Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

ENVIRONMENTAL SCIENCE 8290/01

Paper 1

May/June 2003

1 hour 45 minutes

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
2	
3	
4	
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7	
8	
Total	

This document consists of **21** printed pages, **3** blank pages and an insert.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate
[Turn over

1 Fig. 1.1 shows three areas **A**, **B** and **C** of different surface air pressure in the northern hemisphere.

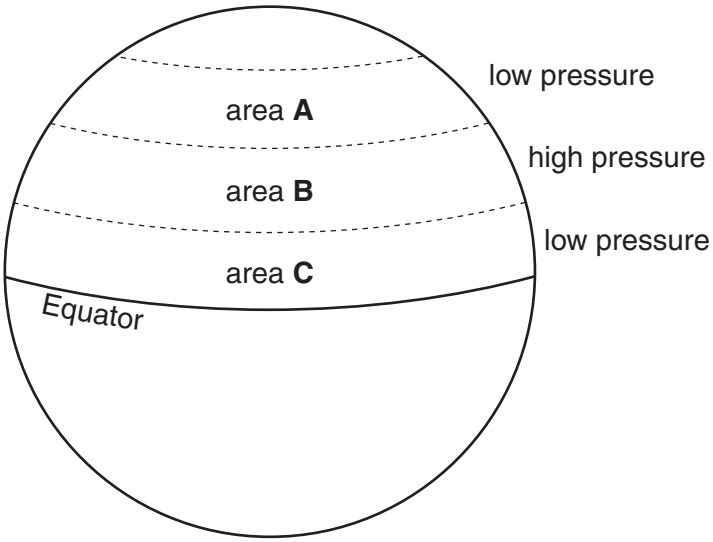

Fig. 1.1

(a) On Fig. 1.1 use arrows to show the general directions of air movement between

(i) areas **A** and **B,**

(ii) areas **B** and **C.** [2]

(b) Explain how the direction of air movement between these areas is influenced by the Earth's rotation.

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.....[2]

Fig. 1.2 shows an outline map of a typical frontal depression, also known as a cyclone.

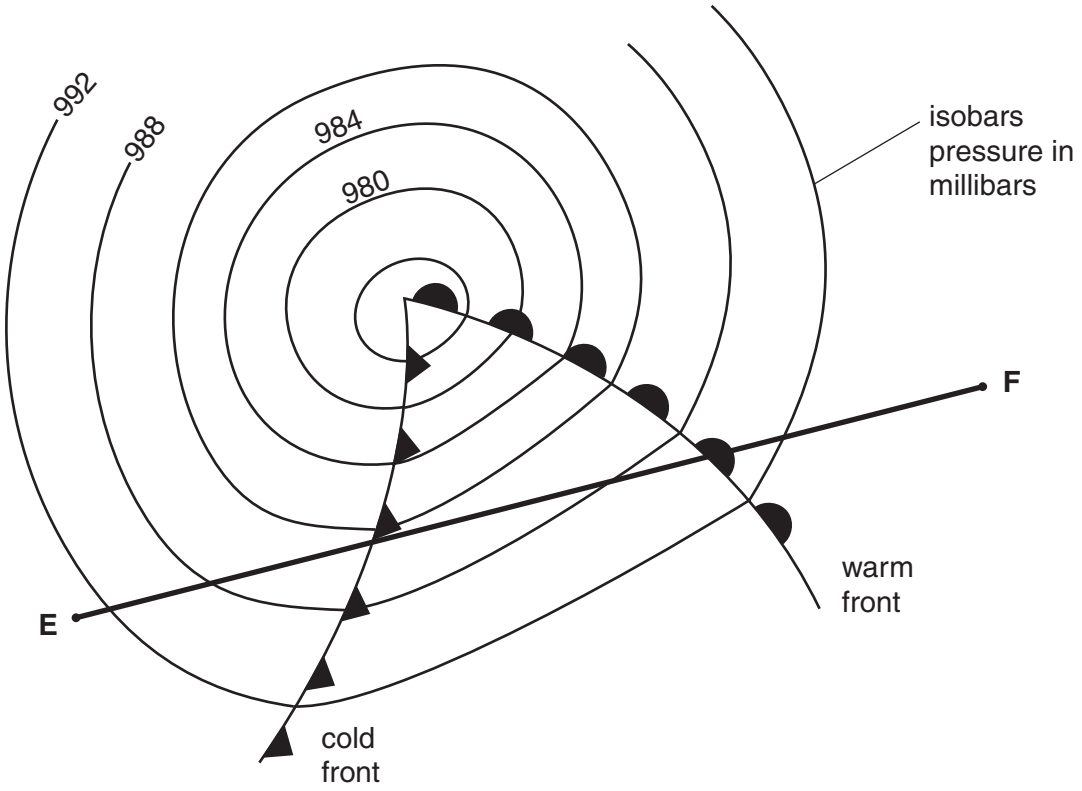

Fig. 1.2

(c) Line **E** to **F** on Fig. 1.2 is used in Fig. 1.3.
Use Fig. 1.3 to construct a cross section through the frontal depression. Label the warm front, the cold front, an area of stratus cloud and an area of cumulo-nimbus cloud. [4]

Fig. 1.3

(d) Describe the temperature, air pressure and rainfall pattern which would accompany the passage of the cyclonic system shown in Fig. 1.2.

temperature .....

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air pressure .....

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rainfall .....

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.....[6]

2 Fig. 2.1 shows the Carbon Cycle.

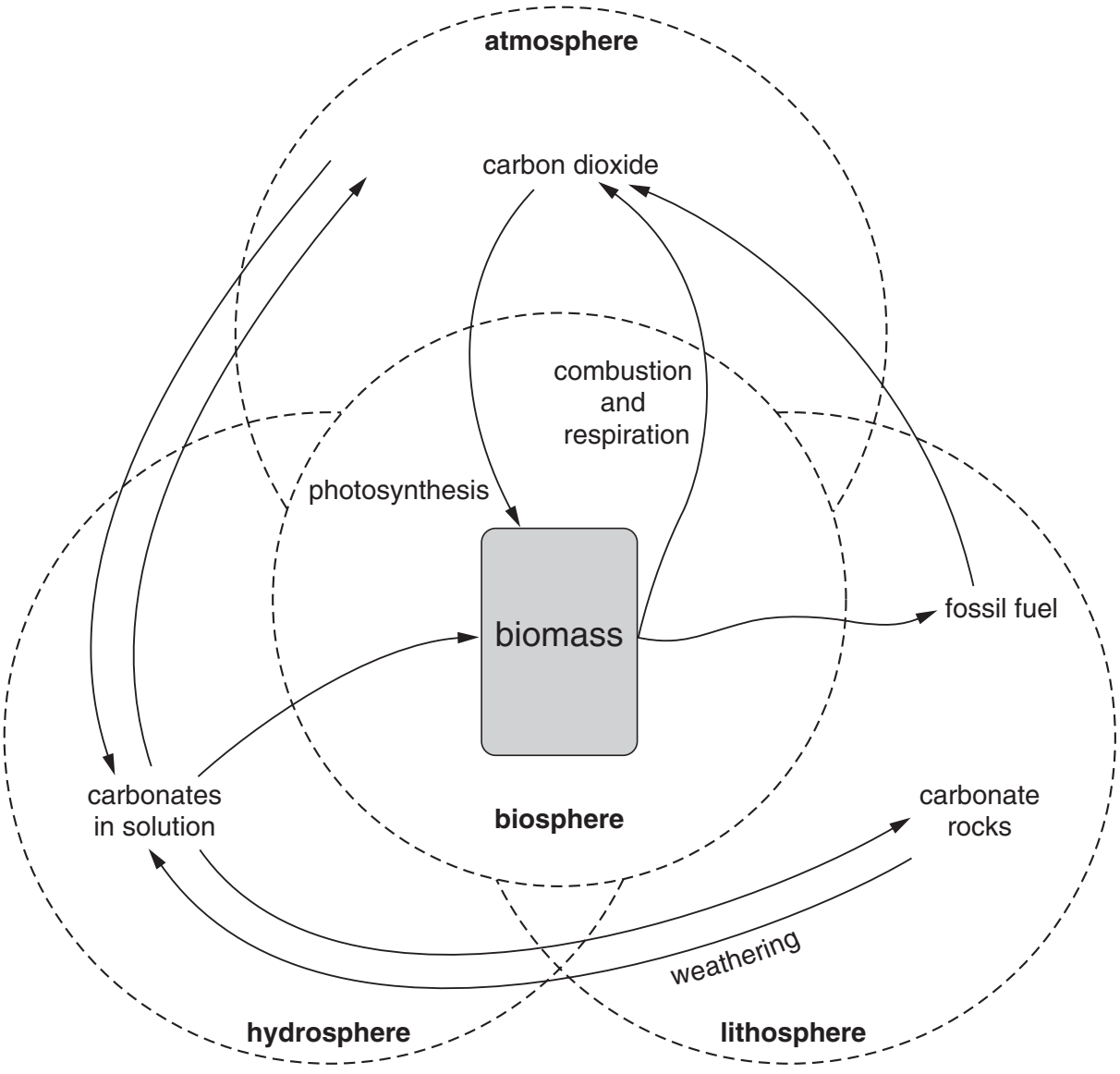

Fig. 2.1

(a) Explain the meaning of the arrows and labels in Fig. 2.1.

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(b) Describe how photosynthesis transfers carbon dioxide from the atmosphere to the biomass.

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(c) Give two reasons why it is important to understand the nature of *carbon sinks*.

1. .....

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2. .....

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.....[2]

(d) "One hundred and fifty of the world's major governments met in Kyoto, Japan, to discuss agreements to cut emissions of carbon dioxide, methane, nitrogen oxides, sulphur hexafluoride and hydrofluorocarbons, all important greenhouse gases. Industrialised nations agreed to reduce their emissions of greenhouse gases by, for example:

Canada	6%
EU	8%
Japan	6%
USA	7%

These must be achieved between 2001 and 2012.

The countries that really need to be involved said 'hell no' at Kyoto."

Suggest three reasons why many countries of the **developed** world have found it difficult to meet the requirements of the Kyoto protocol.

1. .....

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2. .....

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3. .....

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.....[6]

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Question 3 begins on the next page

3 The insert provided shows an area of tropical rain forest before and after burning.

(a) (i) Describe the structure of vegetation shown in photograph **A**.

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.....[3]

(ii) Name and explain the role of **one** abiotic factor important to the vegetation cover shown in photograph **A**.

factor .....

role .....

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.....[3]

(b) Photograph **B** shows the impact of burning on a former area of tropical rain forest. Describe three effects that forest burning could have on the area shown on photograph **B**.

1. .....

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2. .....

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3. .....

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.....[3]

(c) Table 3.1 contains data about the production and recycling of plant biomass within two ecosystems

Table 3.1

	total dry mass/kg m^{-2}		
ecosystem	new plant biomass produced per year	plant litter produced per year	humus content of soil
deciduous woodland	0.9	0.5	4.5
tropical rain forest	3.3	2.5	0.2

Explain the differences between the two ecosystems in the production of new plant biomass, plant litter and humus.

new plant biomass .....

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plant litter .....

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humus .....

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4 Fig. 4.1 shows 6 effects of the Earth's land surface and atmosphere on incoming and outgoing radiation.

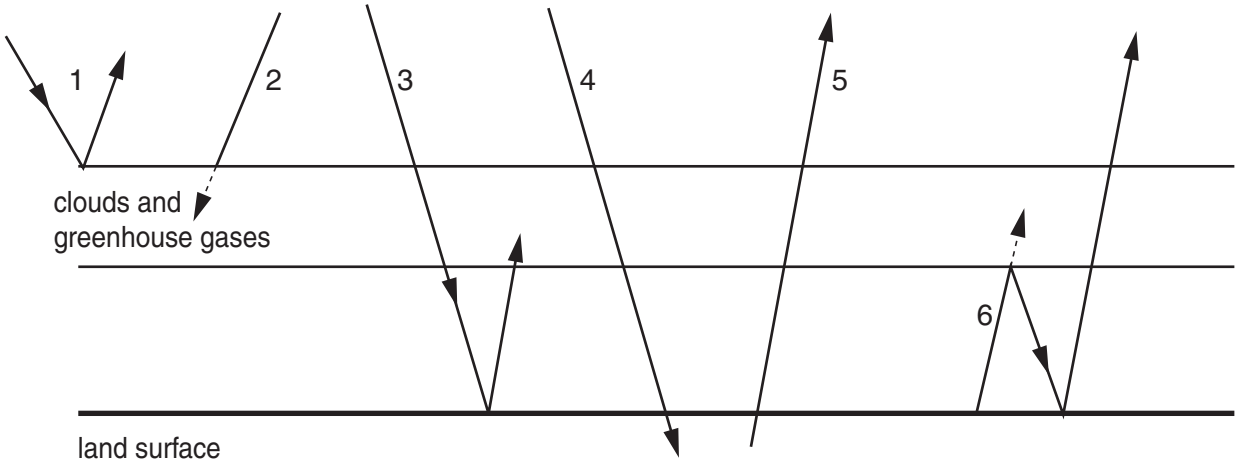

Fig. 4.1

(a) Complete Table 4.1 below by matching the number with the description of the effect. (As guidance number 4 is completed).

Table 4.1

description of the effect	number
The Earth's surface absorbs incoming radiation.	4
Radiation that is absorbed by the gases in the atmosphere. This warms the atmosphere.	
	3
As the Earth's surface is warmed and radiates heat, some of this escapes into space.	

[3]

(b) Explain the processes that are occurring in effects 1 and 6 in Fig. 4.1.

effect 1 .....

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effect 6 .....

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(c) Suggest **two** reasons for the way in which the amount of solar radiation reaching the Earth's surface varies with latitude.

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.....[2]

(d) Explain the meaning of the term *albedo.*

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(e) Explain why the Earth's albedo in high latitudes exceeds that in equatorial regions.

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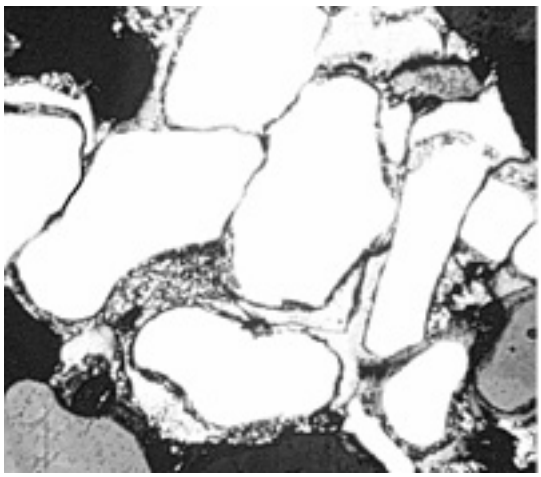
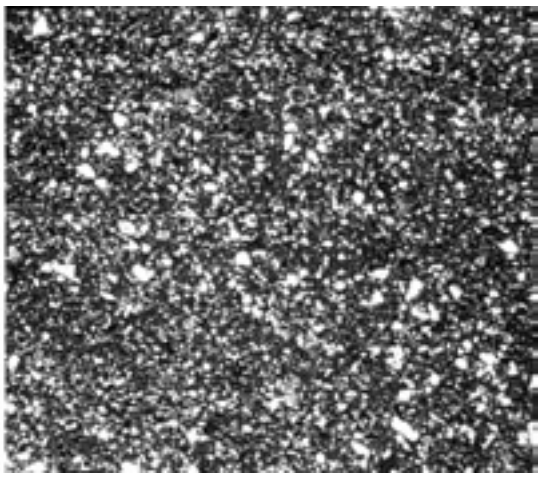
5 Fig. 5.1 shows thin sections of two sedimentary rocks **A** and **B**.

A



scale: ×30

B



scale: ×30

Fig. 5.1

In both sections the white minerals are quartz and the black minerals are ferro-magnesian.

(a) Describe the texture of rock **A**.

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.....[2]

(b) Describe the texture of rock **B**.

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.....[2]

(c) Describe the types of environment that would produce rocks **A** and **B**.

rock **A** .....

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rock **B** .....

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.....[4]

Fig. 5.2 shows a granite intrusion into some sedimentary rocks.

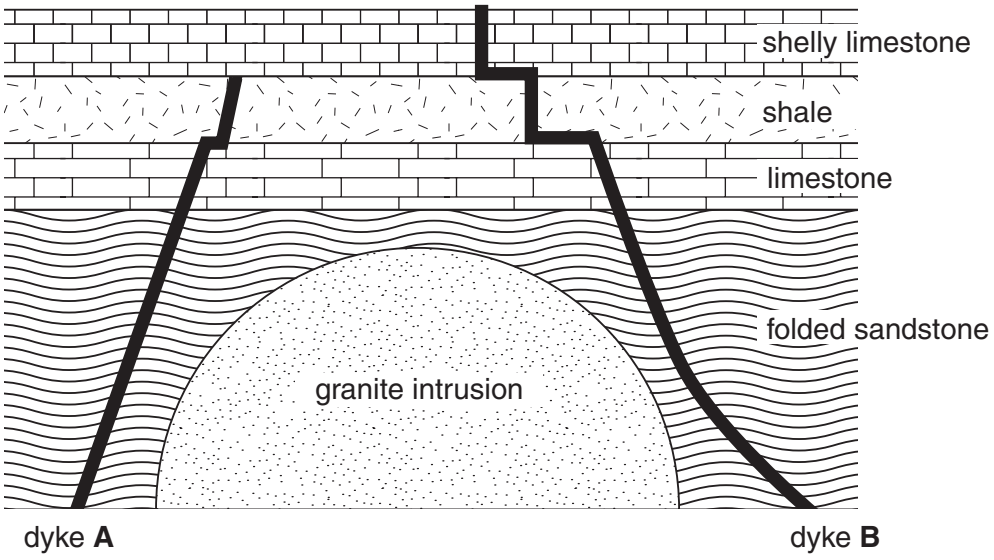

Fig. 5.2

(d) Describe the effect that the intrusion of the granite may have on the nearby sandstone.

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.....[2]

(e) What effect will the dykes have had upon the limestone and shale in the contact zone either side of each intrusion?

limestone .....

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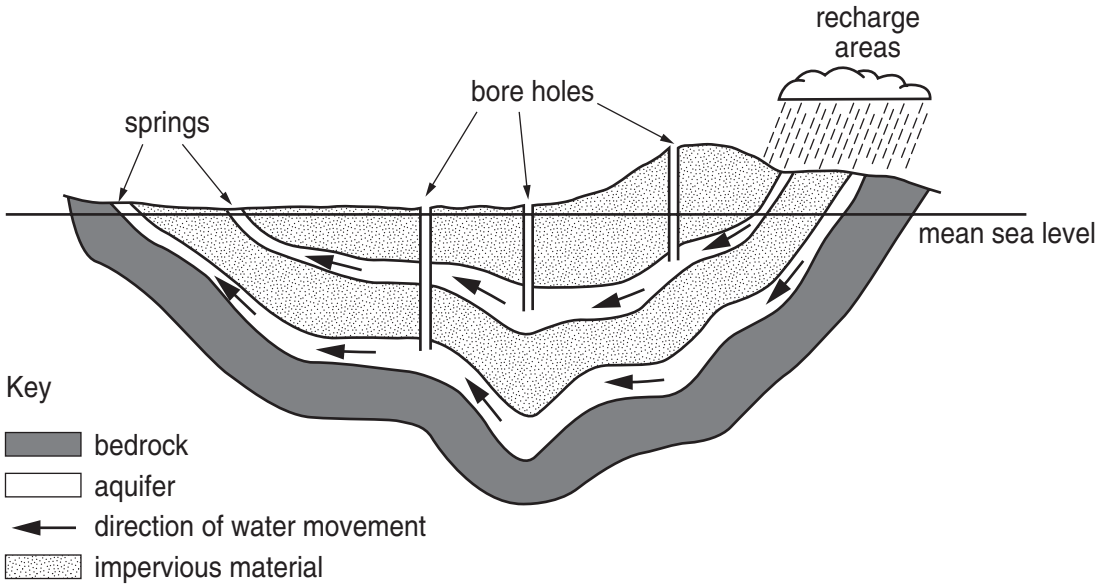
shale .....

.....[2]

6 Fig. 6.1 shows a cross section of an artesian basin.



operation of an artesian basin

Fig. 6.1

(a) What is groundwater?

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(b) Describe the geological conditions that have enabled the development of this artesian basin.

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.....[3]

(c) Why do springs occur in the areas labelled?

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.....[2]

(d) Give two reasons for the construction of the boreholes shown in Fig. 6.1.

1. .....

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2. .....

.....[2]

(e) An artesian basin is one example of a water storage zone. State **one** other example.

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7 Fig. 7.1 shows two ways in which population growth is related to the carrying capacity of an environment.

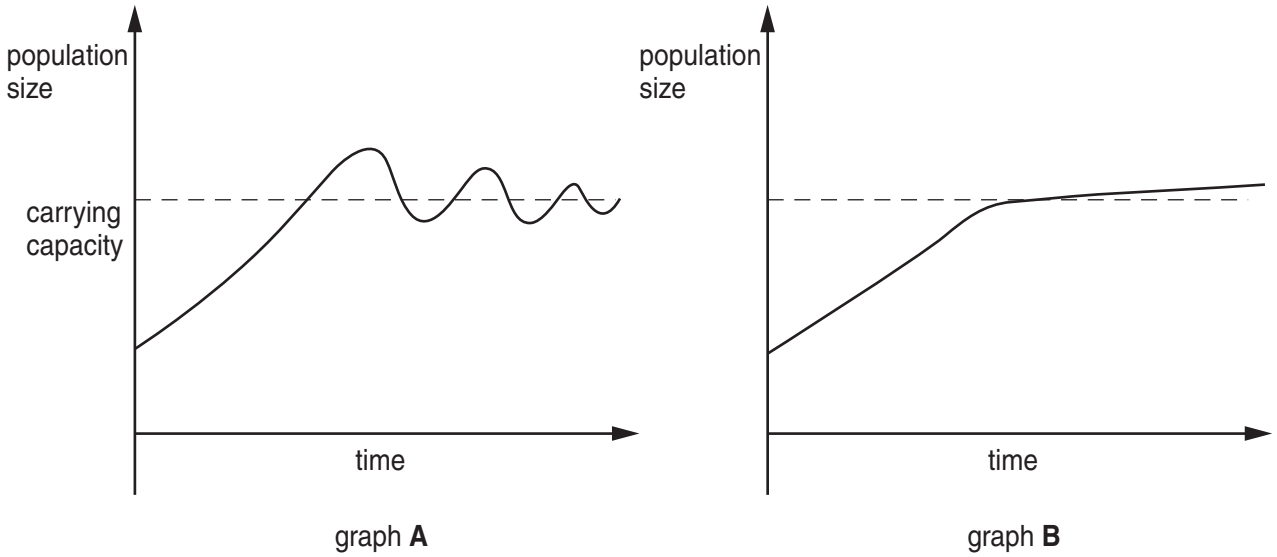

Fig. 7.1

(a) What is meant by *carrying capacity*?

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.....[2]

(b) Describe the type of population or species shown by

(i) graph **A**, ...

(ii) graph **B**. .....[2]

Fig. 7.2 is a model for the regulation of a population of fish.

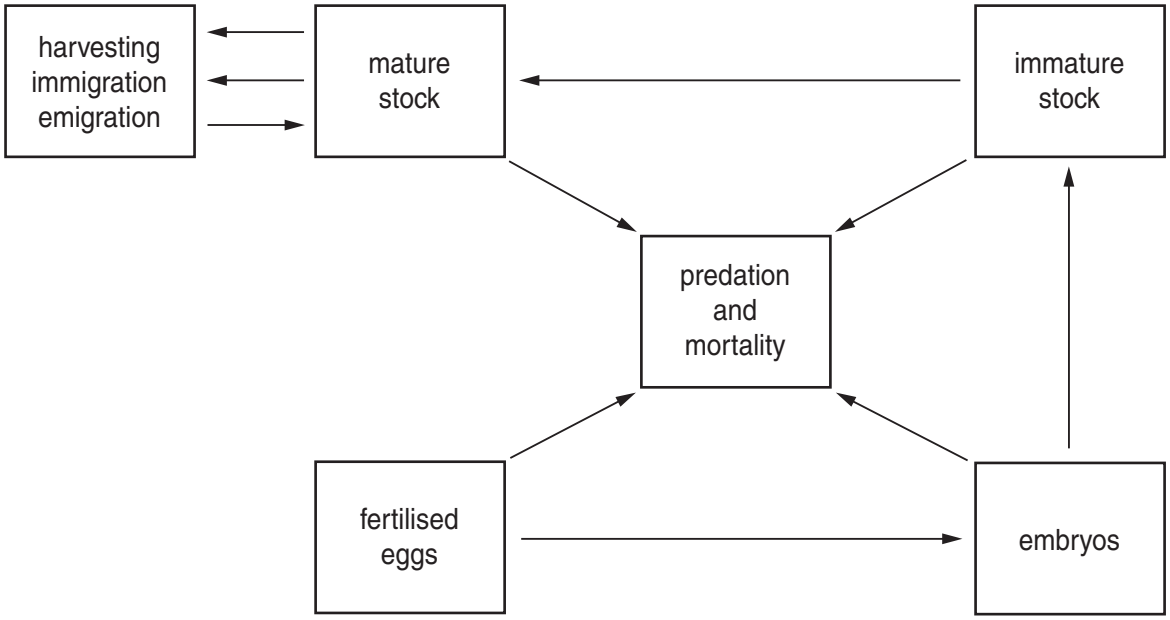

Fig. 7.2

(c) Describe the conditions under which the population of mature stock will remain stable.

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(d) The size of a population of a particular species is linked to the size of the predator population. Fig. 7.3. shows this relationship.

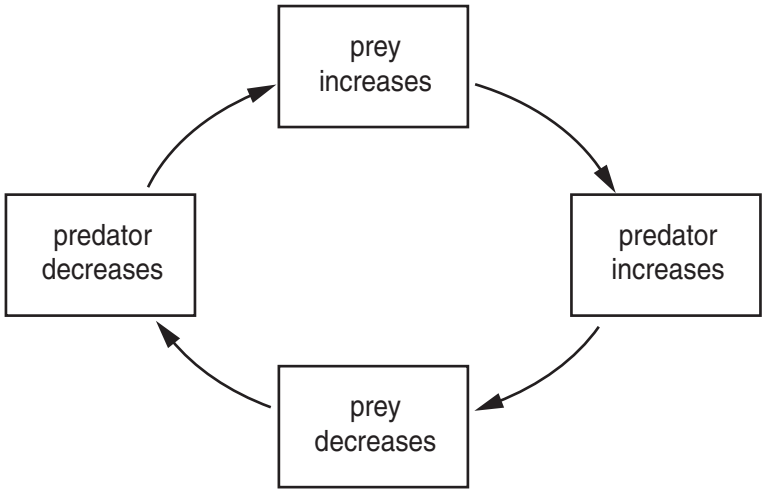

Fig. 7.3

Using an example your have studied, explain the relationship shown in Fig. 7.3.

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8 Fig. 8.1 shows population pyramids for a developing country and a developed country.

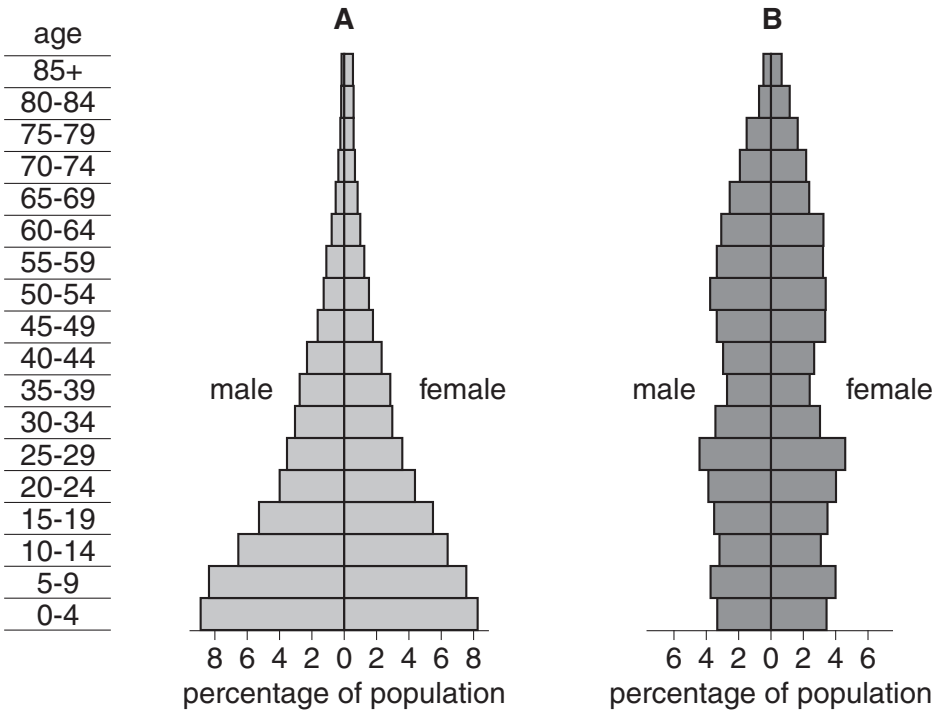

Fig. 8.1

(a) State the type of country that is represented by each pyramid.

A = _____

B = _____ [1]

(b) Explain the differences between the two countries in the population structure for

(i) the 0 to 14 age group,

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.....[2]

(ii) the over 65 age group.

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(c) Fig. 8.2 shows three possible paths for future world population growth.
State a possible reason for each path.

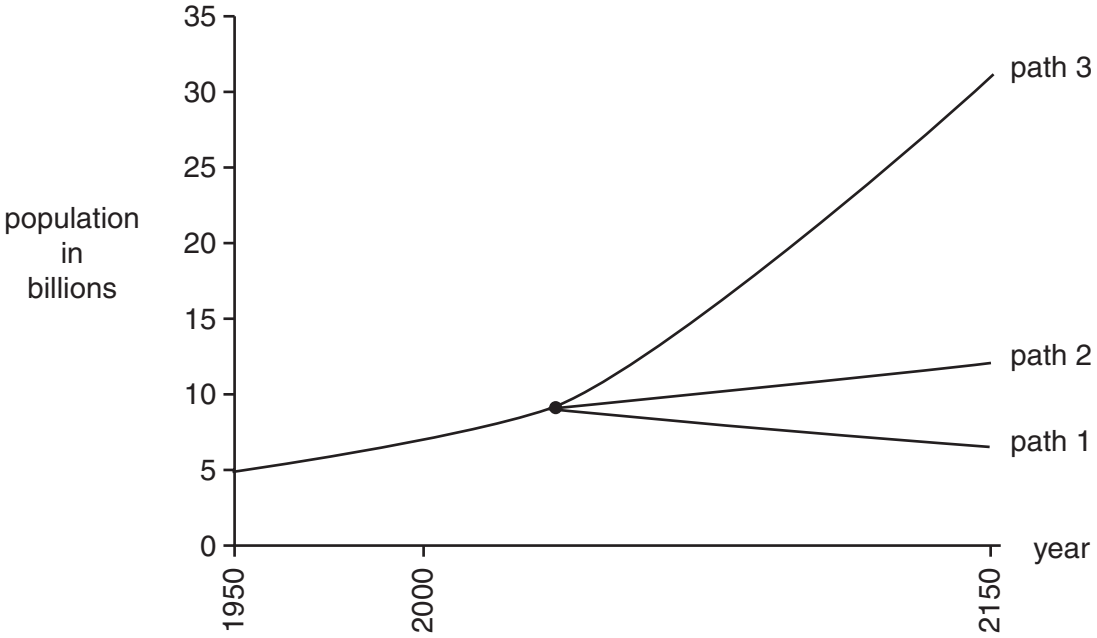

Fig. 8.2

path 1 .....

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path 2 .....

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path 3 .....

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(d) Using an example you have studied, state **one** adverse effect that a rapid increase in population has had upon its physical environment. Explain the effect.

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