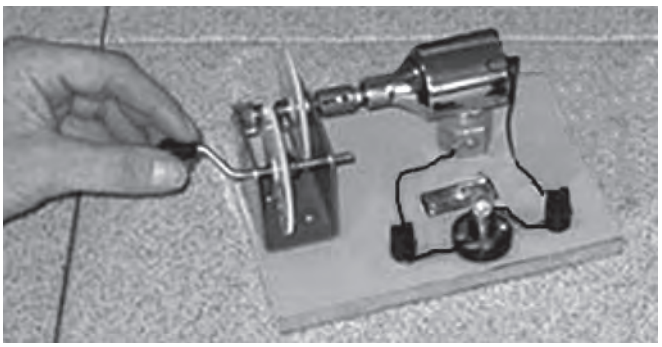
## Generating electricity

**1** The photograph shows a small generator.

When the handle is turned the current produced lights a lamp.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The current produced

**(1)**

- ☒ **A** usually comes from a battery
- ☒ **B** always has the same frequency
- ☒ **C** is always the same size
- ☒ **D** is usually alternating in direction

(ii) State the unit in which electric current is usually measured.

**(1)**

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(b) (i) Describe what happens inside the generator to produce the current.

**(3)**

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(ii) State **one** way in which the size of the current could be increased.

**(1)**

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*(c) The National Grid is supplied with electricity from large-scale electrical generators.

These generators may be driven using different energy sources.

Compare the use of a non-renewable energy source with the use of a renewable energy source to produce electricity for the National Grid.

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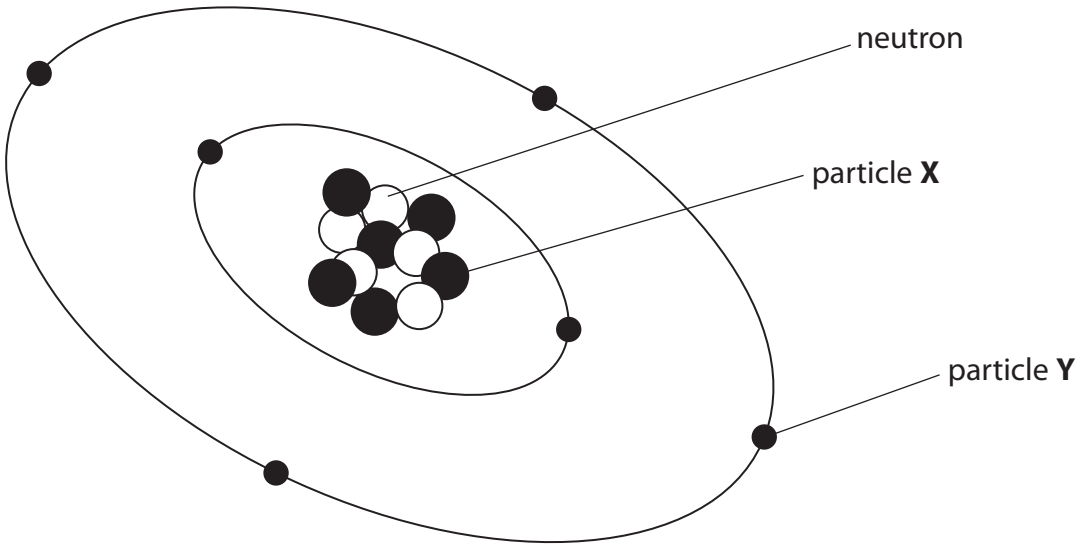
**(Total for Question 5 = 12 marks)**

**Radioactive material**

**2** (a) The diagram represents an atom of carbon.




NOT to scale

(i) State the name of particle **X**.

**(1)**

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(ii) State the name of particle **Y**.

**(1)**

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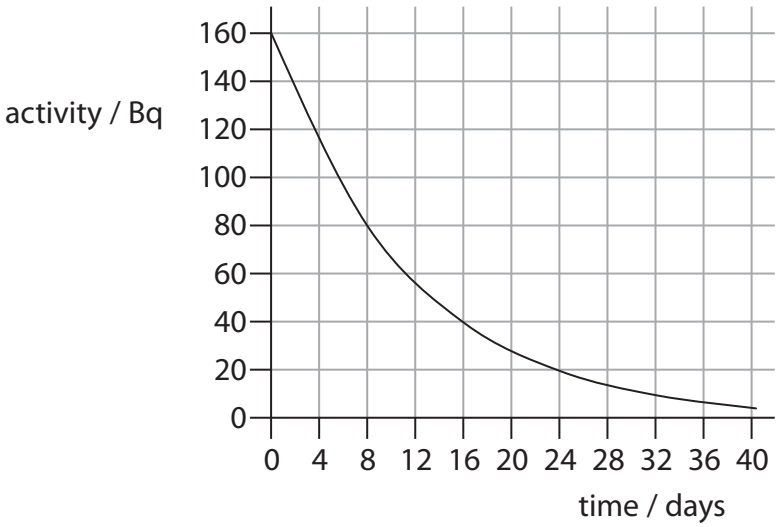
(b) Iodine-131 is a radioactive isotope of iodine.

The graph shows how the activity of a sample of iodine-131 decreases with time.



(i) Use the graph to calculate the half-life of iodine-131.

**(2)**

half-life = ..... days

(ii) Another sample of iodine-131 has an activity of 800 Bq.

Calculate how long it will take before its activity decreases to 200 Bq.

**(2)**

time = ..... days

*(c) There are plans to build more nuclear power stations to supply electricity to the National Grid.

Discuss the advantages and disadvantages of using nuclear power to generate electricity.

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**(Total for Question 5 = 12 marks)**

## Investigating electric motors

**3** Some students investigate the efficiency of electric motors.

(a) (i) The students find that one electric motor has an efficiency of 60%.

Explain in terms of energy what is meant by an efficiency of 60%.

**(2)**

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(ii) The students use some motors to lift weights.

The students measure the input power and output power of two motors.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The power of a motor is the rate at which it transfers

**(1)**

☒ **A** current

☒ **B** energy

☒ **C** voltage

☒ **D** charge

(iii) The first motor has a power rating of 20 W.

The motor is used for 15 s.

Calculate the energy supplied to the motor.

**(2)**

energy supplied to the motor = ..... J

(iv) In the second motor, the useful output power was 18 W when the input power was 24 W.
Calculate the efficiency of this motor.

**(2)**

efficiency = ..... %

(b) One of the students states that all of the energy supplied to a motor is transferred into other forms.

Complete the following sentence by putting a cross (☒) in the box next to your answer.
This statement is one example of the idea of

**(1)**

☒ **A** renewable energy

☒ **B** conservation of energy

☒ **C** non-renewable energy

☒ **D** sustainable energy

**(Total for Question 2 = 8 marks)**