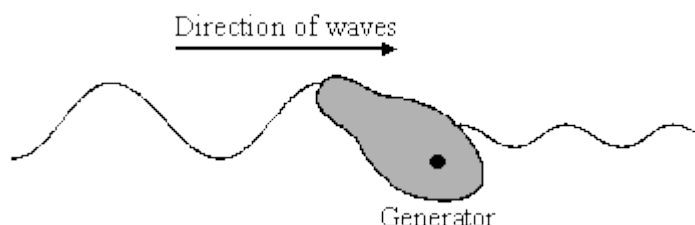
- (b) The diagram shows the direction of the waves across the pool. The waves reflect off the side of the pool.



Draw a line on the diagram to show the direction of the waves after they hit the side of the pool.

(1)

- (c) The swimming pool is used to test a model of an electricity generator. The waves make the floating generator move up and down. This energy is transferred to electricity.



- (i) In the following sentence, cross out the **two** lines that are wrong in the box.

The diagram shows that the amplitude of the waves

gets larger stays the same gets smaller

as the waves pass the generator.

(1)

- (ii) What type of energy does the generator transfer to electricity?

.....

(1)

- (iii) Energy from ocean waves could be used to generate electricity. Would this be a renewable or non-renewable energy resource?

.....

(1)

(Total 7 marks)

40

- (a) (i) A student wrote "Coal traps energy from the Sun". Explain what the student means.

.....

.....

.....

(2)

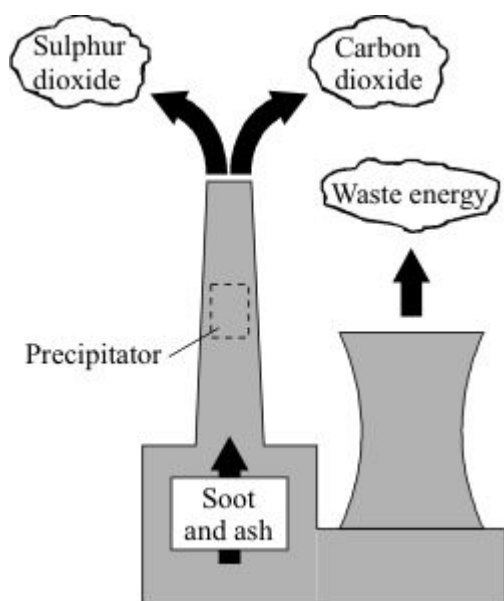
- (ii) How is energy released from coal?

.....

.....

(1)

- (b) The diagram shows the waste products from a coal-fired power station.



- (i) In what form does the power station waste energy?

.....

(1)

- (ii) Carbon dioxide released into the atmosphere will lead to a rise in the Earth's temperature. Why?

.....

.....

(1)

(Total 5 marks)

41

(a) Electricity can be generated using different energy resources.

- (i) Draw lines to link each way of producing electricity to a statement about an energy resource.

Method of producing electricity	Energy resource statements
Tidal barrage	Produces only a small amount of electricity
Solar panel	Is built across a river estuary
Wind turbine	Produces a lot of unwanted noise
Nuclear power station	Rough seas are needed
Wave machine	The waste is very dangerous

(4)

- (ii) Which
- one**
- of these methods of producing electricity uses a non-renewable energy resource?

.....

(1)

(b) The wind is a renewable energy resource.

- (i)
- One**
- of the following statements describes the source of energy that creates a wind. Tick the box next to the correct statement.

The Earth turning on its axis. ☐The gravity pull of the Moon. ☐Heat from the Sun. ☐

(1)

- (ii) Complete the sentence by choosing the correct word from the box.

heat	kinetic	sound
------	---------	-------

A wind turbine transfers energy to electrical energy.

(1)

- (iii) A wind turbine does not produce electricity all of the time. Why not?

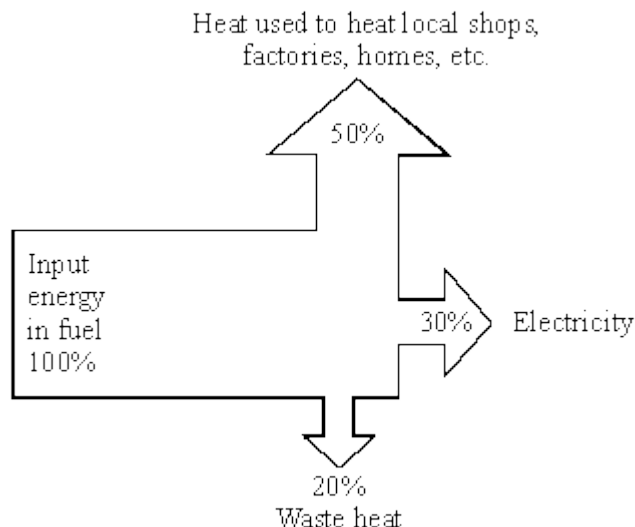
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(1)

(Total 8 marks)

42

In a traditional power station 30% of the energy input is usefully transferred to electricity, the rest is wasted as heat. The diagram shows the energy transfers in a combined heat and power (CHP) station.



Explain why replacing traditional power stations by CHP stations may be beneficial to the environment.

.....

.....

.....

.....

(Total 2 marks)

43

- (a) Coal, gas, oil and wood are all examples of fuels.

- (i) What are fuels?

.....

(1)

- (ii) Write the names of these fuels in the table below to show which are renewable and which are non-renewable.

RENEWABLE FUELS	NON-RENEWABLE FUELS

(2)

- (b) The list below shows energy resources which are not fuels.

geothermal nuclear solar tides wind

Write the names of the energy resources in the table below to show which are renewable and which are non-renewable.

RENEWABLE FUELS	NON-RENEWABLE FUELS

(2)

- (c) Why is it better to use more renewable energy resources rather than non-renewable resources?

.....

.....

.....

.....

(2)
(Total 7 marks)

44

Complete the following sentences.

A TV set is designed to transfer electrical energy into

energy and energy.

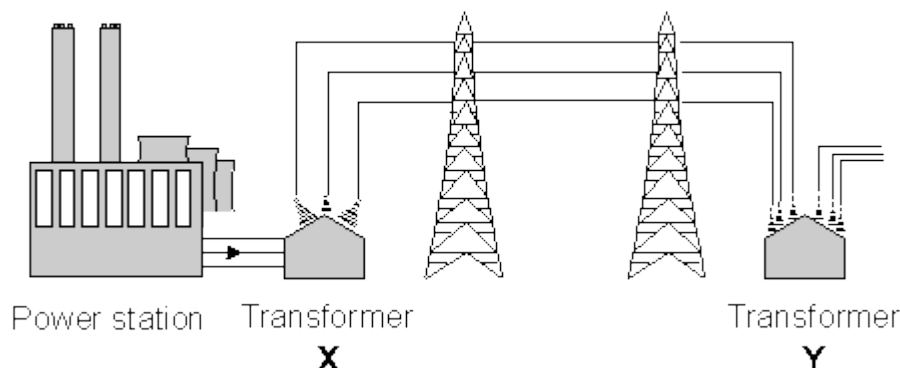
A hair dryer is designed to transfer electrical energy into

energy and energy.

(Total 4 marks)

45

The outline diagram below shows part of the National Grid. At **X** the transformer increases the voltage to a very high value. At **Y** the voltage is reduced to 240 V for use by consumers.



- (i) At **X** a transformer increases the voltage. What happens to the current as the voltage is increased?

.....

(1)

(ii) Why is electrical energy transmitted at very high voltages?

.....
.....

(1)

(iii) The transformer at **Y** reduces the voltage before it is supplied to houses. Why is this done?

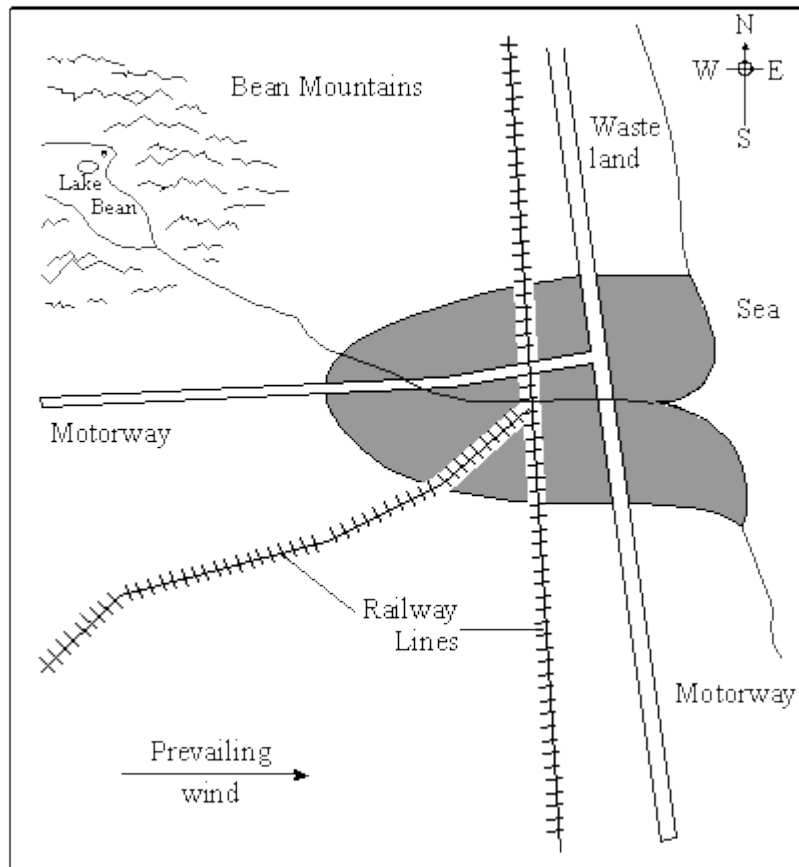
.....
.....

(1)

(Total 3 marks)

46

The map below shows an industrial region (shaded).



The prevailing wind is from the west. There is a nearby mountainous area, from which a river flows through the region. The major road and rail links are shown.

A power station is to be built to supply electrical energy to the region. The energy will be for a range of domestic and industrial uses.

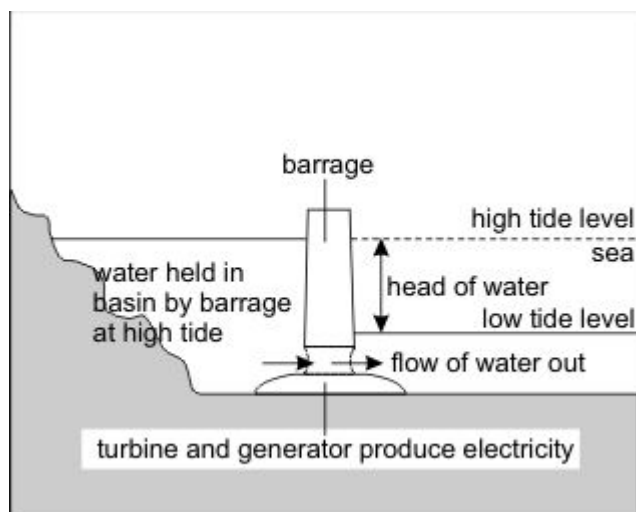
The choice is between a coal fired power station, wind turbines and a hydroelectric scheme.

Three local groups each support a different option. Choose which option you would support and justify your choice by making reference to the financial, social and environmental implications of your choice compared with those of the alternative systems.

(Total 8 marks)

47

The outline diagram below shows a tidal power generating system.



Gates in the barrage are open when the tide is coming in and the basin is filling to the high tide level. The gates are then closed as the tide begins to fall.

Once the tide outside the barrage has dropped the water can flow through large turbines in the barrage which drive generators to produce electrical energy.

In one second 1.2×10^9 kg of water flows through the turbines at a speed of 20 m/s.

- (a) When used with a water speed of 20 m/s the system has an efficiency of 90% in converting the kinetic energy of the water into electrical energy. Calculate the power output of the generators.

.....

(2)

- (b) The power output of a coal fired power station is 1000 MW (1×10^9 W).

- (i) Suggest **two** advantages of coal fired power stations over tidal power generating systems.

1.

 2.

- (ii) Suggest **two** advantages of tidal power generating systems over coal fired power stations.

1.

.....

2.

.....

- (iii) Suggest and explain **one** disadvantage of a tidal power generating system.

.....

.....

.....

.....

(6)
(Total 8 marks)

48

Describe, in as much detail as you can, how the energy stored in coal is transferred into electrical energy in a power station.

.....

.....

.....

.....

.....

.....

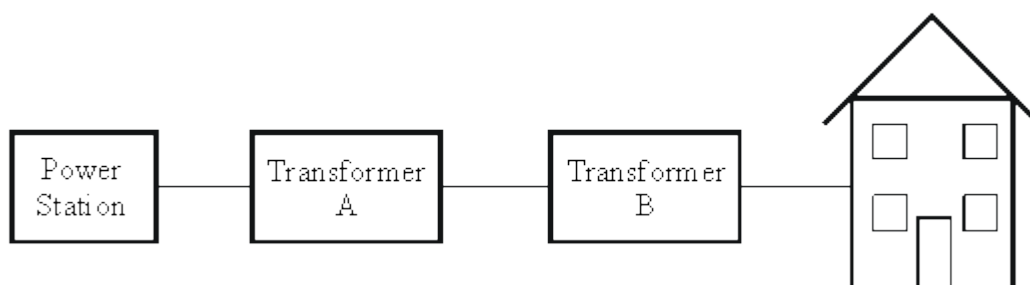
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.....

.....

(Total 5 marks)

49



Transformer A produces a very high voltage to transmit the electrical energy through the National Grid.

Explain why electrical energy is transmitted at a very high voltage.

.....

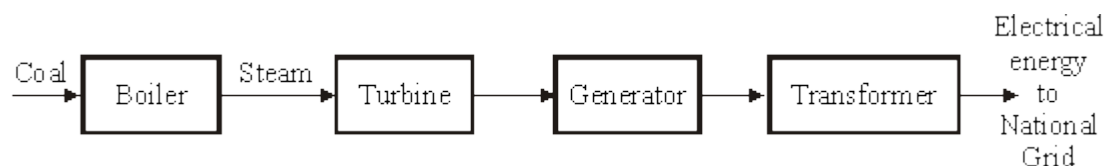
.....

.....

(Total 3 marks)

50

The diagram below shows four stages in the production of electricity by a coal-fired power station.



- (a) (i) Write down **two** environmental problems which are caused by burning coal to generate electricity.

1

.....

.....

2

.....

.....

(ii) How may these environmental problems be reduced?

1

.....

.....

2

.....

.....

(4)

(b) Some data for Didcot coal-fired power station is given below.

Number of generators	4
Maximum continuous power rating of a generator	500 MW at 23 500 V
Energy content of coal used	2.66×10^{10} J per tonne
Total quantity of coal used each day	18 289 tonnes

Use the given data to calculate:

(i) the total electrical energy output each day.

.....

.....

.....

AnswerJ/day

(ii) the total input of coal energy each day.

.....

.....

.....

AnswerJ/day

(iii) the efficiency of the power station.

.....

.....

.....

Answer %

(8)

(c) Energy is conserved.

- (i) Choose **one** of the stages in the diagram at the start of the question.
State what happens to the wasted energy during this stage.

.....

.....

.....

- (ii) Explain what happens to all wasted energy during energy transfers.

.....

.....

.....

(3)
(Total 15 marks)

51

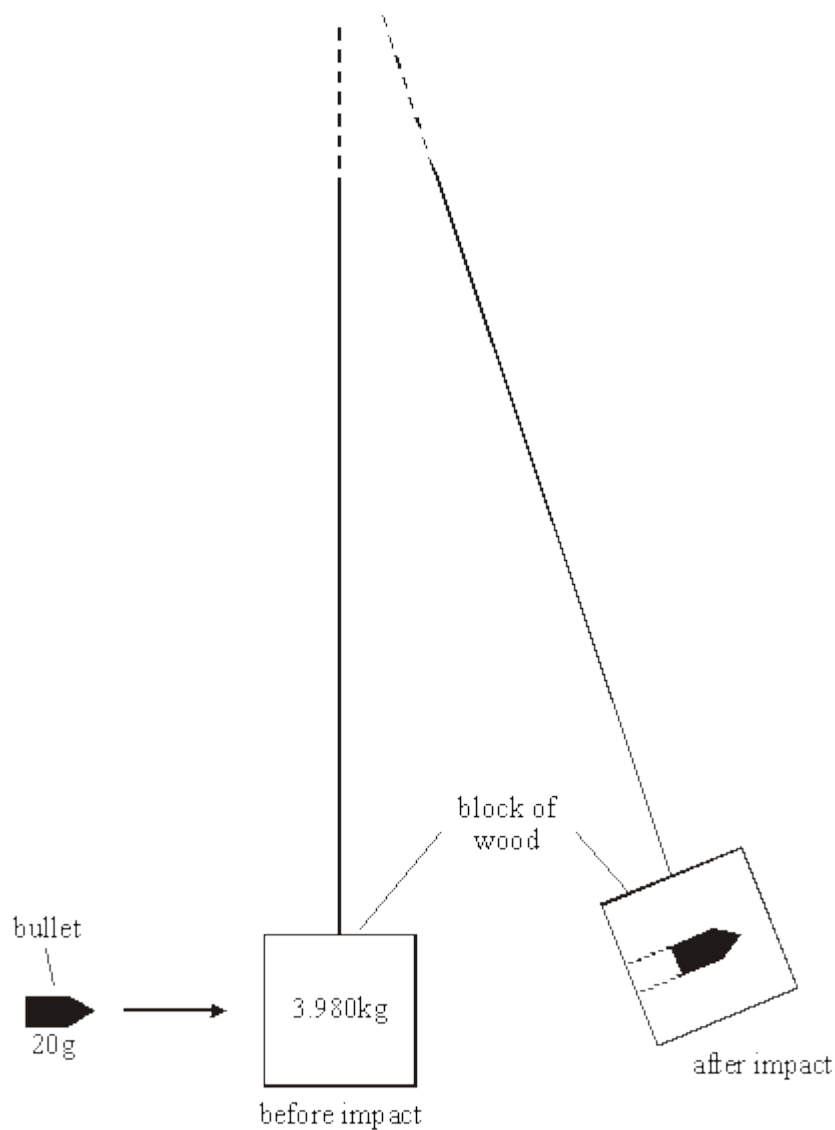
- (a) When an object is moving it is said to have momentum.
Define momentum.

.....

.....

(1)

- (b) The diagram below shows one way of measuring the velocity of a bullet.



A bullet is fired into a block of wood suspended by a long thread.

The bullet stops in the wooden block.

The impact of the bullet makes the block swing.

The velocity of the wooden block can be calculated from the distance it swings.

In one such experiment the block of wood and bullet had a velocity of 2 m/s **immediately after** impact. The mass of the bullet was 20 g and the mass of the wooden block 3.980 kg.

- (i) Calculate the combined mass of the block of wood and bullet.

..... Mass

(1)

- (ii) Calculate the momentum of the block of wood and bullet **immediately after** impact.

.....

 Momentum

(3)

- (iii) State the momentum of the bullet **immediately before** impact.

.....

(1)

- (iv) Calculate the velocity of the bullet **before** impact.

.....

 Velocity m/s

(3)

- (v) Calculate the kinetic energy of the block of wood and bullet **immediately after** impact.

.....

 Kinetic energy

(3)

- (vi) The kinetic energy of the bullet before the impact was 1600 joules. This is much greater than the kinetic energy of the bullet and block just after the impact. What has happened to the rest of the energy?

.....

.....

.....

.....

(1)
(Total 13 marks)

52

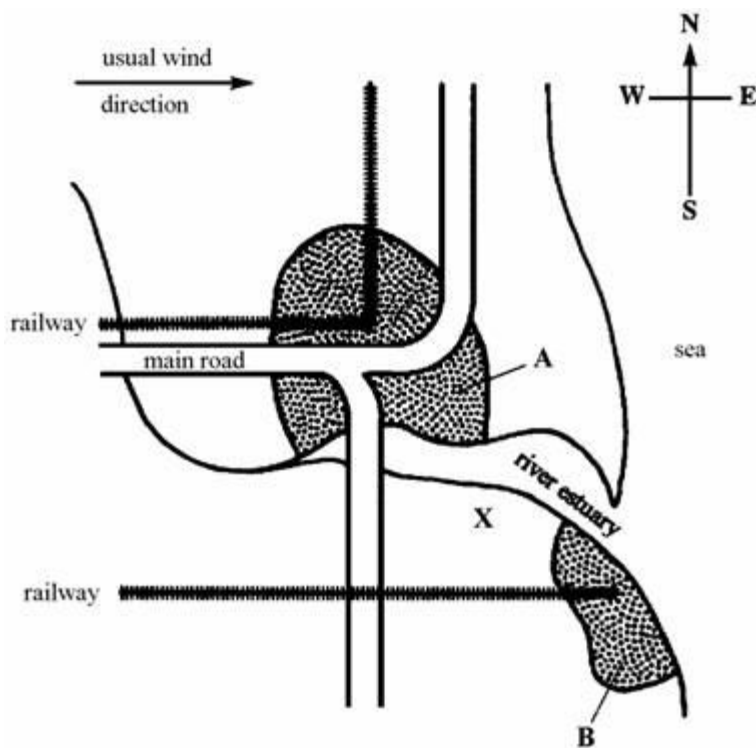
The map below shows the position of two towns, **A** and **B**, on the banks of a large river estuary.

A is an important fishing and ferry port.

The wind usually blows from the west. The major roads and railways are shown.

A power station is to be built in area X to generate electricity for the region.

The choice is between a nuclear power station and a coal fired power station.



- (a) State the advantages and disadvantages of the two methods of generating electrical energy.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6)

- (b) Which method would you choose for this site?

.....

Explain the reason for your choice.

.....

.....

.....

.....

.....

.....

.....

(3)

(Total 9 marks)

53

State and explain the advantages and disadvantages of using nuclear power stations to produce electricity.

.....

.....

.....

.....

.....

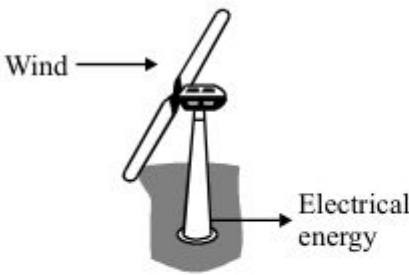
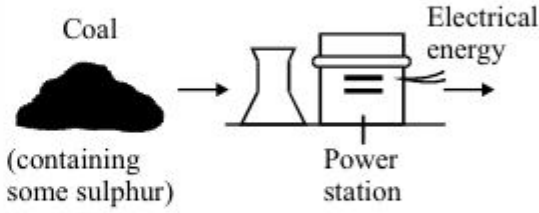
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(Total 4 marks)**54**

Electricity is a useful form of energy.

(a) Different energy sources can be used to generate electricity.

Wind is an energy source	Coal, a fossil fuel, is an energy source
	
This wind turbine generates 1 MW. (1 MW = 1000 kW)	This coal-fired power station generates 1000 MW.
Electricity demand in the UK can be 48 000 MW.	

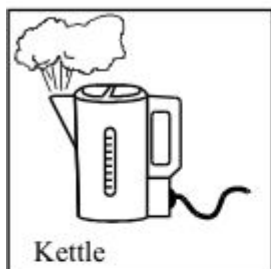
Give **one** advantage and **one** disadvantage (other than cost) of using each energy source to generate electricity in the UK.

Advantage	Disadvantage
Using wind	Using wind
Using coal	Using coal

(4)

- (b) List **A** shows three electrical devices.
List **B** gives the type of useful energy transferred.

Draw a straight line from each electrical device in List **A** to the useful energy it transfers in List **B**.

List A**Electrical device****List B****Useful energy transferred**

heat

light

sound

(2)
(Total 6 marks)

55

Use of renewable sources of energy is expected to increase. The table shows the comparative costs of producing 1 kWh of electricity from different energy sources.

Types of energy sources used in the UK	Cost of producing 1 kWh of electrical energy
Fossil fuels(non-renewable)	Coal 1.0 p
	Gas 1.4 p
	Oil 1.5 p
Nuclearfuels (non-renewable)	Nuclear 0.9 p
Renewable	Hydroelectric 0.2 p
	Wind 0.9 p
Installation and decommissioning costs are notincluded	

At present about 2% of electricity generated in the UK uses renewable energy sources. Consider the three types of energy sources in the table and give **one** advantage and **one** disadvantage for each (other than installation and decommissioning costs).

Advantage	Disadvantage
Using fossilfuels	Using fossilfuels
Usingnuclear fuels	Usingnuclear fuels
Usingrenewable sources	Usingrenewable sources

(Total 6 marks)

56

When you transfer *energy* to a shopping trolley, the amount of *work done* depends on the *force* used and the *distance moved*.



Complete the table by using the correct units from the box.

joule (J)

metre (m)

newton (N)

The first one has been done for you.

Quantity	Unit
energy (transferred)	joule
force	
distance (moved)	
work done	

(Total 2 marks)

57

Different energy sources are shown in the box.



An 'Eco-home' is one which is friendly to the environment.

Imagine you are designing an 'Eco-home' which can use any of the energy sources above to generate electricity

- (a) Choose **one** non-renewable energy source from the box above that could provide the electricity supply to your 'Eco-home', but which would be **unsuitable**.

Write the energy source in the table and explain, as fully as you can, why it is **unsuitable** for an 'Eco-home'.

Non-renewable energy source	Unsuitable for an 'Eco-home' because
.....
.....

(2)

- (b) Choose **two** suitable renewable energy sources from the box opposite that could provide an electricity supply to your 'Eco-home'.

Write the two energy sources in the table and describe, in as much detail as you can, the undesirable environmental effects of using these.

Renewable energy source	Undesirable environmental effects
1 	
2 	

(4)
(Total 6 marks)