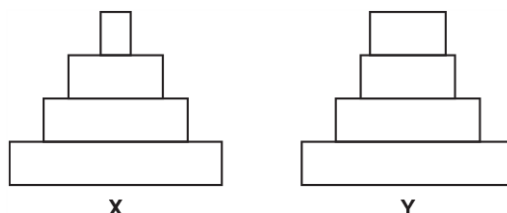


# Ecosystems (H)

1. The diagram shows pyramids of biomass for two food webs, **X** and **Y**.



Which statement explains the difference between the two pyramids?

- A** In food web **X** there is a greater efficiency of transfer between primary consumer and secondary consumer than in **Y**.
- B** In food web **X** there is a greater efficiency of transfer between secondary consumer and tertiary consumer than in **Y**.
- C** In food web **X** there is a lower efficiency of transfer between primary consumer and secondary consumer than in **Y**.
- D** In food web **X** there is a lower efficiency of transfer between secondary consumer and tertiary consumer than in **Y**.

Your answer

[1]

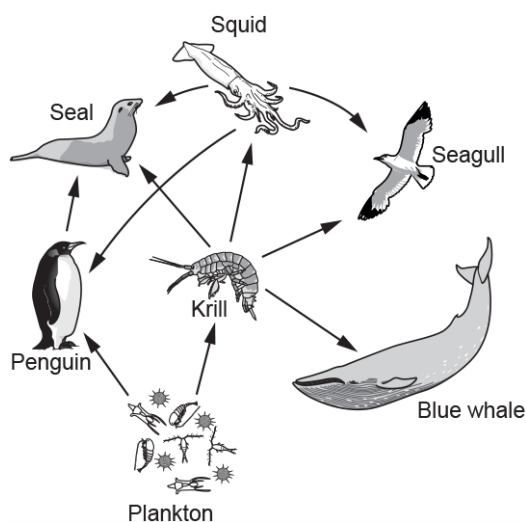
2. Which is the correct definition of a parasite?

- A** An organism that is always at the top of a food chain.
- B** An organism that kills and eats another organism.
- C** An organism that lives on another living organism so that they both benefit.
- D** An organism that lives on or in another living organism causing it harm.

Your answer

[1]

3. The diagram shows a food web in the sea.



**Not to scale**

The number of penguins decreased in the area. This caused an increase in seal numbers.

What is a possible reason for the increase in seal numbers?

- A Less seals were eaten.
- B The krill numbers dropped.
- C There were more plankton for the seals to eat.
- D The seals had less competition for squid.

Your answer

[1]

4. In food chains, biomass is lost between different trophic levels.

One reason for this is the release of undigested food from the body.

Which term is used to describe this release?

- A Decomposition
- B Egestion
- C Excretion
- D Peristalsis

Your answer

[1]

5. A student estimates the number of snails in a pond.

Part of his method involves collecting snails and marking them.

What is the name of the method that he is using?

- A Aseptic technique
- B Capture-recapture
- C Percentage increase
- D Scaling-up

Your answer

[1]

6 (a). Fig. 16.1 shows the water cycle occurring in a lake.

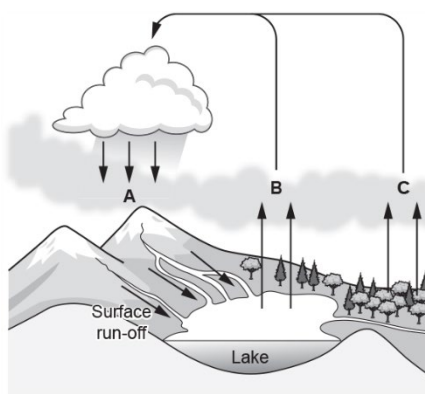


Fig. 16.1

Draw a line to the correct name for the three processes labelled **A**, **B** and **C** in Fig. 16.1.

<b>A</b>	Evaporation
<b>B</b>	Photosynthesis
<b>C</b>	Precipitation
	Respiration
	Translocation
	Transpiration

[3]

(b). Surface run-off water passes through soil and back into the lake.

Write down one reason why surface run-off water is important to organisms living in the lake.

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[1]

7 (a). Gardeners often turn dead plant material from their garden into compost. They then add this compost to the soil where they are growing plants.

Why do gardeners add compost to their soil?

Tick (✓) **one** box.

Bacteria in the compost kill disease causing fungi.

The compost is sterile and so is aseptic.

The compost provides carbon dioxide for photosynthesis.

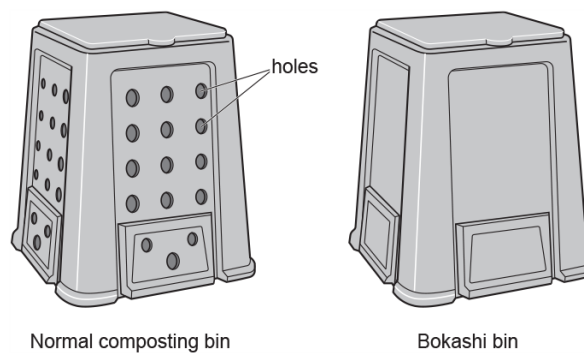
The compost provides minerals for the plants.

[1]

(b). Compost can be made in a composting bin. In the bin **aerobic bacteria** turn dead plant material into compost.

Some people use a different way of making compost, called bokashi. In this process the compost is made **anaerobically**.

The drawings show a normal composting bin and a bokashi bin.



Normal composting bin

Bokashi bin

Explain the difference in the design of the two composting bins.

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[2]

(c). Scientists investigate the two methods of making compost.

This is their method:

- Take one large pile of dead plant material
- Divide the material into two samples of equal mass
- Place one sample into the normal composter and place one sample into the bokashi composter
- Measure the temperature in each composter every 10 days
- After 40 days, measure the mass of the compost.

Write down **one** way that the scientists make sure that they can draw valid conclusions.

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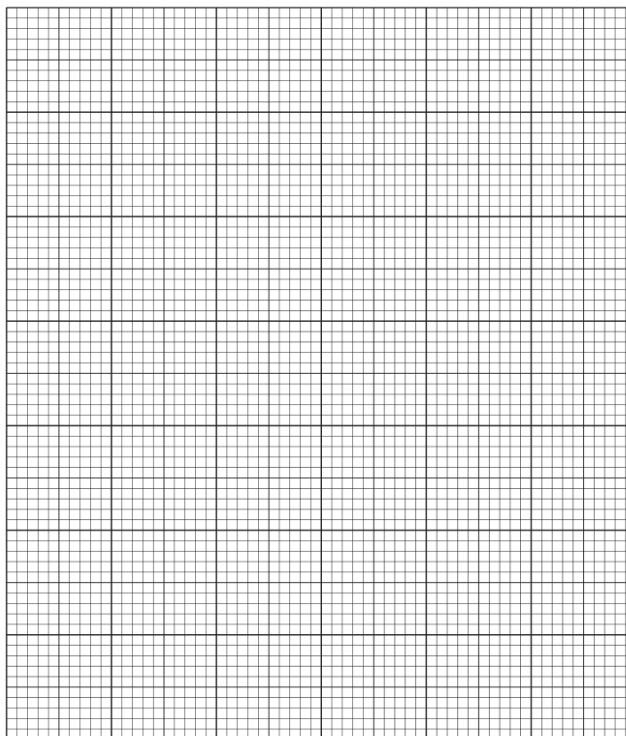
[1]

(d). **Table 18.1** shows the scientists' temperature readings.

Time (days)	Temperature of the compost (°C)	
	normal compost	bokashi compost
0	26	26
10	70	27
20	53	29
30	42	31
40	28	28

**Table 18.1**

- i. Plot the scientists' results on the grid for normal and bokashi compost, and draw **two** curves of best fit.



[5]

- ii. Explain why the temperature of the compost in the **normal** bin changed as shown in the graph.

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**[2]**

- iii. Explain the difference in the temperature changes between the aerobic normal compost and the anaerobic bokashi compost.

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**[2]**

(e). **Table 18.2** shows the scientists' results for the mass of the compost.

	<b>Normal compost</b>	<b>Bokashi compost</b>
<b>Mass at start (kg)</b>	1500	1500
<b>Mass after 40 days (kg)</b>	750	1100

**Table 18.2**

A gas is given off in the formation of the compost. This causes most of the decrease in mass.

- i. The percentage decrease in the mass of the normal compost is 50%.  
Calculate the percentage decrease in the mass of the bokashi compost.  
Give your answer to **2** significant figures.

Percentage decrease = ..... % **[3]**

- ii. The scientists concluded that the bokashi method of composting might be better for the environment.

Use your answer from part (i) to justify the scientists' conclusion.

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**[2]**

**8 (a).** A salt marsh is a large muddy area of land where a river joins the sea. This is a rare habitat and some plants grow on salt marshes but nowhere else.

When the tide comes in the salt marsh gets covered with seawater.

Explain the effects of salt water on plant cells.

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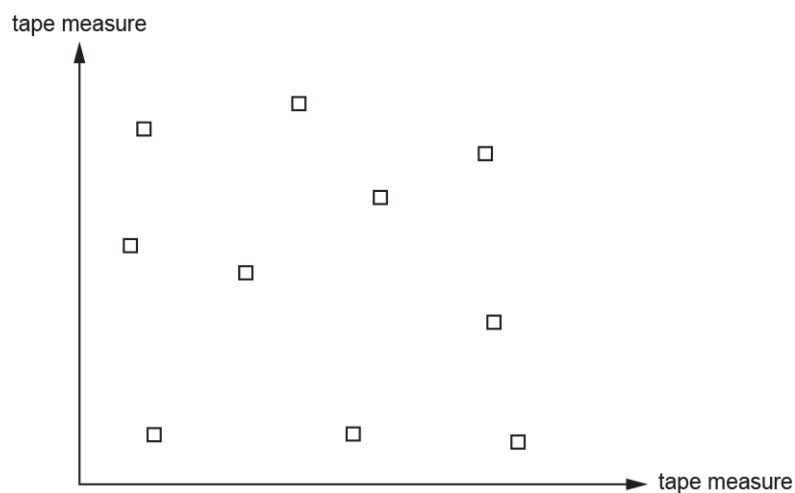
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**[1]**

**(b).** A student investigates the plants growing on a salt marsh. He uses a quadrat to sample the plants.

He puts down two long tape measures at right angles to each other across the salt marsh. He then picks numbers at random and uses them to decide where to place a quadrat.

The diagram shows the position of all his quadrats across the salt marsh.



- i. The salt marsh measured 50 m x 50 m.

Each quadrat measured 0.5 m x 0.5 m.

Calculate the percentage of the whole salt marsh that was sampled by the student.

Percentage = ..... % **[3]**

- ii. A second student sampled by placing five quadrats close together in the centre of the salt marsh.

Evaluate the sampling method of the second student compared to the method of the first student.

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**[3]**

- iii. Suggest **one** factor that the students should consider in a risk assessment for their experiment.

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**[1]**

**(c).** In some salt marshes large sand banks have been built. This stops tides from entering the salt marsh.

The level of soil on the salt marsh builds up and the marsh turns into dry land.

This dry land shows a greater biodiversity of plants than a salt marsh.

Explain why some scientists want to limit the building of sand banks, even though they increase biodiversity.

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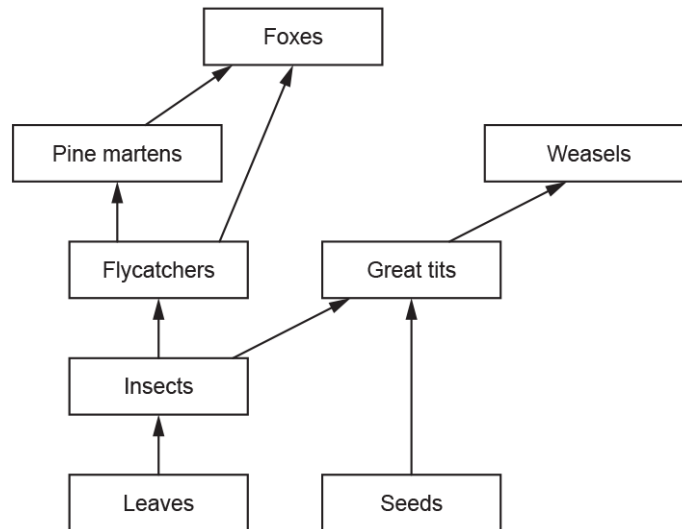
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**[2]**



9 (a). The diagram shows part of a food web from a woodland.



- i. Great tits are described as both primary consumers and secondary consumers.

Explain why.

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[2]

- ii. Foxes are described as both predators and competitors of pine martens.

Explain why.

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[2]

- iii. Which organism in the food web occupies the second trophic level?

----- [1]

(b). Great tits and flycatchers are both birds.

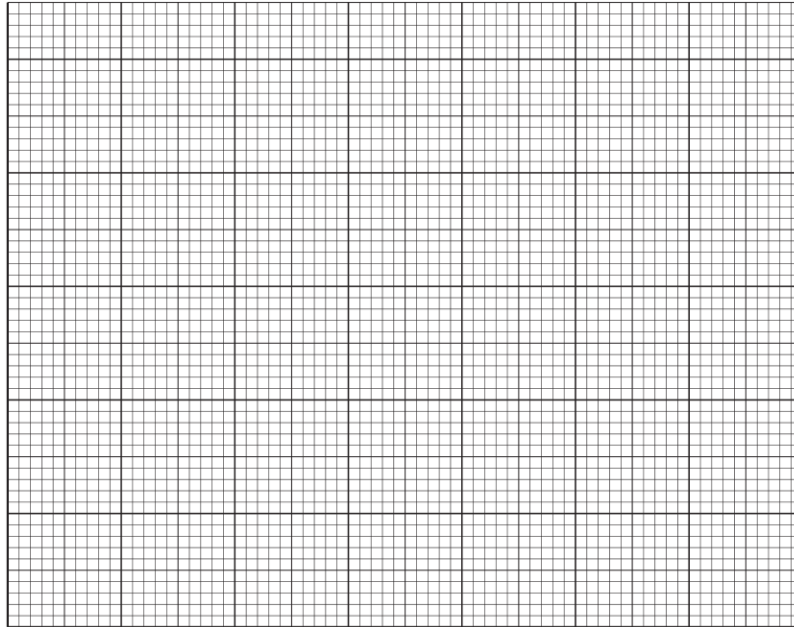
In a conservation project, scientists have built boxes for the birds to nest in. The scientists fixed the boxes on trees at different heights.

The table shows how many birds of each type used the boxes for nesting.

Height of bird box above the ground (m)	Number of bird boxes used	
	By great tits	By flycatchers
1	1	6
2	7	5
4	10	6

- i. Draw a **bar chart** on the graph paper to show the scientists' results.

The results for great tits and flycatchers should be on the same axis.



[4]

ii. The food web shows:

- Weasels feed on great tits
- Pine martens feed on flycatchers.

Weasels live on the ground but pine martens live in trees.

How can this be used to explain the results of the scientists' investigation?

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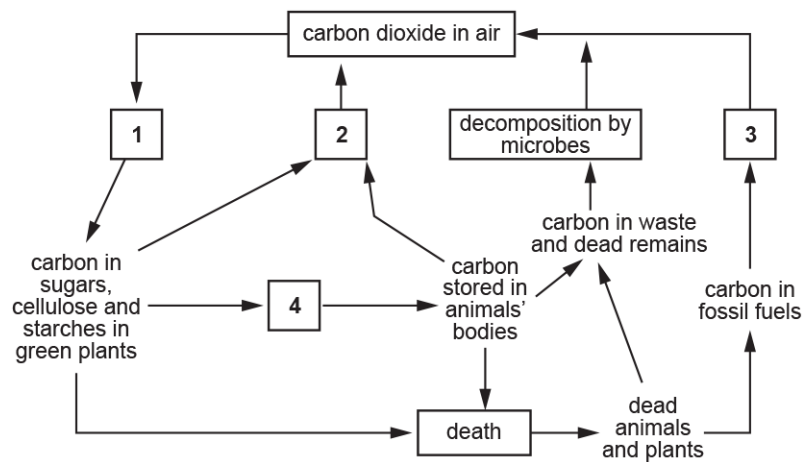
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**[3]**

10 (a). The diagram shows the carbon cycle.



Boxes 1-4 represent different processes in the carbon cycle.

Draw lines to link boxes 1-4 to the correct name for the process in the carbon cycle.

1	Combustion
2	Eating
3	Photosynthesis
4	Respiration

**[2]**

(b). Scientists investigated if crops could be grown on the planet Mars.

They used a soil that was similar to the soil found on Mars. The soil contained some minerals but no living organisms.

- i. The scientists managed to grow crops in the soil. However on Mars, the minerals in the soil would soon run out.

Explain why.

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----- [2]

- ii. Living organisms could be added to the soil but there is no air on Mars. The plants would need to be grown in an enclosed structure.

At first, air would need to be added, but after a while the organisms in the soil and the plants would supply each other with the gases they need.

Explain how this would happen.

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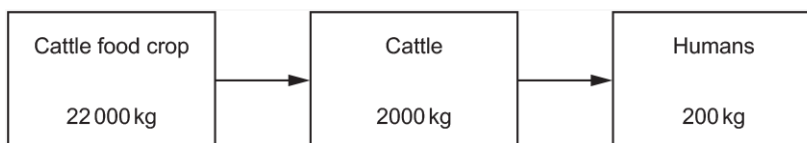
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----- [2]

11 (a). The diagram shows the flow of biomass through an agricultural food chain.



- i. Calculate the percentage efficiency of transfer of biomass between the cattle food crop and humans.

Answer = \_\_\_\_\_ % [2]

- ii. Write down **two** ways that biomass is lost from the food chain.

1

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2

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[2]

**(b).** High levels of light intensity can damage plants. To prevent damage, plants have a protection mechanism.

When light intensity levels get **too high**, the protection mechanism switches on. This stops the plant absorbing too much light.

When the light intensity drops to safe levels, the protection mechanism switches off **slowly**.

Explain why this mechanism would **reduce** the biomass available to humans.

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[6]

(c). Switching off the protection mechanism described in part (b) involves the plant making a **protein**.

Scientists have put extra copies of the gene for this protein into the plants. This makes the plant make more mRNA molecules.

- i. Explain why making more mRNA will switch off the mechanism faster.

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----- [2]

- ii. Scientists have found that the genetically modified plants make 20% more biomass.

Use the agricultural food chain on page 21 to calculate the increase in biomass this would provide for humans.

Answer = \_\_\_\_\_ kg [2]

- iii. Inserting extra copies of a plant's gene into a plant is a type of genetic modification (GM).

Another example of GM involves inserting a bacterial gene into a plant which makes the plant produce an insecticide.

Suggest reasons why.

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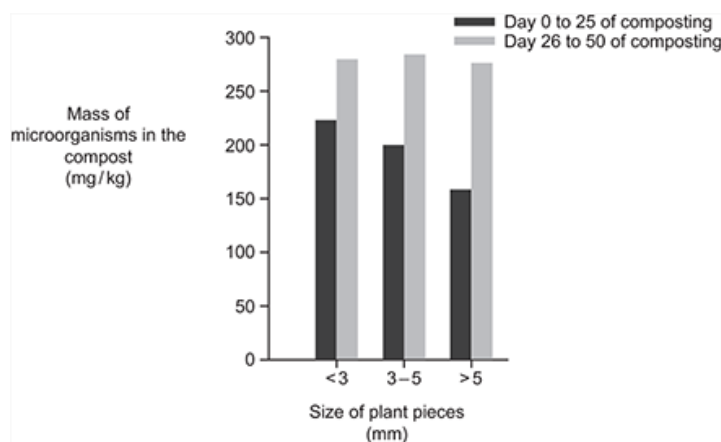
----- [2]

12(a). This machine helps shred plants for a compost heap.



The machine can shred plants into three different sizes.

This graph is in the instruction booklet for the machine.



Which size of plant pieces is best for making compost?

Explain your answer.

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**[3]**

(b). The size of the plant pieces has an effect on the number of microorganisms in the compost.

Suggest why.

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**[2]**

(c). The decomposition of dead plants and animals is an important process for ecosystems.

Explain why.

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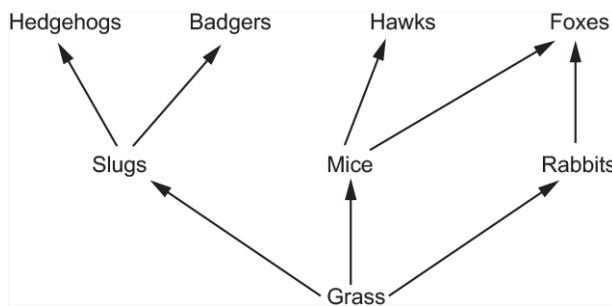
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**[3]**

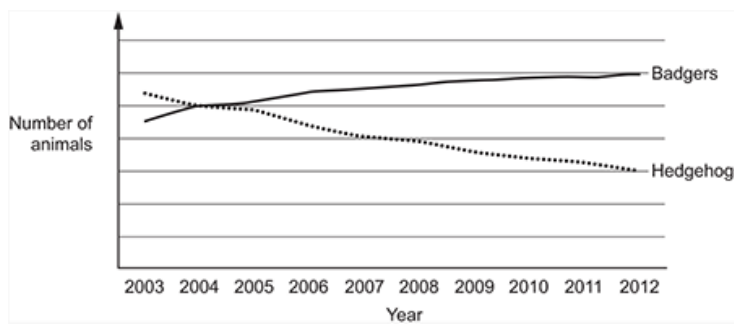
13 (a). The diagram shows part of a food web from a grassland.



A survey was set up to see if the number of badgers and hedgehogs has changed in the UK.

The number of badgers and hedgehogs were counted in different areas each year from 2003 to 2012.

The graph shows the results.



Use the food web to suggest an explanation for the change in the number of hedgehogs shown in the graph.

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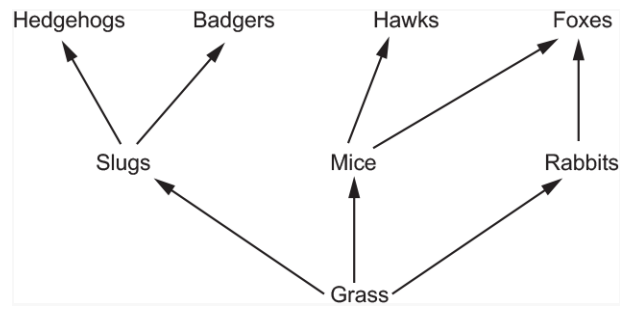
**[2]**







15. The diagram shows part of a food web from a grassland.



How many secondary consumers are shown in this food web?

----- [1]

**END OF QUESTION PAPER**