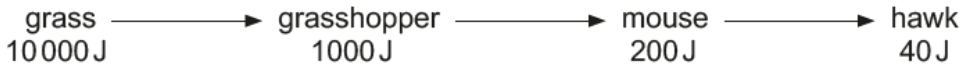
Community level systems – 2022 GCSE Gateway Biology A

1. June/2022/Paper_J247/04/No.1

The diagram shows the energy trapped as biomass at each stage of a food chain.



What is the percentage efficiency in the transfer of energy between the grasshopper and the mouse?

A 0.2%

B 8%

C 10%

D 20%

Your answer ☐ **[1]**

2. June/2022/Paper_J247/04/No.5

What is the definition of a parasite?

A An organism that kills another organism and then feeds from it.

B An organism that kills another organism by out-competing it.

C An organism that lives on or in another organism causing it harm.

D A microorganism that causes disease in another living organism.

Your answer ☐ **[1]**

3. June/2022/Paper_J247/04/No.6

Animal populations can be estimated using a method called capture-recapture.
The number of animals in the population is estimated using the formula:

$$\text{population estimate} = \frac{\text{number in first sample} \times \text{number in second sample}}{\text{number of marked animals in second sample}}$$

Sometimes marking the animals makes them less well-camouflaged.

What effect would this have on the population estimate?

A The estimate is always too high.

B The estimate is always too low.

C The estimate is either too high or too low.

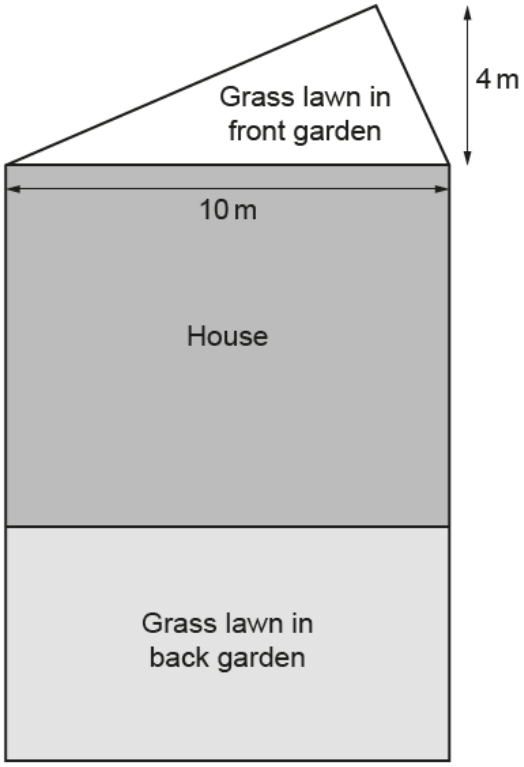
D There is no effect on the estimate.

Your answer ☐ **[1]**

4. June/2022/Paper_J247/04/No.16

A gardener grows thistle plants as weeds in his grass lawns.
He wants to see if thistle plants grow better in the front garden than in the back garden.

The diagram shows a plan of the grass lawns in each garden.



(a) The gardener estimates the number of thistle plants in each metre squared of the **back** garden. He gets an estimate of 2.5 thistle plants / m^2.

Describe an experimental method the gardener uses to get this estimate.

Include the name of the piece of apparatus he uses.

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..... **[3]**

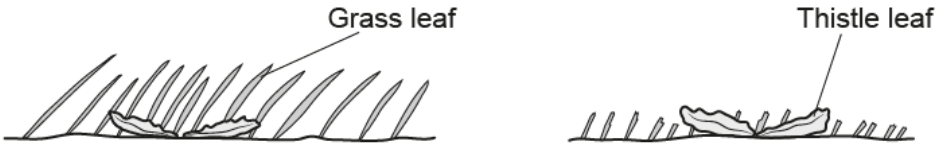
(b) The **front** garden is smaller so he counts all the thistle plants growing in the lawn.
He counts 36 plants.

Calculate the number of thistle plants per metre squared in the front garden.
Use the formula: area of a triangle = ½ × base × height

Number of thistles = ... / m^2 **[2]**

(c) The gardener cuts the grass more often in the back garden. He thinks thistles grow better when he mows the grass more often.

The diagram shows the grass lawns before and after he has mown them.



Before mowing **After mowing**

Explain how cutting the grass more often can affect how well the thistles grow.

Use ideas about competition and photosynthesis.

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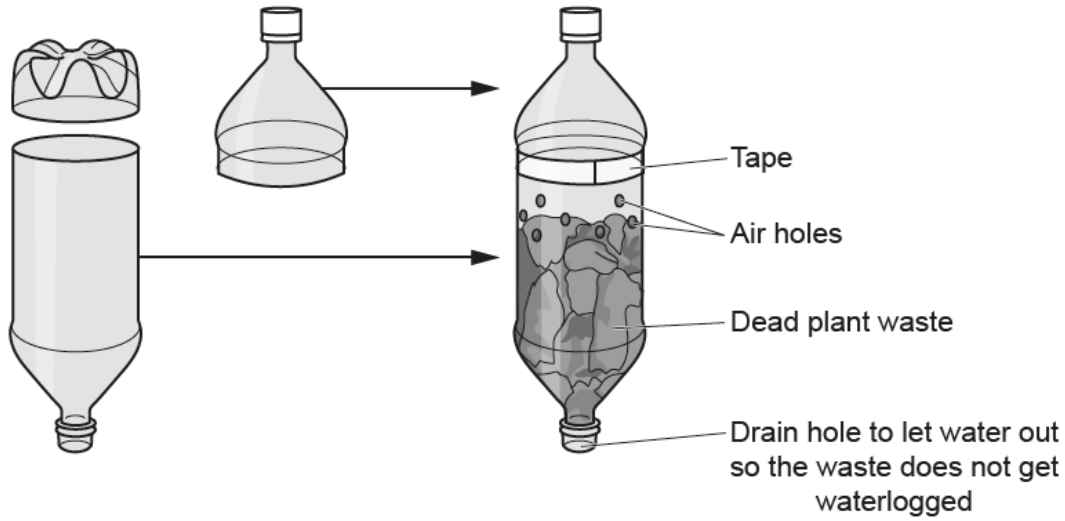
..... **[3]**

5. June/2022/Paper_J247/04/No.17

Some students investigate decomposition of dead plant waste.
They make a composter from two plastic bottles.



(a) Why do the students make air holes in the bottle?
Tick (✓) **one** box.

To allow heat into the bottle. ☐

To allow oxygen gas into the bottle. ☐

To prevent the build-up of nitrogen gas in the bottle. ☐

So that carbon dioxide gas can enter. ☐

[1]

(b) The students want to see if the number of air holes in the bottles affects the rate of decomposition.

- They set up bottles with different numbers of air holes.
- They then measure the mass of the bottle and compost at the start and after four weeks.

The table shows their results.

	Mass of bottles and plant waste (g)	
Number of air holes	**At the start**	**After 4 weeks**
2	300	270
4	300	250
8	300	240
16	300	235

(i) Calculate the loss in mass **per week** of the bottle and plant waste with 16 air holes.

Give your answer to **3** significant figures.

Loss in mass = ... grams / week **[3]**

(ii) Describe the effect of the number of air holes on the rate of decomposition of the plant waste.

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..... **[2]**

(iii) The students checked that all the bottles and plant waste had a mass of 300 g at the start of the experiment.

Explain why this helps the students to analyse the results.

.....

..... **[1]**

(iv) What is the independent variable in the students' investigation?

..... **[1]**

(v) The students notice that during the experiment, water drips through the drain hole at the bottom of the apparatus on to the floor.

Explain why this can produce inaccurate results **and** how the students can change their method to correct this.

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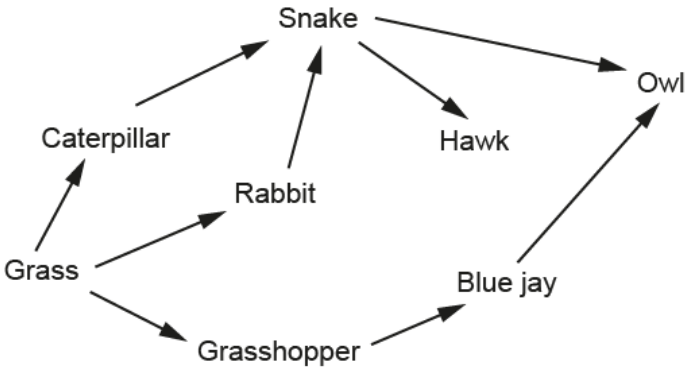
..... **[2]**

6. June/2022/Paper_J247/02/No.1

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]**

7. June/2022/Paper_J247/02/No.9

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

A Growth

B Photosynthesis

C Predation

D Respiration

Your answer ☐ **[1]**

8. June/2022/Paper_J247/02/No.12

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]**

9. June/2022/Paper_J247/02/No.13

The table shows the number of insects caught using a net on different days in a week.

Day	**M**	**Tu**	**W**	**Th**	**F**	**S**	**Su**
Number of insects	6	8	5	4	8	9	2

What is the median and mode of the number of insects caught in **one** day?

A Median = 6 Mode = 8

B Median = 6 Mode = 6

C Median = 8 Mode = 8

D Median = 8 Mode = 6

Your answer ☐ **[1]**

10. June/2022/Paper_J247/02/No.14

The diagram shows the energy trapped as biomass at each stage of a food chain.

grass	→	grasshopper	→	mouse	→	hawk
10 000 J		1000 J		200 J		40 J

What is the percentage efficiency in the transfer of energy between the grasshopper and the mouse?

A 0.2%

B 8%

C 10%

D 20%

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11. June/2022/Paper_J247/02/No.23

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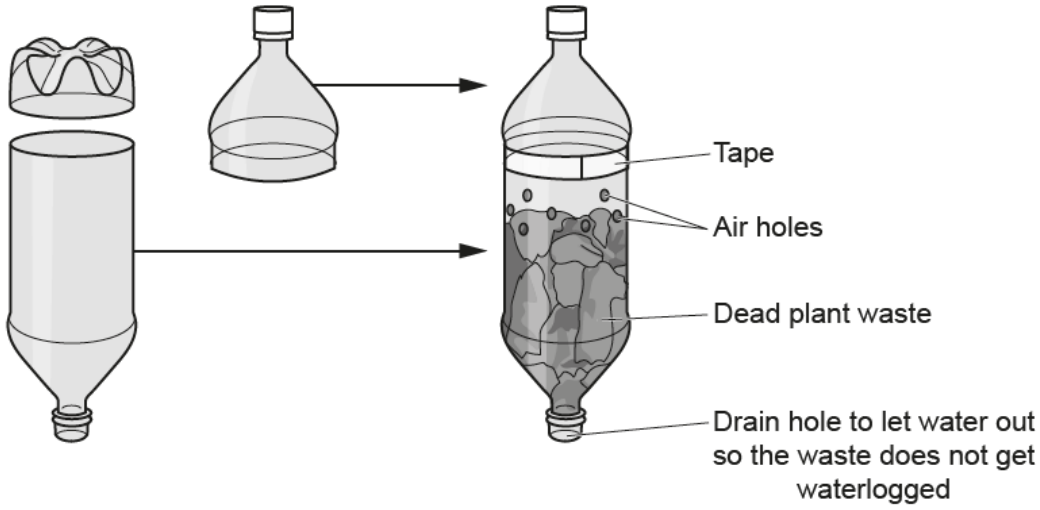

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