

P3 Questions

Name: _____

Class: _____

Date: _____

Time: **58 minutes**

Marks: **58 marks**

Comments:

Q1. 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.

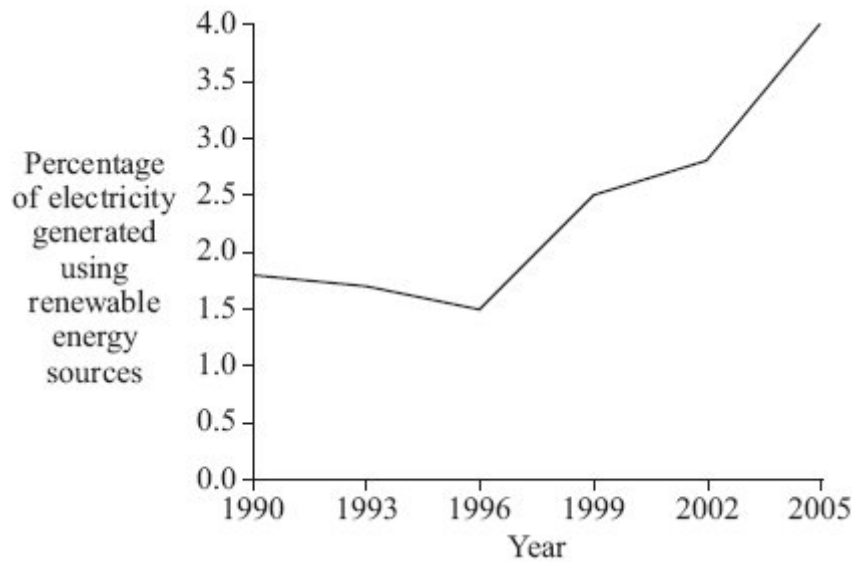
(1)

(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)

Q2. (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)

Q3. State and explain the advantages and disadvantages of using nuclear power stations to produce electricity.

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.....
.....
.....
.....
.....
.....

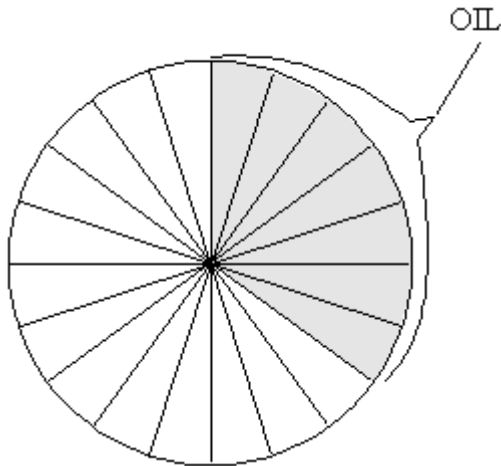
(Total 4 marks)

Q4. The table shows the main sources of energy used in Britain in 1990.

coal	35%
oil	35%
gas	24%
nuclear	5%

moving water (hydro)	1%
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(a) Finish the pie-chart, using the figures in the table.



(4)

(b) Complete the following sentences.

To release energy from coal, gas and oil they must be burned.

Coal, gas and oil are all

(1)

(c) Which **one** of the energy sources in the table is renewable?

Write down the name of **one** other renewable energy source.

(2)

(d) How does the amount of energy obtained from nuclear sources in 1990 compare with the amount obtained from moving water?

.....

.....

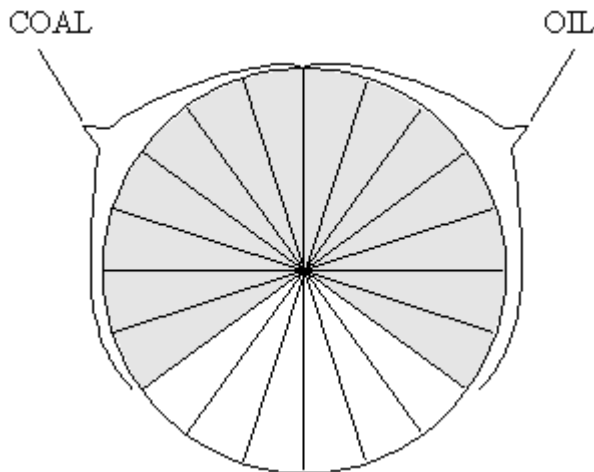
(2)

(Total 9 marks)

Q5. The table shows the main sources of the energy used in Britain in 1990.

coal	35%
oil	35%
gas	24%
nuclear	5%
moving water (hydro)	1%

(a) Finish the pie-chart, using the figures in the table.



(3)

(b) How does the amount of energy obtained from nuclear sources in 1990 compare with the amount obtained from moving water?

.....

(1)

(c) Moving water (hydro) is a renewable energy source.

Write down the name of **one** other renewable energy source.

.....

(1)

(d) Explain why electricity is **not** included in the table of energy sources.

.....

.....

(1)

(Total 6 marks)

Q6.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?

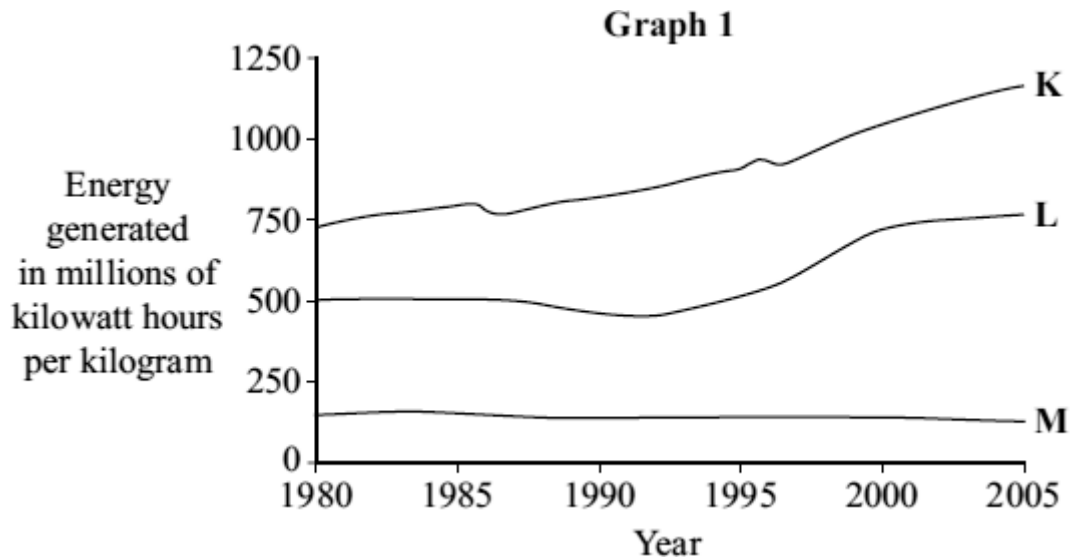
.....

.....

(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.

.....

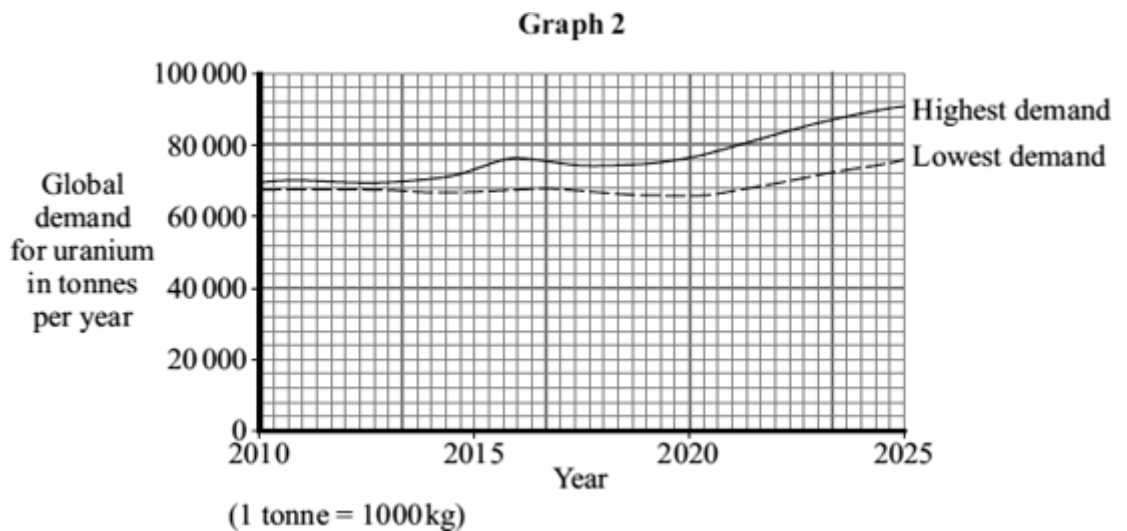
.....

.....

.....

(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.

.....

.....

.....
.....

(2)
(Total 6 marks)

Q7. Iceland is a country that generates most of its electricity using geothermal power stations and hydroelectric power stations.

- (a) (i) Complete the following sentences to describe how some geothermal power stations work.

In regions where volcanoes are active, the ground is hot.

Cold is pumped down into the ground

and is by hot rocks.

It returns to the surface as steam. The steam is used to turn a turbine.

The turbine drives a to produce electricity.

(3)

- (ii) Which **one** of the following statements about geothermal power stations is true?

Tick (✓) **one** box.

Geothermal power stations use fossil fuels.

Geothermal power stations produce carbon dioxide.

Geothermal power stations provide a reliable source of electricity.

(1)

- (b) What is needed for a hydroelectric power station to be able to generate electricity?

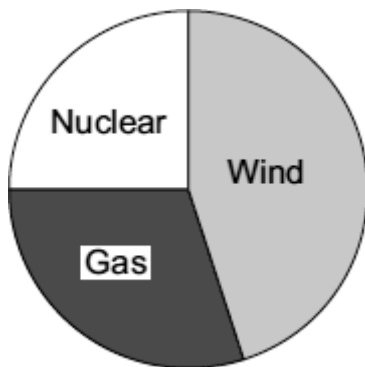
Tick (✓) **one** box.

- Falling water
- A long coastline
- Lots of sunny days

(1)
(Total 5 marks)

Q8. (a) An electricity company claims to generate all of its electricity from environmentally friendly energy sources.

The energy sources used by the company are shown in the pie chart.



Do you think that the claim made by the company is correct?

Draw a ring around your answer.

Yes	No	Maybe
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Explain the reasons for your answer.

.....

.....

.....

.....

(2)

(b) The government is committed to increasing the amount of electricity generated from renewable sources. A newspaper reported that:

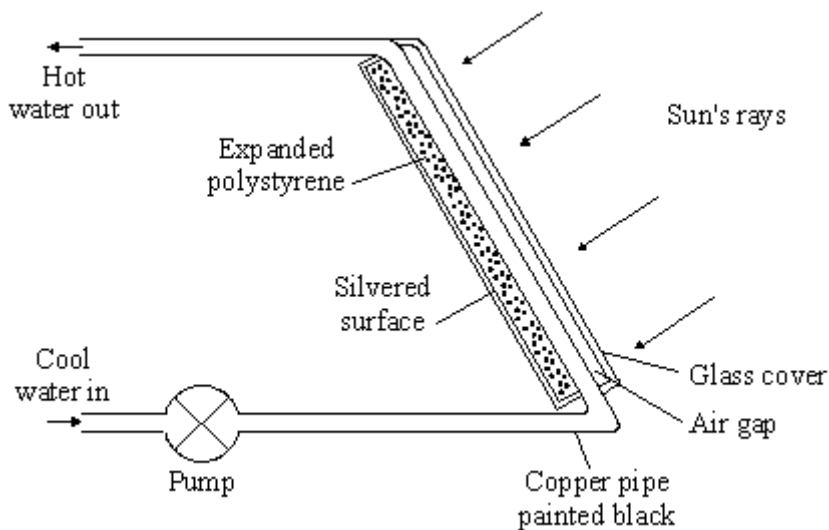
More wind farms, wave powered generators, solar generators and nuclear power stations would need to be built

Why is the statement made in the newspaper incorrect?

.....

(1)
 (Total 3 marks)

Q9. The diagram shows part of a solar water heater. Water circulating through the solar panel is heated by the Sun.



(i) Complete the following sentence.

Heat energy is transferred from the Sun to the solar panel by

.....

(1)

(ii) The pipe inside the solar panel is black. Why?

.....
.....

(1)

(iii) There is a layer of expanded polystyrene behind the black pipe. Why?

.....
.....

(1)

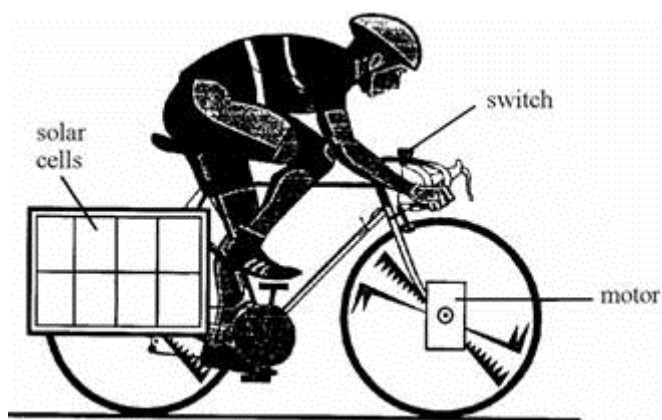
(iv) A silvered surface is used at the back of the solar panel. Explain why.

.....
.....
.....
.....

(2)

(Total 5 marks)

Q10. The diagram shows an experimental solar-powered bike.



A battery is connected to the solar cells.
The solar cells charge up the battery.
There is a switch on the handlebars.
When the switch is closed, the battery drives a motor attached to the front wheel.

- (a) Use words from the list to complete the following sentences. Words may be used once, more than once, or not at all.

chemical **electrical** **heat (thermal)** **kinetic**
light **potential** **sound**

(i) The solar cells transfer energy to energy.

(ii) When the battery is being charged up, energy is transferred to energy.

(iii) The motor is designed to transfer energy to energy.

(6)

- (b) (i) The cyclist stops pedalling for 10 seconds. During this time the motor transfers 1500 joules of energy. Calculate the power of the motor.

.....
.....

Power W

(2)

(ii) Name **one** form of wasted energy which is produced when the motor is running.

.....

(1)

(Total 9 marks)

- M1.**
- (a) (i) an unreliable energy source 1
- (ii) a predictable energy source 1
- (b) plant / grow (at least) one new tree 1
- (c) greater than 4 % 1
- [4]**
-
- M2.**
- (a) (i) sources of energy
for 1 mark
- (ii) wood coal
oil
gas
all correct gains 2 marks
3 correct gains 1 mark 3
- (b) geothermal nuclear
tides
wind
solar
all correct gains 2 marks
4 correct gains 1 mark 2
- (c) non-renewable fuels cause pollution (or reverse)
conserve/limit use of coal/gas/oil;
so supplies last longer/renewable sources can be replaced
any 2 from 4 for 1 mark each 2

[7]

M3. Read all the answer first. See below.

Mark the first two advantages and disadvantages (✓ or X) ignoring

neutral answers. Only allow a third advantage if there is only one disadvantage given. Only allow a third disadvantage if only one advantage is given.

max. 3 advantages (e.g. cheap fuel, good availability, saving fossil fuels, low running costs, reliable, more energy / kg, less fuel needed, no greenhouse gases emitted, no SO₂ causing acid rain)

max. 3 disadvantages (e.g. danger to health of local community, non renewable, high cost of decommissioning, long half life of waste materials, need for safe storage of waste, high cost of commissioning, danger involved in transporting fuel / waste)

max. 4 marks

[4]

##

(a) sectors nearer to correct value than to 1% either side

coal	35%
nuclear	5%
gas	24%
moving water	1%

*each for 1 mark -
to a maximum of 3 marks
deduct 1 mark if sector left blank*

three sectors labelled correctly w.r.t. rank order of size
for 1 mark

4

(b) (fossil) fuels (*allow combustible/flammable/non renewable*)

1

- (c) moving water/hydro
wind/waves/tides/solar (*allow* geothermal/
wood/biomass)
each for 1 mark 2

- (d) any indication that we get more (energy from nuclear sources)
gains 1 mark

but

- 5 times as much/more
gains 2 marks 2

[9]

- M5.** (a) *sectors closer to correct value than $\pm 1\%$ nuclear (5%)*
gas 24% moving water 1%
each for 1 mark
maximum of 2 marks 3

sectors labelled correctly w.r.t. rank order of size
for 1 mark

But deduct 1 mark if not all sectors used

- (b) 5 x as much (do **not** credit simply more/4% more)
4 x as much 1

- (c) wind/waves/solar/tides
(allow geothermal/wood/biomass)
any one for 1 mark 1

- (d) *idea that*
electricity is a secondary/man made source/needs another
source to produce it
for 1 mark

M6. (a) (i) (dismantle and) remove radioactive waste / materials / fuels
accept nuclear for radioactive
*do **not** accept knock down / shut down*

1

(ii) increases it
*do **not** accept it has a negative effect*

1

(b) (i) *if efficiency is not mentioned it must be implied*
answers in terms of energy
generated only gains no credit

K most efficient

or

M least efficient

*accept **K** and / or **L** are more efficient than **M***

1

(efficiency) of **K** and **L** increases, (efficiency) of **M** (almost) constant /slightly reduced

all 3 power stations must be mentioned to get this mark

1

(ii) any **two** from:

- do not know how many (nuclear) power stations there will be
- power stations may continue to increase in efficiency
- do not know what type of power station new ones will be
accept new methods may be found to generate electricity / energy
accept other ways of generating energy may be expanded

- do not know future energy / electricity demands
accept we may become more energy efficient
- may be new uses for uranium

2

[6]

M7.(a) (i) water

1

heated

accept boiled or turned to steam

*do **not** accept evaporated*

1

generator

1

(ii) geothermal power stations provide a reliable source of electricity

1

(b) falling water

1

[5]

M8. (a) *marks are awarded only for the reason but must match the ringed answer*
*for both marks a **MAYBE** answer should include a **YES** and **NO** response answers in terms of the sources being renewable or non-renewable are insufficient*

any **two** from:

YES answers may include:

- wind produces no pollutant gases

accept wind burns no fuel
accept CO₂ / SO₂ / oxides of nitrogen / greenhouse gas for pollutant gases

- nuclear produces no pollutant gases
accept nuclear burns no fuel
- (burning) gas does not produce SO₂
accept gas does not cause acid rain
*do **not** accept they don't / none produce pollutant gases*

NO answers may include:

- nuclear produces radioactive waste
- (burning) gas produces CO₂ / pollutant gases / air pollution
accept contributes to global warming / greenhouse effect

2

- (b) nuclear power stations use a non-renewable fuel
accept uranium / plutonium is non-renewable
*do **not** accept some are unrenewable*

1

[3]

- M9.** (i) radiation **or** infra red
*do **not** accept rays*
*do **not** accept waves*
accept electromagnetic waves

1

- (ii) good absorber (of heat) to absorb heat (**or** infrared)
*do **not** accept 'attract' **or** 'capture' **or** soak*

1

- (iii) reduce heat loss (from the panel)
accept (good) (heat) insulator
*accept stop **or** reduce conduction*
*accept stop **or** reduce convection*
accept traps heat

accept keeps water hot

1

(iv) to reflect (back into the panel) heat **or** infrared **or** Sun's energy

do not accept 'bouncing'

do not accept reflect Sun

*do not accept reflect sunlight **or** sun's rays*

1

radiated **or** given out by the (black) pipe

accept back to pipe

accept reduce heat loss for 1 mark

accept reduce heat loss by radiation for 2 marks

accept stop heat loss by radiation for 1 mark

1

[5]

M10. (a) (i) light electrical

2

for 1 mark each

(ii) electrical.....chemical

for 1 mark each

2

(iii) electrical kinetic

for 1 mark each

2

(b) (i) 1500 / 10

gains 1 mark

1

but

150

gains 2 marks

1

(ii) heat (thermal) or sound

for 1 mark

1

