Centre Number	Candidate Number

Candidate Name _____

CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Advanced Subsidiary Level

ENVIRONMENTAL SCIENCE 8290/1

PAPER 1 **MAY/JUNE SESSION 2002**

1 hour 45 minutes

Candidates answer on the question paper.
No additional materials are required.

TIME 1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The marks allocated are an indication of the length of answer required.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	

This question paper consists of 15 printed pages and 1 blank page.

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Local Examinations Syndicate

[Turn over

Answer **all** the questions.

Write your answers in the spaces provided.

1 Figs 1.1 to 1.7 show seven graphs in which the labels of the axes have been omitted.

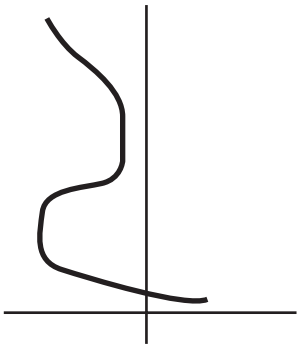

Fig. 1.1

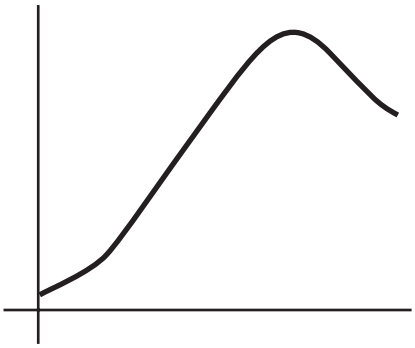

Fig. 1.2

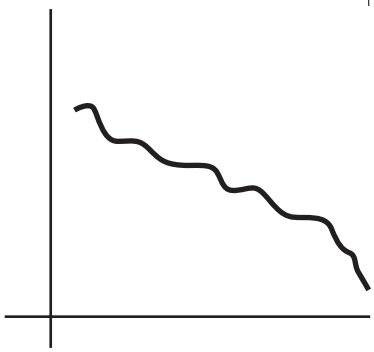

Fig. 1.3

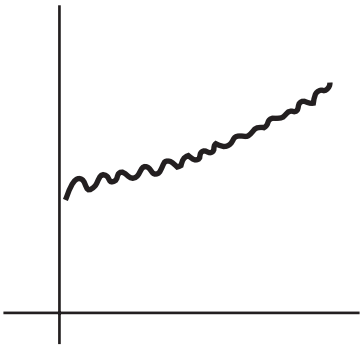

Fig. 1.4

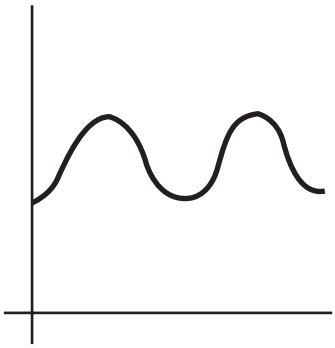

Fig. 1.5

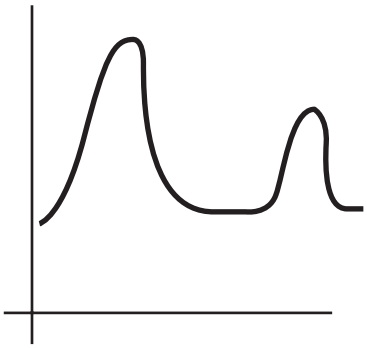

Fig. 1.6

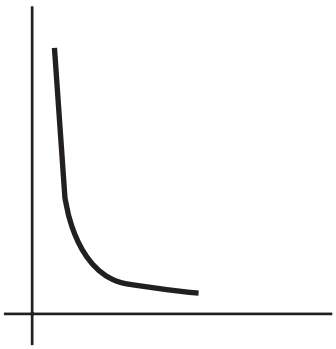

Fig. 1.7

Fig. 1.8 shows a list of the pairs of the missing labels.

vertical axis	horizontal axis	graph
concentration of gas in the atmosphere	altitude above sea level	Fig. 1.7
height above sea level	temperature	
carbon dioxide concentration in the atmosphere	time (last forty years)	
length of daylight 60° N	time (two years Jan to Dec)	
relative absorption of solar radiation by chlorophyll	wavelength of visible light	
relative intensity of solar radiation	wavelength of radiation (ultraviolet to infra-red)	
average concentration of ozone in the Antarctic stratosphere	time (last thirty years)	

Fig. 1.8

(a) Match up each pair of axes from Fig. 1.8 with the appropriate graph from Figs 1.1 to 1.7 and write your answers in the column labelled **graph** in Fig. 1.8.

The answer for Fig. 1.7 has been written in the appropriate space as an example. [6]

(b) (i) Explain what is meant by the term *Earth's albedo*.

.....

.....

.....[2]

(ii) Suggest why the burning of tropical rainforests could increase or decrease the Earth's albedo.

increase .....

.....

.....[2]

decrease .....

.....

.....[2]

2 The changes in numbers of separate populations of two species of beetle, **A** and **B**, were studied. They were in separate containers but they experienced the same conditions. Figs 2.1 and 2.2 show the population growth curves for the two types of beetle.

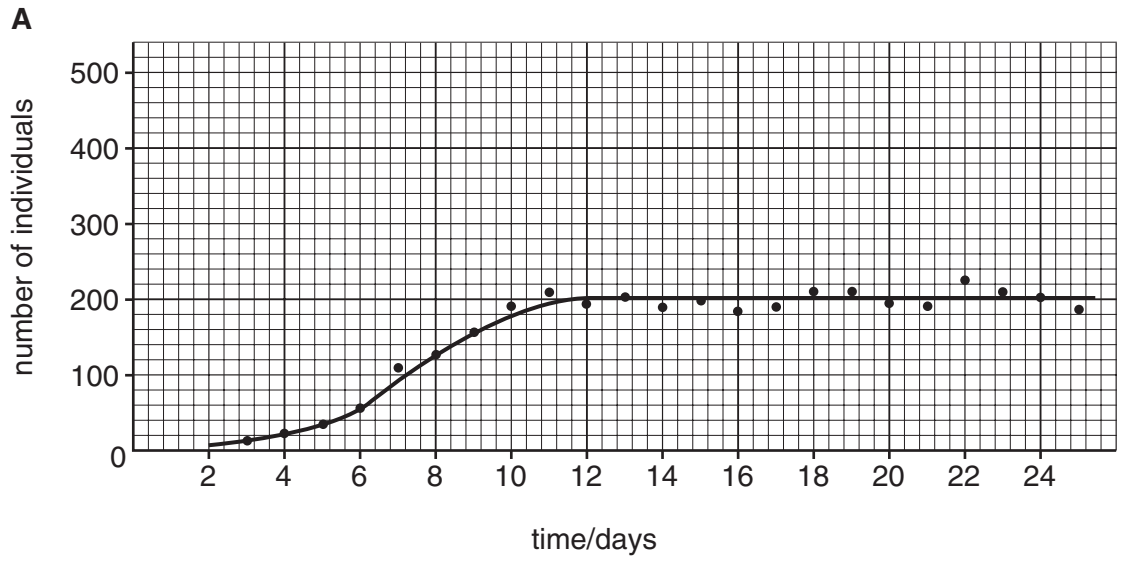

Fig. 2.1

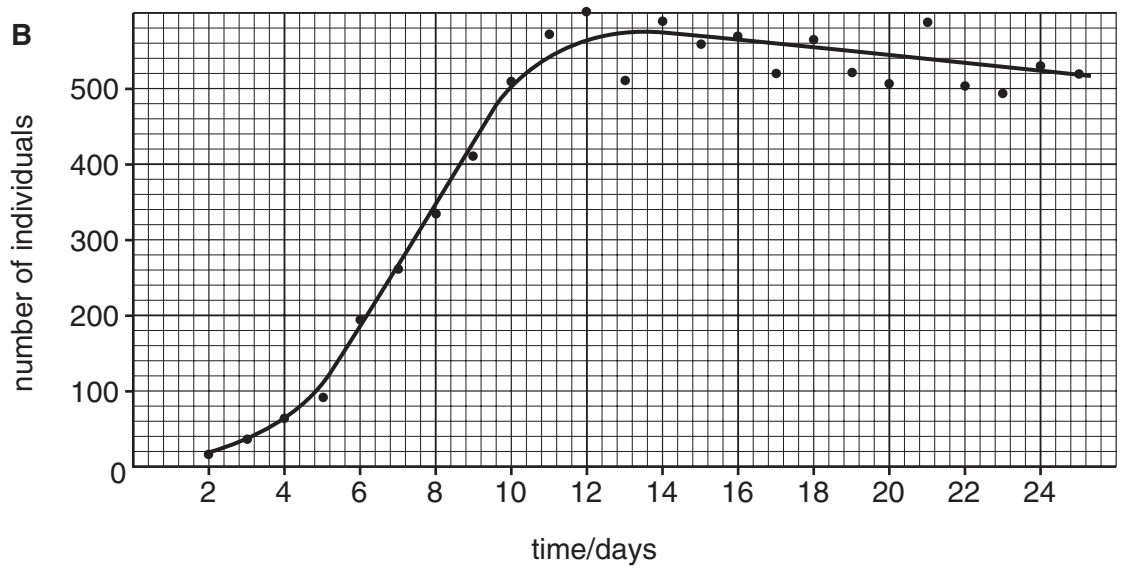

Fig. 2.2

(a) Name the type of population growth curve shown in Figs 2.1 and 2.2.

.....[1]

(b) Which population grows at the faster rate?

.....[1]

(c) Calculate the average growth rate of population **B** from day 4 to day 10.
Show your working.

[2]

In another experiment the two types of beetle were placed in the same container and the changes in their numbers were studied.

Fig. 2.3 shows the population growth curves for the two types of beetle in this experiment.

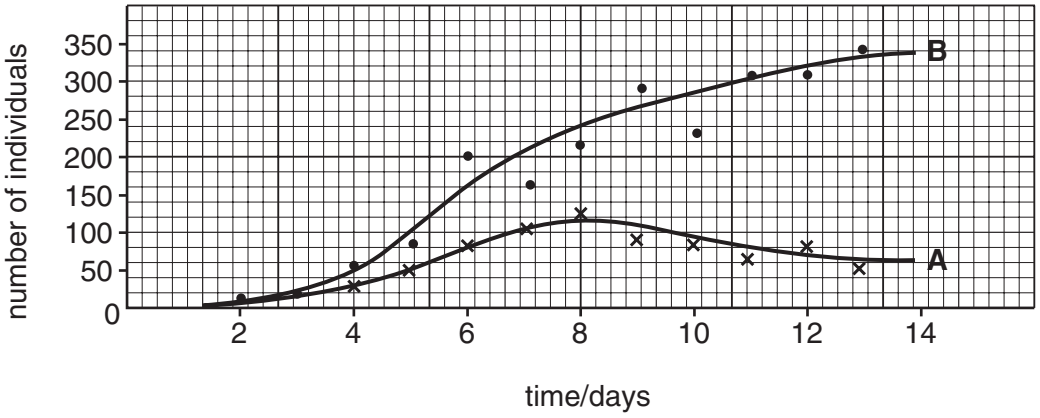

Fig. 2.3

(d) The presence of one type of beetle affects the population of the other type of beetle.

Give **three** pieces of evidence in support of this statement.

.....

.....

.....

.....[3]

(e) Suggest **three** reasons why the presence of one type of beetle could affect the size of the population of the other type of beetle.

.....

.....

.....

.....[3]

3 **(a)** Explain what is meant by the term

(i) *sedimentary* rock, ...

.....

.....[2]

(ii) *igneous* rock, ...

.....

.....[2]

(iii) *metamorphic* rock. .....

.....

.....[2]

Fig. 3.1 shows a section through a number of rocks.

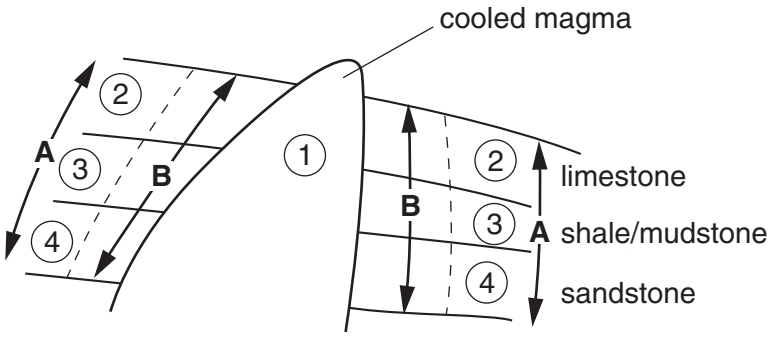

Fig. 3.1

(b) By using the numbers 1, 2, 3 and 4, identify which rocks are

(i) sedimentary, ...[1]

(ii) igneous. .....[1]

(c) Explain why the rocks in region **A** are different from those in region **B**.

.....

.....[2]

(d) Rock contains a number of different minerals.

Explain the difference between a rock and a mineral.

.....

.....[1]

4 Weathering is the disintegration and decomposition of rock in its original position (in situ). It can be divided into three main types – biological, chemical and physical.

(a) (i) Describe **one** example of **biological** weathering.

.....

.....

.....[2]

(ii) Describe **one** example of **chemical** weathering.

.....

.....

.....[2]

(iii) Describe **one** example of **physical** weathering.

.....

.....

.....[2]

(b) Soil is formed by the progressive weathering of parent rock.

Outline three differences between weathered rock and soil.

1 .....

2 .....

3 .....[3]

(c) Rivers, ice and wind can act as agents of the processes of erosion, transport and deposition.

Give **one** example of each type of process.

erosion .....

.....

transport .....

.....

deposition .....

.....[3]

[Turn over

5 Fig. 5.1 shows a simplified form of the water cycle. The major storage zones and flows, in kg per year, are shown.

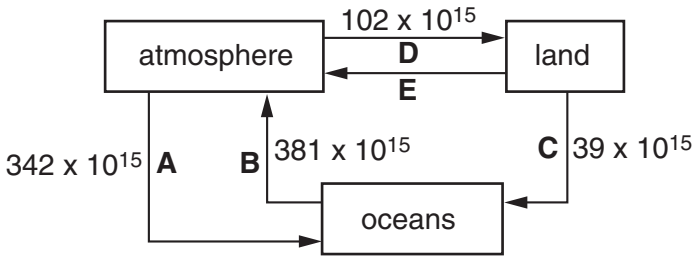

Fig. 5.1

(a) Name the processes **B** and **E**.

B is ..... **E** is .....[2]

(b) Some of the processes shown on Fig. 5.1 require an input of energy.

(i) Name the source of energy. .....[1]

(ii) By using one or more of the letters **A** to **E**, state which processes require an input of energy.

.....[1]

(c) Calculate the rate of process **E**. Show your working.

[2]

(d) Each storage zone contains a different quantity of water.

Which storage zone contains the largest quantity of water and which the smallest quantity?

largest ..... smallest .....[1]

(e) The water in the land storage zone can be divided into four smaller storage zones : groundwater,
ice caps/glaciers,
lakes,
rivers/streams.

Which zone contains the largest quantity of water and which the smallest quantity?

largest ..... smallest .....[1]

6 The climate of a region is influenced by the presence or absence of winds, ocean currents and large areas of land or water.

(a) Explain how the presence of a large area of water can influence a region's mean annual range in temperature.

.....

.....

.....

.....[2]

(b) Explain how the prevailing direction of winds can influence the climate of an area.

.....

.....

.....

.....[2]

Ocean currents, which can be described as either warm or cold, can transport large quantities of energy. Fig. 6.1 shows the Earth's major ocean surface currents.

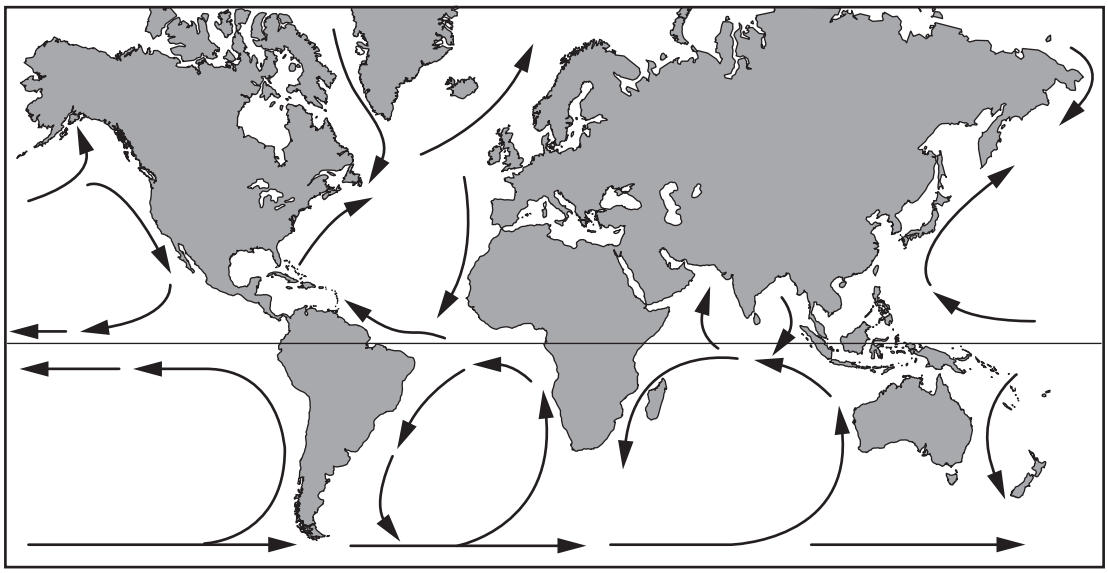

Fig. 6.1

(c) (i) Identify any **two** of the currents shown by labelling them on Fig. 6.1. [2]

(ii) Using the labels **w** (warm) and **c** (cold), label **two** warm and **two** cold currents shown in Fig. 6.1. [2]

(d) Describe **one** way in which a named ocean current influences the climate of a coastal area.

name of current .....

influence .....

.....[2]

7 Fig. 7.1 shows a diagrammatic view of the carbon cycle in terms of its major storage zones (boxes) and the flows of carbon between them (arrows).

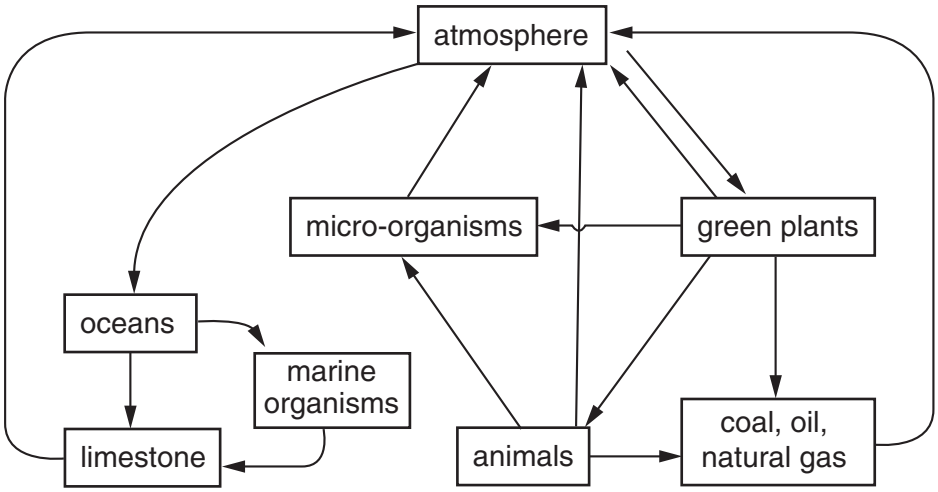

Fig. 7.1

(a) Four processes shown in the cycle are photosynthesis, respiration, combustion and dissolving.

By referring to Fig. 7.1, give one example of each. The answer for photosynthesis has been given as an example.

photosynthesis	atmosphere	to	green plants
respiration	.....	to	.....
combustion	.....	to	.....
dissolving	.....	to	.....[3]

(b) By referring to Fig. 7.1, name a major storage zone that is decreasing in size due to human activity and explain why it is decreasing.

name .....

explanation .....

.....

.....[2]

[Turn over

(c) By referring to Fig. 7.1, name a major storage zone that is increasing in size due to human activity and explain why it is increasing.

name .....

explanation .....

.....[2]

(d) A storage zone can be described as either a source or a sink depending upon the rates at which carbon is lost and gained. Explain this statement.

.....

.....

.....[2]

8 **(a)** Complete each of the statements below by correctly choosing a name from the following list. Each name may be used once, more than once or not at all.

carbon dioxide, nitrogen, oxygen, ozone, water,

(i) ..... forms 0.04% by volume of the Earth's atmosphere.

(ii) ..... forms 21% by volume of the Earth's atmosphere.

(iii) ..... forms 78% by volume of the Earth's atmosphere.

(iv) ..... is found in its highest concentration in the Earth's stratosphere.

(v) ..... was the major component of the Earth's early atmosphere.

[3]

(b) The movement of air (wind) can be caused by the differential heating of land.

Explain, with the aid of labelled diagrams, how

(i) offshore winds are produced,

[2]

(ii) onshore winds are produced.

[2]

9 Read the following passage then answer the questions below.

The gradual change from an area of bare rock to a woodland takes place in a number of stages. The surface of bare rock contains few nutrients but autotrophs, such as blue-green bacteria and other single-celled photosynthetic organisms, which have no root systems, are able to survive there. When only a little organic matter has accumulated, lichens and mosses start to grow. These are able to help break up the surface of the rock and a thin soil starts to form. As plants die, their remains are converted into humus, which improves the fertility of the soil. Seeds, mainly of grasses, start to germinate and the grasses gradually colonise the area. In time the grasses give way to more dominant species, such as larger shrubs. These, in turn, are followed by trees, which dominate the final stage.

(a) What is the general name given to

(i) the gradual change from an area of bare rock to an area of trees;

.....[1]

(ii) organisms involved in the first stage;

.....[1]

(iii) the community formed in the last stage?

.....[1]

(b) Explain what is meant by the term *autotroph*.

.....

.....

.....[2]

(c) Name the type of organism that converts dead plant material into humus.

.....[1]

(d) Suggest two reasons why large species such as trees dominate the final stage of the process.

1 .....

.....

2 .....

.....[2]

(e) Outline **one** way in which animals can influence the sequence of stages.

.....

.....

.....[2]

[Turn over

10 Fig. 10.1 shows part of a food web based on a tree.

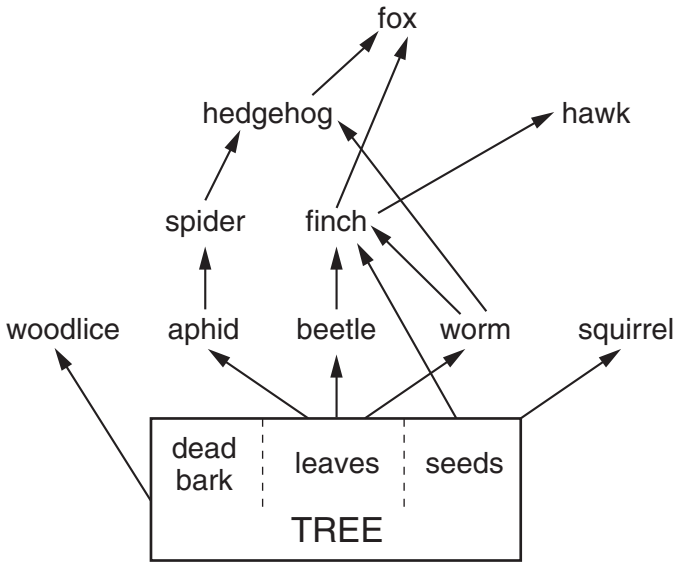

Fig. 10.1

(a) By reference to Fig. 10.1, name an organism that is

(i) a herbivore, ...[1]

(ii) an omnivore, ...[1]

(iii) a carnivore, ...[1]

(iv) a secondary consumer only, ...[1]

(v) a detritivore or decomposer. .....[1]

(b) The tree is part of a woodland of similar trees. The long term future of the woodland is threatened by squirrels which started breeding in the wood a few years earlier.

Use the information in Fig. 10.1 to suggest why the long term future of the woodland might be threatened.

.....

.....

.....[2]

(c) A food web can be shown in the form of either a pyramid of biomass or a pyramid of numbers. Figs 10.2 and 10.3 show the two types of pyramid for the food web shown in Fig. 10.1.

Identify which pyramid is the pyramid of biomass and explain your answer.

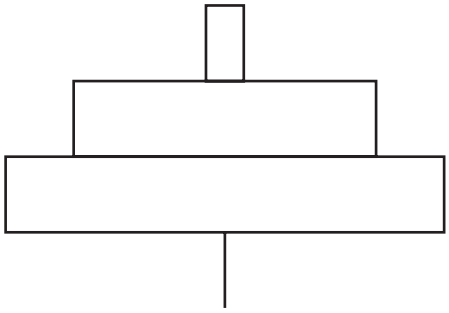

Fig. 10.2

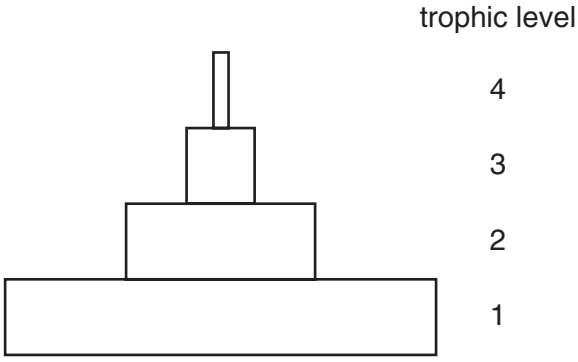

Fig. 10.3

pyramid. .....

explanation .....

.....[2]

(d) A food web can also be represented as a pyramid of energy. Fig. 10.4 shows a pyramid of energy.

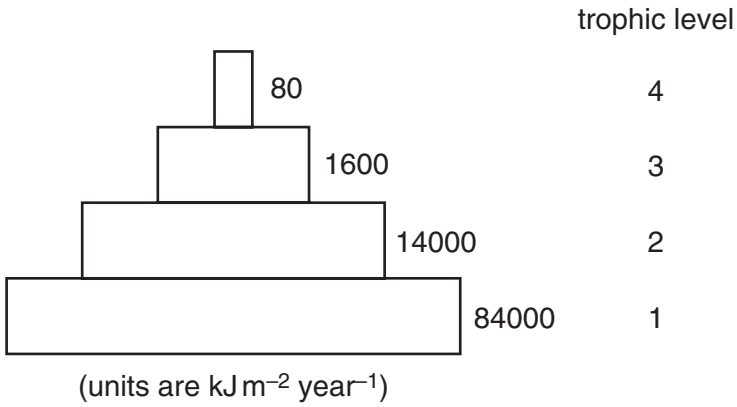

Fig. 10.4

Calculate which transfer of energy between trophic levels is the most efficient.

Show your working. [2]

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