



## Cambridge International AS Level

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### ENVIRONMENTAL MANAGEMENT

8291/02

Paper 2 Management in Context

For examination from 2022

SPECIMEN PAPER

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

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### INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

### INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

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This document has **22** pages. Blank pages are indicated.

- 1 Electronic waste (e-waste) includes items such as discarded personal computers and electronic components within televisions and computer monitors.

The number of e-waste landfill sites is increasing around the world. Around 50 million tonnes of e-waste were generated worldwide in 2018.

- (a) Suggest why the number of e-waste landfill sites is increasing around the world.

.....  
 ..... [1]

- (b) People are concerned about leaching of toxic substances from e-waste into soil.

Suggest **one** reason why people are concerned about leaching of toxic substances into soil.

.....  
 ..... [1]

- (c) A soil scientist wants to find out if soil near an e-waste landfill site is contaminated with lead.

The scientist collects 500 g of soil from five sampling sites.

Fig. 1.1 shows the location of the five sampling sites.

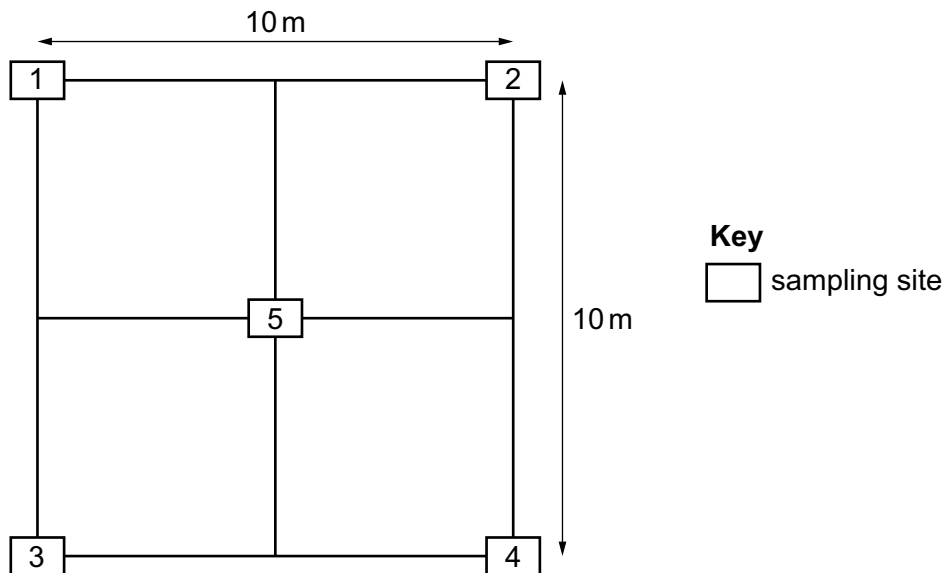


Fig. 1.1

The scientist considers two methods, **A** and **B**, for obtaining soil samples for analysis.

method **A**

- 1 Remove any stones, animals or plant material from each 500 g soil sample.
- 2 Put 100 g of soil from each of the five soil samples into a large plastic bucket and mix the soil thoroughly.
- 3 Remove 100 g of mixed soil from the bucket and put in a clean plastic bag.
- 4 Test this sample of soil for lead.

method **B**

- 1 Remove any stones, animals or plant material from each 500 g soil sample.
- 2 Put 100 g of soil from the sample collected at site 1 into a clean plastic bag.
- 3 Test this sample of soil for lead.
- 4 Repeat steps 2 and 3 for the other sampling sites.

(i) Suggest **one** advantage of using method **A** compared with method **B**.

.....  
..... [1]

(ii) Suggest **one** limitation of using method **A** compared with method **B**.

.....  
..... [1]

(iii) Suggest **one** reason why plant material is removed from the 500 g soil samples.

.....  
..... [1]

(d) Some information on lead concentrations in soil is shown in Table 1.1.

**Table 1.1**

concentration of lead / ppm*	recommendations
< 400	<ul style="list-style-type: none"> <li>• wash hands immediately after gardening</li> <li>• wash all produce thoroughly</li> </ul>
400 to 999	<ul style="list-style-type: none"> <li>• reduce exposure to the soil</li> <li>• wash hands immediately after gardening</li> <li>• restrict access of children to the soil</li> <li>• do not grow leafy vegetables directly in the soil</li> </ul>
1000 to 2000	<ul style="list-style-type: none"> <li>• reduce exposure to the soil</li> <li>• wash hands immediately after gardening</li> <li>• do not grow food crops in the soil</li> <li>• do not allow children access to the soil</li> <li>• keep soil covered</li> </ul>
> 2000	<ul style="list-style-type: none"> <li>• avoid contact with the soil</li> <li>• contact your local health department or environmental protection officer</li> </ul>

\*ppm = parts per million

A concentration of 400 ppm is the safe soil lead concentration threshold.

The scientist used method **A** and found the soil sample had a lead concentration of 1358 ppm.

Write a conclusion about the lead concentrations in this sample of soil.

In your conclusion include **one** recommendation from the table.

.....

.....

.....

..... [2]

- (e) Some high-income economy countries (HICs) export their e-waste to low-income economy countries (LICs).

In 2018, this waste disposal strategy was permitted provided the electronic item can be repaired or reused.

Evaluate the advantages and disadvantages for HICs and LICs of this waste disposal strategy.

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..... [6]

- (f) Describe **two** strategies for reducing the impacts of e-waste.

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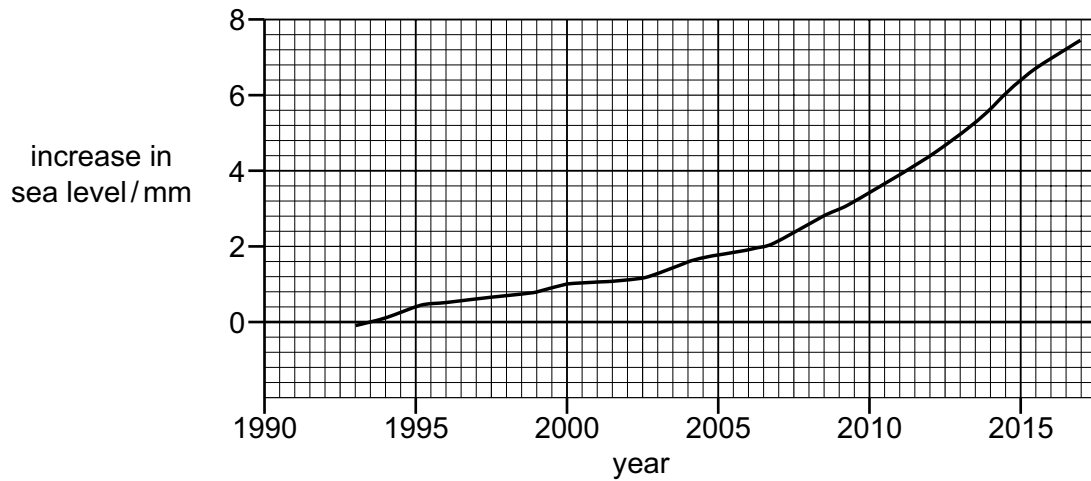
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2 .....

..... [2]

[Total: 15]

- 2 The graph in Fig. 2.1 shows the increase in sea level due to ice loss from the Antarctic ice sheet between 1993 and 2017.



**Fig. 2.1**

- (a) Describe the trend in sea level between 1993 and 2017, shown in Fig. 2.1.

.....

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.....

.....

..... [3]

- (b) Suggest an explanation for the trend shown by the data.

.....

.....

.....

..... [2]

- (c) The Antarctic Treaty was originally signed by 12 nations in 1959. The treaty has now been signed by 53 nations.

The Antarctic Treaty refers to Antarctica as:

‘... a natural reserve, devoted to peace and science’.

Agreements within the treaty relate to:

- protection of the Antarctic environment
- designation and management of protected areas
- management of tourism
- freedom of scientific investigation
- scientific cooperation.

Figs. 2.2, 2.3 and 2.4 show human activities within the area covered by the Antarctic Treaty.

Fig. 2.2 shows tourists visiting a king penguin colony.



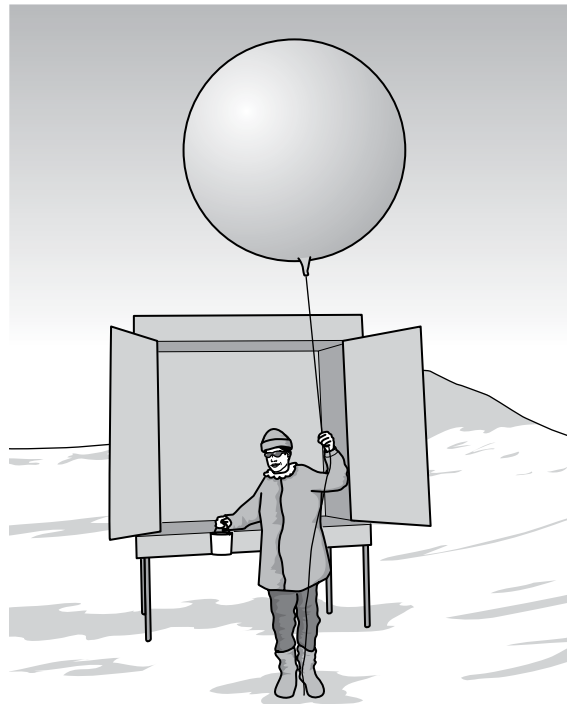
**Fig. 2.2**

Fig. 2.3 shows scientists carrying out research in the Antarctic. Researchers use vehicles powered by a fossil fuel to cover the large distances in the Antarctic.



**Fig. 2.3**

Fig. 2.4 shows a meteorologist using a weather balloon. A monitoring device is attached to the balloon, which is released into the atmosphere. The device sends meteorological information back to a computer.



**Fig. 2.4**



- (i) Evaluate the success of the Antarctic Treaty in managing the impact of human activity in Antarctica. Refer to evidence from Figs. 2.2, 2.3 and 2.4 in your answer.

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..... [6]

- (ii) There are deposits of coal in Antarctica.

Mining is prohibited by the Antarctic Treaty.

Suggest **two** other reasons why these coal deposits are **not** mined.

1 .....

.....

2 .....

..... [2]

[Total: 13]



(ii) Describe **one** benefit of using a beating tray as a sampling technique.

.....  
..... [1]

(b) The codling moth (*C. pomonella*) is a major pest of apple trees in parts of the USA.

The codling moth larvae eat holes in the apple fruit, which makes the apples unsellable.

A researcher decides to use crowd sourcing to investigate the extent of the codling moth problem in the USA.

The researcher posts a questionnaire online and asks members of the public to record sightings of the adult codling moth or its larvae and any damage to the apple tree or fruit.

(i) Write a suitable questionnaire the researcher could use to obtain the information. The questionnaire should contain four questions.

**Questionnaire on codling moth sightings**

Question 1 .....  
.....  
Question 2 .....  
.....  
Question 3 .....  
.....  
Question 4 .....  
..... [4]

(ii) Suggest **two** limitations of this method of data collection.

1 .....  
.....  
2 .....  
..... [2]

(c) The codling moth is considered an invasive species in China.

(i) State what is meant by invasive species.

.....  
.....  
.....  
..... [2]

(ii) State **one** impact of invasive species.

.....  
..... [1]

[Total: 16]

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- 4 (a) Predictions about climate change are based on computer model projections. Table 4.1 shows data for the percentage difference in warming rates between model projections and observed values between 1975 and 2013.

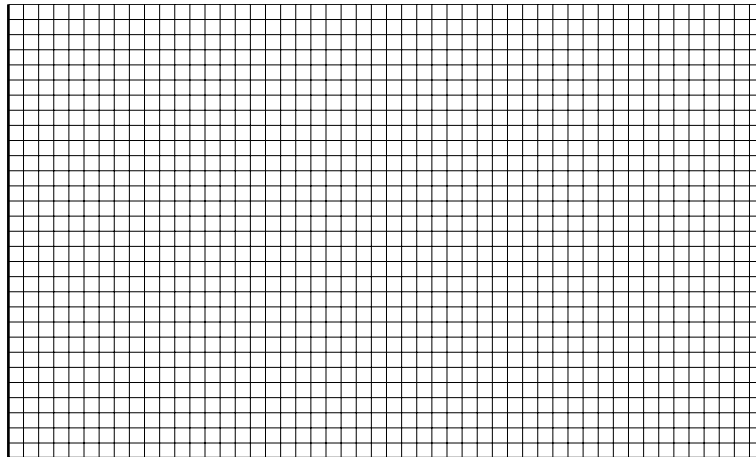
**Table 4.1**

date of model	percentage difference in warming rates between model projections and observed values
1975	+30
1981	-20
1988	+30
1990	+17
1995	-28
2001	-14
2007	+8
2013	+9

**Key**

- + model overestimated warming rate
- model underestimated warming rate

- (i) Plot these data as a bar chart on the grid.



[3]

- (ii) Calculate the range for these data.

range = ..... [1]

(iii) Comment on the reliability of these computer model projections in predicting the rate of warming between 1975 and 2013.

.....  
.....  
.....  
..... [2]

(iv) Outline the difficulties in using climate change models.

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..... [4]

(b) Describe strategies for managing climate change through the reduction of greenhouse gas emissions.

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..... [4]

(c) Solar radiation management is a geo-engineering strategy aimed at counteracting climate change.

(i) Outline how solar radiation management could be used to counteract climate change.

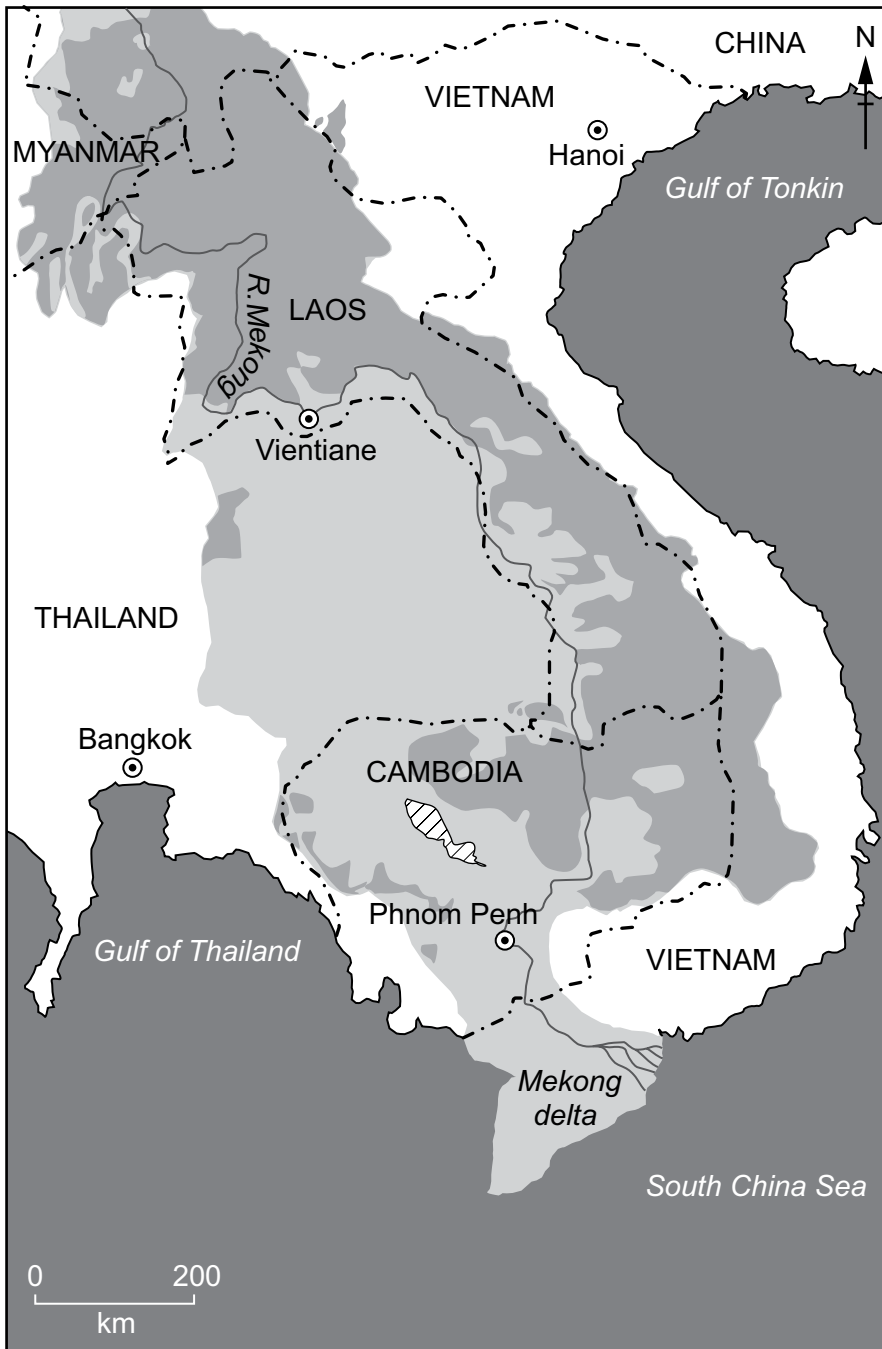
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..... [3]

(ii) Suggest why some people are concerned about using solar radiation management to counteract climate change.

.....  
..... [1]



(d) Fig. 4.1 contains information about the Mekong river basin, which extends over a large area of land in southeast Asia.



- 1 Snow and glacier melt is the main source of fresh water in the upper course of the river.
  
- 2 The river flow is influenced by the monsoon rains (May to October).
  
- 3 The Mekong delta:
  - is an area of low land where the Mekong river splits into smaller rivers
  - has an increase in salinity (concentration of salt in water) when river flow is low during the dry season (November to April)
  - is a major rice-growing region of the world
  - has a population of approximately 17 million.

**Key**

Land use in Mekong river basin

- agriculture
- forested area

land outside Mekong river basin

- Mekong river basin boundary
- capital city
- international boundary
- sea
- lake

**Fig. 4.1**



- 5 The graph in Fig. 5.1 shows data for total population of high-income economy countries (HICs) and low-income economy countries (LICs) between 1960 and 2015.

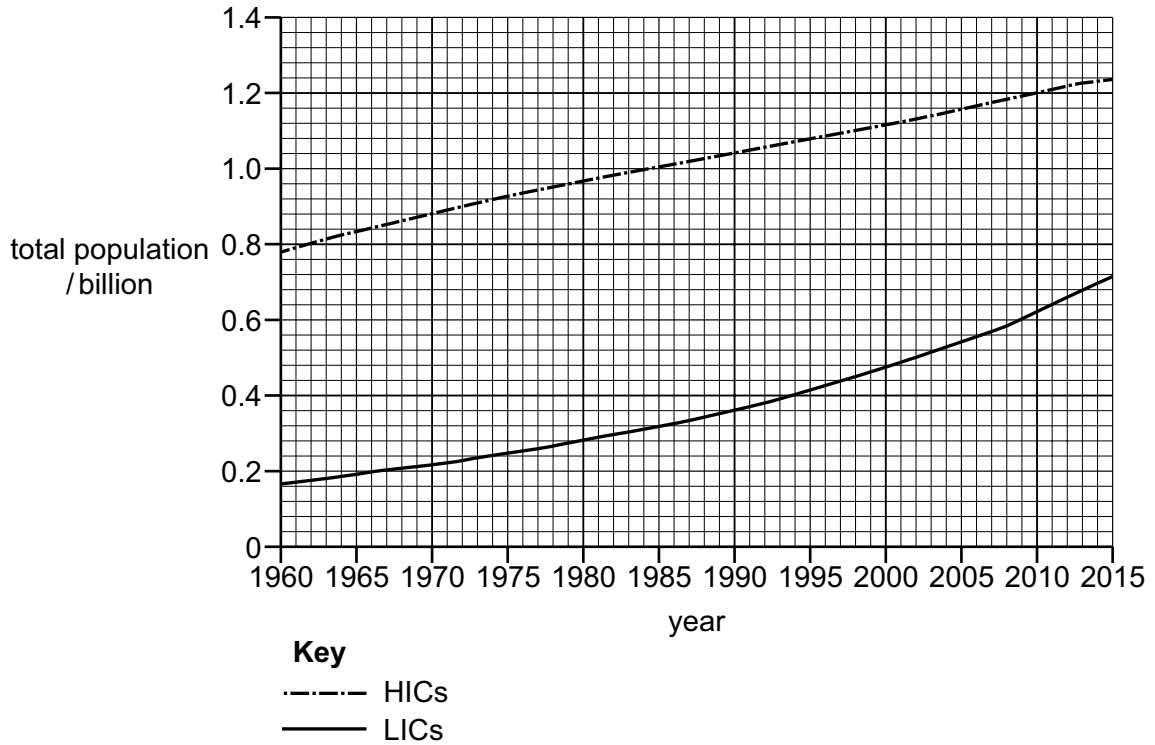


Fig. 5.1

- (a) (i) The data in Fig. 5.1 show a percentage increase in population of 59% for HICs from 1960 to 2015.

Calculate the percentage increase in population for LICs from 1960 to 2015.

Give your answer to 2 significant figures.

.....% [2]

- (ii) Use the data to compare the trend in population for LICs and for HICs between 1960 and 2015.

.....  
 .....  
 .....  
 ..... [2]

(b) Fig. 5.2 shows data for the percentage of the total energy generated from fossil fuels for HICs and LICs between 1960\* and 2015.

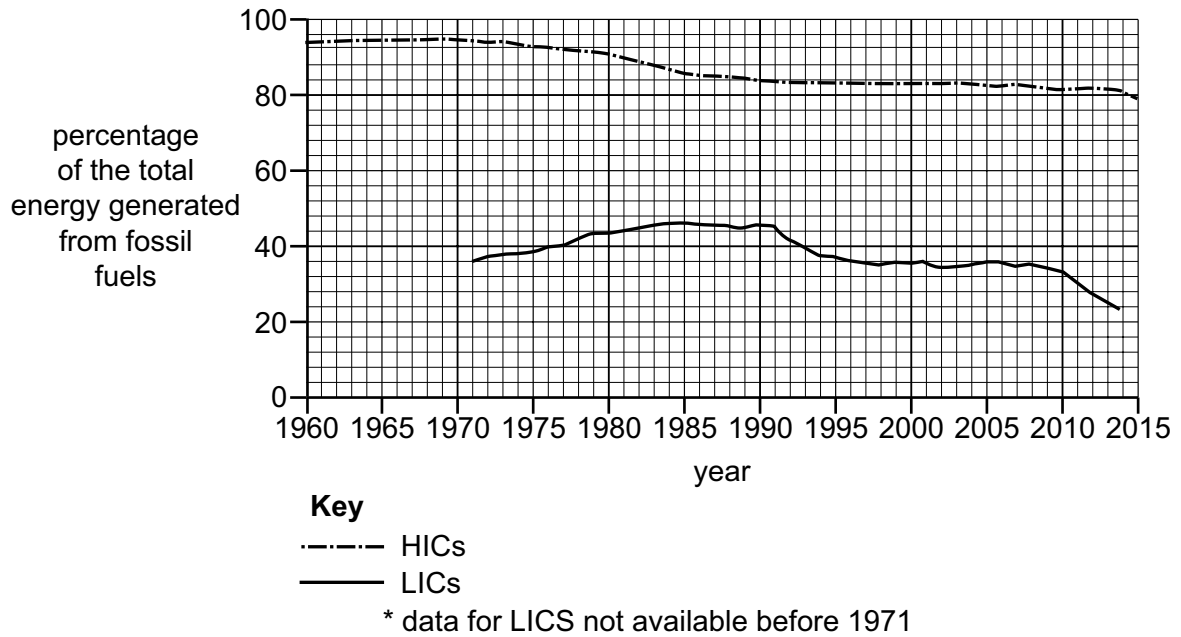


Fig. 5.2

Fig. 5.3 shows data for the percentage of the total energy generated from renewable energy resources for HICs and LICs between 1990 and 2015.

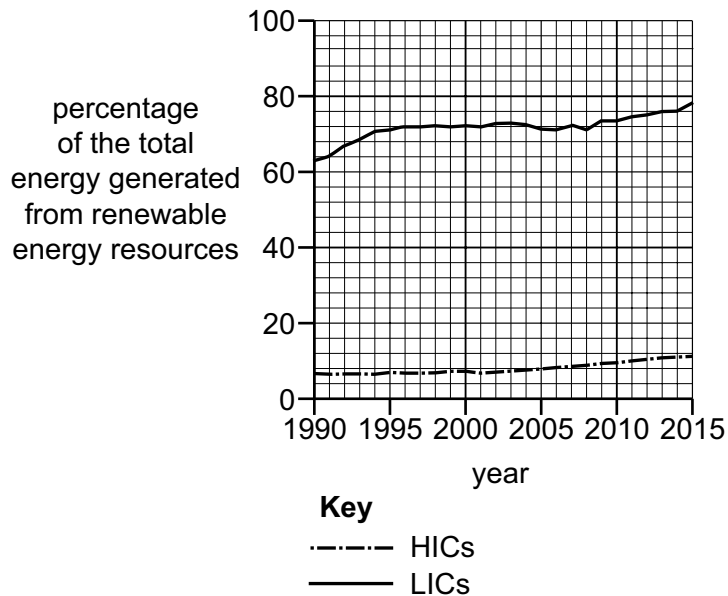


Fig. 5.3



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**Copyright Acknowledgements:**

- Question 2 Figure 2.2 © C016/1332; FRANS LANTING, MINT IMAGES/SCIENCE PHOTO LIBRARY; *Tourists at edge of king penguin colony, Aptenodytes patagonicus, South Georgia Island*; [www.sciencephoto.com](http://www.sciencephoto.com)
- Question 2 Figure 2.3 © C001/3262; EXTRA-POL/LOOK AT SCIENCES/SCIENCE PHOTO LIBRARY; *Antarctic surveying. Researchers using a snow micropen (SMP) to study layers (strata) of snow*; [www.sciencephoto.com](http://www.sciencephoto.com)
- Question 3 Figure 3.1 © Ref: PMR55H; Selwyn/Alamy Stock Photo; *Crab apple tree at Ryedale Folk Museum, Hutton le Hole, Yorkshire UK*; [www.alamy.com](http://www.alamy.com)

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