

GCSE Physics A (Gateway)

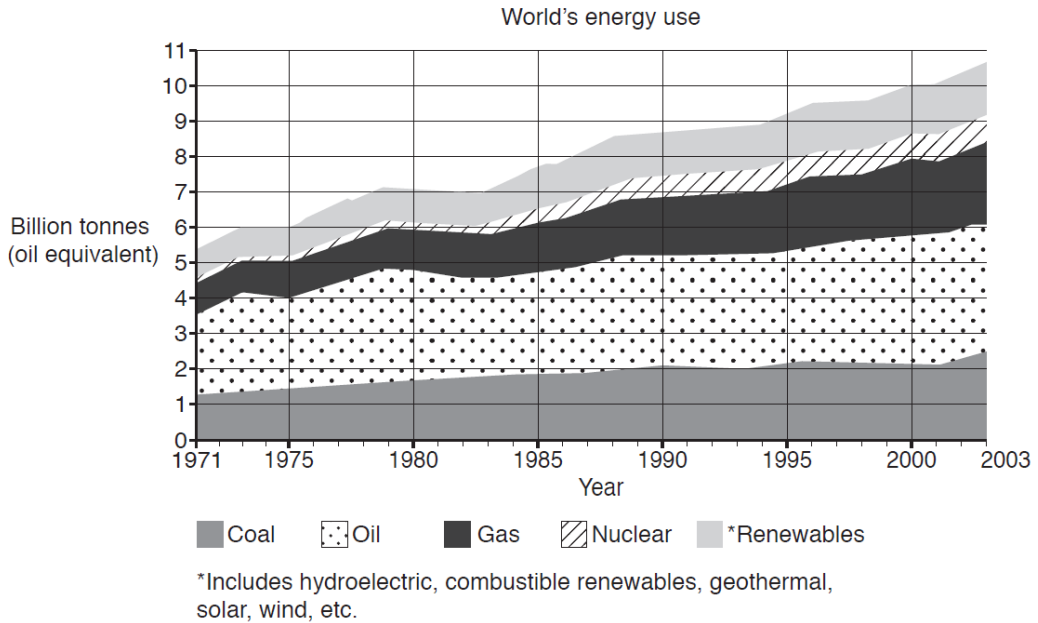
J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 8

1

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.



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

$$10.5 - 5.5 = 5$$

Answer =⁵..... billion tonnes (oil equivalent)

[1]

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

Oil

[1]

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

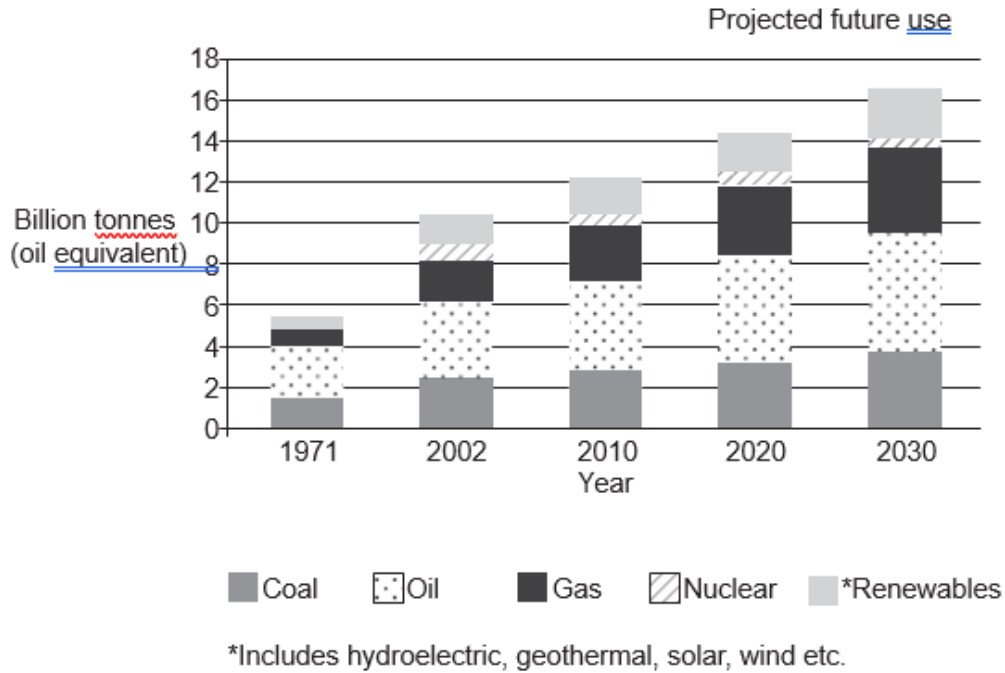
Approximately what percentage of this amount was due to fossil fuel use?

[2]

$$\frac{8.5}{10.6} \times 100 = 80.2\%$$

(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.

[2]

- Because fossil fuels are non-renewable source, increased demand means the fossil fuels would run out faster
- Increase use of fossil fuel means increase in production of greenhouse gases and increased global warming effect.

(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]

- Because it can produce much higher energy than fossil fuels and renewable sources
- Because it doesn't have a global warming effect.

(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]

step-up transformer

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

[1]

To reduce the current and therefore energy loss as heat.

- (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.

a.c. is an alternating current where the current's direction changes periodically whilst d.c. is a direct current where the current only flows in one direction.

[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.

$$P = IV + V = IR \rightarrow P = I^2 R$$

$$P = 11^2 \times 23 = 2783 \text{ W} \quad \text{Answer} = \dots\dots\dots 2.783 \dots\dots\dots \text{ kW}$$

[4]

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

Because the wind speed varies over time / every day. (low level of wind gives low power and vice versa) [1]

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

State a reason why.

Because wind is inconsistent thus wind turbine cannot meet the power demand all the time. [1]

Total Marks for Question Set 8: 18

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