OCR GCSE GATEWAY PHYSICS A · J249

PHYSICS



EXAM QUESTION PACK

P8.2 POWERING EARTH

SCORE	PERCENTAGE
/225	%

STEMUP

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Gateway Physics A (9-1)

Powering Earth

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:
Additional resources may be supplied with this paper.

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: Not set

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **225**.
- The total number of marks may take into account some 'either/or' question choices.

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1 Which correctly describes electricity supply to homes in the UK?

A 50 Hz a.c.
B 50 Hz d.c.
C 230 Hz a.c.
D 230 Hz d.c.

Your answer ☐

[1]

2 Why are high voltages used to transfer electrical power from power stations in the National Grid?

A allows low resistance wires to be used.
B produces a higher current.
C reduces energy losses.
D voltage can be changed using transformers.

Your answer ☐

[1]

3(a) Many power stations burn fuels to generate electricity.

Fuels can be renewable or non-renewable.

Wood is used in some power stations.

Why is it called a renewable fuel?

---

[1]

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(b) Rachael has completed her homework on fuels used in power stations.

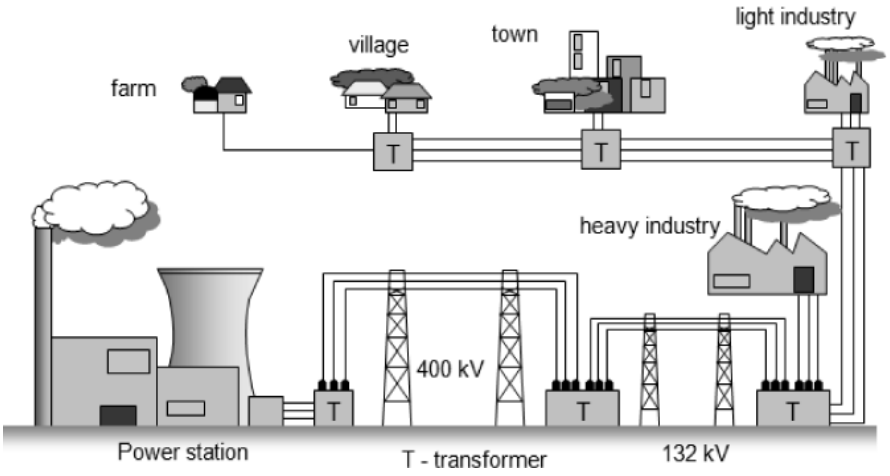
Look at her table below.

Fuel	Type
Wood	renewable
Plant and vegetable oils	renewable
Peat	non-renewable
Coal	renewable
North Sea gas	non-renewable
Uranium	renewable

She has made **two** mistakes, identify these in the table by putting a cross (**x**) next to them.

[2]

(c) Power stations produce electrical energy and use the National Grid to send it to factories and homes in the UK.



A step-up transformer is used in the National Grid.

State what a step-up transformer does.

---

[1]

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(d) Domestic UK electrical wiring uses live, neutral and earth wires.

Complete the two empty boxes and then draw lines to match up the wires to their colour and function.

Wire	Colour	Function
Live		Completes the circuit
Earth	brown	
Neutral	yellow and green	Has a high potential difference

[4]

4 The National Grid transfers energy efficiently using high voltages.

Why are high voltages more efficient?

A High voltages produce a high current which heats wires less.
B High voltages produce a low current which heats wires more.
C High voltages produce a high current which heats wires more.
D High voltages produce a low current which heats wires less.

Your answer

[1]

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5 Which row correctly describes the domestic electricity supply in the UK?

	a.c. or d.c.	frequency (Hz)	voltage (V)
A	a.c.	50	230
B	a.c.	230	50
C	d.c.	50	230
D	d.c.	230	50

Your answer

[1]

6 Voltage is increased before transmission through the National Grid.

It is increased from 25 000 V up to 400 000 V. This increases the voltage 16 times.

(i) How much would this increase in voltage affect the current?

---

[2]

(ii) Use the formula: **power = current^2 × resistance**

to explain why this voltage increase is important to power loss in transmission cables.

---

[2]

7 Jin's car runs on petrol. Petrol is a fossil fuel.

She would like a car that does not use fossil fuels so that she can reduce her effect on the environment.

(i) Write down two possible alternatives to fossil fuels for cars.

1

2

---

[2]

(ii) Jin thinks that some alternatives may not be suitable to use in the UK.

Suggest **one** alternative that may not be suitable.
Explain your answer.

---

[1]

8 Alec designs a house.
He wants the house to use **renewable** energy from the Sun.

He would like to use both of these methods:

- passive solar heating
- photocells.

Describe how Alec can use these two methods in his house to help reduce pollution to the environment. Explain how he can maximise the energy he collects by using these methods.

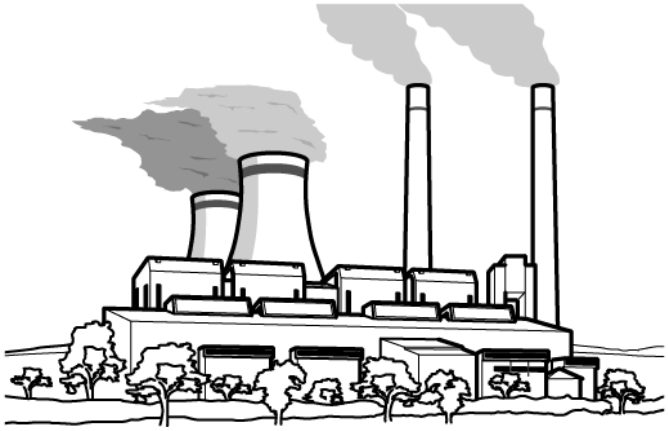


The quality of written communication will be assessed in your answer to this question.

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[6]

9(a) This question is about power stations.



Power stations generate electricity.

Name two **fossil** fuels used in power stations.

_____ and _____ [1]

(b) Name one **renewable** fuel used in power stations.

_____ [1]

(c) Complete the sentences.

Electricity is generated in power stations.

It is transmitted around the UK through a system of power lines called the _____ .

This system connects the power station to **consumers** such as

_____ and _____ .

[2]

10 Elin's mains supply is 230 V.

The electricity company transmits electricity through the National Grid at a higher voltage of 400 000 V.

This reduces energy waste for the company.

Explain why.

---

[2]

11 We use electricity to provide energy in our everyday activities.

Look at the table.

It shows the average electrical energy in kWh used per person each day in different countries.

Country	Average electrical energy used per person each day in kWh
Austria	4.3
Belgium	6.2
Denmark	5.2
Finland	9.7
France	5.8
Germany	4.3
Ireland	4.6
Luxembourg	4.4
Norway	20.5
Sweden	12.9
Switzerland	5.8
UK	5.0

(i) In the UK the Smith family use 7 300 kWh of electrical energy in a year (365 days).

Use the figures in the table to calculate the number of people in the Smith family.

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Show your working.

---

answer _____ people **[2]**

(ii) The average electrical energy use **per person** each day in the UK is less than that in Belgium.

However, as a country, Belgium uses less electrical energy than the UK.

Suggest a reason why.

---**[1]**

12 The National Grid transfers power from power stations to homes and factories.

The transmission voltages in the National Grid are very high.

Describe one **risk** and one **benefit** of using high voltages to transmit electricity.

---**[2]**

13 Carly has a hair dryer. The hair dryer has a plastic case as well as an insulated cable.



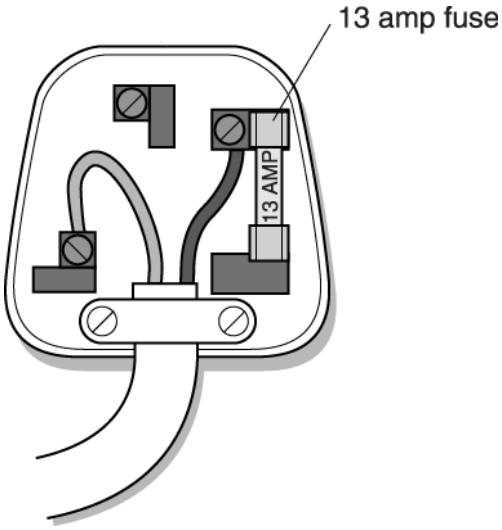
She attaches a plug to the hair dryer.

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Look at the inside of the plug she uses.



Explain why the plug only needs two wires and a fuse.

Explain why this fuse needs to be 13 amp rather than a 3 amp.

The quality of written communication will be assessed in your answer to this question.

[6]

14 We use electricity to provide energy in our everyday activities.

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Germany	4.3
Ireland	4.6
Luxembourg	4.4
Norway	20.5
Sweden	12.9
Switzerland	5.8
UK	5.0

(i) In the UK a person uses an average of 5.0 kWh of electrical energy each day.

How much would a family of 4 people use on average in 7 days?

---

answer _____ kWh **[2]**

(ii) Which countries in the table use the lowest amount of electrical energy per person each day?

---

[2]

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(iii) In Norway some people only use about 7 kWh of electrical energy each day.

This is much less than the average amount of electrical energy used, which is 20.5 kWh.

Suggest how these two figures can both be correct.

---

[1]

(iv) The average electrical energy use **per person** each day in the UK is less than that in Belgium.

However, as a country, Belgium uses less electrical energy than the UK.

Suggest a reason why.

---

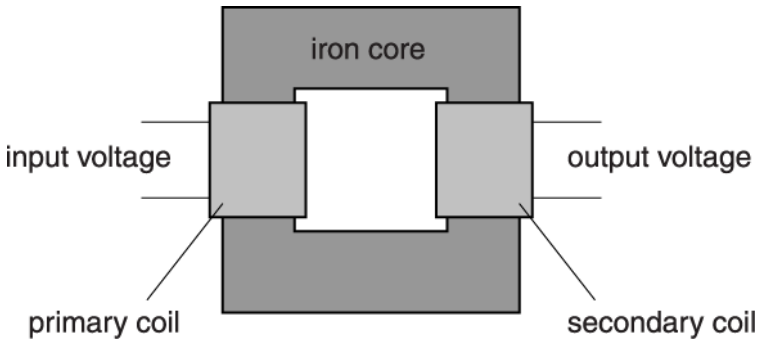
[1]

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15 This question is about transformers.



Transformers are used to change the voltage of an AC supply.

Susan has completed her homework on identifying step-up and step-down transformers.

	Input voltage in V	Output voltage in V	Step-up or step-down
A	10	20	Step-up
B	40	100	Step-down
C	25	50	Step-down
D	50	10	Step-down

Susan spots **two** mistakes in her work.

Which two rows, **A**, **B**, **C** or **D** are incorrect?

_____ and _____

Explain your choices.

_____

_____

_____ [2]

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16 This question is about alternating current (AC).

What is the frequency of the mains electricity supply in the UK?
Tick (?) the correct box.

5 Hz	☐	*50 Hz*	☐
10 Hz	☐	*100 Hz*	☐

[1]

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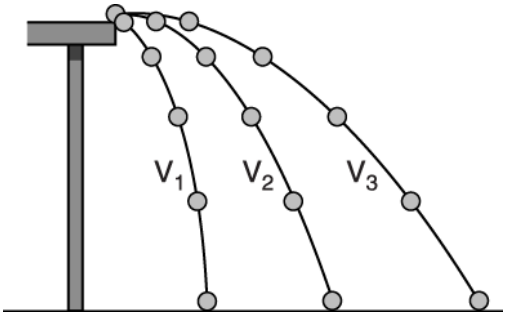
17 Gita rolls a marble at a velocity V_1 off the edge of a desk.

She repeats the experiment by rolling the marble at different velocities, V_2 and V_3.

She uses a camera to show the paths of the marble.

Look at the diagram of her results.

It shows the position of the marble at equal time intervals for each path.



Compare the velocities and describe the paths (V_1, V_2 and V_3) of the marble.

For path V_3 describe the horizontal and vertical accelerations of the marble.

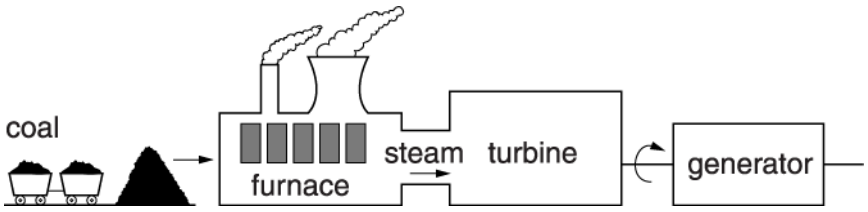
The quality of written communication will be assessed in your answer to this question.

[6]

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18 Power stations are used to generate electricity.

Look at the diagram of a power station that uses coal.



(i) Nuclear power stations have some **similarities** to coal power stations.

They both use a fuel.

Describe **one** other way they are similar.

---

[1]

(ii) Nuclear power stations have some **differences** to coal power stations.

Describe **one** way they are different.

---

[1]

19 Carly needs to attach a new mains plug to her hair dryer.



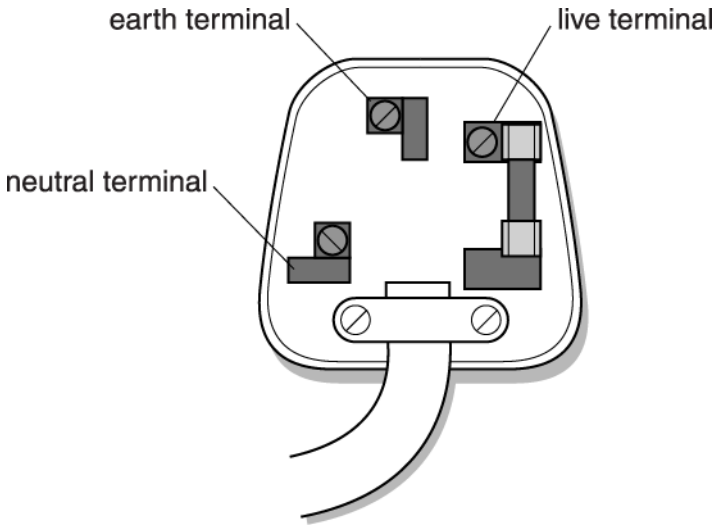
The hair dryer is a **double insulated** appliance.

She puts a 13 amp fuse in this plug.

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Write instructions for connecting the **two** different coloured wires needed in the plug.

Describe why it is important to use a 13 amp fuse.

You may draw on the diagram of the plug to help your answer.

The quality of written communication will be assessed in your answer to this question.

[6]

20 Elin's phone charger plugs into the 230 V mains.

The charger reduces the voltage to 12 V.

Name the device in the charger that is used to reduce the voltage.

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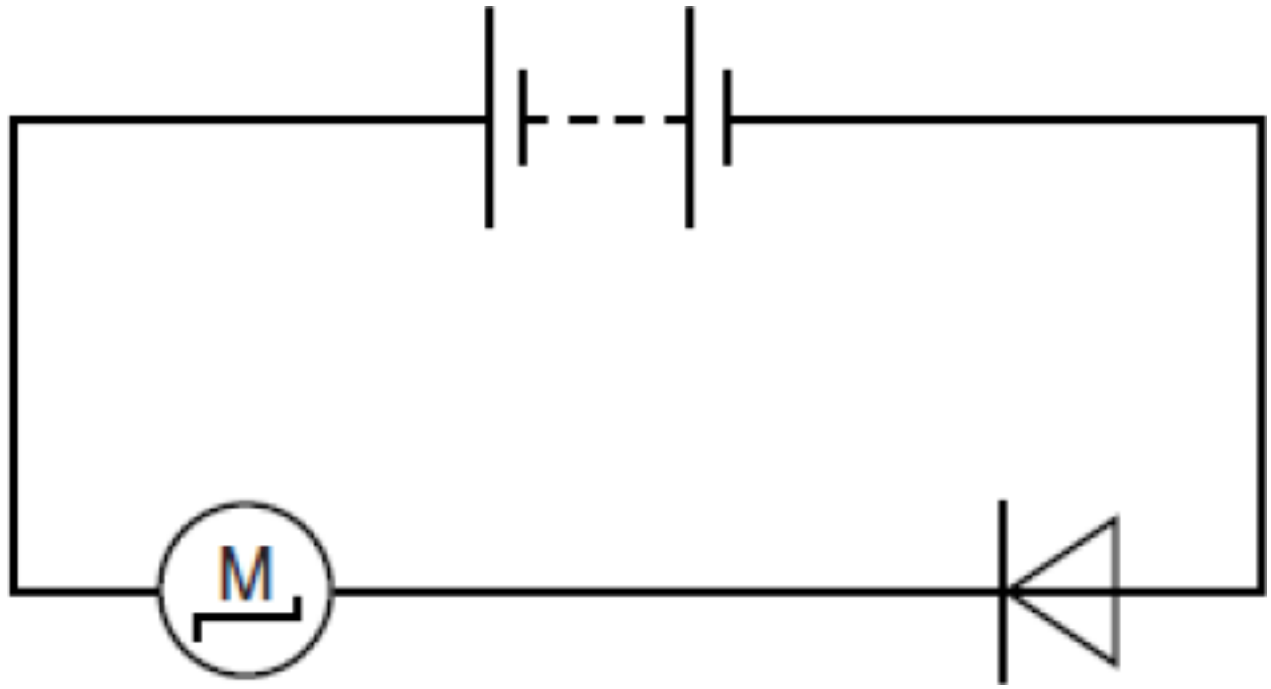
[1]

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21(a) Rob puts a motor in a circuit.



The motor does not turn.

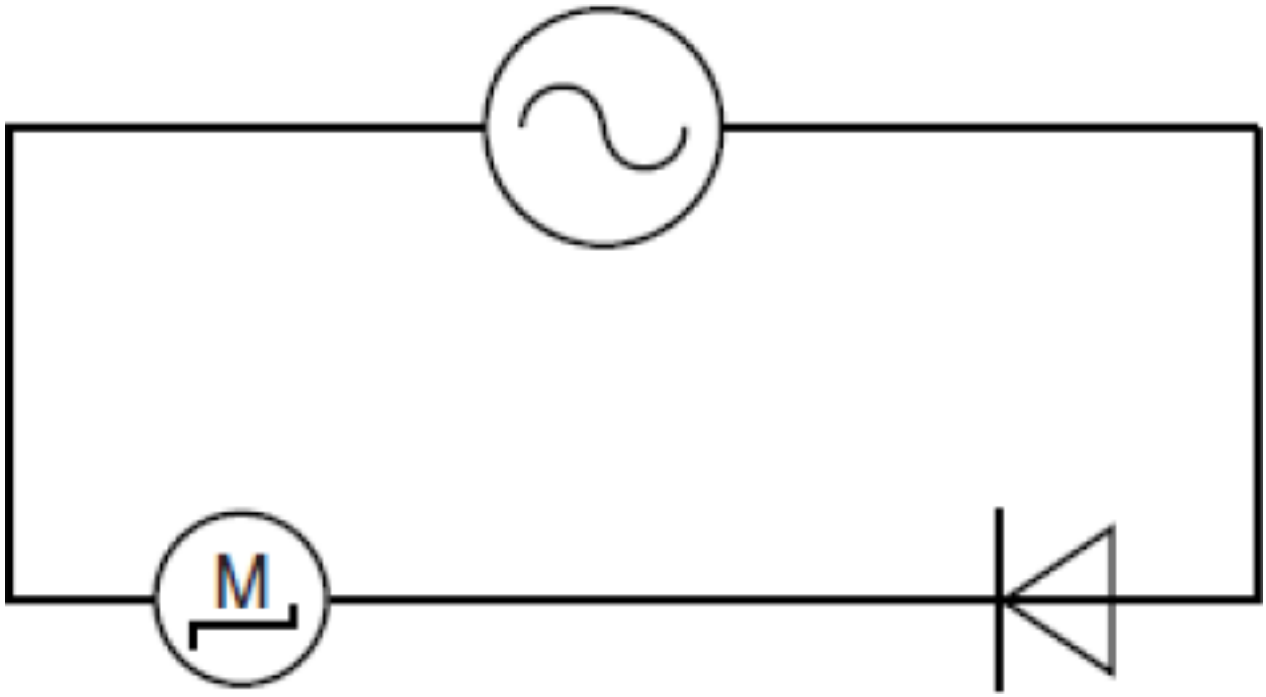
Explain why.

---

[2]

(b) Rob replaces the battery with an ac supply.

The motor now turns, but not smoothly.



Explain why.

---

[1]

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22 This question is about electrical devices.

Look at the information about five different transformers.

Put a tick (?) in the correct column to identify each type of transformer.

The first one has been done for you.

Input voltage	Output voltage	Step up	Step down	Isolating
12	240	?		
500	10			
230	230			
240	80			
1000	10000			

[2]

23 This question is about nuclear energy.

Complete the crossword.

One answer has been done for you.

Across

3 A fuel used in a nuclear power station is _ _ _ _ _ _ _.

Down

1 The process that gives out energy in a nuclear reactor is nuclear **f i s s i o n**.

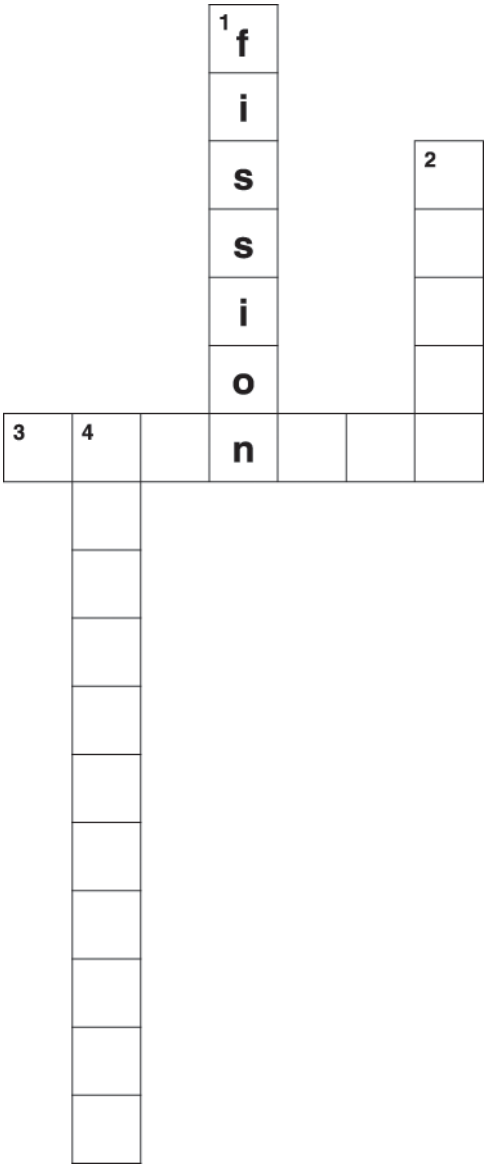
2 Energy from the reactor is used to heat water turning it into _ _ _ _ _ _.

4 The waste produced by the nuclear reaction is _ _ _ _ _ _ _ _ _ _ _.

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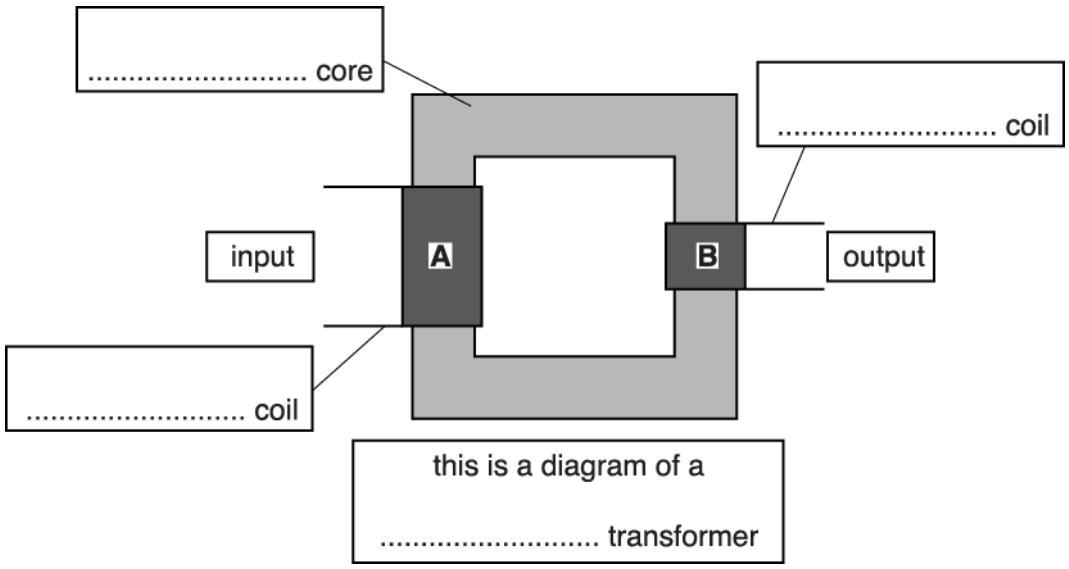
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[2]

24(a) Transformers are used in many different appliances.

Look at the simple diagram of a transformer.



A has 4000 turns and **B** has 150 turns.

(i) Complete the **four** labels on the diagram.

[2]

(ii) The input voltage is 10 000 V.

Calculate the output voltage.

---

output voltage _____ V

[2]

(b) Transformers are devices that work with alternating current (AC).

Explain why transformers require AC.

---

[2]

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25 The voltage of electricity used in the home is 230 V.

The voltage of electricity used for some power lines is more than 110 000 V.

Transformers are used as part of the National Grid.

Explain why transformers improve the transfer of electricity to the home.

---

[2]

26 Sam's car uses a biofuel.
She says that, over time, this does not increase the amount of carbon dioxide in the atmosphere.
Is she correct?
Explain your answer.

---

[3]

27(a) Electrical power can be generated in many ways.

Look at the data on different types of power generation.

Power generator	% Efficiency
Wind turbine farm	30
Coal power station	34
Nuclear power station	35
Oil power station	32
Gas power station	45

Coal, oil, gas and nuclear are all types of **thermal** power station.

Why are all these called thermal power stations?

---

[1]

(b) Thermal power stations are more efficient than wind turbine farms.

Suggest why wind turbine farms are often preferred to thermal power stations.

---

[1]

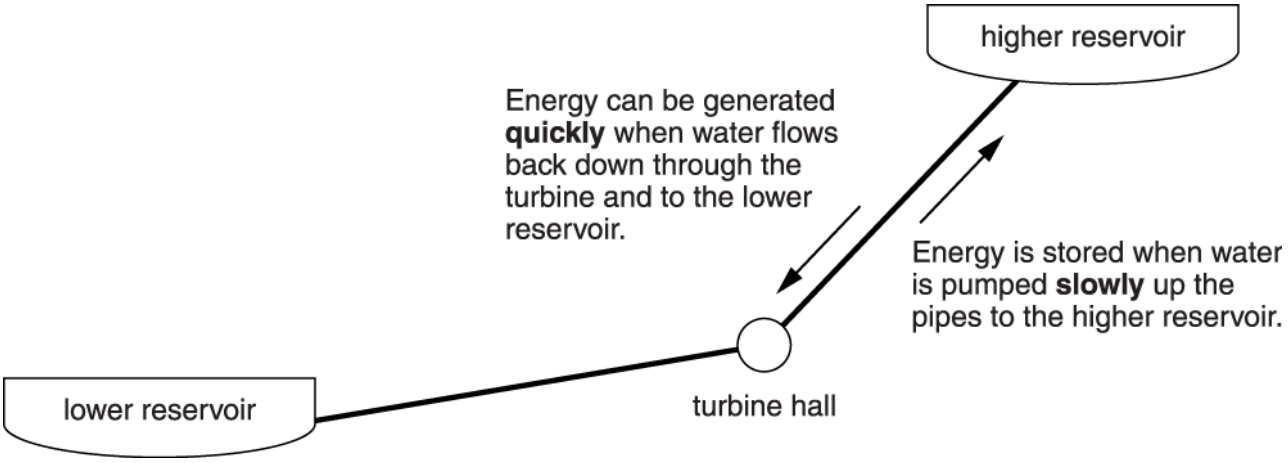
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28 Fuel power stations produce electricity **steadily**, 24 hours a day.

Some fuel power stations make use of a pumped storage system to help meet the demand for electricity.

At night, the pumped storage system is used to store surplus energy from the fuel power station.

Look at the diagram of a pumped storage system which uses water.



Explain how the pumped storage system can benefit suppliers and consumers of electricity during a 24 hour period.

The quality of written communication will be assessed in your answer to this question.

[6]

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29(a) Nuclear power stations have benefits and risks.

Davinder is worried because he lives near a nuclear power station.

Write about **one risk** of living near a nuclear power station.

Explain how **this** risk is reduced for people living nearby.

---

[2]

(b) The nuclear power station produces electricity.

The electrical output of the power station is connected to transformers.

The outputs of these transformers are connected to the National Grid.

Why are these transformers used and how is this important for the National Grid?

---

[3]

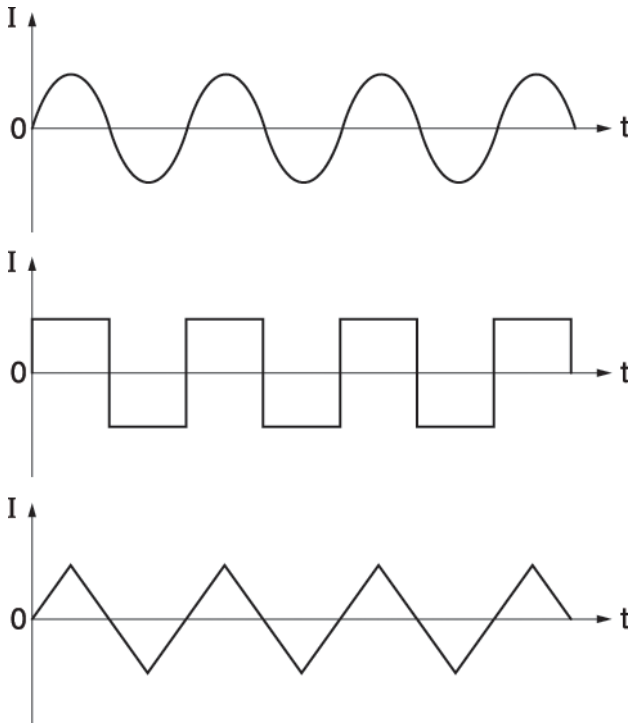
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30 A generator in a power station produces alternating current (AC).

Look at the three different current-time graphs.



Describe why all the graphs show alternating currents.

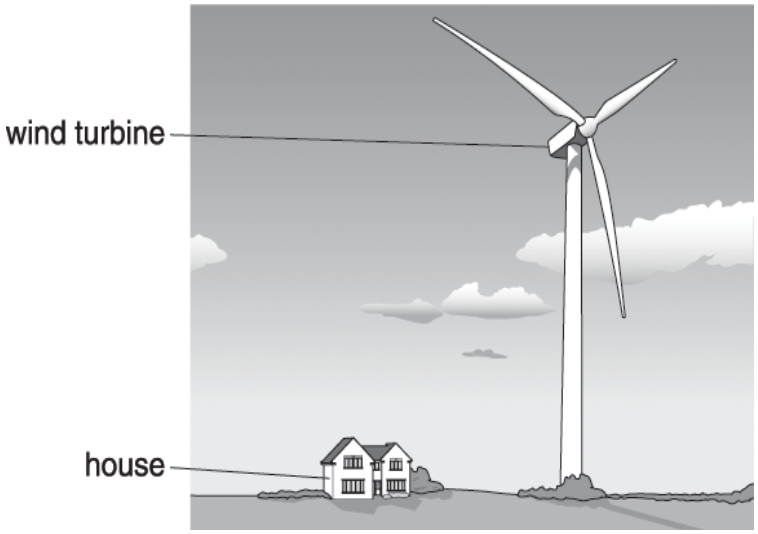
---

[1]

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31(a) The Sun's energy produces convection currents that cause wind.

Wind is used to drive turbines.



Describe the **advantages** of wind turbines compared to a conventional coal power station.

---

[2]

(b) The people in the house are concerned about noise from the turbine.

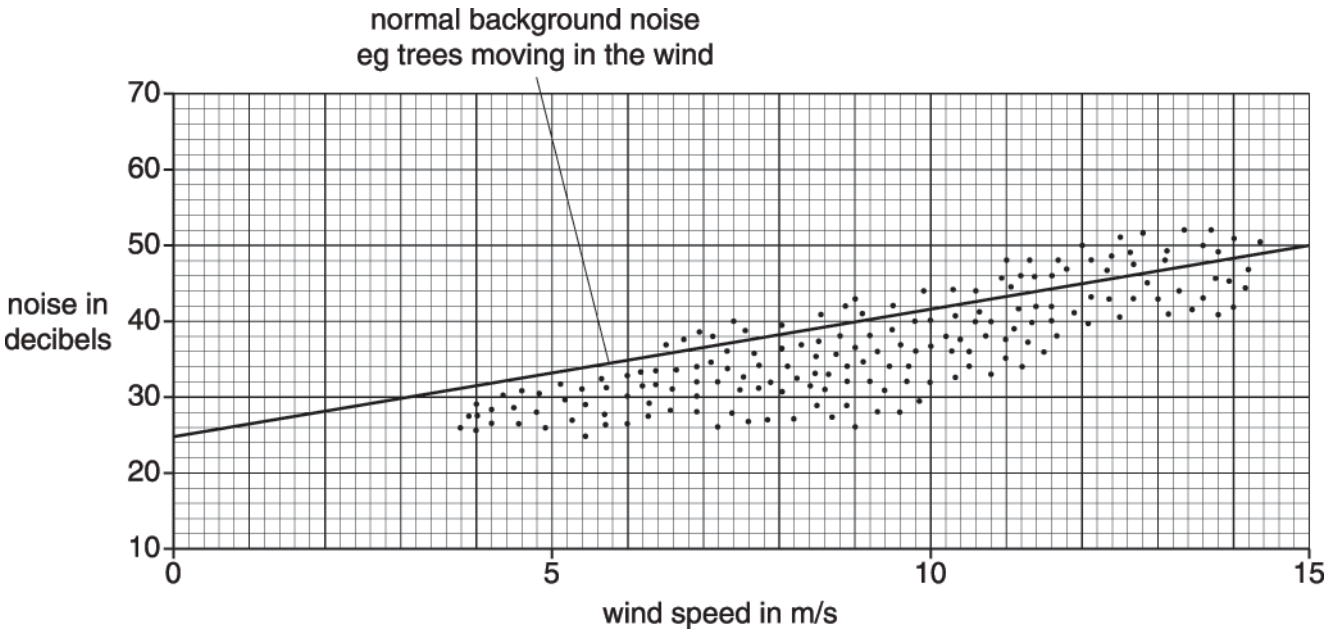
Look at the graph.

Each dot shows a measurement of the noise from the wind turbine.

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(i) Use the graph to describe how the wind turbine noise is affected by wind speed.

---

[1]

(ii) The mean wind speed in this area is 5 m/s.

The maximum wind speed in this area is usually less than 15 m/s.

Explain, using data from the graph, why the people in the house **do not** normally need to worry about the noise from the turbine.

---

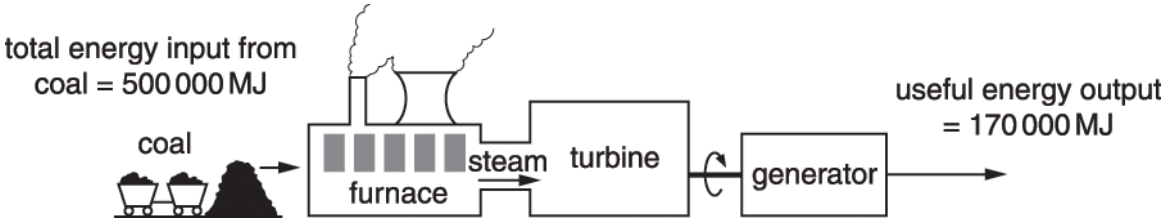
[2]

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32(a) Electricity is generated in power stations.



Calculate the efficiency of this power station.

---

efficiency _____

[2]

(b) The generator in the power station produces alternating current (AC).

(i) Name the type of current a battery produces.

---

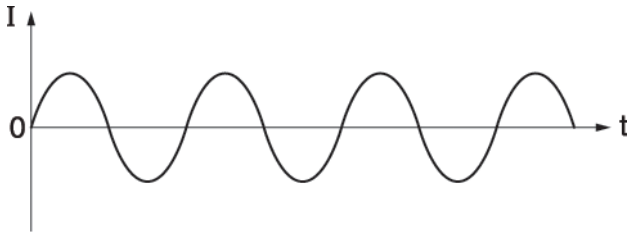
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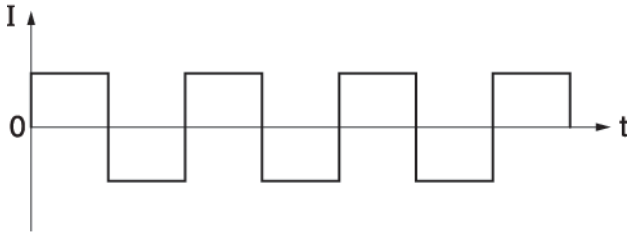
(ii) Look at the three different current-time graphs.

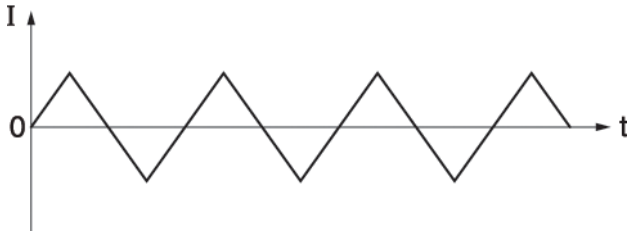
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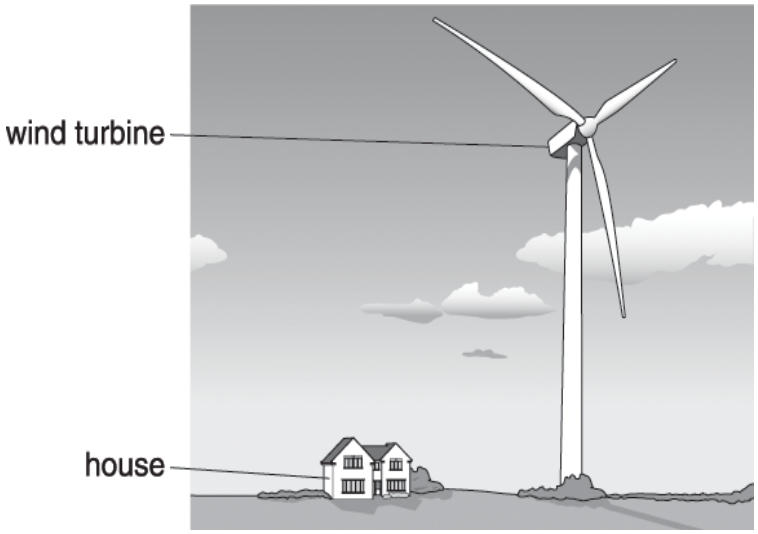
Describe why all the graphs show alternating currents.

---

[1]

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Wind is used to drive turbines.



Describe the **advantages** of wind turbines compared to a conventional coal power station.

---

[2]

(b) The people in the house are concerned about noise from the wind turbine.

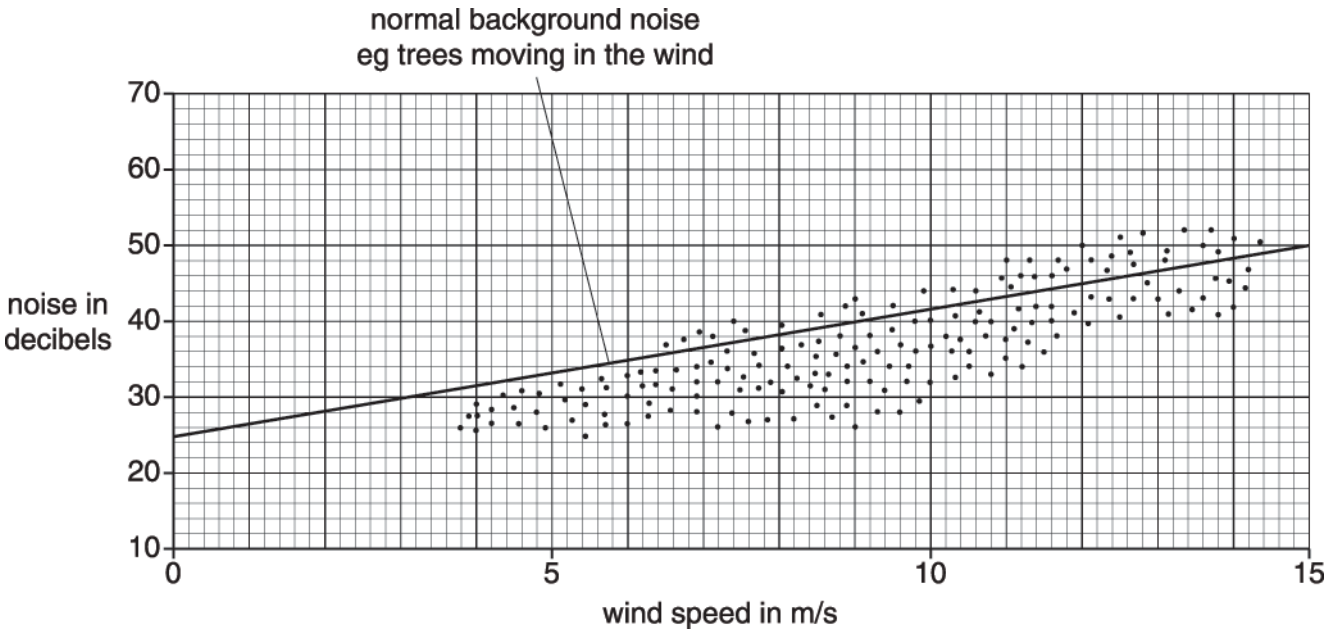
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Each dot shows a measurement of the noise from the wind turbine.

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[1]

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The maximum wind speed in this area is usually less than 15 m/s.

Explain, using data from the graph, why the people in the house **do not** normally need to worry about the noise from the turbine.

---

[2]

34(a) Energy can be collected from the Sun in many ways.

Photocells transfer the energy in sunlight into electricity.

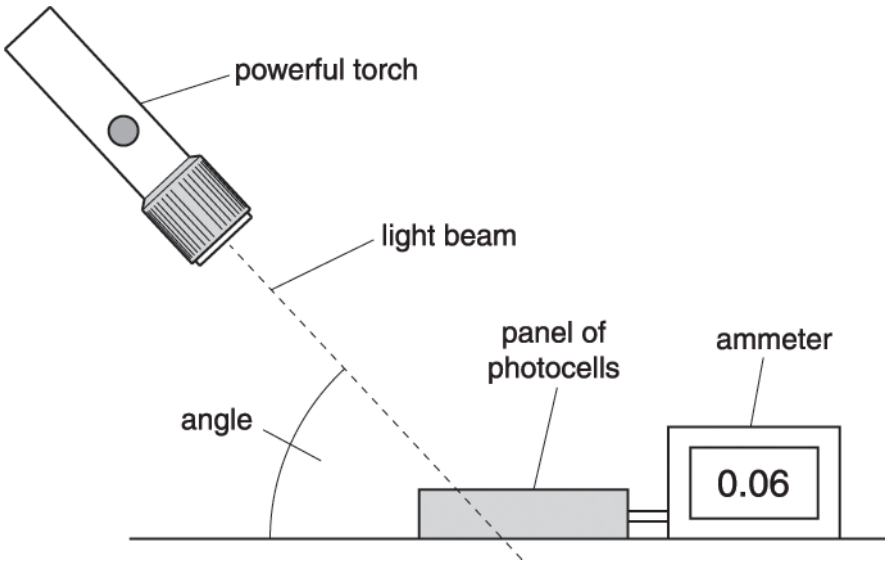
Megan does an experiment with a panel of photocells in the laboratory.

Look at the diagram.

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Megan shines the light on the photocell panel and records the current produced.

She changes the angle of the light beam and measures the current again.

Look at her results.

Angle of light beam in degrees	Current in mA
0	0.00
15	0.02
30	0.04
45	0.07
60	
75	0.16
90	0.22

Megan has lost her result for 60°. Estimate the current for an angle of 60°.

answer _____ mA

[1]

(b) Describe how the current changes with increasing angle of light beam.

_____

_____ [1]

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(c) Megan thinks she can get an output of 1.10 mA at 90° using 5 solar panels connected together.

Suggest why her prediction is sensible.

---

[1]

(d) The Sun in the UK is never at an angle of 90° to the Earth's surface.

The Sun appears to move across the sky during the day.

Suggest how the output of a single solar panel could be increased.

---

[1]

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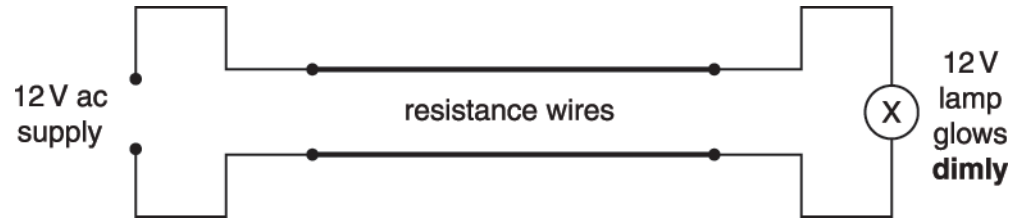
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35 Ian is learning about power transmission and the National Grid.

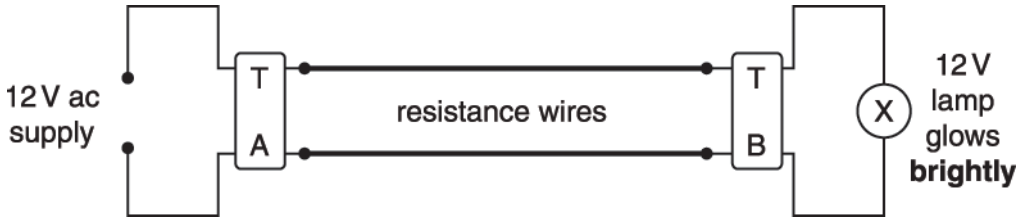
His teacher demonstrates how power loss can be reduced in a model transmission line.

She first sets up a system like this and the light glows dimly.



She adds two transformers (TA and TB) before and after the resistance wires.

The lamp now glows brightly.



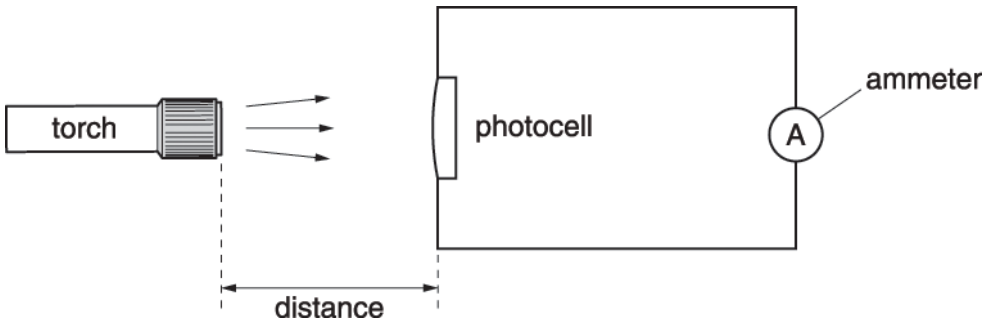
Explain these observations, and how this type of arrangement is used to reduce energy losses in the National Grid.

The quality of written communication will be assessed in your answer to this question.

[6]

36 John investigates the current produced by a photocell.

Look at the circuit he uses.



John moves the torch away from the photocell.

This changes the current through the ammeter.

Look at his results.

Distance between torch and photocell in cm	10	20	30	40	50
Current in mA	192	48		12	8

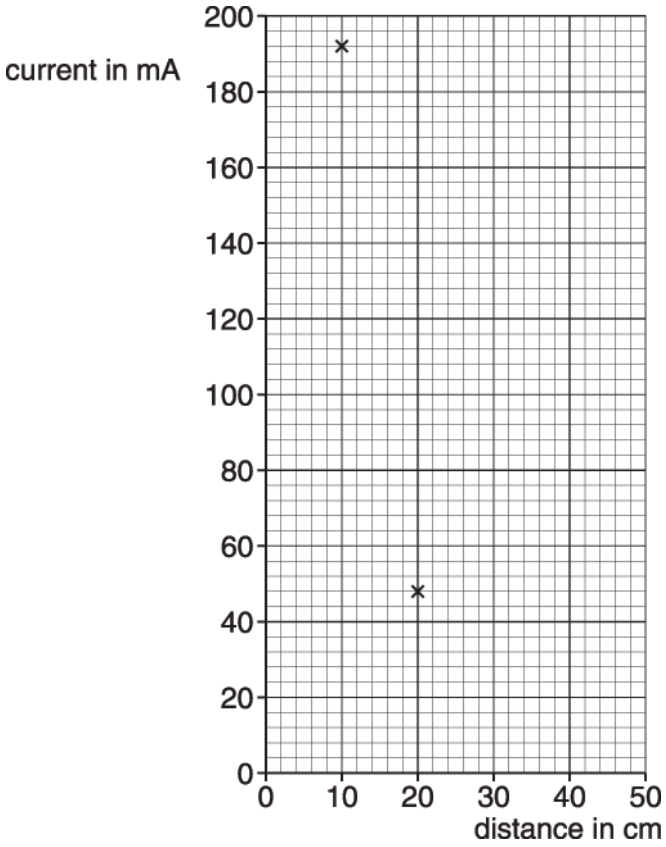
(i) Use the graph to help predict the current in mA for a distance of 30 cm.

The first two results in the table have been plotted for you.

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Current for a distance of 30 cm = _____ mA

[2]

(ii) Write a detailed conclusion about the relationship between the current and the distance between the torch and the photocell.

---

[2]

(iii) Explain why this trend happens.

---

[1]

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37(a) Nuclear power stations have benefits and risks.

Davinder is worried because he lives near a nuclear power station.

Write about **one risk** of living near a nuclear power station.

Explain how **this** risk is reduced for people living nearby.

---

[2]

(b) The nuclear power station produces electricity.

The electrical output of the power station is connected to transformers.

The outputs of these transformers are connected to the National Grid.

Why are these transformers used and how is this important for the National Grid?

---

[3]

38 Transformers are used to **increase** the voltage of the electricity before it is transmitted to homes.

Explain why the voltage is increased.

---

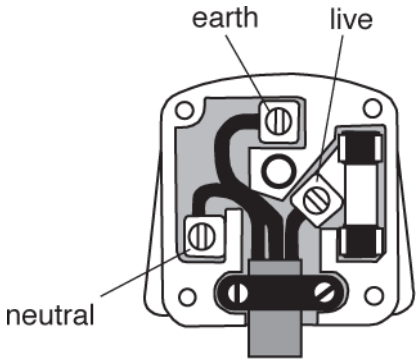
[2]

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39(a) Look at the diagram of a plug for an appliance.



Complete the table.

Wire	Colour	Function
earth	green / yellow	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
live	_ _ _ _ _ _ _ _ _ _ _ _	carries the high voltage
neutral	_ _ _ _ _ _ _ _ _ _ _ _	completes the circuit

[3]

(b) Some appliances are double insulated.

They have only two wires.

Write down the names of these two wires.

---------- and ----------

[1]

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40 Clive finds information about voltages across the National Grid.

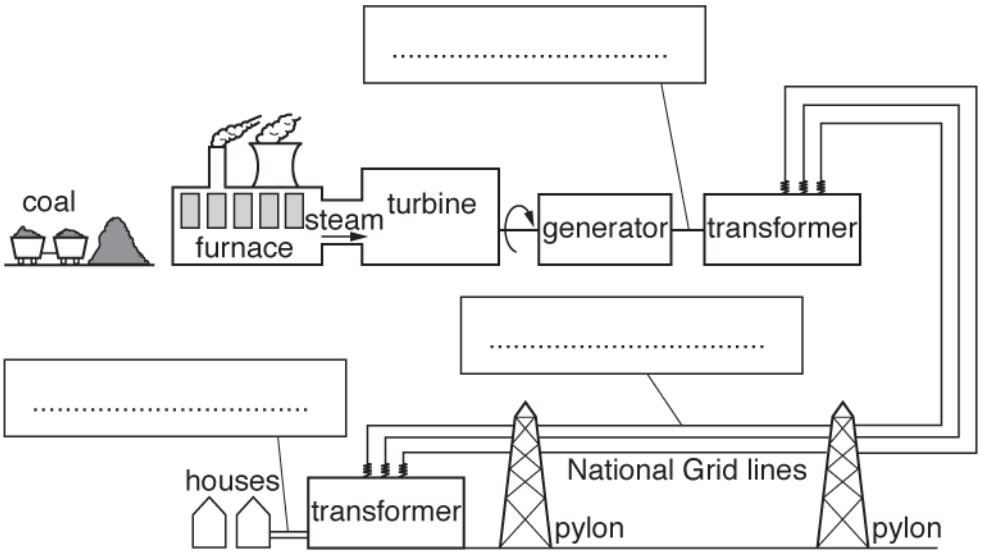
Here are the voltages:

25 000 V

230 V

275 000 V

Look at the diagram of a power station connected to the National Grid.



(i) Write the correct voltages in the boxes on the diagram.

[1]

(ii) Describe how different transformers are used in the National Grid.

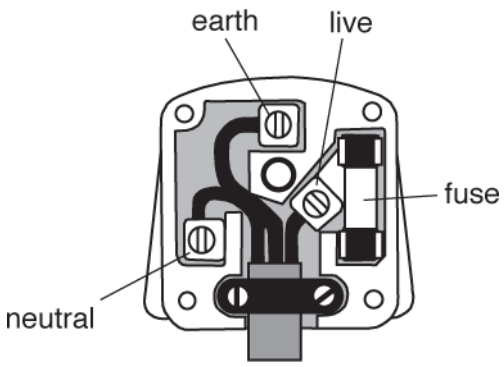
[2]

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41 Look at the diagram of a plug for an appliance.



Describe the functions of the live, neutral and earth wires.

---[3]

42(a) Electricity is produced using different methods.

Some methods produce direct current (DC) and some methods produce alternating current (AC).

Write down which of the following methods produce alternating current (AC) and which produce direct current (DC).

generator ---

photocell ---

battery --- [2]

(b) A generator produces electricity.

Then the electricity is distributed to homes, factories and offices.

Describe the main stages in the production **and** distribution of electricity.

---[3]

43 Ralph thinks that waste from nuclear power stations contributes to global warming.

Harry thinks deforestation contributes to global warming.

Explain who is correct.

---[1]

44 Which of the following correctly describes the domestic electricity supply in the UK?

A 230 V a.c. at 50 Hz

B 230 V a.c. at 60 Hz

C 230 V d.c. at 50 Hz

D 230 V d.c. at 60 Hz

Your answer [ ] [1]

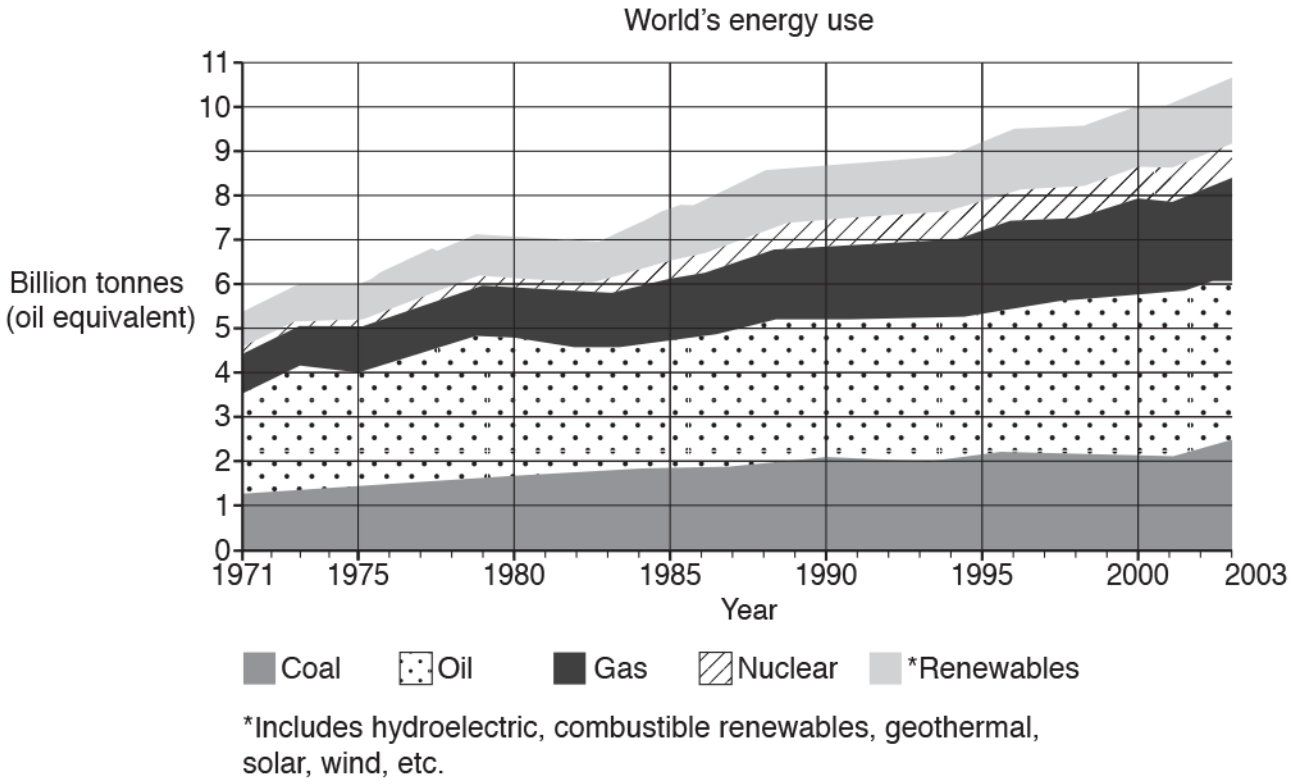
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45(a) The graph shows how the World's energy use has changed from the year 1971 to the year 2003.

It also shows the amount of different energy sources used.



(i) Approximately how much did the total World's energy use increase from the year 1971 to the year 2003?

Answer = ---------- billion tonnes (oil equivalent) **[1]**

(ii) Which energy source had the **greatest** use in the year 2003?

---------- **[1]**

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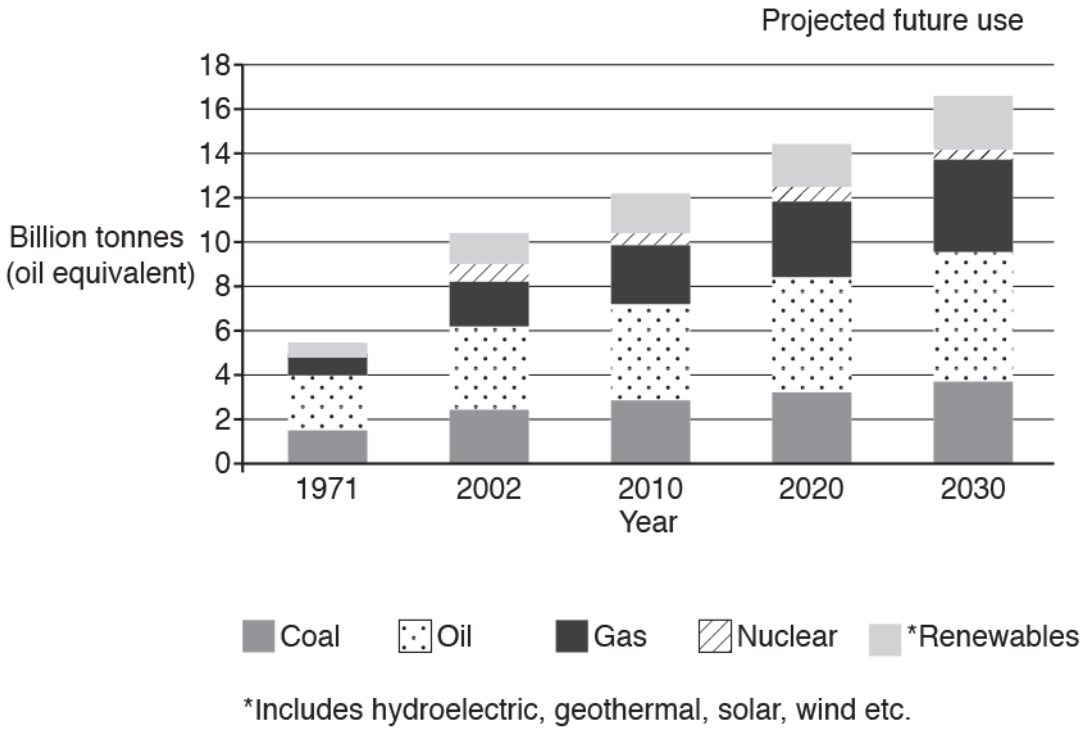
(iii) The total energy use in the year 2003 was 10.6 billion tonnes (oil equivalent).

Approximately what percentage of this amount was due to fossil fuel use?

Answer = ---------- % **[2]**

(b) Scientists are researching the World's energy use for the future.

The graph shows some of their research.



(i) The future demand for fossil fuels is expected to increase.

Give two reasons why scientists are worried about this increase in demand.

1 ----------

---

2 ----------

---

[2]

(ii) In the UK the government is closing coal fired power stations and planning for new nuclear power stations to be built.

Suggest why the government wants more nuclear power stations.

---

[2]

(c) Power stations in the UK generate electricity at 25 kV a.c.

The voltage is then increased to 400 kV a.c. and distributed by power lines.

(i) Write down the full name of the device used to **increase** the voltage.

---

[1]

(ii) Why is it important to increase the voltage in these power lines?

---

[1]

(iii) The high voltages across the power lines are reduced to 230 V a.c. for use in the home.

A phone charger changes the 230 V a.c. to a 5 V d.c.

Explain the difference between d.c. and a.c.

---

[2]

(d) A domestic wind turbine has a power rating which varies from 1.0 kW to 3.0 kW.

(i) The domestic wind turbine has an electrical resistance of 23 Ω.

It generates a current of 11 A on a windy day.

Calculate the power output in kW of the turbine on this day.

Answer = ---------- kW **[4]**

() Suggest why the manufacturer gives a range for the power rating of the wind turbine.

---**[1]**

(i) Using just **one** domestic wind turbine may be an unreliable source of power for a house.

State a reason why.

---**[1]**

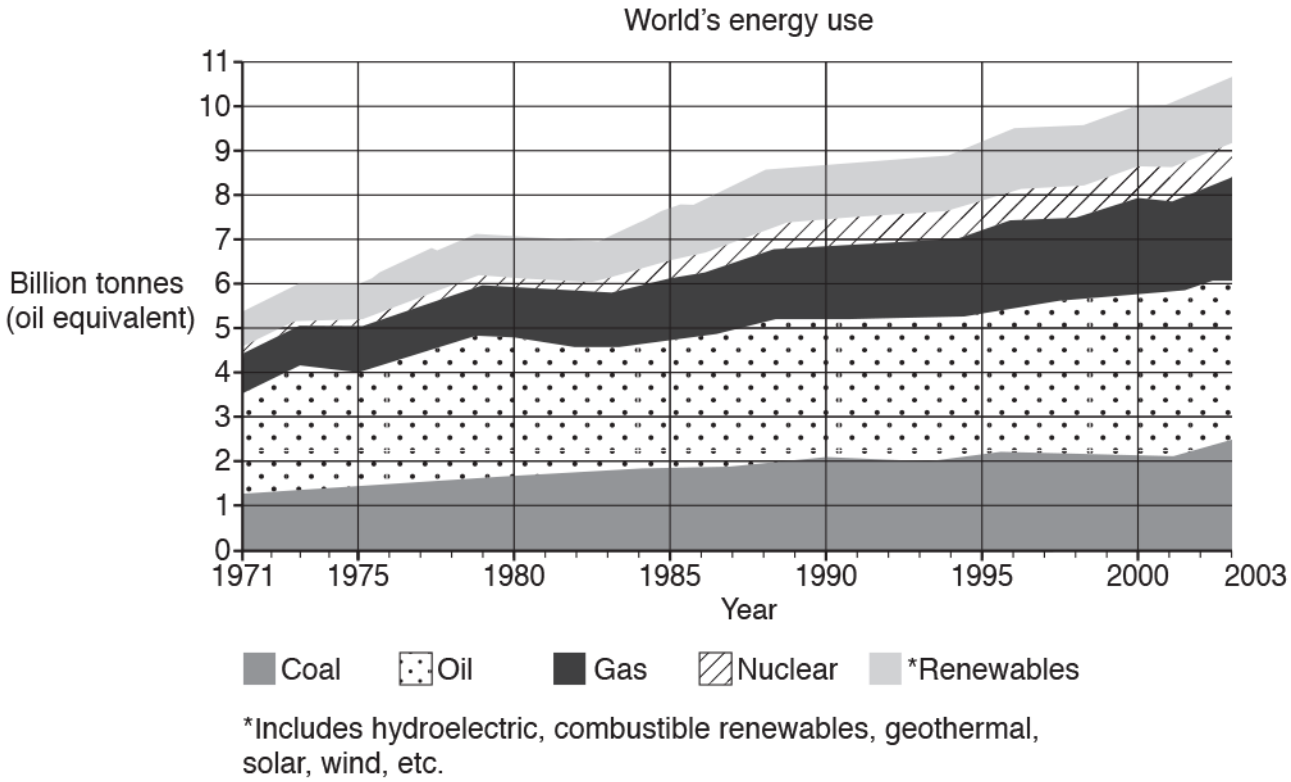
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46(a) The graph shows how the World's energy use has changed from the year 1971 to the year 2003.

It also shows the amount of different energy sources used.



(i) Approximately how much did the total World's energy use increase from the year 1971 to the year 2003?

Answer = _____ billion tonnes (oil equivalent) **[1]**

(ii) Which energy source had the **greatest** use in the year 2003?

_____ **[1]**

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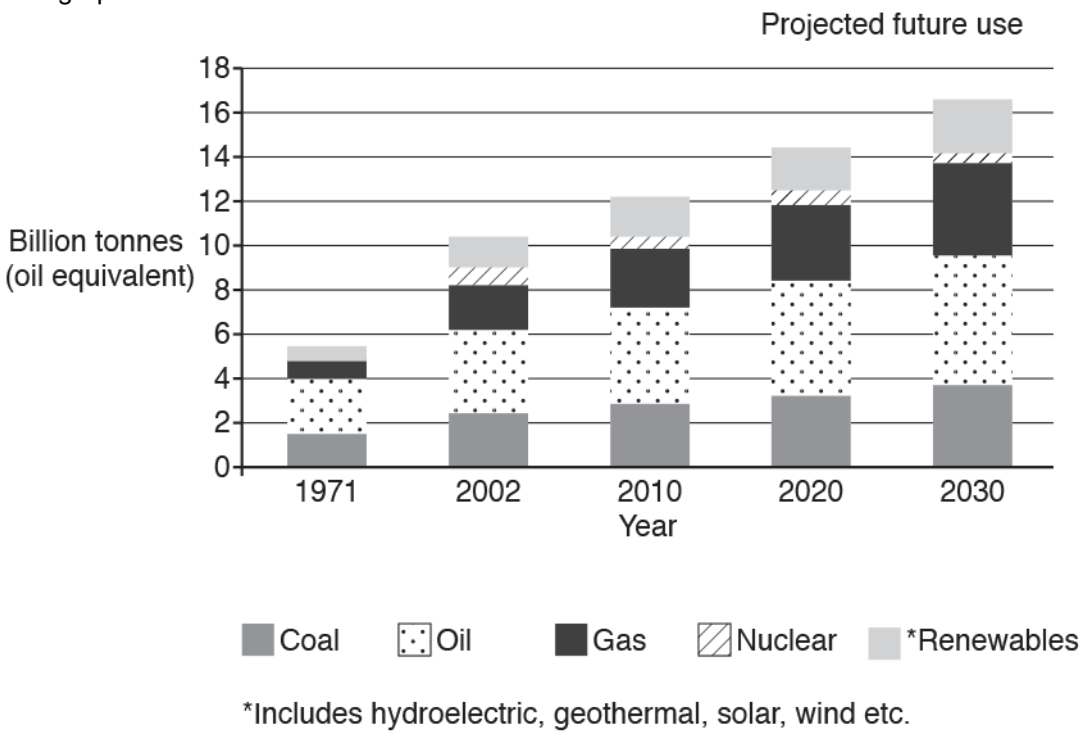
(iii) The total energy use in the year 2003 was 10.6 billion tonnes (oil equivalent).

Approximately what percentage of this amount was due to fossil fuel use?

Answer = ---------- % **[2]**

(b) Scientists are researching the World's energy use for the future.

The graph shows some of their research.



(i) The future demand for fossil fuels is expected to increase.

Give two reasons why scientists are worried about this increase in demand.

1. ----------

---

2. ____________________

____________________ [2]

(ii) In the UK the government is closing coal fired power stations and planning for new nuclear power stations to be built.

Suggest why the government wants more nuclear power stations.

____

____

____________________ [2]

(c) Power stations in the UK generate electricity at 25 kV a.c.

The voltage is then increased to 400 kV a.c. and distributed by power lines.

(i) Write down the full name of the device used to **increase** the voltage.

____________________ [1]

(ii) Why is it important to increase the voltage in these power lines?

____________________ [1]

(iii) The high voltages across the power lines are reduced to 230 V a.c. for use in the home.

A phone charger changes the 230 V a.c. to a 5 V d.c.

Explain the difference between d.c. and a.c.

____

____

____________________ [2]

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(d) A domestic wind turbine has a power rating which varies from 1.0 kW to 3.0 kW.

(i) The domestic wind turbine has an electrical resistance of 23 Ω.

It generates a current of 11 A on a windy day.

Calculate the **power** output in kW of the turbine on this day.

Answer = ---------- kW **[4]**

(ii) Suggest why the manufacturer gives a range for the power rating of the wind turbine.

---

[1]

(iii) Using just **one** domestic wind turbine may be an unreliable source of power for a house.

State a reason why.

---

[1]

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47 Which statement shows energy resources that are **all renewable?**

A Bio-fuel, wind, hydro-electricity and tides.

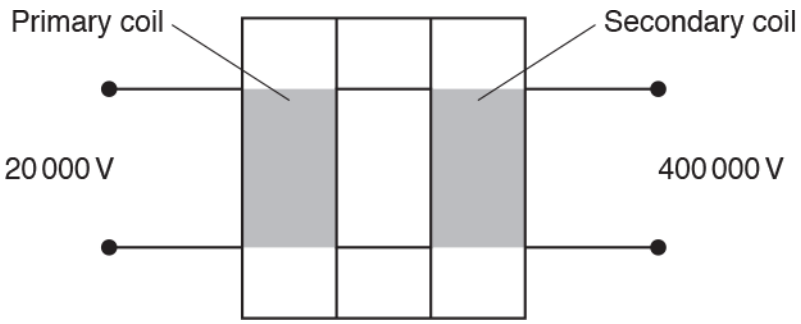
B Fossil fuels, bio-fuel, wind and hydro-electricity.

C Fossil fuels, nuclear fuel, hydro-electricity and tides.

D Nuclear fuel, bio-fuel, wind and tides.

Your answer ☐ [1]

48 This is a diagram of a transformer used in the national grid.



Why is this transformer used in the national grid?

A To decrease the power in the national grid by a factor of 20.

B To decrease the power loss in the national grid by a factor of 400.

C To increase the power in the national grid by a factor of 20.

D To increase the power loss in the national grid by a factor of 400.

Your answer ☐ [1]

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49 Nuclear fission can be used as a power source to produce electricity.

Give one **advantage** and one **disadvantage** of using nuclear power to produce electricity.

advantage _____

_____

disadvantage _____

_____

[2]

50(a) Energy is transferred at high voltages in the national grid.

This house is near to a transmission line.



Explain why radio waves may be produced by the transmission line.

_____

_____

[2]

_____

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(b) Explain why it is more efficient to transfer energy at high voltages.

---

[2]

(c) The transmission line has a power loss of 6.156 kW.

Its resistance is 15.39 Ω.

Calculate the current in the transmission line.

Current = ... A **[5]**

51 Which statement describes the domestic electricity supply in the UK?

A 50 V a.c. at 230 Hz

B 50 V d.c. at 230 Hz

C 230 V a.c. at 50 Hz

D 230 V d.c. at 50 Hz

Your answer ☐ **[1]**

52 Here are some graphs for the potential difference (p.d.) of four electrical supplies.

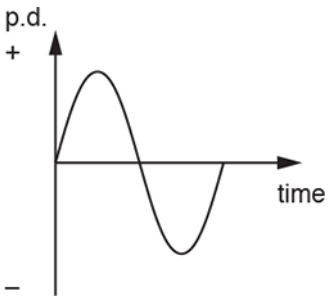
Which graph shows a direct voltage?

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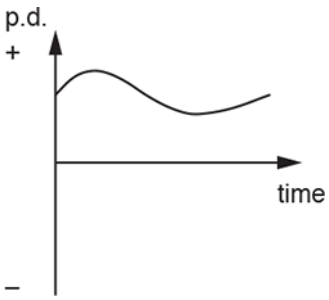
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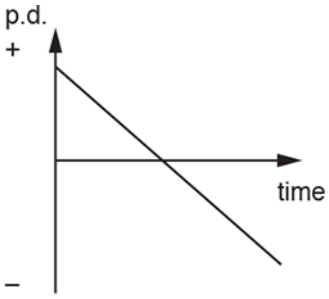
A



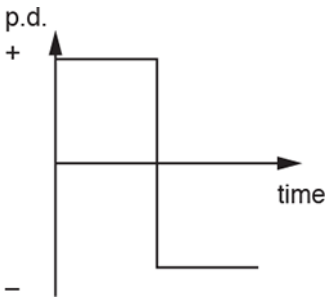
B



C



D



Your answer

[1]

53 Which row in the table correctly describes how the national grid transfers electrical energy efficiently?

	Voltage	Current	Reason
A	High	High	To increase heating in wires.
B	High	Low	To reduce heating in wires.
C	Low	High	To reduce heating in wires.
D	Low	Low	To reduce heating in wires.

Your answer [ ] [1]

54 The table shows the current and potential difference (p.d.) for four different transformers.

Which row shows the correct data for a **step-up** transformer?

	Primary coil		Secondary coil	
	p.d. (V)	Current (A)	p.d. (V)	Current (A)
A	6	4	12	2
B	12	2	3	8
C	12	2	12	2
D	12	2	24	1.5

Your answer [ ] [1]

55 Some scientists say nuclear fission is renewable. Other scientists say it is non-renewable.

Suggest why the scientists disagree.

---

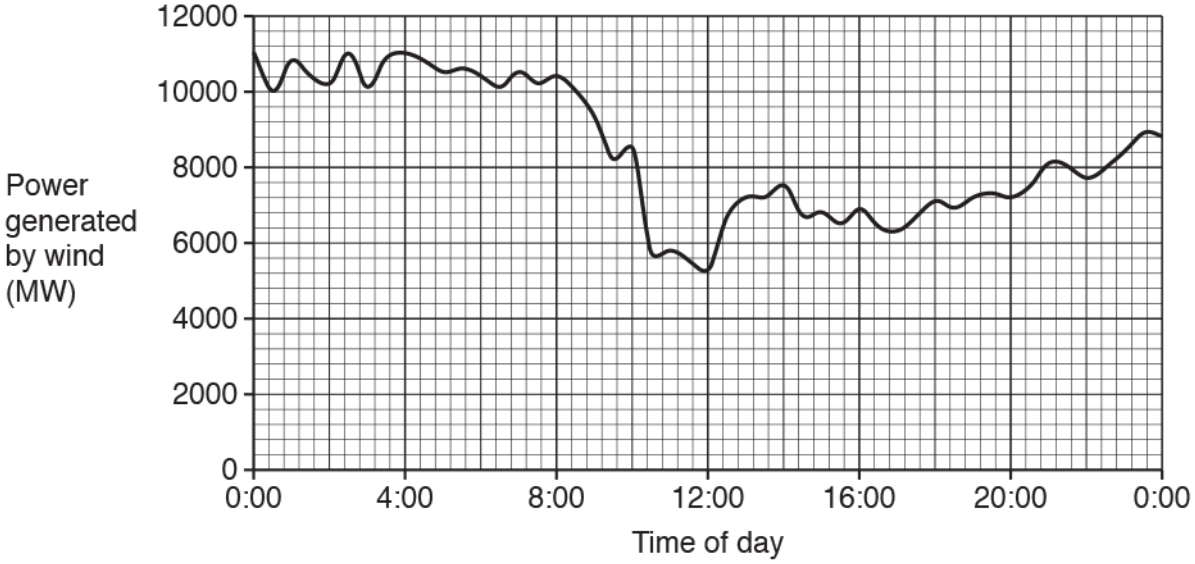
[1]

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56 The graph shows how the power generated by the wind in the UK varied over one day.



Which row in the table is correct?

	Maximum power generated (MW)	Reliability of wind power
A	5200	Reliable
B	5200	Unreliable
C	11 000	Reliable
D	11 000	Unreliable

Your answer [ ] [1]

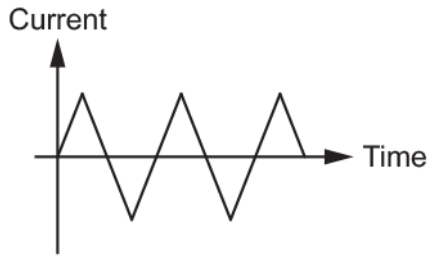
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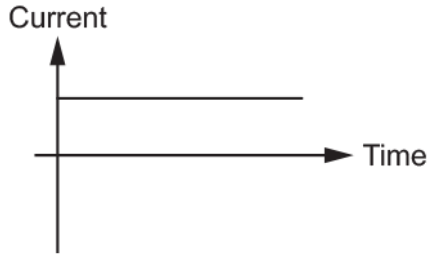
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57 Which graph shows an alternating current (a.c.)?

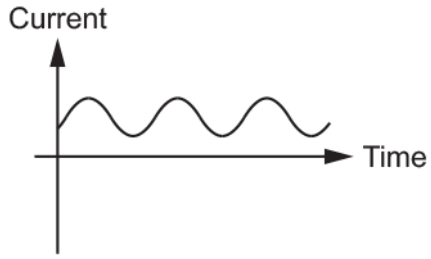
A



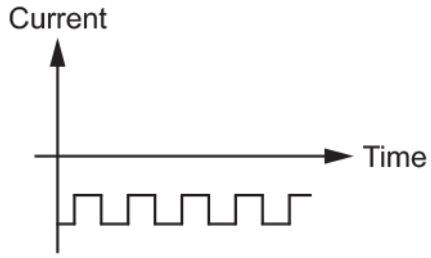
B



C



D



Your answer [1]

(i) A projector is connected to the mains power supply. The projector has an earth wire.

State the potential difference between the earth wire and the live wire in normal use.

Potential difference = ... V **[1]**

(ii) A projector with a plastic case does not need an earth wire.
A projector with a metal case needs an earth wire.

Explain why.

---

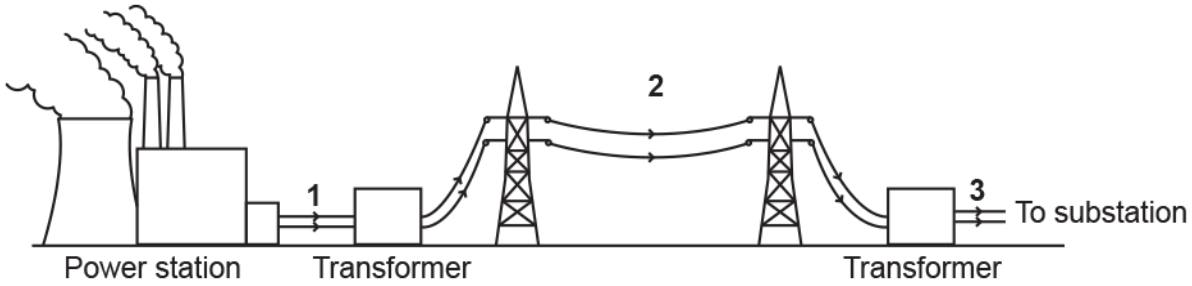
[2]

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59 The diagram shows a simplified version of the national grid.



The potential difference (p.d.) is different at each point in the national grid.

Which row in the table is correct?

	p.d. at position 1 (V)	p.d. at position 2 (V)	p.d. at position 3 (V)
A	230	5 000	11 000
B	25 000	450 000	11 000
C	450 000	150	230
D	450 000	5 000	230

Your answer [ ] [1]

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60 A projector is used to create a larger image of an object.

(i) The projector is connected to the mains power supply. The projector has an earth wire.

State the potential difference between the earth wire and the live wire in normal use.

Potential difference = ...V **[1]**

(ii) A projector with a plastic case does not need an earth wire.
A projector with a metal case needs an earth wire.

Explain why.

---

[2]

61 * The UK generates some of its electrical power from wind turbines.

Fig. 18.1 shows the total electrical power generated by wind turbines in the UK.

The graph is for a single day in December which had very strong winds.

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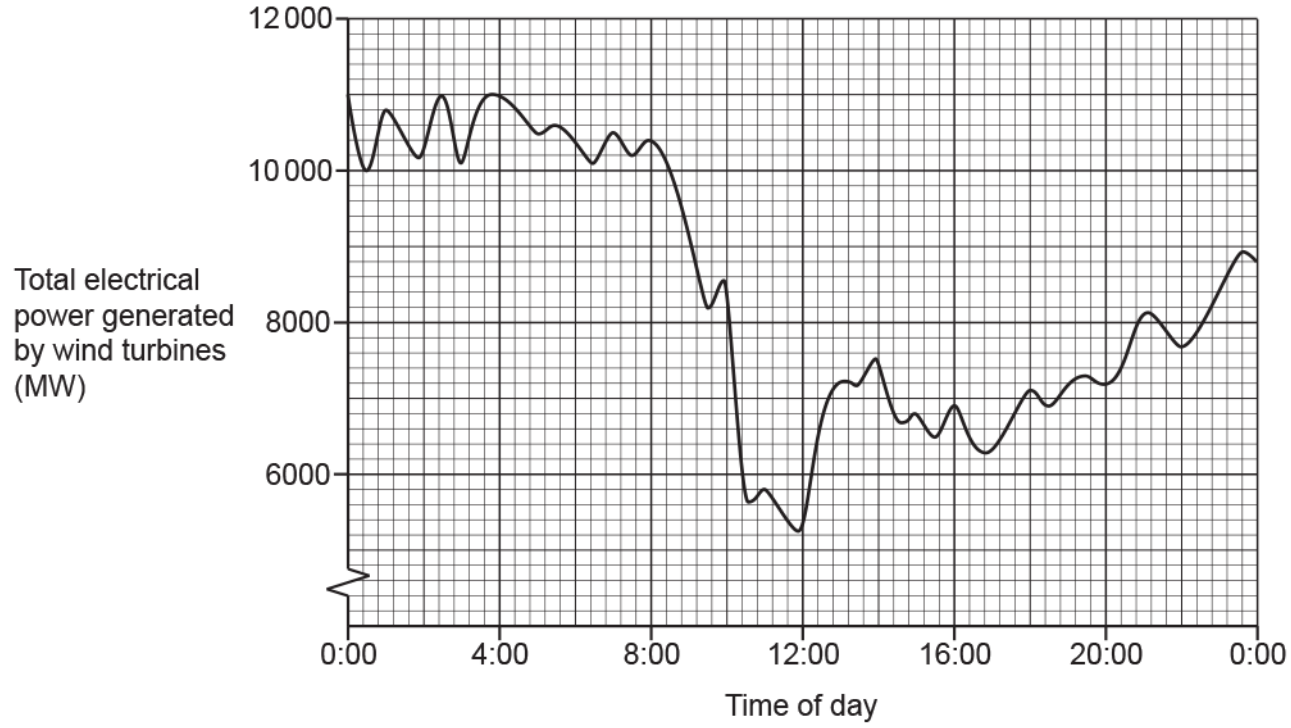
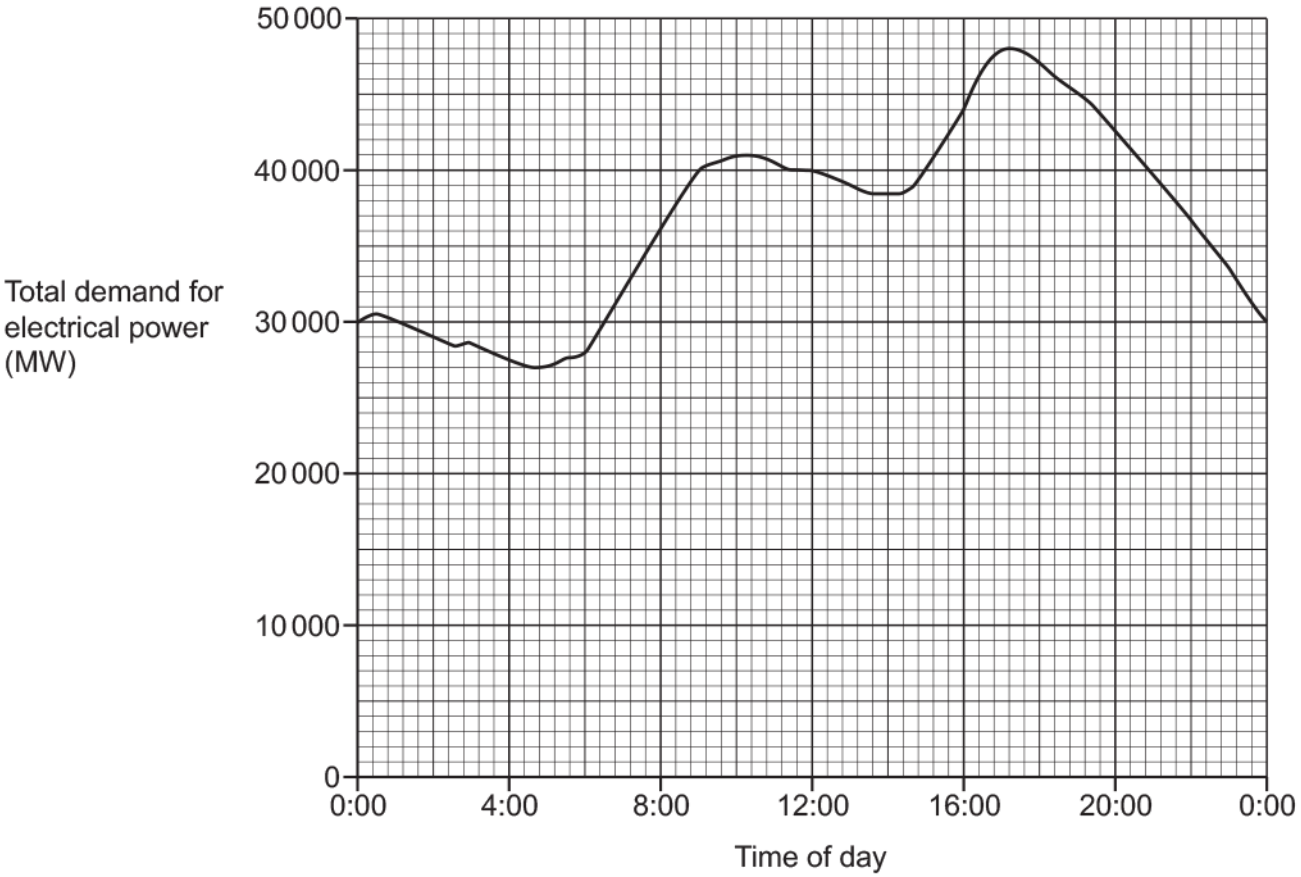


Fig. 18.1

Fig. 18.2 shows the total demand for electrical power in the UK on the same day.



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Fig. 18.2

Some experts believe the UK should generate most of its electrical power from wind.

Evaluate the advantages and disadvantages of this idea.

Use the graphs in **Fig. 18.1** and **Fig. 18.2** and your own ideas about wind turbines to support your answer.

[6]

62 Water can be heated using a 12 V heater.

A transformer is used to change a 120 V supply into 12 V.
The current in the secondary coil is 9.0 A.

Calculate the current in the primary coil.

Use an equation from the data sheet.

Current = ... A **[2]**

END OF QUESTION PAPER

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