AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.4.1

# Trophic levels

## Past-paper questions

| | |
|---|---|
| Tier | **Foundation** |
| Question groups | **18** |
| Available paper years | **2008–2025** |

## Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

**Name:** _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

**4.7.4.1 Trophic levels**

**Question 01**

January 2008 | BLY2F | Original Q6 | Legacy

**6** (a) Tuna fish are carnivores. In the wild they feed on smaller fish called herring. Herring feed on plankton. Tuna can be attacked by parasitic worms which feed on their flesh.

(i) In the space below sketch the appearance of a pyramid of biomass for this food chain.

Do not forget to label each section of the pyramid.

*(2 marks)*

(ii) If a tuna eats 1 kg of herring, it gains about 65 g in mass.

Give **two** reasons why so little of the mass of the herring is converted into mass of the tuna.

1 .....

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2 .....

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*(2 marks)*

(b) Young tuna are caught by fish farmers and reared in large pens in the sea.

The fish are fed more food than they would normally catch themselves so they grow quickly. When they reach 400 kg they are sold.

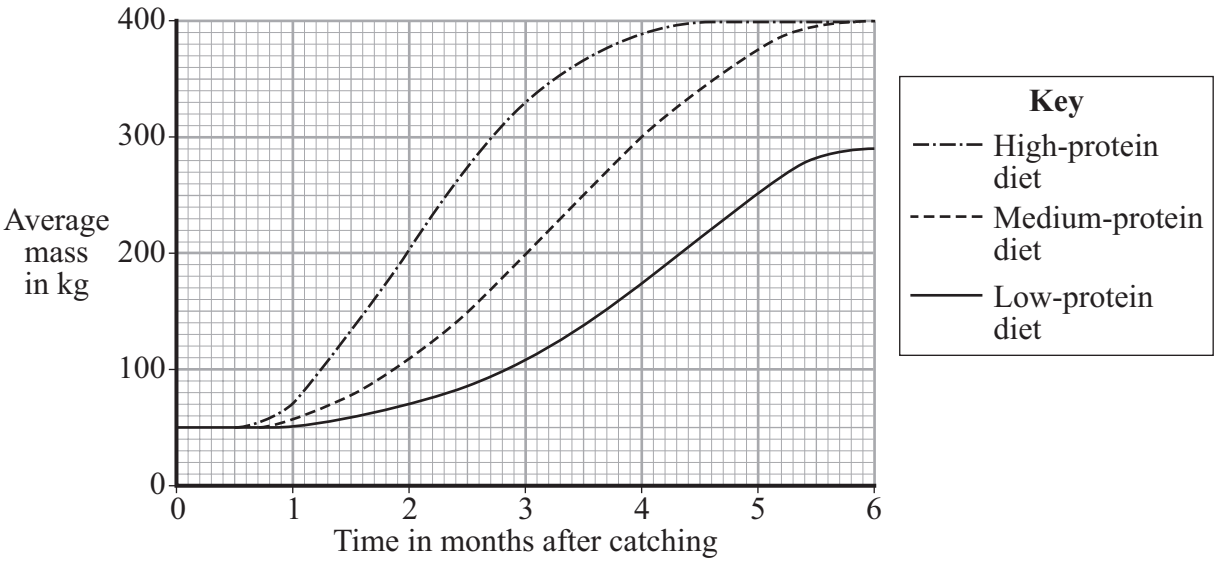
The graph on the opposite page shows the effect of feeding tuna different amounts of protein in their food.

**4.7.4.1 Trophic levels**

**Question 01 · continued**



*BLANK*




(i) Calculate the average increase in mass per month of the fish fed on the low-protein diet over the six months.

Show clearly how you work out your answer.

.....

.....

Average increase in mass per month ..... kg

*(2 marks)*

(ii) There is not enough information in the graph to allow the fish farmer to decide whether to use the high-protein diet or the medium-protein diet.

Suggest **one** other piece of information that he needs in order to make this decision.

.....

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*(1 mark)*

(c) Some consumers will not buy tuna grown in this way.

Suggest **one** reason for their decision.

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*(1 mark)*

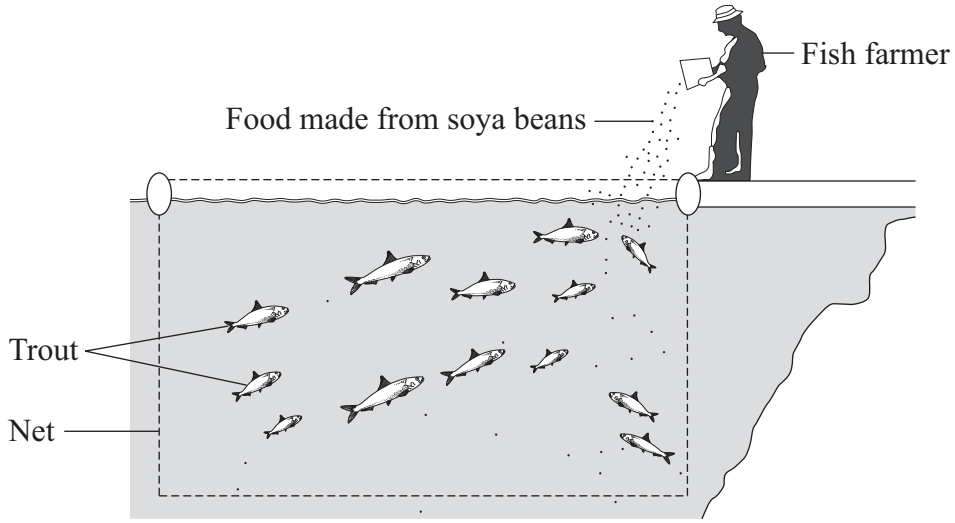
**8**

**4.7.4.1 Trophic levels**

**Question 02**

January 2019 | BLY2F | Original Q6 | Legacy

**6** A fish farmer keeps trout in a large net in a lake.




The fish farmer feeds the trout on food made from soya beans.

When the trout are large enough the farmer sells them for food for people.

**6** (a) Draw a pyramid of biomass for the three organisms in this food chain.

Label the pyramid.

*(2 marks)*

**4.7.4.1 Trophic levels**

**Question 02 · continued**



*for mark*

**6** (b) It would be more energy efficient if people ate the soya beans rather than eating the trout.

Which **two** of the following are reasons for this?

Tick (✓) **two** boxes.

Some people do not like eating animals such as trout. ☐

The trout release energy when they respire. ☐

Soya bean plants release energy when they respire. ☐

Some energy will be lost in waste from the trout. ☐

Soya bean plants absorb energy during photosynthesis. ☐

*(2 marks)*

**6** (c) Suggest **one** advantage to the fish farmer of keeping the trout in a large net instead of letting them swim freely in the lake.

.....

.....

*(1 mark)*

**6** (d) Some trout die before they are large enough to be sold.
The dead trout contain carbon.

Use your knowledge of the carbon cycle to describe how this carbon is returned to the atmosphere after the trout die.

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*(2 marks)*

7

### 4.7.4.1 Trophic levels

**Question 03**

January 2011 | BLY2F | Original Q8 | Legacy

**8** A group of students investigated a food chain in a garden.

The table shows the estimates of the population and biomass of some of the organisms the students found.

| Organism | Number in the garden | Mean mass of each one in g | Biomass of population in g |
|---|---|---|---|
| Hedgehog | 1 | 200 | 200 |
| Slug | 600 | 2 | 1200 |
| Lettuce | 20 | 300 | |

**8 (a) (i)** Calculate the biomass of the lettuce population.

Show clearly how you work out your answer.

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.....

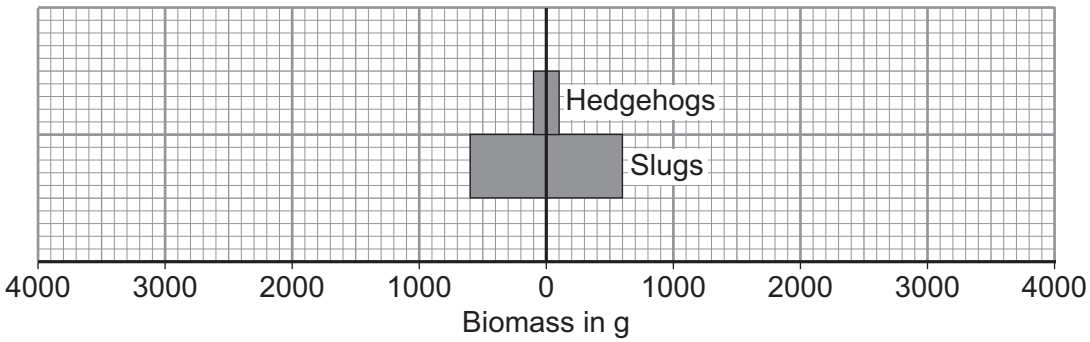
.....

Biomass = ..... g

*(2 marks)*

**8 (a) (ii)** Use your answer to part (a)(i) to complete the pyramid of biomass.

Show the biomass of the lettuces in the garden.




*(2 marks)*

**4.7.4.1 Trophic levels**

**Question 03 · continued**



**8 (b)** Hedgehogs eat slugs.

The biomass of the hedgehog population is much less than the biomass of the slug population.

Explain why as fully as you can.

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*(3 marks)*

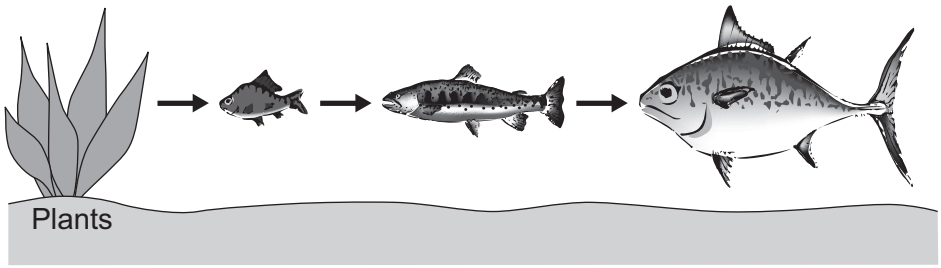
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### 4.7.4.1 Trophic levels

**Question 04**

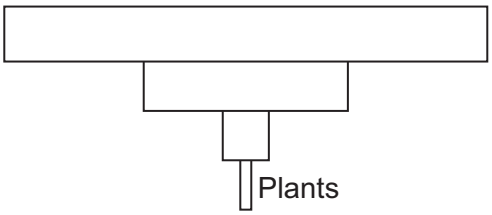
June 2011 | BLY2F | Original Q7 | Legacy

**7** The picture shows a food chain.

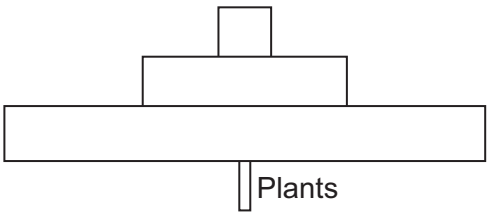



**7 (a)** Which diagram shows a pyramid of biomass for the food chain in the picture?

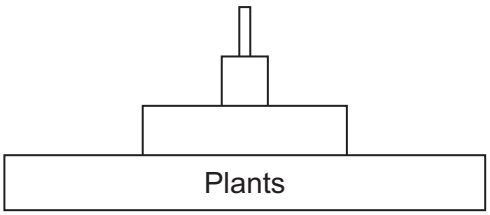
Tick (✓) **one** box.




☐




☐




☐

*(1 mark)*

**7 (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 mark)*

4.7.4.1 Trophic levels

Question 04 · continued



**7 (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 marks)*

4

**Turn over for the next question**

### 4.7.4.1 Trophic levels

**Question 05**

June 2012 | BL1FP | Original Q3 | Legacy

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

**3 (a)** Complete the sentences.

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

*(1 mark)*

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

*(1 mark)*

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

**3 (b) (i)** This process transfers light energy into

chemical
sound
electrical

energy.

*(1 mark)*

**3 (b) (ii)** The process uses the gas

carbon dioxide.
oxygen.
water.

*(1 mark)*

**3 (b) (iii)** The process produces carbon-containing compounds called

carbohydrates.
minerals.
salts.

*(1 mark)*

4.7.4.1 Trophic levels

Question 05 · continued



**3 (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 marks)*

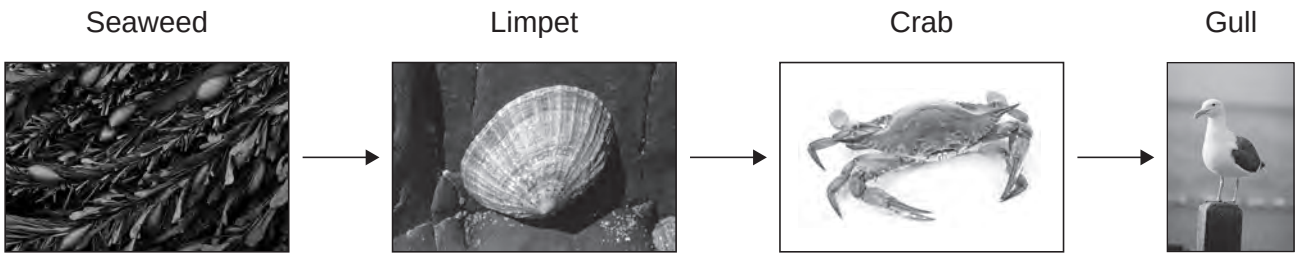
7

### 4.7.4.1 Trophic levels

**Question 06**

January 2013 | BL1FP | Original Q6 | Legacy

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




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 | |

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

.....

.....

Biomass = ..... g

*(1 mark)*

4.7.4.1 Trophic levels

Question 06 · continued



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

Label the pyramid.

*(2 marks)*

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

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

*(2 marks)*

5

### 4.7.4.1 Trophic levels

**Question 07**

June 2013 | BL1FP | Original Q4 | Legacy

**4** 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.

**4 (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 mark)*

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




Tree bark covered with lichens

Tree bark made black by pollution

4.7.4.1 Trophic levels

Question 07 · continued



**4 (b) (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 mark)*

**4 (b) (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.

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*(3 marks)*

**Question 4 continues on the next page**

4.7.4.1 Trophic levels

Question 07 · continued



**4 (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 marks)*

**4 (c) (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 marks)*

9

### 4.7.4.1 Trophic levels

**Question 08**

June 2013 | BL3FP | Original Q8 | Legacy

**8** There are many ways to increase the efficiency of food production.

**8 (a)** The table shows the energy available to humans from two different food chains.

| Food chain | Energy transferred to humans in kJ per hectare of crop |
|---|---|
| Wheat → humans | 900 000 |
| Wheat → pigs → humans | 90 000 |

**8 (a) (i)** Compare the amount of energy the two food chains transfer to humans.

.....

.....

*(1 mark)*

**8 (a) (ii)** Give **one** reason for the difference in the amount of energy the two food chains transfer to humans.

.....

.....

*(1 mark)*

**4.7.4.1 Trophic levels**

**Question 08 · continued**



**8 (b)** *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Give methods used in the factory farming of animals.
Explain the advantages and disadvantages of these methods.

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*(6 marks)*

8

### 4.7.4.1 Trophic levels

Question 09

June 2014 | BL1FP | Original Q8 | Legacy

**8** Food chains show the flow of energy through the organisms in a habitat.

**8 (a)** **Figure 9** shows a food chain.

**Figure 9**




The biomass in each stage of the food chain changes as food passes along the food chain.

Draw a pyramid of biomass for this food chain.

Label the pyramid.

**[2 marks]**

4.7.4.1 Trophic levels

Question 09 · continued



**8 (b)** **Table 2** shows three food chains, **A**, **B** and **C**.

**Table 2**

| | Food chain |
|---|---|
| **A** | plants → sheep → human |
| **B** | plants → grasshoppers → frogs → trout → human |
| **C** | plants → human |

**8 (b) (i)** In which food chain, **A**, **B** or **C**, will the greatest proportion of biomass and energy of the plants be passed to humans? ☐

**[1 mark]**

**8 (b) (ii)** Give reasons why the food chain that you chose in part **(b)(i)** passes on the greatest proportion of biomass and energy to humans.

**[3 marks]**

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6

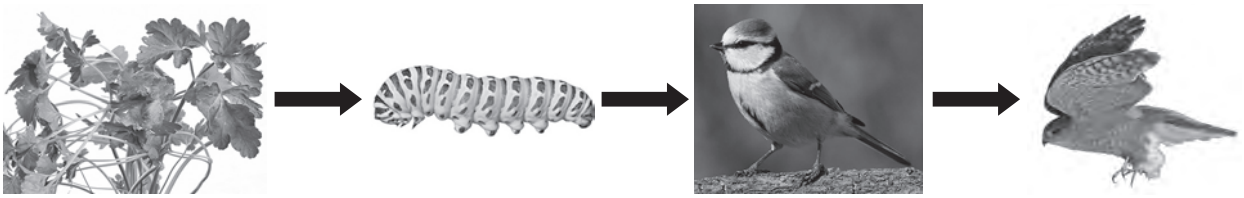
4.7.4.1 Trophic levels

Question 10

June 2016 | BL1FP | Original Q3 | Legacy

**3** **Figure 3** shows how energy and biomass pass along a food chain.

**Figure 3**



Parsley → Swallowtail caterpillar → Blue tit → Hawk

**3 (a)** The parsley shown in **Figure 3** carries out photosynthesis.

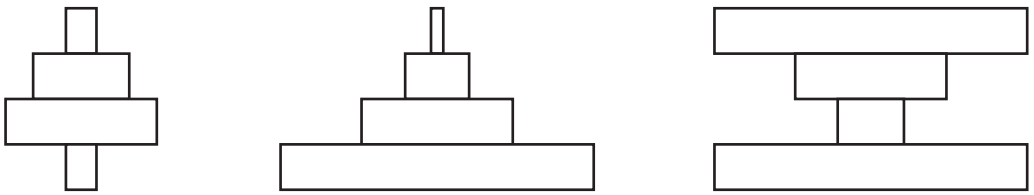
Why is photosynthesis important in the food chain?

**[2 marks]**

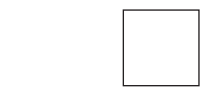
**3 (b)** Which diagram shows the pyramid of biomass for the food chain in **Figure 3**?

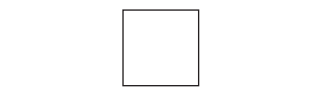
**[1 mark]**

Tick (✓) **one** box.









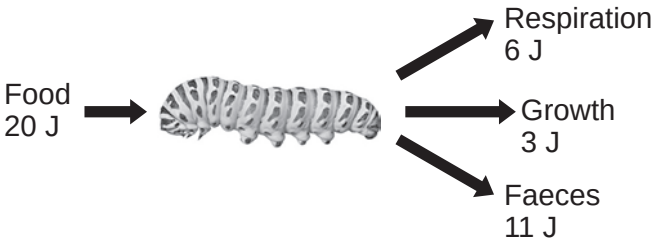
4.7.4.1 Trophic levels

Question 10 · continued



**3 (c)** **Figure 4** shows the ways a swallowtail caterpillar transfers 20 J of energy from food.

**Figure 4**




What percentage of the energy in the caterpillar's food is used for growth?

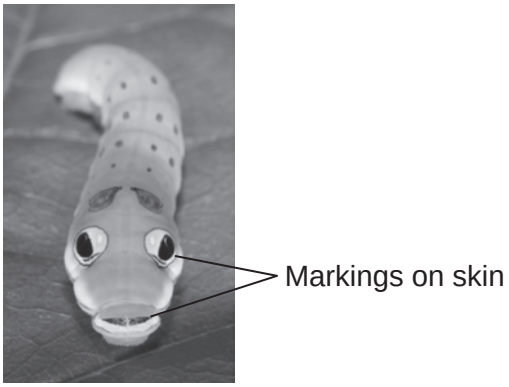
**[2 marks]**

Percentage = _____

**3 (d)** The organisms in the food chain are adapted for survival.

**3 (d) (i)** **Figure 5** shows a swallowtail caterpillar seen from the back.

**Figure 5**




Suggest how the swallowtail caterpillar shown in **Figure 5** is adapted to reduce the chance of being eaten by blue tits.

**[2 marks]**

4.7.4.1 Trophic levels

Question 10 · continued



**3 (d) (ii)** **Figure 6** shows a hawk.

**Figure 6**



Suggest **two** ways that the hawk is adapted to catch and kill blue tits.

**[2 marks]**

1 _____

_____

2 _____

_____

9

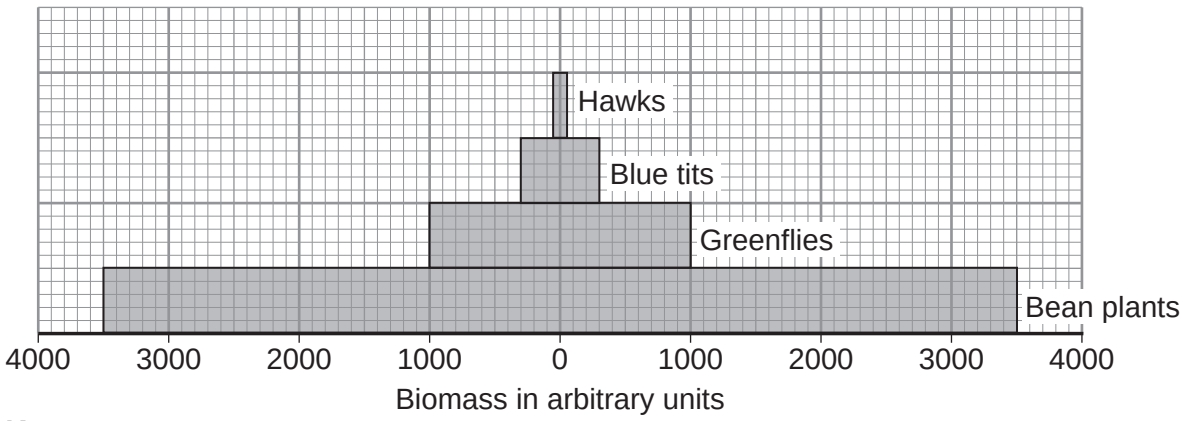
4.7.4.1 Trophic levels

Question 11

June 2017 | BL1FP | Original Q7 | Legacy

7 **Figure 8** shows a pyramid of biomass for a food chain.

**Figure 8**




**Key**

= 500 arbitrary units

**7 (a) (i)** Not all of the biomass of the bean plants is converted into the biomass of greenflies.

Calculate the biomass of bean plants that is **not** converted into the biomass of greenflies.

**[2 marks]**

Use information from **Figure 8**.

_____

_____

Biomass = _____ arbitrary units

4.7.4.1 Trophic levels

Question 11 · continued



**7 (a) (ii)** For every 10 grams of biomass eaten by the hawks, more than 8 grams of biomass are lost.

Give **one** way in which the biomass eaten by hawks is lost from the food chain.

**[1 mark]**

Tick (✓) **one** box.

Hawks reproduce ☐

Hawks produce faeces ☐

Hawks grow ☐

Hawks feed on other birds ☐

**7 (b)** When the bean plants grow they gain biomass.

Complete the sentences.

**[2 marks]**

The bean plants gain biomass by the process of _____ .

In this process, the bean plants make a carbohydrate called _____ .

5

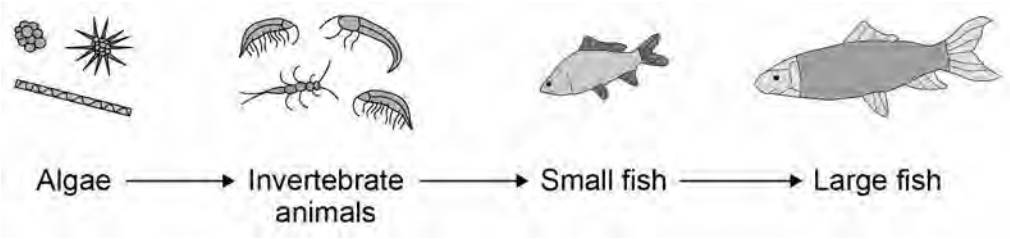
4.7.4.1 Trophic levels

Question 12

June 2018 | 8461/2F | Original Q1

**0 1** **Figure 1** shows a food chain in a river.

**Figure 1**




**0 1 . 1** Draw **one** line from each scientific term to the correct organism in the food chain.

**[3 marks]**

| Scientific term | Organism in the food chain |
|---|---|
| | Algae |
| Apex predator | Invertebrate animals |
| Primary consumer | Large fish |
| Producer | Small fish |

Question 12 · continued



**0 1 . 2** **Table 1** shows the biomass of the organisms at each stage in the food chain.

**Table 1**

| Organism | Biomass in arbitrary units |
|---|---|
| Algae | 840 |
| Invertebrate animals | 200 |
| Small fish | 40 |
| Large fish | 10 |

Calculate the percentage of the biomass of the invertebrate animals that is transferred to the large fish.

**[2 marks]**

Use the equation:

$$\text{percentage} = \frac{\text{biomass of large fish}}{\text{biomass of invertebrate animals}} \times 100$$

Percentage = _____

**Question 1 continues on the next page**

4.7.4.1 Trophic levels

Question 12 · continued



**0 1 . 3** A large amount of biomass is lost from the food chain.

Complete the sentences.

Choose answers from the box.

**[3 marks]**

| | | |
|---|---|---|
| **coordination** | **digestion** | **excretion** |
| **filtration** | **ingestion** | **respiration** |

When the small fish eat the invertebrate animals, not all of this material is broken down during _____ .

Materials absorbed from the gut may enter the body cells of the small fish. These materials are broken down into carbon dioxide and water by _____ .

The carbon dioxide and other waste materials from the body cells are removed from the small fish by _____ .

**0 1 . 4** A disease kills many of the small fish.

Why does the number of invertebrate animals increase?

**[1 mark]**

_____

_____

9

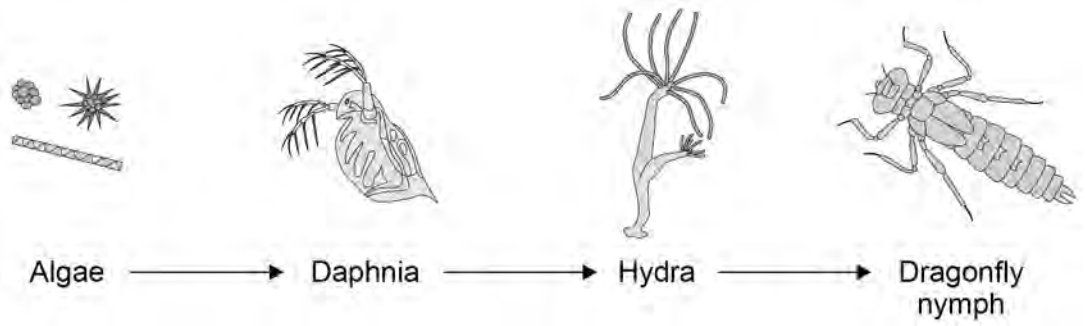
4.7.4.1 Trophic levels

Question 13

June 2019 | 8461/2F | Original Q7

**0 7** **Figure 14** shows a food chain in a pond.

**Figure 14**




**0 7 . 1** Which term describes the Daphnia in this food chain?

**[1 mark]**

Tick (✓) **one** box.

- Apex predator ☐
- Primary consumer ☐
- Producer ☐
- Secondary consumer ☐

4.7.4.1 Trophic levels

Question 13 · continued



**0 7 . 2** Draw a pyramid of biomass for the food chain.

Label each trophic level.

**[2 marks]**

**0 7 . 3** Give **one** reason why the total biomass of the Daphnia in the pond is different from the total biomass of the algae.

**[1 mark]**

**Question 7 continues on the next page**

Question 13 · continued



Students investigated the size of the population of Daphnia in the pond.

This is the method used.

1. Collect 1 $dm^3$ of pond water from near the edge of the pond.
2. Pour the water through a fine net.
3. Count the number of Daphnia caught in the net.
4. Repeat steps 1–3 four more times.

**Table 3** shows the results.

**Table 3**

| Sample number | Number of Daphnia in 1 $dm^3$ water |
|---|---|
| 1 | 5 |
| 2 | 21 |
| 3 | 0 |
| 4 | 16 |
| 5 | 28 |

**0 7 . 4** Calculate the mean number of Daphnia in 1 $m^3$ of pond water.

1 $m^3$ = 1000 $dm^3$

**[2 marks]**

Mean number of Daphnia in 1 $m^3$ of pond water = _____

4.7.4.1 Trophic levels

Question 13 · continued



**0 7 . 5** The pond was a rectangular shape, measuring:

- length = 2.5 metres
- width = 1.5 metres
- depth = 0.5 metres.

Calculate the estimated number of Daphnia in the pond.

Use your answer from Question **07.4**.

Give your answer in standard form.

**[4 marks]**

Number of Daphnia in the pond = _____

**Question 7 continues on the next page**

Question 13 · continued



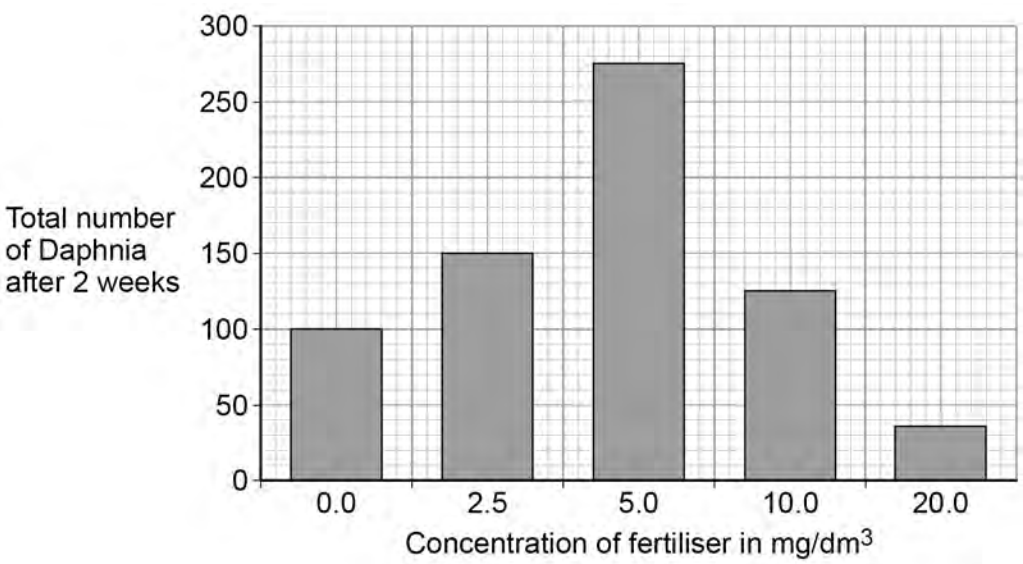
Rainfall can cause fertiliser to be washed from farmland into a pond.

The students investigated the effect of fertiliser on the population of Daphnia in water from the pond.

- The students put 20 Daphnia in each of five different concentrations of fertiliser.
- The students counted the total number of Daphnia in each concentration of fertiliser after 2 weeks.

**Figure 15** shows the results.

**Figure 15**




**0 7 . 6** A concentration of 5.0 mg/dm$^3$ of fertiliser caused a large increase in the population of Daphnia.

Explain why.

**[2 marks]**

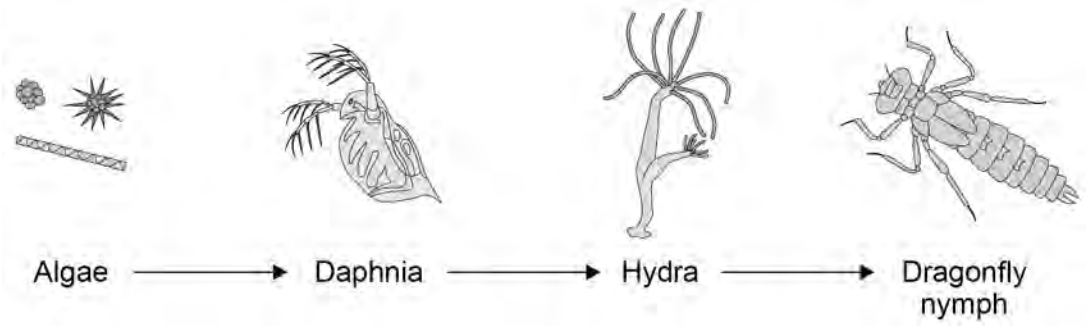
4.7.4.1 Trophic levels

Question 13 · continued



**0 7 . 7** **Figure 14** is repeated below.

**Figure 14**




The population of **Hydra** will decrease when 20 mg/dm$^3$ of fertiliser is added to the pond.

Explain why.

**[2 marks]**

14

4.7.4.1 Trophic levels

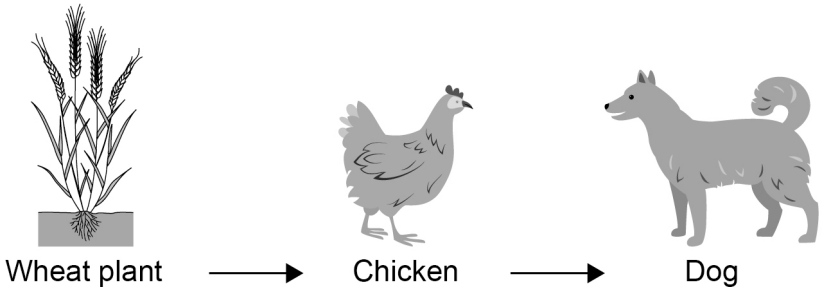
Question 14

November 2020 | 8461/2F | Original Q1

**0 1** A food for pet dogs contains meat from chickens.

**Figure 1** shows the food chain.

**Figure 1**




**0 1 . 1** What is the trophic level of the dog?

**[1 mark]**

Tick (✓) **one** box.

1 ☐ 2 ☐ 3 ☐

**0 1 . 2** Draw **one** line from each organism to the description of the organism's position in the food chain.

**[3 marks]**

| Organism | Description |
|---|---|
| Chicken | Herbivore |
| Dog | Producer |
| Wheat | Secondary consumer |
| | Tertiary consumer |

4.7.4.1 Trophic levels

Question 14 · continued



**0 1 . 3** Name the process wheat plants use to make glucose.

**[1 mark]**

**0 1 . 4** Some of the chicken biomass does **not** become part of the dog's biomass.

What is **one** reason why?

**[1 mark]**

Tick (✓) **one** box.

Some of the chicken is used for the dog to grow ☐

The dog produces waste in faeces ☐

The wheat is eaten by the dog ☐

**Question 1 continues on the next page**

4.7.4.1 Trophic levels

Question 14 · continued



A new dog food has been developed.

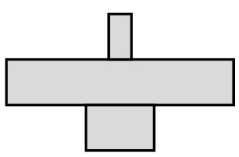
The new dog food is made from insects.

The insects in the dog food factory are fed on vegetables.

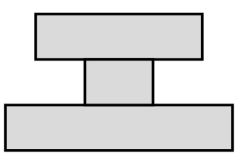
**0 1 . 5** Which pyramid of biomass represents the vegetables, insects and dogs in this food chain?

**[1 mark]**

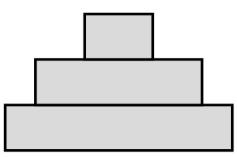
Tick (✓) **one** box.



☐



☐



☐

4.7.4.1 Trophic levels

Question 14 · continued



**0 1 . 6** Beef from cows is used to make some dog food.

Cows release methane.

The company that makes dog food from insects made the statement:

'Dog food made from insects is more sustainable than dog food made from beef.'

Which are **two** reasons that support the company's statement?

**[2 marks]**

Tick (✓) **two** boxes.

- [ ] Dogs will eat more insects than cows
- [ ] Farming cows needs more land than farming insects
- [ ] Fewer cows being farmed will slow down global warming
- [ ] Fewer insects than cows are needed to produce dog food
- [ ] The food chain for dog food made from insects has more trophic levels

9

4.7.4.1 Trophic levels

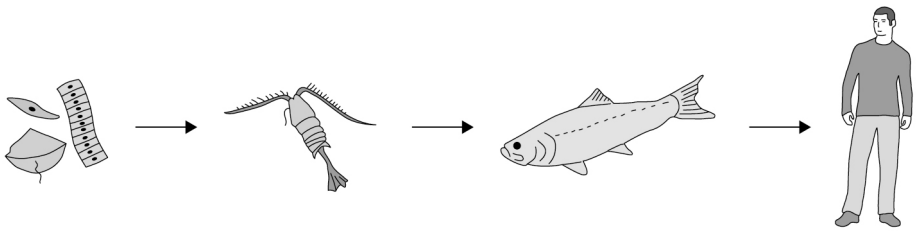
Question 15

November 2021 | 8461/2F | Original Q3

**0 3** People eat fish caught in the North Sea.

**Figure 4** shows a food chain.

**Figure 4**




Not to scale

**0 3 . 1** The algae make glucose by photosynthesis.

Which **two** substances do the algae need for photosynthesis?

**[2 marks]**

Tick (✓) **two** boxes.

- Carbon dioxide ☐
- Nitrogen ☐
- Oxygen ☐
- Starch ☐
- Water ☐

4.7.4.1 Trophic levels

Question 15 · continued



**0 3 . 2** What is the source of energy for photosynthesis?

**[1 mark]**

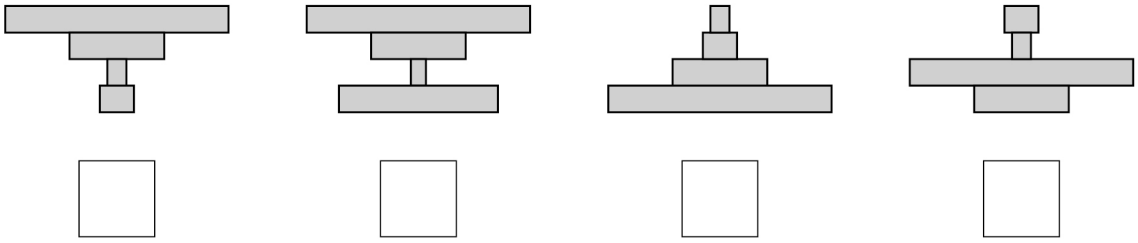
Tick (✓) **one** box.

- Light ☐
- Mineral ions ☐
- Protein ☐
- Water ☐

**0 3 . 3** Which pyramid of biomass is correct for the food chain shown in **Figure 4**?

**[1 mark]**

Tick (✓) **one** box.



**Question 3 continues on the next page**

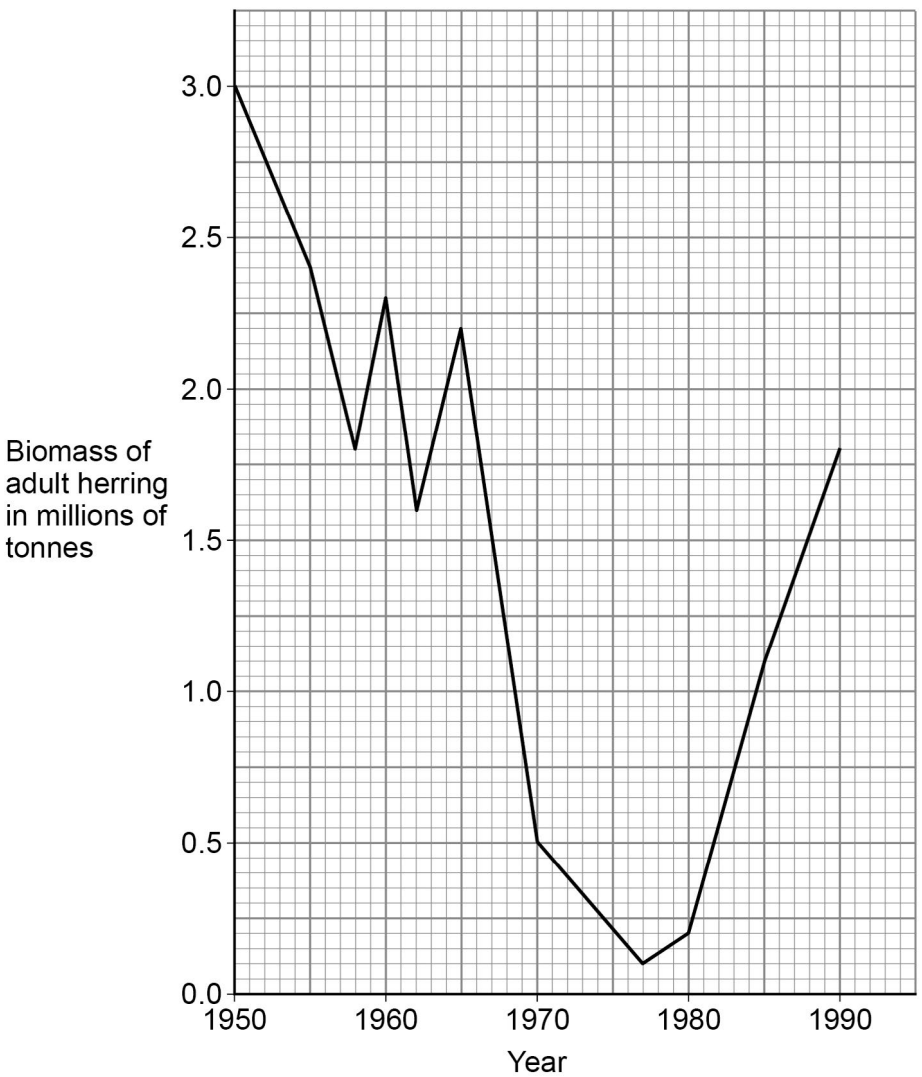
4.7.4.1 Trophic levels

Question 15 · continued



**Figure 5** shows the biomass of adult herring in the North Sea between 1950 and 1990.

**Figure 5**



4.7.4.1 Trophic levels

Question 15 · continued



**0 3 . 4** Too many herring were caught in the 1960s.

Calculate the percentage decrease in the biomass of adult herring between 1960 and 1970.

Use the equation:

$$\text{percentage decrease} = \frac{(\text{biomass in 1960} - \text{biomass in 1970})}{\text{biomass in 1960}} \times 100$$

Give your answer to the nearest whole number.

**[4 marks]**

Percentage decrease = _____ %

From 1977, laws were introduced to help conserve herring.

**0 3 . 5** Describe the change in biomass of adult herring from 1977 to 1990.

Use data from **Figure 5** in your answer.

**[2 marks]**

**Question 3 continues on the next page**

4.7.4.1 Trophic levels

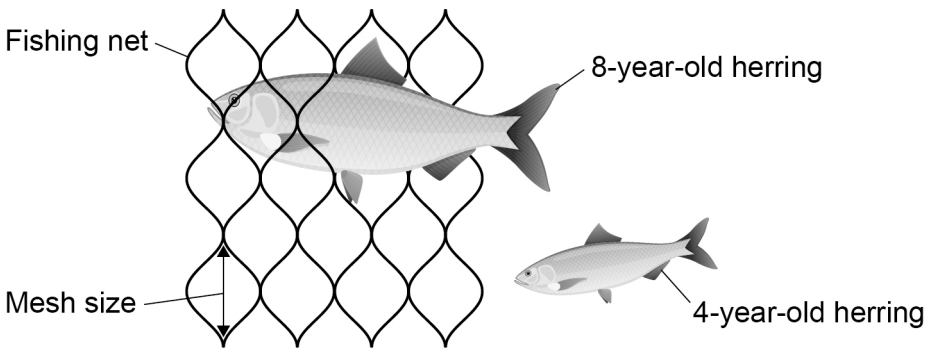
Question 15 · continued



**0 3 . 6** One of the laws was to control mesh size of fishing nets.

**Figure 6** shows a fishing net with a legal mesh size.

**Figure 6**




Herring can live for up to 12 years.

Herring start to reproduce when they are 3 to 4 years old.

Explain how the control of mesh size of fishing nets has helped to conserve stocks of herring.

**[2 marks]**

12

4.7.4.1 Trophic levels

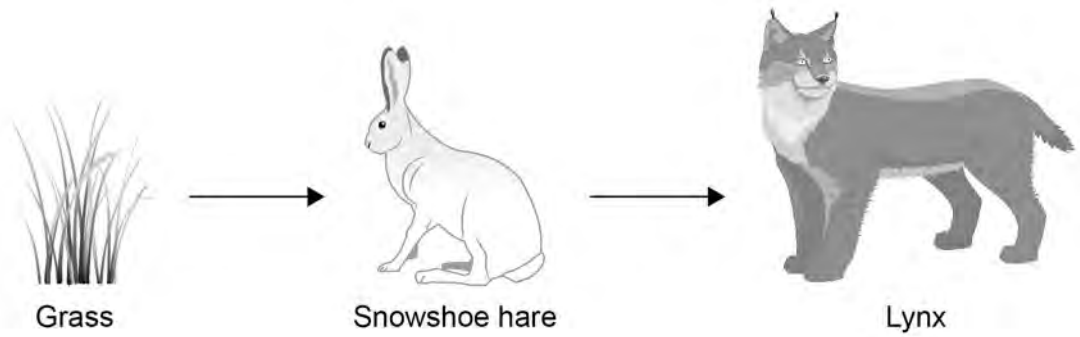
Question 16

June 2023 | 8461/2F | Original Q3

**0 3** Different species in a habitat may depend on each other for food.

**Figure 3** shows a food chain.

**Figure 3**




**0 3 . 1** The grass needs energy to grow.

What is the source of energy for the grass?

**[1 mark]**

**0 3 . 2** **Table 2** lists different types of feeding relationship.

**Table 2**

| Feeding relationship | Organism |
|---|---|
| Secondary consumer | Lynx |
| Primary consumer | |
| Producer | |
| Herbivore | |
| Carnivore | |
| Prey | |
| Predator | |

Write the name of **one** organism from **Figure 3** in each box in **Table 2**.

**[3 marks]**

Each organism may be written in one box or in more than one box.

The first box has been completed for you.

**Question 3 continues on the next page**

**0 3 . 3** **Figure 4** shows the appearance of the snowshoe hare in the summer and in the winter.

**Figure 4**

**Snowshoe hare in summer**



**Snowshoe hare in winter**



The snowshoe hare has a different fur colour in the summer than in the winter.

Explain how the different fur colour increases the chance of survival of the snowshoe hare.

**[3 marks]**

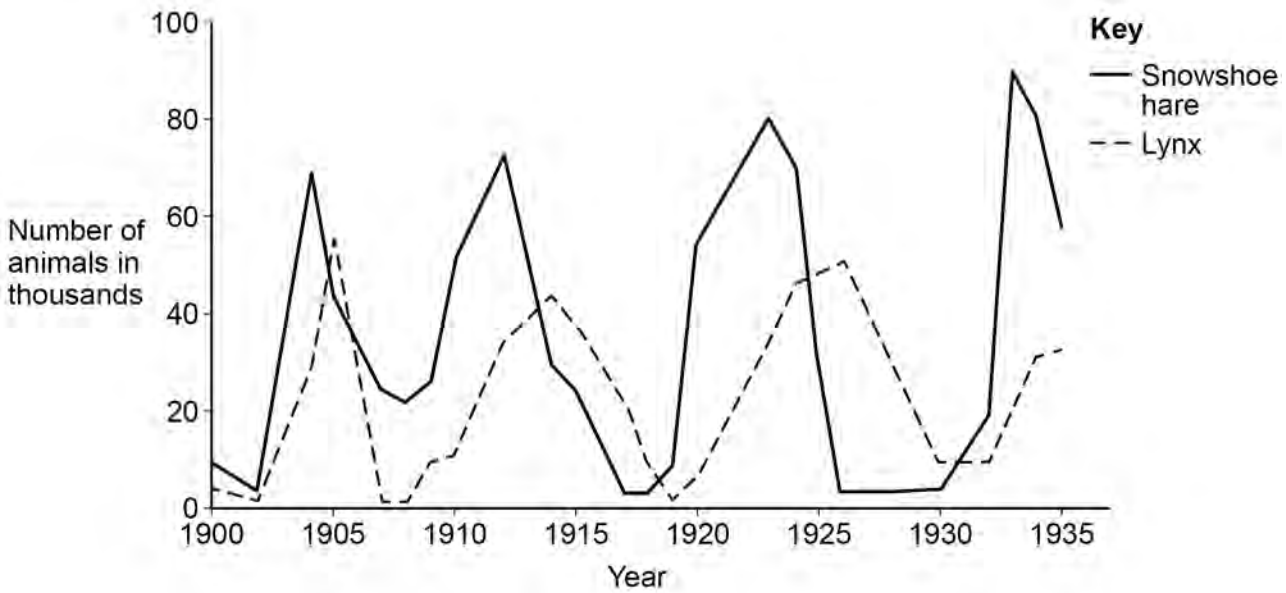
**Question 3 continues on the next page**

Question 16 · continued



**Figure 5** shows how the number of snowshoe hares and the number of lynx varied in one area between 1900 and 1935.

**Figure 5**




**0 3 . 4** **Figure 5** shows that the number of snowshoe hares and the number of lynx increase and decrease several times.

Suggest **two** reasons why the number of **snowshoe hares** increases.

**[2 marks]**

1 _____

_____

2 _____

_____

4.7.4.1 Trophic levels

Question 16 · continued



**0 3 . 5** The number of snowshoe hares increased and decreased four times between 1900 and 1935.

What effect does an **increase** in the number of snowshoe hares have on the number of lynx?

**[1 mark]**

**0 3 . 6** Suggest **one** reason why the number of lynx decreased from 1915 to 1919.

Use information from **Figure 5**.

**[1 mark]**

**0 3 . 7** When the snowshoe hare eats grass, about 90% of the biomass of the grass is lost.

Give **two** ways the biomass is lost.

**[2 marks]**

1

2

**13**

4.7.4.1 Trophic levels

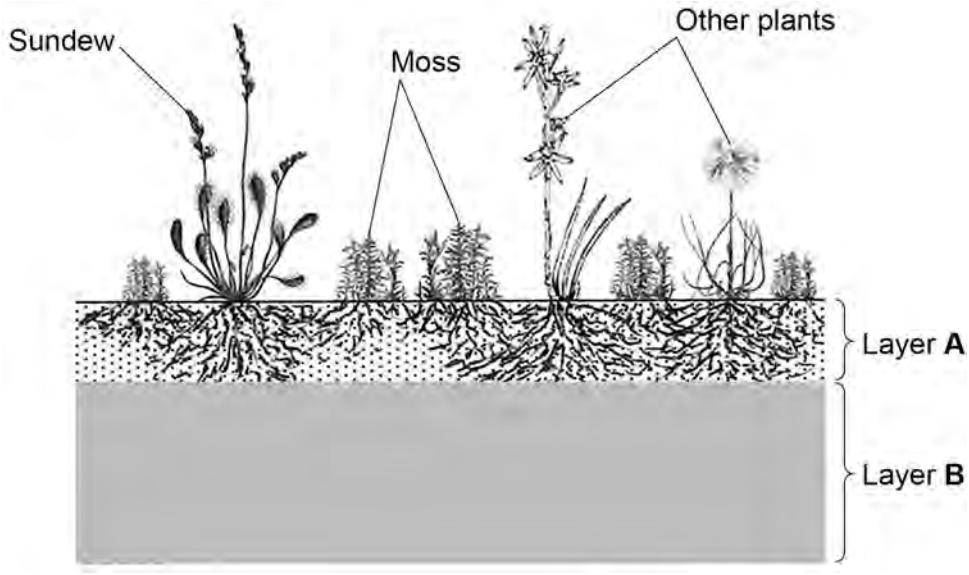
Question 17

June 2024 | 8461/2F | Original Q10

1 0 Peat bogs are estimated to contain twice as much carbon as all the world's forests.

**Figure 13** shows a section through part of a peat bog.

**Figure 13**




Layer **A** contains a lot of air.

Layer **B**:

- contains the dead remains of plants
- has a low pH
- contains very little oxygen
- contains carbon dioxide and methane.

4.7.4.1 Trophic levels

Question 17 · continued



**1 0 . 1** Explain why most of the dead remains of plants in layer **B** do **not** decay.

**[3 marks]**

**1 0 . 2** The peat bog in **Figure 13** is a stable community.

The moss produces biomass at a rate of 340 g/m$^2$/year.

What is the approximate biomass of the moss that becomes biomass in primary consumers?

**[1 mark]**

Tick (✓) **one** box.

- 0.34 g/m$^2$/year ☐
- 3.4 g/m$^2$/year ☐
- 34 g/m$^2$/year ☐
- 340 g/m$^2$/year ☐

**Question 10 continues on the next page**

4.7.4.1 Trophic levels

Question 17 · continued



The sundew plant shown in **Figure 13** on page 38 has leaves with sticky hairs that trap and digest insects.

Digestion of the insects releases phosphates and simple compounds of nitrogen that are used by the sundew plant.

**1 0 . 3** What substance can the sundew plant make using the **phosphates**?

**[1 mark]**

Tick (✓) **one** box.

- Cellulose ☐
- DNA ☐
- Glycerol ☐
- Starch ☐

**1 0 . 4** What substance can the sundew plant make using the **nitrogen**?

**[1 mark]**

Tick (✓) **one** box.

- Fatty acid ☐
- Glucose ☐
- Lactic acid ☐
- Protein ☐

4.7.4.1 Trophic levels

Question 17 · continued



**1 0 . 5** Humans have destroyed large areas of peat bog to collect peat.

The peat provides fuel and provides compost for gardeners to use.

The peat comes from layer **B** in **Figure 13** on page 38.

Layer **B**:

- contains the dead remains of plants
- has a low pH
- contains very little oxygen
- contains carbon dioxide and methane.

**Figure 14** shows the removal of peat from a peat bog.

**Figure 14**




Explain how the destruction of peat bogs and the use of peat affects the temperature of the Earth's atmosphere.

**[4 marks]**

10

4.7.4.1 Trophic levels

Question 18

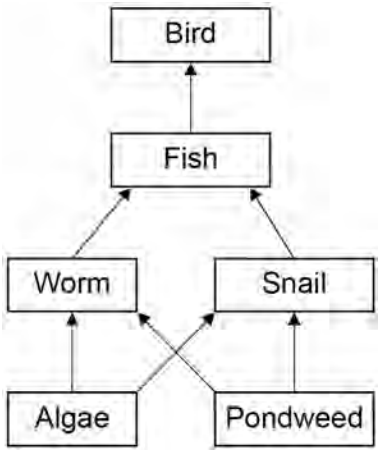
June 2025 | 8461/2F | Original Q6

**0 6** Different species in a habitat may depend on each other for food.

Several food chains may be linked together to form a food web.

**Figure 10** shows a food web in a lake.

**Figure 10**




**0 6 . 1** Most organisms in the food web get their energy by eating other organisms.

Where does the pondweed get energy from?

**[1 mark]**

Tick (✓) **one** box.

- Carbon dioxide ☐
- Mineral ions ☐
- Sunlight ☐
- Water ☐

4.7.4.1 Trophic levels

Question 18 · continued



**0 6 . 2** Name **one** organism from **Figure 10** that is a primary consumer.

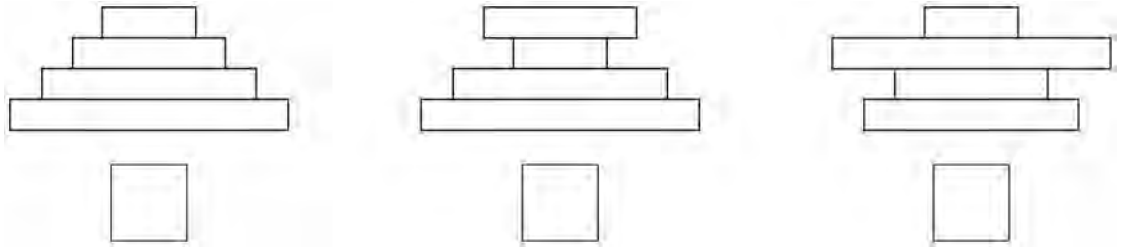
**[1 mark]**

**0 6 . 3** There are four trophic levels in **Figure 10**.

Which is the correct pyramid of biomass for the food web in **Figure 10**?

**[1 mark]**

Tick (✓) **one** box.



**0 6 . 4** One of the food chains in **Figure 10** is:

algae → worm → fish → bird

10% of the biomass in each trophic level is transferred to the next trophic level.

What percentage of the biomass in the algae is transferred to the fish?

**[1 mark]**

Tick (✓) **one** box.

10% ☐ 1% ☐ 0.1% ☐

**Question 6 continues on the next page**

Question 18 · continued



**0 6 . 5** What are **two** ways that **energy** is lost from organisms in the food chain?

**[2 marks]**

Tick (✓) **two** boxes.

- Diffusion ☐
- Faeces ☐
- Movement ☐
- Osmosis ☐
- Photosynthesis ☐

**0 6 . 6** Scientists counted the number of fish, snails and worms in a sample taken from the lake.

**Table 3** shows the results.

**Table 3**

| | Tally | Number of organisms in the sample |
|---|---|---|
| Fish | \|\|\| | |
| Snails | 𝍸 𝍸 \|\| | |
| Worms | 𝍸 𝍸 𝍸 𝍸 \|\|\| | |

Complete **Table 3**.

**[2 marks]**

8