

1. Mistletoe is a green plant that can often be seen growing high in a tree in winter.



Mistletoe can make its own food but very slowly.

Therefore, it needs to take some food from the tree that it grows on. The tree does not benefit.

Complete these sentences about how the mistletoe feeds.

Use words from the list.

chlorophyll
respiration

leaf
starch

phloem
sunlight

photosynthesis
xylem

Mistletoe can make some food by

This is because it contains the green chemical which traps energy from

The energy is used by the mistletoe to make sugars.

The mistletoe also gets some sugars from the tissue of the tree.

[4]

2(a). Microorganisms are found in milk.

These microorganisms make enzymes that can cause milk to decompose.

State the name of **one** type of microorganism that can cause milk to decompose.

[1]

(b). Some students design an investigation to see how fast a sample of milk decomposes.

This is the method the students use:

- Pour 20 cm³ of milk into a beaker.
 - Keep the beaker at 25 °C.
 - Measure the pH of the milk at different times over 72 hours.
- i. Suggest **one** piece of apparatus the students could use to keep the beaker of milk at a constant temperature.

[1]

- ii. When milk decomposes, sugars in the milk are turned into lactic acid.

To show how fast the milk decomposes, the students measure the time it takes for the pH to change.

Which term describes the time it takes for the pH to change?

Tick (✓) **one** box.

Control variable☐

Dependent variable☐

Independent variable☐

[1]

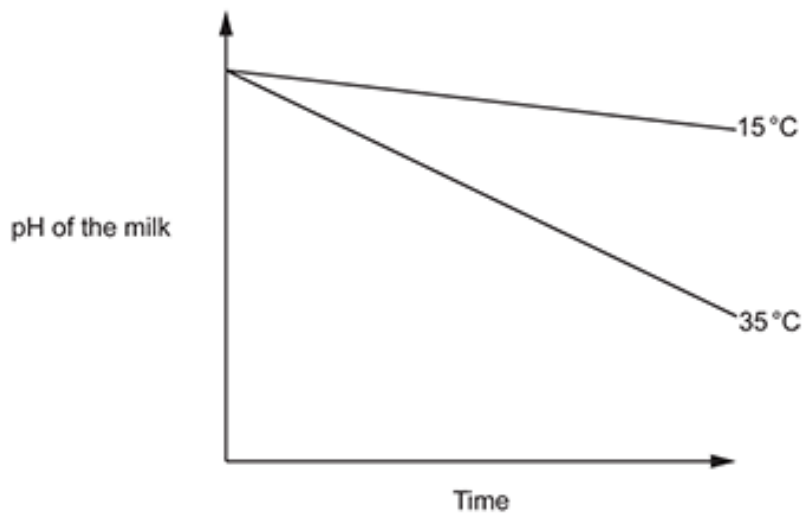
(c). The students repeated the experiment at two other temperatures.

The table shows the results.

Temperature (°C)	pH of milk				
	At the start	After 12 hours	After 24 hours	After 48 hours	After 72 hours
15	6.5	6.4	6.3	6.1	5.8
25	6.5	6.3	6.2	5.9	5.5
35	6.5	6.3	6.1	5.5	4.9

- i. The graph shows the pattern of the students' results for 15 °C and 35 °C.

Draw a line on the graph to show the pattern at 25 °C.



[1]

- ii. Complete the sentences to explain the difference between the students' results at 15 °C and 35 °C.

Milk decomposes at 35 °C.

Increasing the temperature increases the of the molecules.

This causes more frequent between enzymes and the
..... molecules.

[4]

- iii. The students want to find the temperature at which the enzymes from the microorganisms change shape and stop functioning (denature).

How could they extend their experiment to find this out?

Tick (✓) **two** boxes.

Repeat at higher temperatures.

☐

Repeat at lower temperatures.

☐

Repeat at more temperatures between 15 °C and 35 °C.

☐

Identify the lowest pH reached.

☐

Identify the temperature where pH decreases the most.

☐

Identify the temperature where pH does not decrease.

☐

[2]

3. Mistletoe is a green plant that can often be seen growing high in a tree in winter.



Mistletoe can make its own food but very slowly.

Therefore, it needs to take some food from the tree that it grows on. The tree does not benefit.

Which term describes the mistletoe's relationship with the tree?

Put a **ring** around the correct option.

mutualistic partner **parasite** **predator** **prey**

[1]

4. Which process in the water cycle involves water moving from clouds to the ground?

- A** Evaporation
- B** Precipitation
- C** Run off
- D** Transpiration

Your answer

[1]

5. The diagram shows a food chain.



How much energy is lost between the producer and primary consumer?

- A** 400 kJ
- B** 4400 kJ
- C** 4500 kJ
- D** 4900 kJ

Your answer

[1]

6. What is the definition of a **population?**

- A** All the communities that live in a habitat.
- B** All the different species living in a habitat.
- C** All the members of one species that live in a habitat.
- D** All the organisms that live in a habitat.

Your answer

[1]**7.****Buddleia, a pest or a friend?**

Many people grow buddleia bushes in their gardens.

Buddleia flowers attract butterflies that feed on nectar. Birds and bats feed on butterflies. Foxes and badgers can live under the cover of the bushes.

Buddleia bushes spread and grow very quickly. In some areas this has caused the numbers of other plants to decrease.

In these areas, scientists have seen large numbers of butterflies. However, they only see the more common types of butterflies and not rare ones.

Some scientists say buddleia are 'pests' but others say they are 'friends'.

Use information from the passage to explain these different opinions about buddleia.

In your answer use ideas about:

- interdependence
 - competition
 - biodiversity.
-

[illegible]

8(a). Sorghum is a crop plant grown in Africa for its seeds as shown in **Fig. 16.1**.



Fig. 16.1

A large colony of weaver birds has 5 000 000 birds.

Calculate the mass of seeds in **kilograms** that this colony eats in a day.

Mass of seeds = kg [2]

(b). Fig. 16.2 shows a food web containing sorghum.

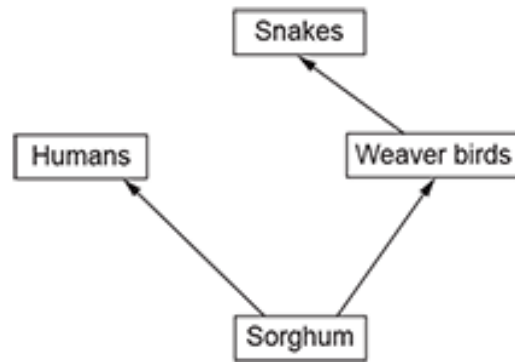


Fig. 16.2

Write down the trophic level for each of these organisms in the food web.

Use the words from the list.

primary consumers

producers

secondary consumers

Sorghum

Snakes

[2]

9. Which process in the carbon cycle **decreases** the amount of carbon dioxide in the air?

- A Combustion
- B Decomposition
- C Photosynthesis
- D Respiration

Your answer ☐

[1]

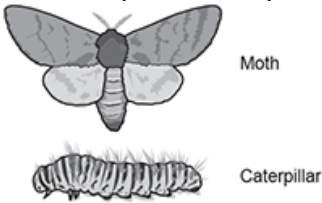
10. Which of these is a **biotic** factor that can affect the growth of plants?

- A Carbon dioxide levels
- B Light availability
- C Mineral content of the soil
- D Number of primary consumers

Your answer ☐

[1]

11(a). Pine processionary moths lay eggs that develop into caterpillars, as shown in the diagram.



The caterpillars eat pine trees.
The caterpillars are eaten by birds such as cuckoos. The caterpillars are also parasitised by fungi.

Draw a food web to show these feeding relationships.

[2]

(b). The caterpillars eat pine trees. Scientists use a fungus to kill the caterpillars to protect the pine trees. The fungus is sprayed as spores which develop into the fungus.

Table 20.1 shows three treatments the scientists try.

Table 20.1

	Site of spraying	Concentration of fungal spores used (million spores / ml)	How long the treatment lasts
Treatment 1	on the tops of the pine trees	100	a few months
Treatment 2	on the soil around the pine trees	100000	many years
Treatment 3	control (spraying with water)	0	

i. Why is the use of the fungal spores an example of biological control?

[1]

ii. How many times **more concentrated** are the spores in the spray used on the soil compared to the spray used on the tops of the pine trees?

Answer[1]

iii. **Table 20.2** shows the results of the scientists’ spraying in one year.

Table 20.2

Site of spraying	Caterpillars killed (%)
on the tops of the pine trees	86.9
on soil	80.0
control (spraying with water)	3.7

The scientists made this statement:

The fungal spores are an effective way to kill the caterpillars.
The fungal spores should be sprayed on the soil not in the trees.

Discuss why the scientists are correct.
Use data from **Table 20.1** and **Table 20.2**.

[3]

12. Which of these is a **biotic** factor that can affect organisms?

- A Light
- B pH of soil
- C Predators
- D Temperature

Your answer ☐

[1]

13. Which process causes the loss of biomass from a food web?

- A Growth
- B Photosynthesis
- C Predation
- D Respiration

Your answer ☐

[1]

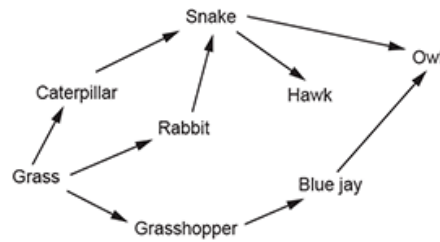
14. Which is the order for the levels of organisation in an ecosystem, starting with the **smallest**?

- A community → population → organism → ecosystem
- B ecosystem → population → community → organism
- C organism → population → community → ecosystem
- D population → organism → ecosystem → community

Your answer

[1]

15. The diagram shows a food web.



Which organisms are secondary consumers?

- A Blue jays and snakes
- B Caterpillars and rabbits
- C Hawks and owls
- D Rabbits and hawks

Your answer

[1]

END OF QUESTION PAPER