



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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8291/12

May/June 2023

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

- Section A: answer **all** questions.
- Section B: answer **one** question.
- 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.

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

This document has **20** pages.

Section A

Answer **all** questions in this section.

- 1 (a) Resources such as food, water and energy require management if they are to be sustainable.

Define the term sustainable resource.

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

- (b) Fig. 1.1 shows data about the world population from 1800 to 2100. The data from 2022 to 2100 is a prediction made by the United Nations.

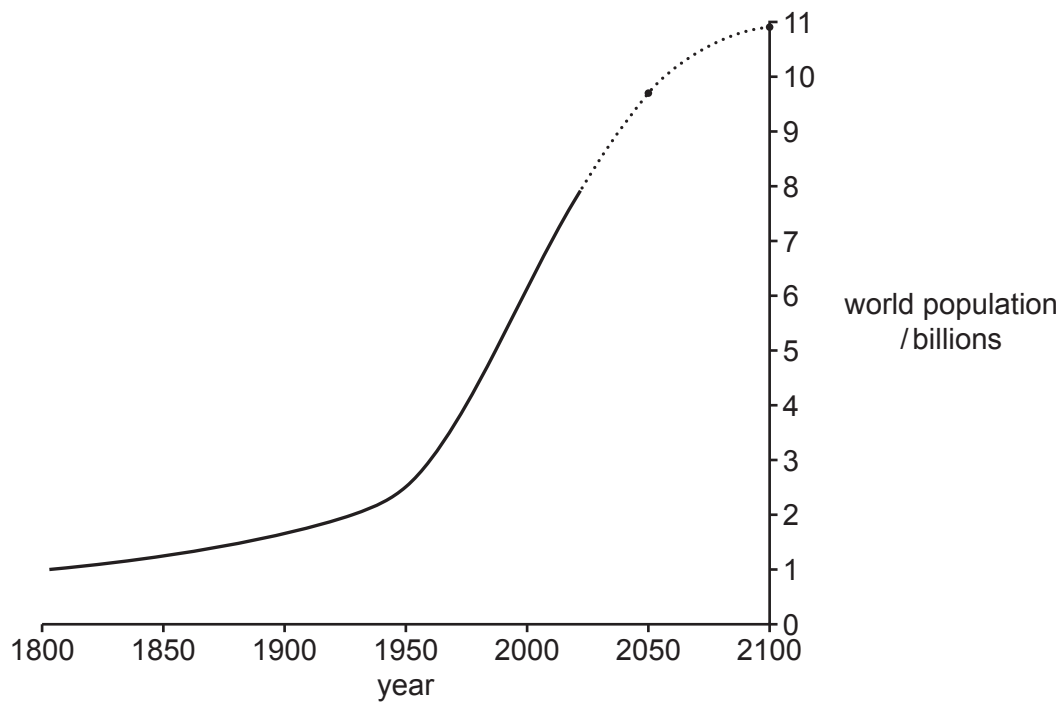


Fig. 1.1

- (i) Describe the change in world population, shown in Fig. 1.1, between 1800 and 2022 and how it is predicted to change until 2100.

1800–2022

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2022–2100

.....

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[3]

- (ii) Some national policies aim to limit the increase in human population.

Describe **three** strategies that governments could introduce to limit the increase in human population.

1

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2

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3

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[3]

(c) Fig. 1.2 shows a population pyramid for Italy. Italy is a country in Europe.

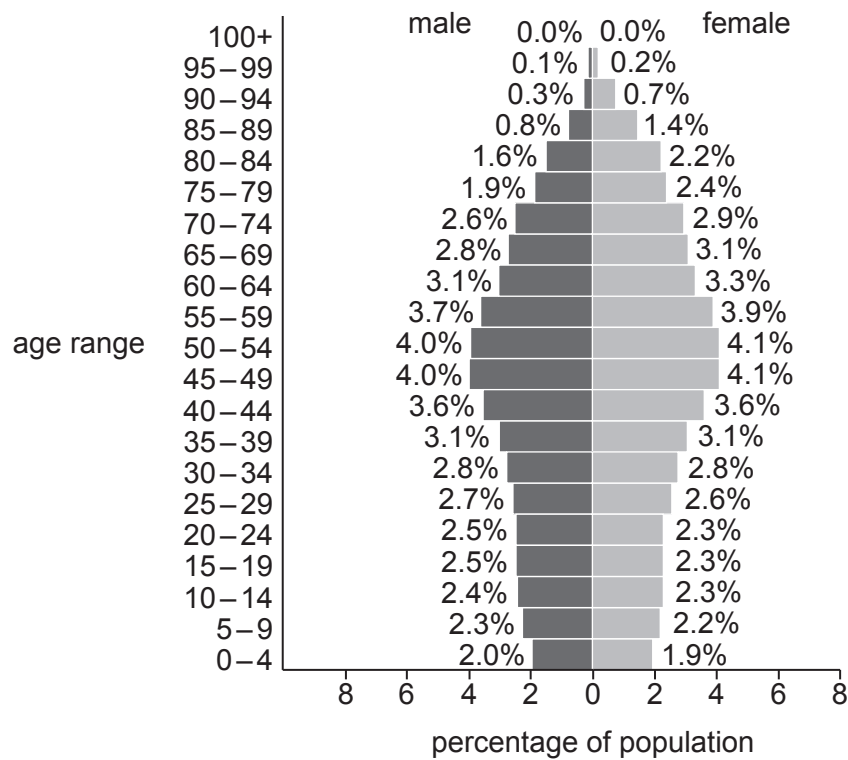


Fig. 1.2

Fig. 1.3 shows a population pyramid for Kenya. Kenya is a country in Africa.

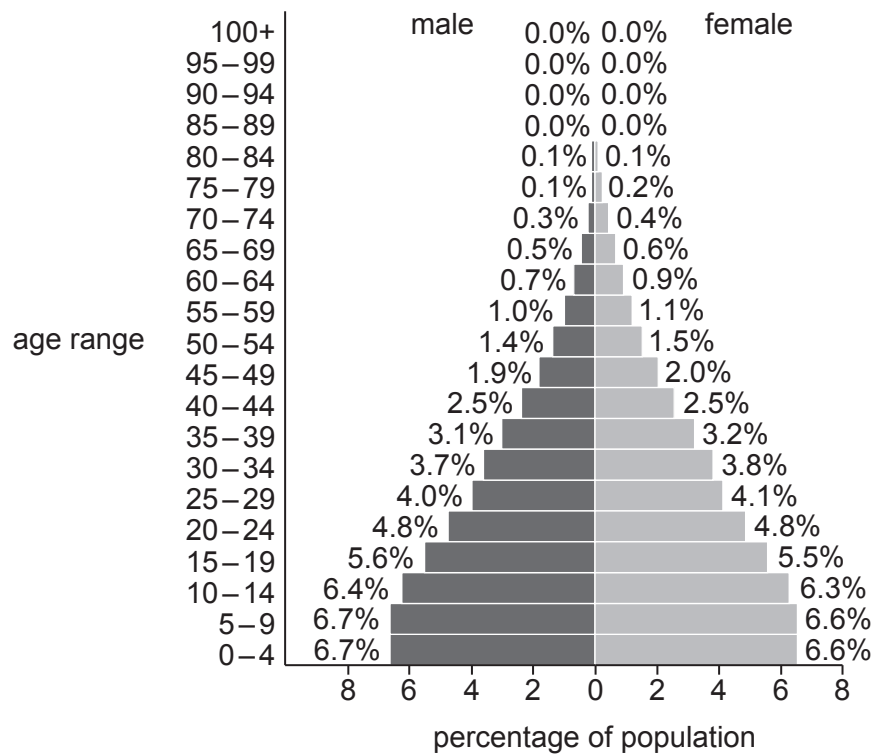


Fig. 1.3

- (i) Compare the population pyramids for Italy and Kenya in Fig. 1.2 and Fig. 1.3.

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..... [3]

- (ii) Suggest reasons for the differences in the population pyramids of Italy and Kenya in Fig. 1.2 and Fig. 1.3.

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..... [4]

[Total: 15]

- 2 (a) Fig. 2.1 shows the Three Gorges Dam on the Yangtze River in China.



Fig. 2.1

The Three Gorges Dam is the largest capacity hydroelectric dam in the world. The dam has 34 hydroelectric generators that can generate the same amount of electricity as 10 nuclear power stations. The dam cost \$32 billion but the cost was recovered by the sale of electricity after just two years of the dam being fully operational. The construction of the dam resulted in a large area of land being flooded. This meant that more than one million people were relocated from their homes.

- (i) One reason for building the Three Gorges Dam was to improve energy security.

State **four** causes of energy insecurity.

- 1
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- 2
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- 3
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- 4
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[4]

- (ii) The Three Gorges Dam generates electricity. This helps reduce energy insecurity.

Suggest **three** other reasons why it was important for the government to build the Three Gorges Dam.

1

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2

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3

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[3]

- (iii) Hydroelectric power generated from the dam is a renewable resource.

State **one** other renewable energy resource.

..... [1]

(b) Fig. 2.2 shows a Chinese paddlefish, *Psephurus gladius*.

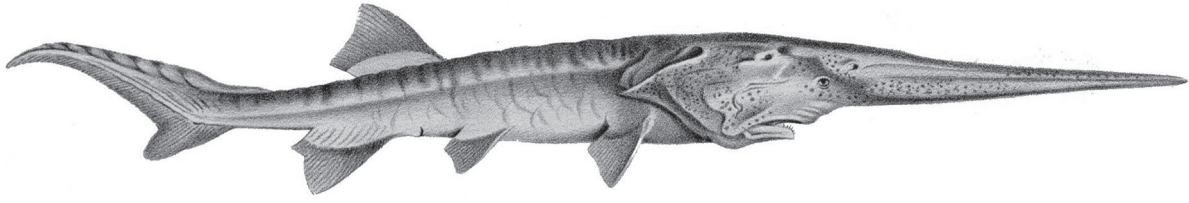


Fig. 2.2

The last known habitat for the Chinese paddlefish was the Yangtze River. In 2010, the International Union for Conservation of Nature (IUCN) Red List stated that the Chinese paddlefish was critically endangered with a population of less than 50 adults in the wild.

(i) State **four** strategies that can increase the population of critically endangered fish.

- 1
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- 2
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- 3
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- 4
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[4]

(ii) Describe the role of the IUCN Red List.

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[3]

- (c) The construction of the Three Gorges Dam was opposed by many people because of its effect on endangered species.

Suggest **other** reasons why the construction of the Three Gorges Dam was opposed by many people.

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..... [4]

[Total: 19]

- 3** Polybrominated diphenyl ethers (PBDEs) are a group of volatile organic compounds that are sprayed onto fabrics to make them flame resistant.

PBDEs are a pollutant. In 1981, scientists in Sweden detected PBDEs in fish in the Viskan River. Since then, PBDEs have been found in many organisms, including humans.

- (a)** Suggest how PBDEs that were sprayed on fabrics can eventually be found in humans.

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- (b) (i)** PBDEs are toxic to humans. They are often disposed of at sea.

Evaluate disposal at sea as a waste management strategy for PBDEs.

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..... [4]

(ii) Suggest **three** strategies for limiting the impacts of PBDEs.

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- 2
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- 3
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[3]

(c) Table 3.1 shows the concentration of PBDEs in samples of fish in the USA.

Table 3.1

fish species	mean concentration of PBDEs /parts per billion	number of fish in sample
halibut	13	42
salmon	12	4
small mouth bass	21	15
white croaker	39	19

One conclusion from the data stated that 'salmon have the lowest mean concentration of PBDEs'.

Do you agree with this conclusion? Give a reason for your answer.

.....

..... [1]

[Total: 13]

- 4 (a) Scientists are using the concept of 'big data' to find deposits of minerals. Potential sites are then investigated to determine if deposits of minerals are actually present.

(i) Describe what is meant by the term 'big data'.

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..... [2]

(ii) The analysis of 'big data' has limitations.

Suggest **three** limitations of using 'big data' to find mineral deposits.

1

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2

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3

..... [3]

- (b) Zircon is a mineral used in the steel and electronics industries. Zircon can be extracted by dredge mining. Dredge mining removes material from the bottom of lakes and rivers.

Fig. 4.1 shows dredge mining in a freshwater lake in Mozambique, Africa.



Fig. 4.1

- (i) Suggest the impacts of dredge mining zircon. Include positive and negative impacts in your answer.

positive impacts

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negative impacts

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[5]

- (ii) Suggest how the extraction of zircon from freshwater lakes can be managed sustainably.

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..... [3]

[Total: 13]

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