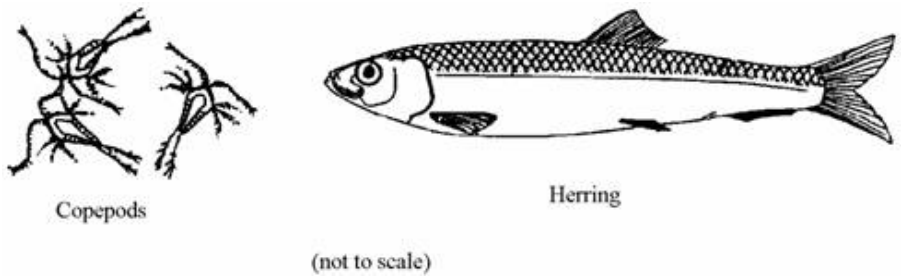
Q1. Copepods are tiny animals which live in the sea.



During the day they live deep down near the sea bed.
At night they move up to the surface where they feed on tiny plants.
When the sun rises they move down to the bottom again.

(a) Suggest why the tiny **plants** live near the surface of the sea.

.....

.....

(2)

(b) Herring feed on copepods.

Where will herring be found during the day? Give a reason for your answer.

.....

.....

.....

(2)
(Total 4 marks)

Q2. **Figure 1** shows a food chain containing three organisms.

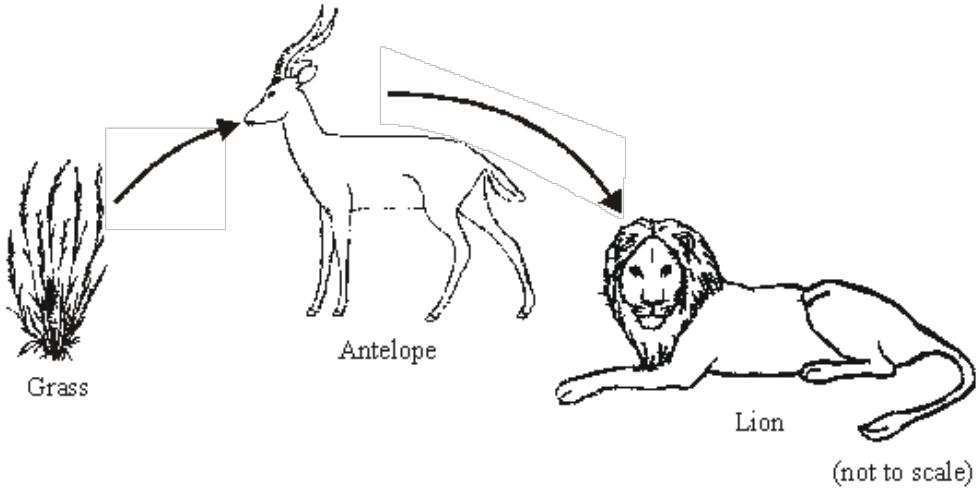


Figure 1

(a) (i) In this food chain, name:

the predator; .....

the prey. .....

(2)

(ii) What is the source of energy for the grass?

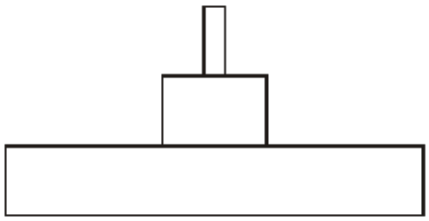
Draw a ring around **one** answer.

carbon dioxide **light** **nitrates** **water**

(1)

(iii) **Figure 2** shows a pyramid of biomass for the organisms in **Figure 1.**

Write the names of the organisms on the correct lines in **Figure 2.**



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……

……

Figure 2

(1)

(b) Waste materials, like faeces from the animals, will decay,

(i) What sort of organisms cause decay?

……

(1)

(ii) **Three** of the following conditions help decay to occur rapidly.

Which conditions do this?

Draw a ring around each of the **three** answers.

aerobic **anaerobic** **cold** **dry** **moist** **warm**

(3)

(iii) The list below gives four substances. Two of these substances are produced by decay and can be used by the grass.

Which **two** substances are these?

Tick (✓) **two** boxes.

Carbon dioxide ☐

Mineral salts ☐

Oxygen ☐

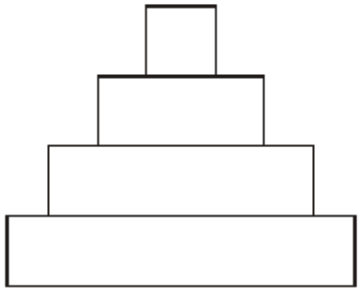
Protein ☐

(2)
(Total 10 marks)

Q3. This is a simple food chain.

Lettuce plant → Slug → Frog → Heron

The diagram shows a pyramid of biomass for this food chain.



……

……

……

……

(a) Write the names of the organisms in the food chain on the correct lines next to the pyramid of biomass.

(1)

(b) (i) The slug obtains its energy from the lettuce plant. What is the source of energy for the lettuce plant?

.....

(1)

(ii) What is the function of chlorophyll in a lettuce plant?

.....

(1)

(iii) The slugs ate some lettuce plants which contained 1620 kJ of energy. Only 10 per cent of this energy is used by the slugs for growth. Use the formula to calculate how much energy can be used by the slugs for growth. Show clearly how you work out your final answer.

$$\text{Amount of energy} = \frac{(\text{Percentage of energy used by slugs}) \times (\text{Amount of energy in lettuce})}{100}$$

.....

.....

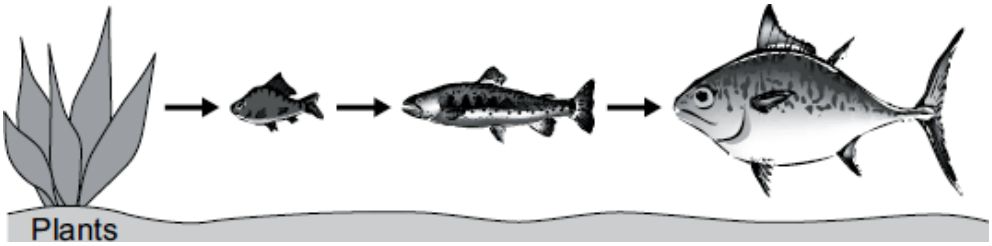
.....

Amount of energy = ... kJ

(2)

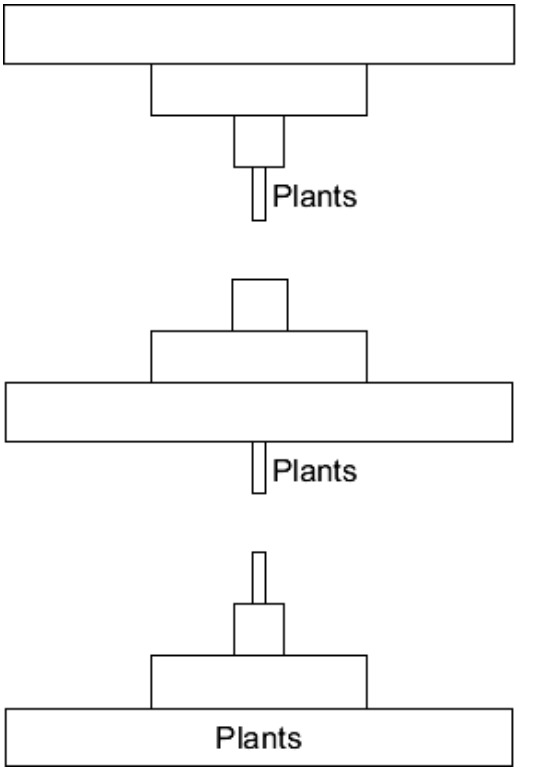
(Total 5 marks)

Q4. The picture shows a food chain.



(a) Which diagram shows a pyramid of biomass for the food chain in the picture?

Tick (✓) **one** box.



(1)

(b) The plants at the start of the food chain absorb energy.

Where does this energy come from?

Draw a ring around **one** answer.

the water **the sun** **minerals**

(1)

(c) Some energy is lost at each stage of the food chain.

Give **two** ways in which energy may be lost from the food chain.

1 .....

.....

2 .....

.....

(2)

(Total 4 marks)

Q5. Green plants are found at the start of all food chains.

(a) Complete the sentences.

(i) The source of energy for green plants is radiation from the .....

(1)

(ii) Green plants absorb some of the light energy that reaches them for a process called .....

(1)

(b) Draw a ring around the correct answer to complete each sentence.

(i) This process transfers light energy into | chemical | sound | electrical | energy.

(1)

(ii) The process uses the gas | carbon dioxide. | oxygen. | water.

(1)

(iii) The process produces carbon-containing compounds called | carbohydrates. | minerals. | salts.

(1)

(c) The amount of living material (biomass) at each stage in a food chain is less than at the previous stage.

The diagram shows a food chain.

oak tree → **caterpillar** → **blue-tit** → **hawk**

Give **two** ways in which biomass is lost in this food chain.

Tick (✓) **two** boxes.

As carbon dioxide from the caterpillar ☐

As food eaten by the hawk ☐

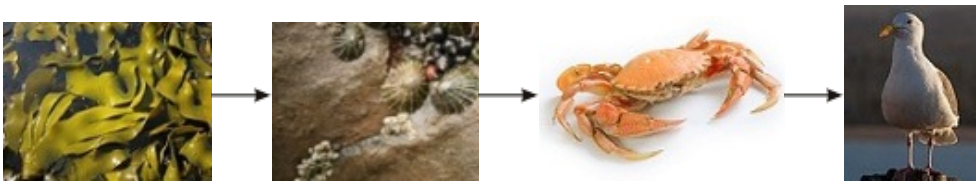
As oxygen from the oak tree ☐

As faeces (droppings) from the blue-tit ☐

(2)
(Total 7 marks)

Q6. The photographs show a food chain from a seashore. The photographs are **not** to the same scale.

Seaweed → Limpet → Crab → Gull



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Students estimated the population and biomass of each of the organisms on part of a seashore.

The table shows the students' results.

Organism	Population	Mean mass of one organism in grams	Biomass of population in grams
Seaweed	50	4000	200 000
Limpet	1200	30	36 000
Crab	100	90	9 000
Gull	2	900	

(a) (i) Use the data in the table to calculate the biomass of the gull population.

.....

.....

Biomass = ... g

(1)

(ii) Draw a pyramid of biomass for this food chain.

Label the pyramid.

(2)

(b) The biomass of the crab population is much less than the biomass of the limpet population.

Suggest **two** reasons why.

1.....

.....

2.....

.....

(2)
(Total 5 marks)

Q7. There are two forms of peppered moth, dark and pale.
Birds eat the moths when the moths are resting on tree bark.

Pollution in the atmosphere may:

- kill lichens living on tree bark
- make the bark of trees go black.

(a) Draw a ring around the correct answer to complete the sentence.

Lichens are very sensitive to air pollution caused by

carbon dioxide.
nitrogen.
sulfur dioxide.

(1)

(b) The photographs show the two forms of peppered moth, on tree bark.

Tree bark covered with lichens Tree bark made black by pollution

(i) The dark form of the peppered moth was produced by a change in the genetic material of a pale moth.

Use **one** word from the box to complete the sentence.

characteristic	**clone**	**mutation**

A change in genetic material is called a .....

(1)

(ii) In the 19th century, pollution made the bark of many trees go black.

Explain why:

- the population of the pale form of the moth in forests decreased
- the population of the dark form of the moth in forests increased.

.....

.....

.....

.....

.....

.....

.....

.....

(3)

(c) (i) The larvae (young) of the peppered moths eat the leaves of birch trees.

The diagram shows the food chain:

birch trees → peppered moth larvae → birds

Draw a pyramid of biomass for this food chain.

Label the pyramid.

(2)

(ii) Which **two** reasons explain the shape of the pyramid you drew in part (c)(i)?

Tick (✓) **two** boxes.

Some material is lost in waste from the birds	☐
The trees are much larger than peppered moth larvae	☐
Peppered moth larvae do not eat all the leaves from the trees	☐
The trees do not use all of the Sun's energy	☐

(2)
(Total 9 marks)