19. Organisms and their environment

19.4 Populations

Paper 3 and 4

Question Paper

Paper 3

Questions are applicable for both core and extended candidates

1 A population of a species of fish was accidentally introduced into a lake.

(a) State **two** features that can be used to classify this introduced species as a fish.

1 .....

2 .....

[2]

(b) Describe what is meant by the term population.

.....

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..... [2]

(c) Fig. 4.1 shows the changes in the population size of the introduced fish species in the lake between 2004 and 2010.

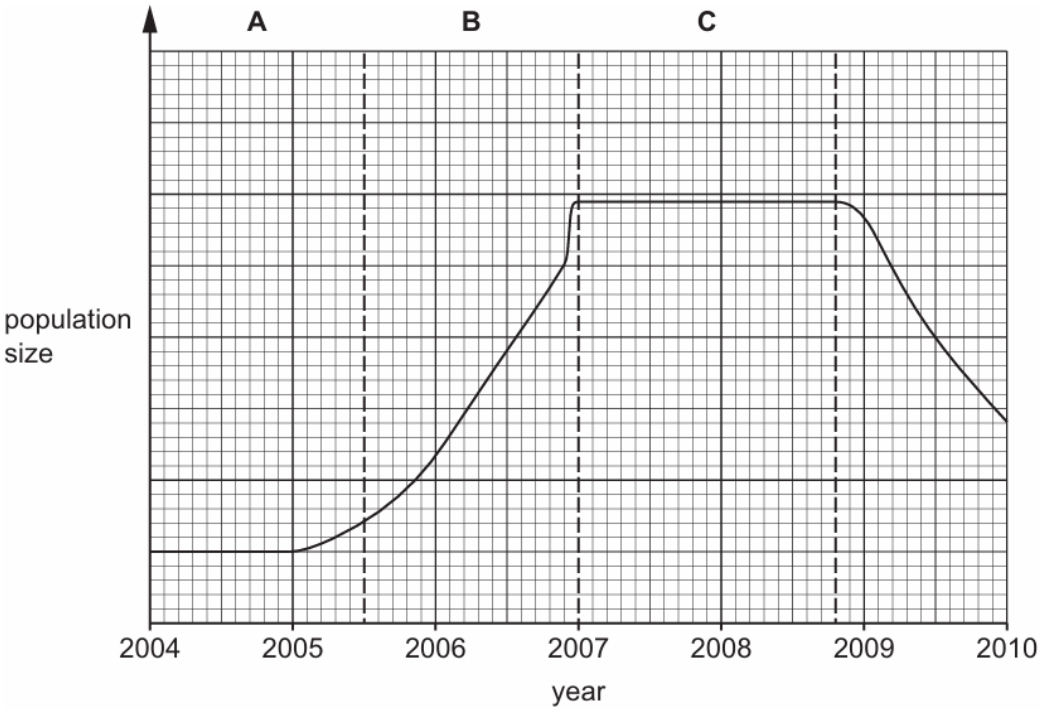

Fig. 4.1

(i) The boxes on the left show the letters identifying the sections of the graph in Fig. 4.1.

The boxes on the right show the phases of population growth.

Draw lines to link each letter with the correct phase.

Draw **three** lines.

letter from Fig. 4.1	**phase**
A	death
B	exponential (log)
C	lag
	stationary

[3]

(ii) Describe possible reasons for the change in population size between 2009 and 2010 in Fig. 4.1.

.....

.....

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.....

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..... [3]

[Total: 10]

2 **(a)** The boxes on the left show two terms.

The boxes on the right show the descriptions of some terms.

Draw **one** line to link each term to its description.

Draw **two** lines.

term	description
	a group of organisms that can reproduce to produce fertile offspring
	all of the populations of different species in an ecosystem
community	
	an organism that gets its energy by feeding on other organisms
	a group of organisms of one species, living in the same area, at the same time
population	
	the position of an organism in a food chain, food web or ecological pyramid
	a unit containing the different species of organisms and their environment, interacting together

[2]

(b) The growth of bacteria in a flask containing nutrients was monitored for six hours.

The number of **live** bacteria per cm^3 was estimated every 30 minutes.

Fig. 6.1 shows the results.

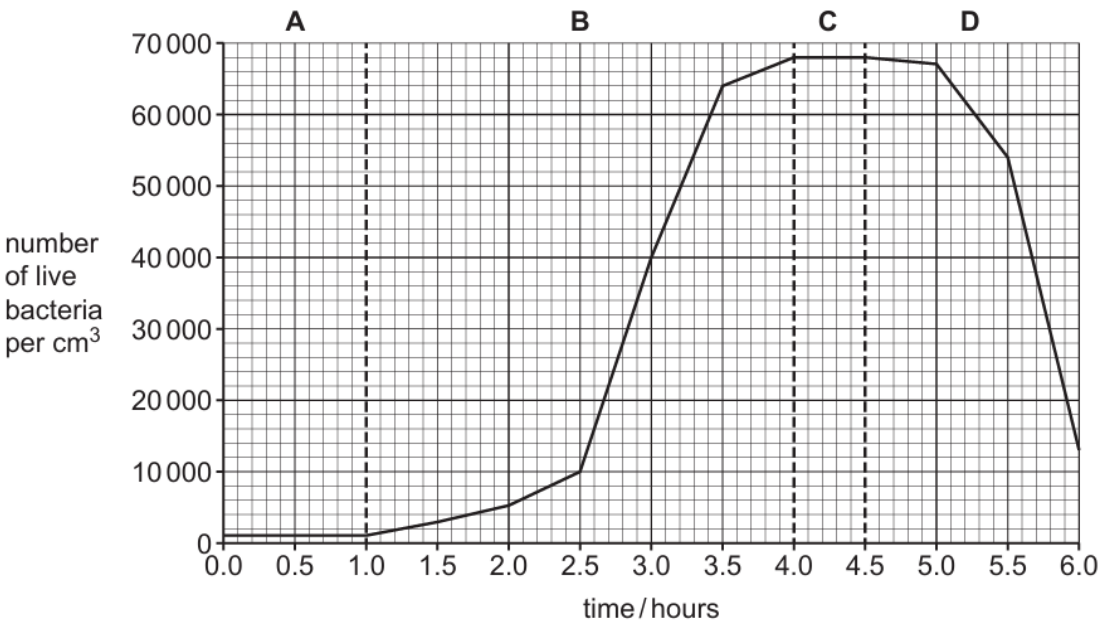

Fig. 6.1

(i) The data in the graph has been divided into four phases: **A**, **B**, **C** and **D**.

The list shows the names of the four phases.

death **exponential** **lag** **stationary**

Use the words from the list to identify phases **A**, **B**, **C** and **D** shown in Fig. 6.1.

A .....

B .....

C .....

D .....

[2]

(ii) Complete the sentences using the data shown in Fig. 6.1 and your knowledge.

The number of live bacteria in phase **A** remained at .....

per cm^3.

In phase **B** the number of live bacteria doubled between 2.0 hours and

..... hours.

The maximum number of live bacteria occurred in phase ..... .

In phase ..... the number of live bacteria decreased because

the bacteria did not have enough ..... .

[5]

[Total: 9]

3 **(a)** The population of leatherback turtles in one part of the Pacific Ocean was monitored over several years.

The population numbers were estimated and the results are shown in Fig. 3.1.

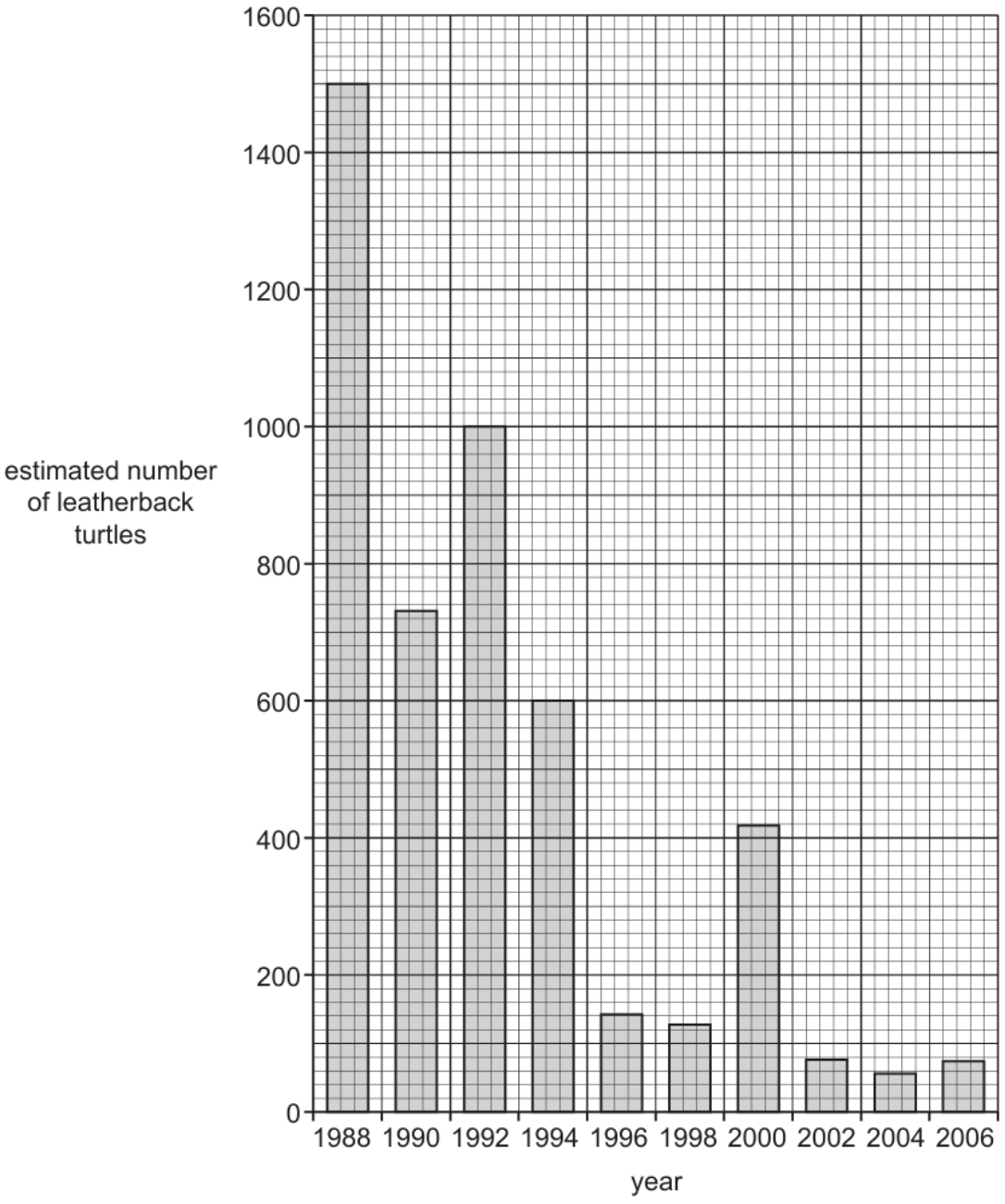

Fig. 3.1

(i) State the year with the lowest estimated number of leatherback turtles shown in Fig. 3.1.

..... [1]

(ii) Using the information in Fig. 3.1, calculate the percentage decrease in the number of turtles between 1988 and 1994.

Space for working.

..... %
[2]

4 **(a)** Define the term population by completing the sentence.

A population is a group of organisms of one ....., living in the same ....., at the same ..... . [3]

(b) The human population size of one country was monitored between 1950 and 2010.

Fig. 8.1 shows the results.

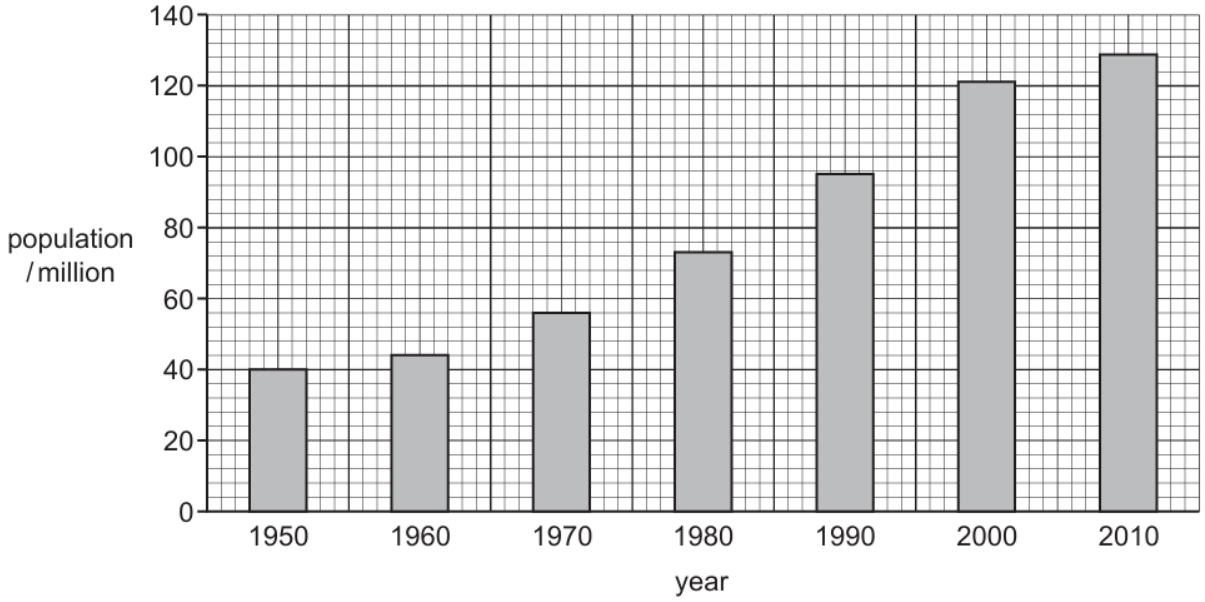

Fig. 8.1

(i) Calculate the difference in population size between 1950 and 2010.

..... million [1]

(ii) State the year when the population size was 56 million.

..... [1]

(c) State **three** factors that can cause an increase in population size.

1 .....

2 .....

3 .....

[3]

(d) Discuss the negative impacts on the environment of a continual increase in the size of the human population.

.....

.....

.....

.....

.....

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.....

.....

..... [4]

[Total: 12]

5 **(d)** Lack of food can affect the population size of animals in ecosystems.

State **two other** factors that could decrease population size.

1 .....

2 .....

[2]

6 **(b)** The size of a rabbit population can increase and decrease from year to year, as shown in Fig. 5.1.

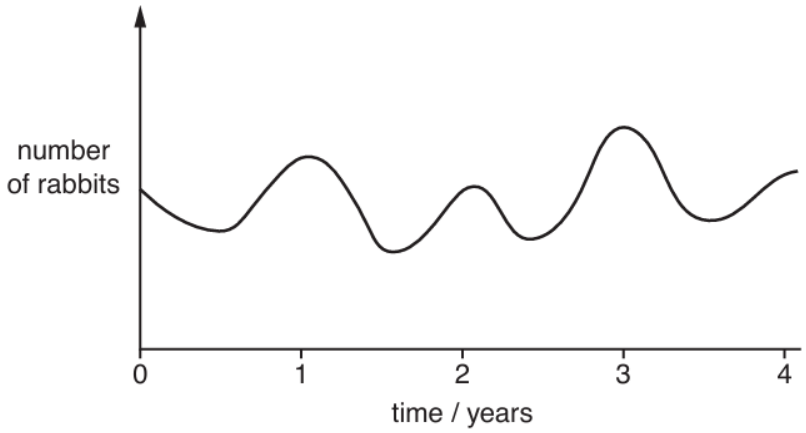

Fig. 5.1

State **two** factors that could cause an increase in a rabbit population.

1 .....

.....

2 .....

.....

[2]

(c) Since 1800 the population of humans in the world has increased dramatically.

State **three** ways in which this increase in the human population has affected marine ecosystems.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

7 Fig. 6.1 is a graph of the world's human population between the years 1000–2000.

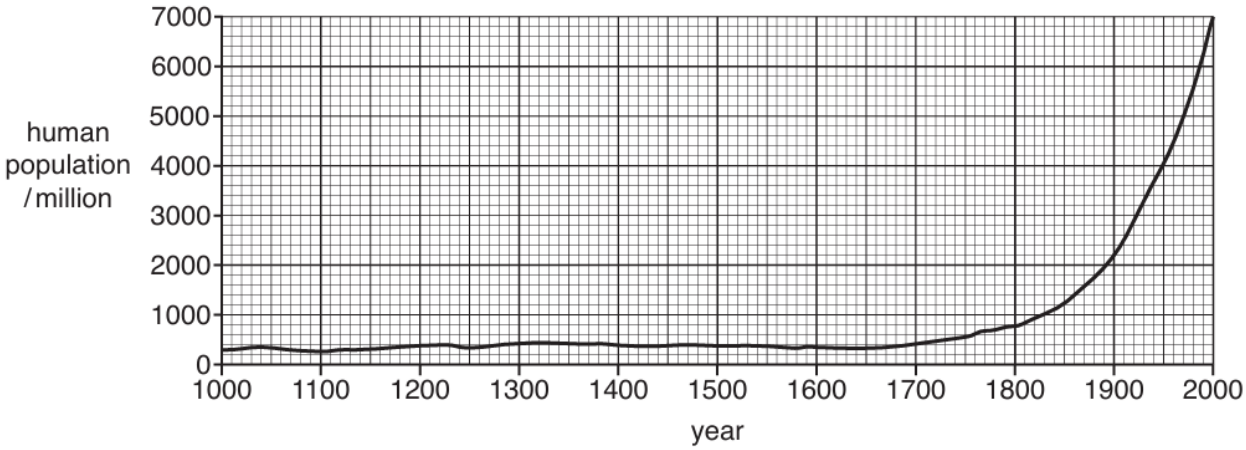

Fig. 6.1

(a) Describe the data shown in Fig. 6.1.

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..... [3]

(b) One explanation for the trend shown in the data after 1900 is the introduction of vaccinations.

Discuss other reasons that explain the trend seen after 1900 in Fig. 6.1.

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.....

..... [3]

(c) Populations in individual countries can decrease rapidly.

Suggest **two** reasons why.

1 .....

2 .....

[2]

Paper 4

Questions are applicable for both core and extended candidates

8 Fig. 5.1 shows Mackinlay's cuckoo-dove, *Macropygia mackinlayi*, which is found on most of the islands in the south-west of the Pacific Ocean.

Fig. 5.1

(a) Karkar Island is one island where Mackinlay's cuckoo-dove is found. This species is part of many communities that are adapted to the different habitats on the island.

(i) Define the term community.

.....

.....

..... [1]

(b) The highest point on Karkar Island is 1800 m above sea level.

In 1969, a researcher surveyed the bird species on Karkar Island. He recorded the vertical distribution of the birds between sea level and 1600 m.

In 2013, other researchers repeated the survey.

Fig. 5.2 shows the ranges of four species, as recorded in the two surveys. The vertical lines represent the range of heights where the birds were seen on the island.

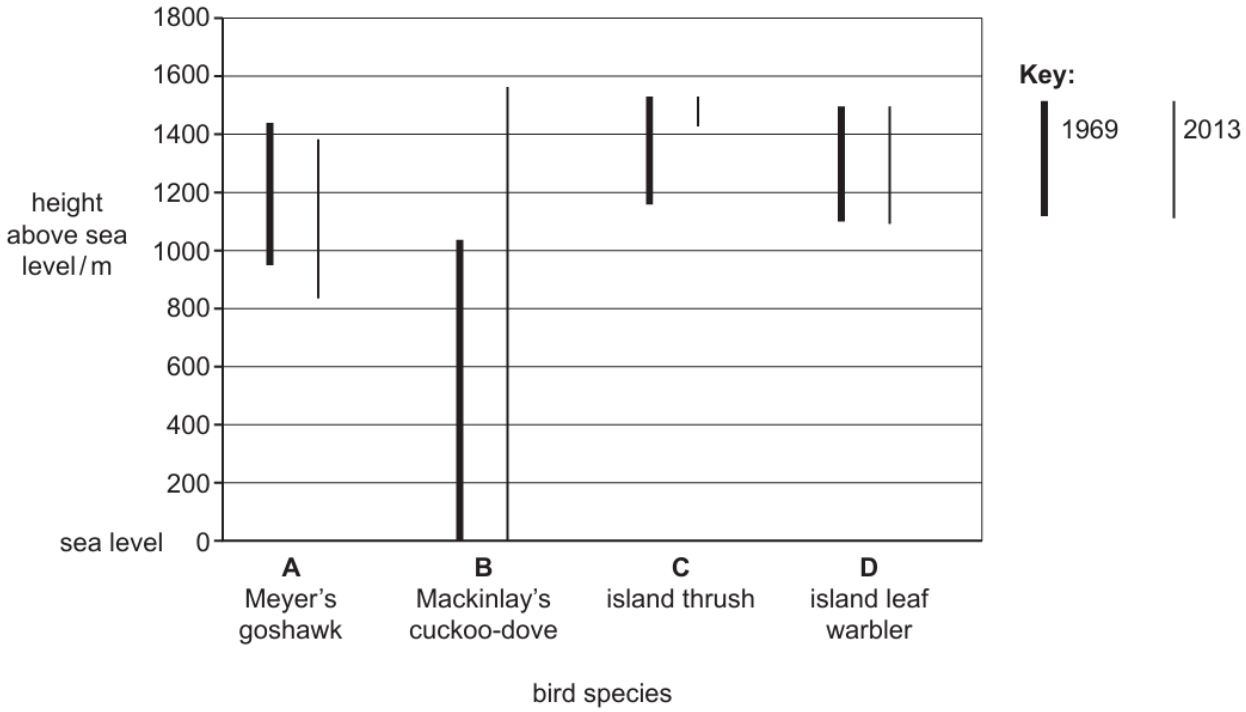

Fig. 5.2

(i) Compare the range in 1969 with the range in 2013 for each of the bird species shown in Fig. 5.2.

A .....

.....

B .....

.....

C .....

.....

D .....

.....

[4]

(c) Small oceanic islands are often inhabited by species of birds that are found nowhere else. Many of these species have decreasing populations and are often endangered.

Explain the risks to these species of birds that have decreasing populations.

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.....

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..... [3]

9 Coral reefs are important ecosystems.

(a) Complete the sentence about ecosystems.

An ecosystem can be defined as a unit containing the ..... of organisms and their ....., interacting together.

[2]