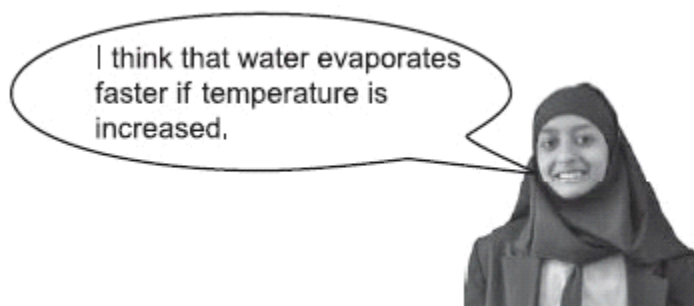


## SET 3 – Aiming for level 7-9 at GCSE

**Q1.** Amena described her idea about the evaporation of water.



Amena

- (a) Write a plan for an investigation you could carry out in the school laboratory to test Amena's idea.  
Assume you have access to all the usual laboratory equipment.

In your plan you must write:

- the one factor you would change as you carry out your investigation (the independent variable)
- the effect you would observe or measure as you carry out your investigation (the dependent variable)
- one factor you would keep the same to help make your test fair.

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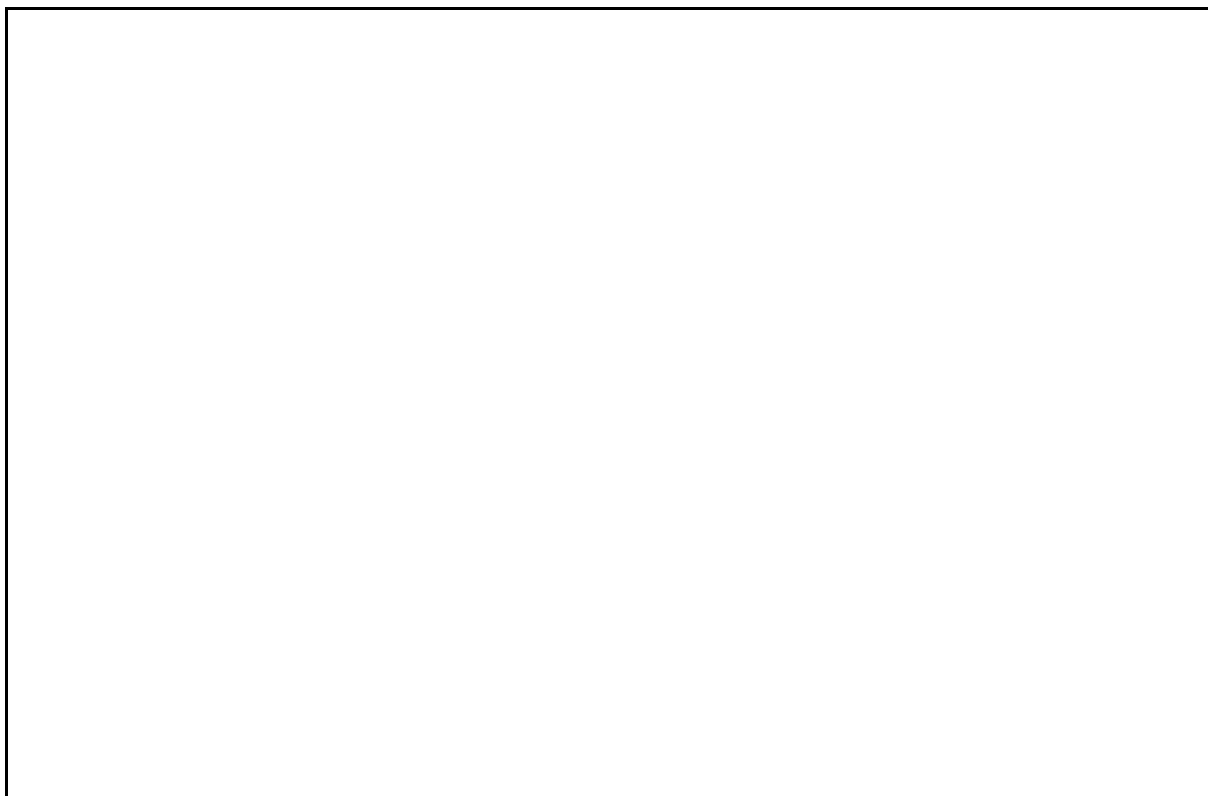
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3 marks

- (b) In the box below, draw and label a table that you could use to record your results.



1 mark  
maximum 4 marks

**Q2.**

- (a) Nuclei of naturally occurring atoms of the element sodium have an atomic number of 11 and a mass number of 23. These are shown as  $^{23}_{11}\text{Na}$ .

Complete the table to show the numbers of electrons, neutrons and protons in an atom of naturally occurring sodium.

type of particle	number in an atom of naturally occurring sodium
electrons	
neutrons	
protons	

3 marks

(b) Another isotope of sodium has a mass number of 24. This is shown as  $^{24}_{11}\text{Na}$ .

- (i) How is an atom of this isotope different from an atom of naturally occurring sodium?

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1 mark

- (ii) Despite the different mass numbers, these atoms are still atoms of sodium. State why.

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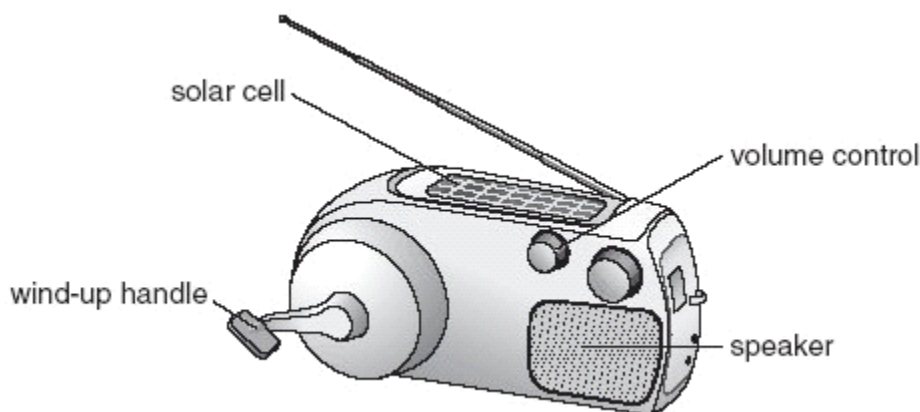
1 mark

Maximum 5 marks

### Q3.

Keith has a wind-up radio.

It does **not** use batteries. It is powered by a steel spring.



- (a) Keith winds up the spring.  
As the spring unwinds, potential energy in the spring is transferred to a generator, which then turns.

The generator provides electrical energy for the radio.

Fill the gaps in the sentences below to show the useful energy changes which take place in the generator and the speaker.

- (i) As the generator turns, ..... energy is changed to electrical energy.

1 mark

- (ii) In the speaker, electrical energy is changed to ..... energy.

1 mark

- (b) When Keith turns the volume up so that the radio is louder, the spring unwinds more quickly.

Why does the spring unwind more quickly?

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1 mark

- (c) The radio has a solar cell which can also provide electrical energy.

Keith winds up his radio and takes it outside without changing the volume. The steel spring unwinds more slowly when sunlight falls on the solar cell. Explain why.

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1 mark

- (d) The wind-up radio was designed for use in poorer countries.

Suggest why wind-up radios are useful in poorer countries.

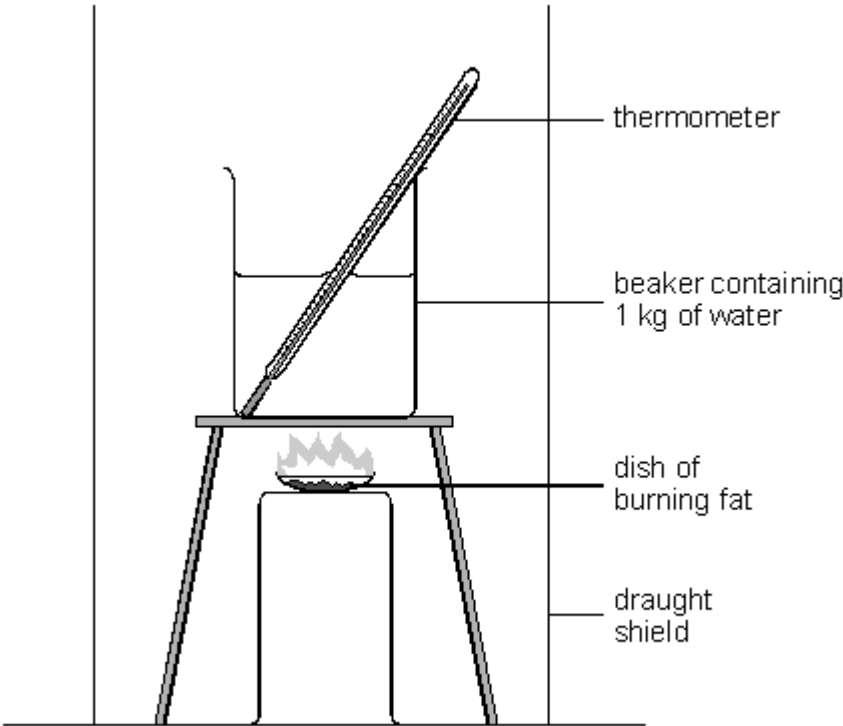
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1 mark  
maximum 5 marks

**Q4.**

- (a) Mammals use fat as a long-term store of energy.
  - (i) The diagram shows some simple apparatus for investigating the amount of energy released by burning fat.



4.2 kJ of energy will raise the temperature of 1 kg of water by 1°C.  
1 g of fat contains 38.5 kJ of energy.

Calculate the rise in temperature of 1 kg of water if 0.5 g of fat is burned.  
Show your working.

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2 marks

- (ii) Fat is stored in layers beneath the skin. This fat is part of the body’s energy reserve. Give another function of the layers of fat.

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1 mark

- (b) Mammals use glucose as a fuel in respiration in their cells. The word equation for respiration is:

glucose + oxygen → carbon dioxide + water

Mammals with a high rate of respiration need to have a high heart rate.  
Explain why.

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2 marks  
Maximum 5 marks

