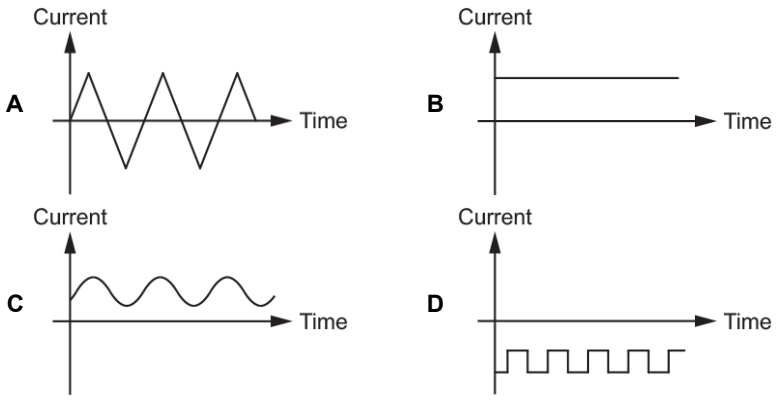
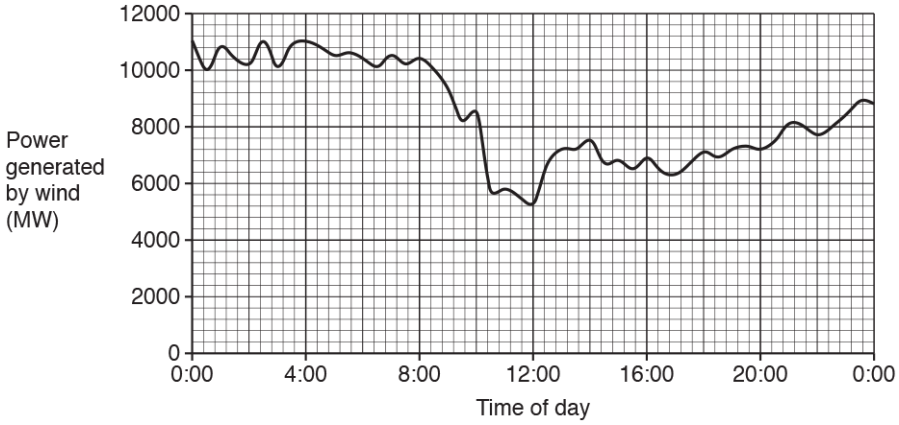
Powering Earth (F)

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



Your answer ☐ **[1]**

2. 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]**

3. 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]**

4. 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]**

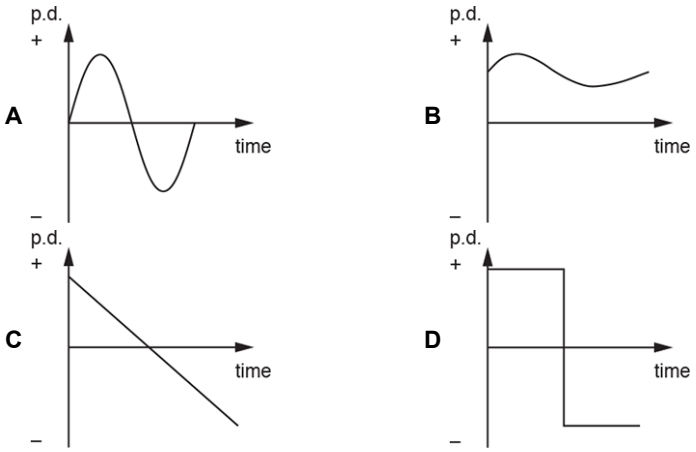
5. Which statement describes the domestic electricity supply in the UK?

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]**

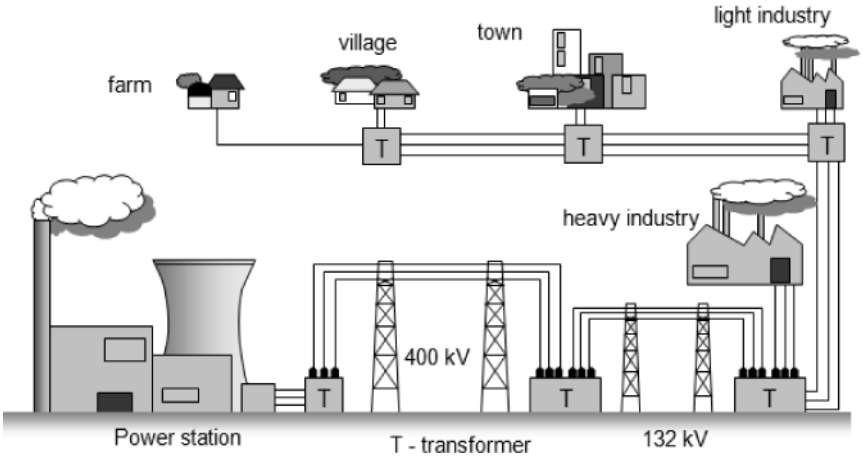
6. Here are some graphs for the potential difference (p.d.) of four electrical supplies.

Which graph shows a direct voltage?



Your answer ☐ **[1]**

7 (a). 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.

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[1]

(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]

8. 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]

9. 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]

10 (a). 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]

(b). 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]**

11 (a). 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]**

(b). 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.

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[1]

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

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[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.

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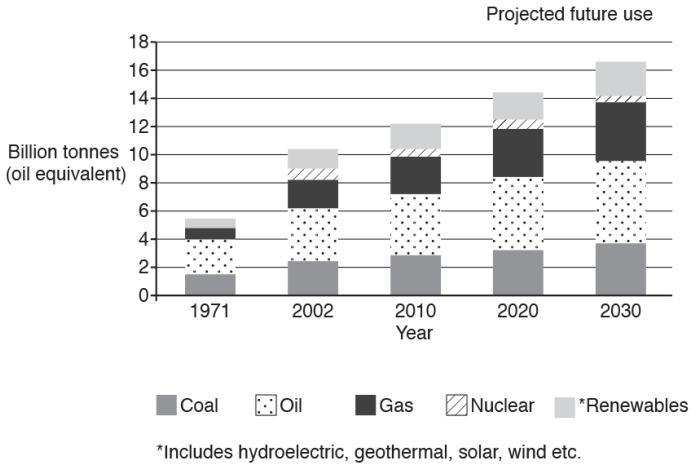
[2]

(c). 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. ---

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2. ---

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[2]

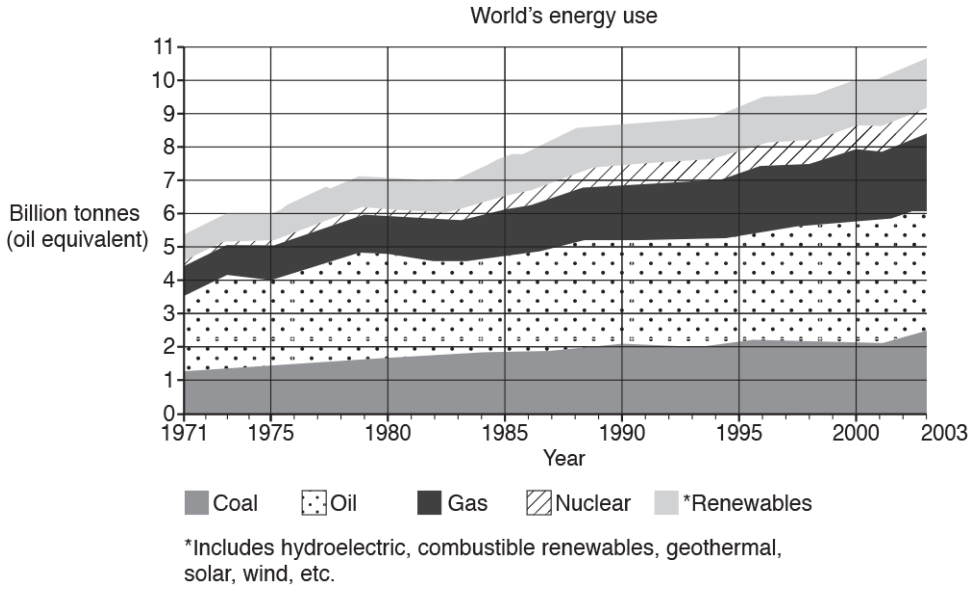
ii. In the UK the government is closing coal fired power stations and planning for new nuclear power stations to be built.

Suggest why the government wants more nuclear power stations.

---**[2]**

(d). 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]**

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]**

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

Suggest why the scientists disagree.

_____

_____

_____ **[1]**

13.

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]**

END OF QUESTION PAPER