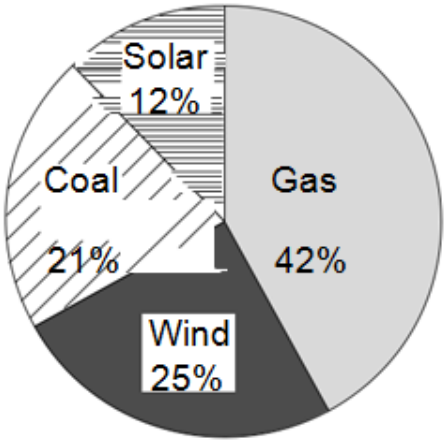
Energy Sources and their Trends in Uses 2

Q:1(a) The pie chart shows the energy sources used by one company to generate electricity.



(a) (i) Which two energy sources used by the company do not produce any polluting gases?

_____and _____

(1 mark)

(a) (ii) Calculate the percentage (%) of electricity that is generated using energy sources that do not produce any polluting gases.

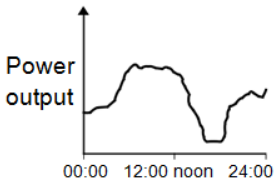
_____

Percentage = _____

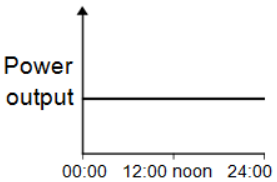
(1 mark)

(b) Which graph, A, B or C, is most likely to show the electrical power output from a wind turbine over one day?

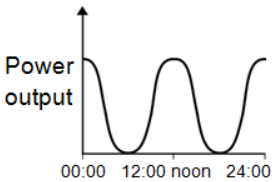
Write your answer, A, B or C, in the box.



Graph **A**



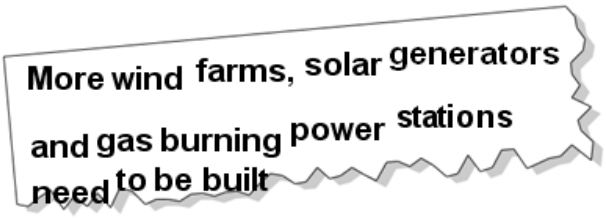
Graph **B**



Graph **C**

Graph ☐

(c) The government has said that more electricity must be generated from renewable energy sources. A newspaper reported that:



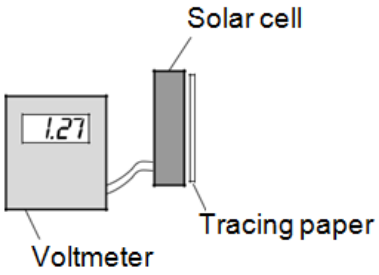
Why is the statement in the newspaper incorrect?

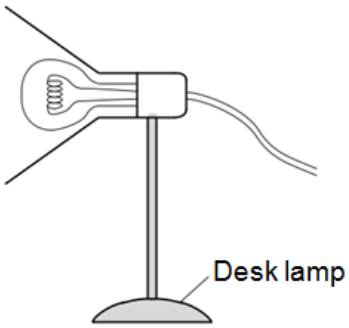
_____

_____

(1 mark)

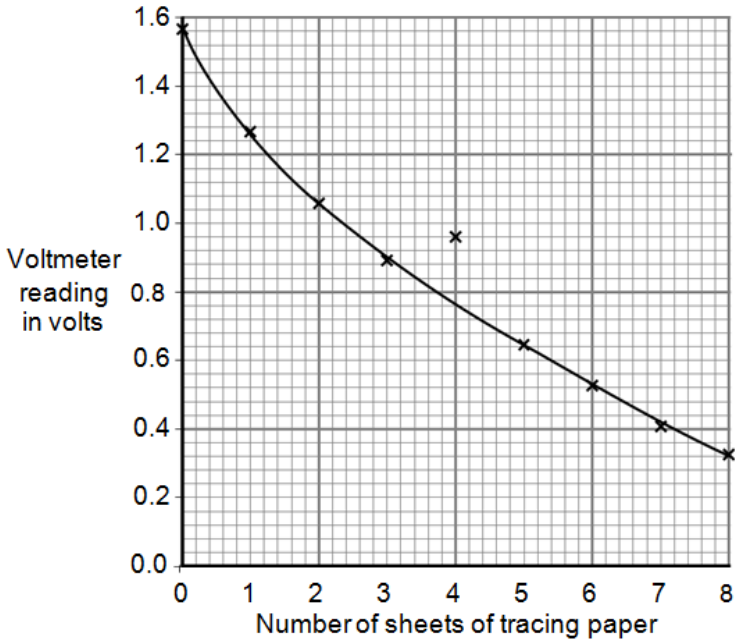
Q:2 A student has read that a solar cell with a dirty surface will not work as well as a solar cell with a clean surface.To test the effect of a dirty surface on a solar cell, the student set up the following equipment.





The student put the desk lamp a fixed distance from the solar cell. To represent the effect of a dirty surface, the student covered the surface of the solar cell with pieces of tracing paper. Each time the student added a piece of paper, she measured the output voltage of the solar cell.

(a) The results taken by the student have been used to draw the graph below.



(a) (i) One of the results seems to be anomalous.

Draw a ring around the anomalous data point on the graph.

(1 mark)

(a) (ii) The larger the number of sheets of tracing paper used, the lower the intensity of the light reaching the solar cell.

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

A decrease in the intensity of the light reaching the solar cell causes

a decrease in
no change to
an increase in

the output voltage from the solar cell.

(1 mark)

(b) People can buy panels of solar cells to generate electricity for their homes.

Any surplus electricity can be sold to the electricity supply company.

(b) (i) Give one environmental advantage of generating electricity using solar cells rather than generating electricity in a coal-burning power station.

_____

_____

(1 mark)

(b) (ii) Draw a ring around the correct answer in the box to complete the sentence.

Allowing the surface of the solar panels to become very dirty will

decrease
not change
the increase

pay-back time.

(1 mark)

(b) (iii) Explain your answer to part (b)(ii).

_____

_____

_____

(2 marks)

Q:3 Nuclear fuels and the wind are two of the energy sources used to generate electricity in the UK.

Explain the advantages of using energy from nuclear fuels to generate electricity rather than using energy from the wind.

Include in your answer a brief description of the process used to generate electricity from nuclear fuels.

(4 marks)

(b) In the UK, most electricity is generated in power stations that emit carbon dioxide into the atmosphere. The impact of these power stations on the environment could be reduced by the increased use of 'carbon capture' technology.

Describe how 'carbon capture' would prevent the build-up of carbon dioxide in the atmosphere.

(2 marks)

Q:4 The world's biggest offshore wind farm, built off the Kent coast, started generating electricity in September 2010.

(a) One advantage of using the wind to generate electricity is that it is a renewable energy source.

(a) (i) Give one other advantage of using the wind to generate electricity.

_____

_____

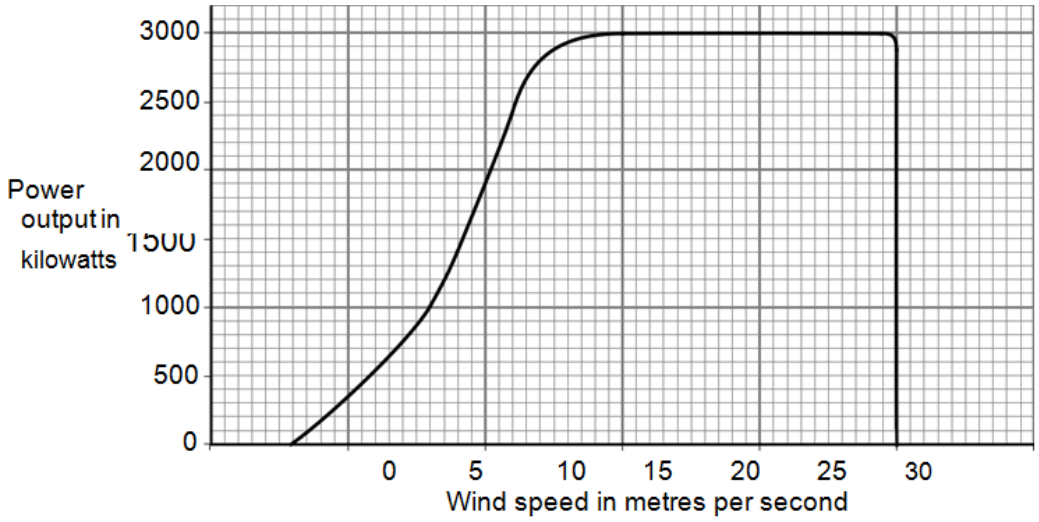
(1 mark)

(a) (ii) Name one other renewable energy source used to generate electricity.

_____

(1 mark)

(b) The graph shows how wind speed affects the power output from a large wind turbine.



(b) (i) What is the maximum possible power output from this wind turbine?

_____

(1 mark)

(b) (ii) Read this part of a newspaper article.

Cold weather stops wind turbines

For the past two weeks, most of the UK's wind turbines have been generating less than one sixth of their maximum power output. To avoid major power cuts in the future, some experts have said that more nuclear power stations need to be built to provide a reliable source of energy.

Use the graph to explain why the power output from the wind turbines was less than one sixth of the maximum.

_____

_____

_____

_____

(2 marks)

(b) (iii) Having more nuclear power stations will help to avoid power cuts in the future. Which two of these reasons explain why?

Put a tick (☑) in the boxes next to your answers.

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

The radioactive waste produced must be stored for many years. ☐

Nuclear power stations do not depend on the weather to generate electricity. ☐

(1 mark)

Q:5 Three energy sources used to generate electricity are given in List A.

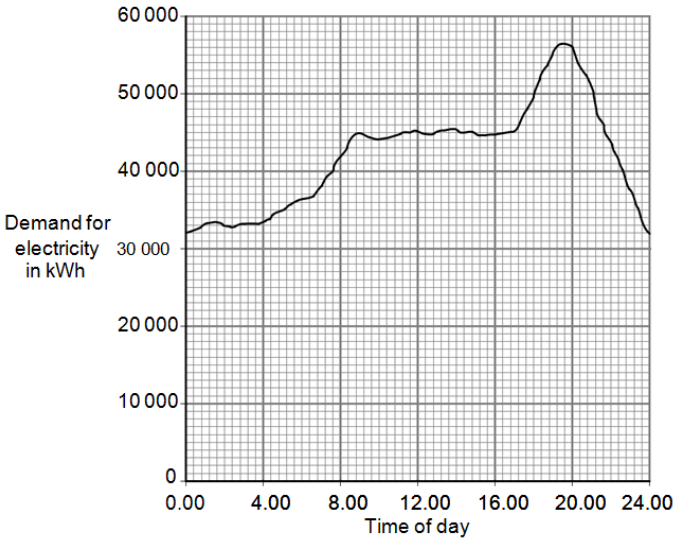
Statements about the energy sources used to generate electricity are given in List B.

Draw one line from each energy source in List A to the statement about the energy source in List B.

List A Energy source	List B Statement about energy source
Geothermal	Uses energy from falling water
Hydroelectric	Uses energy from inside the Earth
Nuclear	Is unpredictable
	Produces dangerous waste

(3 marks)

Q:6(a) The graph shows how the demand for electricity in the UK changes during one 24-hour period.



The table gives the start-up times for two types of power station.

Type of power station	Start-up time
Gas	A few minutes
Nuclear	Several days

How would these two types of power station be used to meet the demand for electricity during this 24-hour period?

_____

_____

_____

_____

_____

_____

(3 marks)

(b) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

A farmer plans to generate all the electricity needed on her farm, using either a biogas generator or a small wind turbine.

The biogas generator would burn methane gas. The methane gas would come from rotting the animal waste produced on the farm. When burnt, methane produces carbon dioxide.

The biogas generator would cost £18 000 to buy and install. The wind turbine would cost £25 000 to buy and install.

The average power output from the wind turbine would be the same as the continuous output from the biogas generator.

Evaluate the advantages and disadvantages of the two methods of generating electricity.

Conclude, with a reason, which system would be better for the farmer to buy and install.

(6 marks)

Q:7 About half of the UK's electricity is generated in coal-burning power stations and nuclear power stations.

(a) Coal-burning power stations and nuclear power stations provide a reliable way of generating electricity.What is meant by a reliable way of generating electricity?

(1 mark)

(b) Over the next few years, most of the older nuclear power stations in the UK will be closed down, and the process of decommissioning will start.

What does it mean to decommission a nuclear power station?

_____

_____

(1 mark)

(c) Climate change has been strongly linked to the emission of carbon dioxide. Many governments around the world are committed to reducing carbon dioxide emissions.

Generating electricity can increase carbon dioxide emissions.

The companies generating electricity could reduce carbon dioxide emissions.

Give two ways the companies could do this.

1 _____

_____

2 _____

_____

(2 marks)

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

The voltage across the overhead cables of the National Grid needs to be much higher than the output voltage from the power station generators.

Explain why.

_____

_____

_____

_____

(3 marks)

TOTAL MARKS=42