

GCSE Biology

Worksheet: Transfer of biomass

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Transfer of biomass

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

An adult barn owl eats about 60 g of food each day. Its food is mainly field voles. One field vole has a mass of about 20 g.

0 1 . 1 Calculate the number of field voles that the barn owl eats each day.

.....

.....

.....

Number of field voles =

[1 mark]

0 1 . 2 Calculate the number of field voles that the barn owl eats in one year (365 days).

.....

.....

.....

Number of field voles =

[1 mark]

0 1 . 3

The mass of the adult barn owl stays about the same, even though it eats this food every day.
Give **one** reason why the food it eats does not become part of its biomass.

.....

.....

[1 mark]

0 2

Biomass is lost at each stage of a food chain.

0 2 . 1

Complete the sentences. Choose answers from the list.
1% · 10% · 50% · faeces · photosynthesis · respiration · sweat · urine
Producers transfer about of the energy from the light that reaches them for photosynthesis.
Only about of the biomass at each trophic level is transferred to the level above.
Some ingested material is not absorbed and is egested as
Some absorbed material is lost as carbon dioxide and water in ,
and as water and urea in

.....

.....

.....

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.....

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.....

.....

[5 marks]

0 3

Only some of the biomass at one trophic level is transferred to the next trophic level.

0 3 . 1

Approximately what percentage of the biomass at one trophic level is transferred to the level above?

Tick (✓) **one** box.

1%

☐

10%

☐

50%

☐

90%

☐

[1 mark]

0 3 . 2

Which **two** of the following are reasons why biomass is lost between trophic levels?

Tick (✓) **two** boxes.

Some ingested material is egested as faeces

☐

Some material is lost as carbon dioxide and water in respiration

☐

Organisms at higher trophic levels are larger

☐

Producers absorb all the light that reaches them

☐

[2 marks]

0 3 . 3

Animals also lose water and one other waste substance in urine.

Name this waste substance.

.....

.....

.....

.....

[1 mark]

0 4

One adult stoat eats about 25 kg of voles each year. The voles convert about 10% of the biomass of the plants they eat into vole biomass.

0 4 . 1

There are 3 adult stoats in a wood.

Calculate the total mass of voles these stoats eat in one year.

.....

.....

.....

Mass of voles = kg

[1 mark]

0 4 . 2

Calculate the mass of plants that the voles must eat to produce this mass of voles.

.....

.....

.....

.....

Mass of plants = kg

[2 marks]

0 4 . 3

Explain why there are many fewer stoats than voles in the wood.

.....

.....

.....

.....

[2 marks]

0 5

Table 1 shows the biomass at three trophic levels in a meadow.

Table 1

Trophic level	Biomass in g/m ²
producers	1200
primary consumers	110
secondary consumers	11

0 5 . 1

Calculate the efficiency of biomass transfer from producers to primary consumers.

.....

.....

.....

.....

Efficiency = %

[2 marks]

0 5 . 2

Calculate the efficiency of biomass transfer from primary consumers to secondary consumers. Give your answer as a fraction in its simplest form.

.....

.....

.....

.....

Efficiency =

[2 marks]

0 5 . 3

Give **two** ways in which biomass is lost between the producers and the primary consumers.

.....

.....

.....

.....

[2 marks]

0 6

Food chains rarely have more than four or five trophic levels.

0 6 . 1

Explain why.

.....

.....

.....

.....

.....

.....

[3 marks]

0 6 . 2

A lake contains 50 000 kg of algae (trophic level 1). Assume that 10% of the biomass is transferred between each trophic level.
Calculate the biomass at trophic level 4.

.....

.....

.....

.....

Biomass = kg

[2 marks]

0 6 . 3

Explain how the loss of biomass between trophic levels affects the number of organisms at each level.

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Biology · Worksheet: Transfer of biomass · 30 marks

Question 1 (3 marks)

01.1 [1 mark]

Answer: 3

- $60 \div 20 = 3$ (1)
-

01.2 [1 mark]

Answer: 1095

- $3 \times 365 = 1095$ (1)

Notes: Allow ECF from the previous part.

01.3 [1 mark]

- not all of the food eaten is digested and absorbed; some is egested as faeces (or lost in pellets) (1)
- much of the absorbed food is used in respiration and lost as carbon dioxide and water (1)
- water and urea (or uric acid) are lost in excretion (1)
- food is used in respiration to release energy for movement and to keep the body temperature constant (1)

Any 1 of the points above.

Question 2 (5 marks)

02.1 [5 marks]

Answer: 1%; 10%; faeces; respiration; urine

- 1% (1)
 - 10% (1)
 - faeces (1)
 - respiration (1)
 - urine (1)
-

Question 3 (4 marks)

03.1 [1 mark]

Correct: 10%

03.2 [2 marks]

Correct: Some ingested material is egested as faeces; Some material is lost as carbon dioxide and water in respiration

03.3 [1 mark]

Answer: Urea

- urea (1)
-

Question 4 (5 marks)

04.1 [1 mark]

Answer: 75 kg

- $25 \times 3 = 75$ (kg) (1)
-

04.2 [2 marks]

Answer: 750 kg

- $75 \div 0.1$ (or $75 \times 100 \div 10$) (1)
- 750 (kg) (1)

Notes: An answer of 7.5 (multiplying by 10% instead of dividing) scores 0 marks. Allow ECF from the previous part.

04.3 [2 marks]

- only a small proportion of the biomass at one trophic level is transferred to the next / most is lost, e.g. in respiration or as faeces (1)
 - so each stoat needs a large mass of voles, and there is only enough biomass at the top of the food chain to support a few stoats (1)
-

Question 5 (6 marks)

05.1 [2 marks]

Answer: 9.2%

- $110 \div 1200 \times 100$ (1)
- 9.2 (%) (1)

Notes: Allow 9.17 or 9.

05.2 [2 marks]

Answer: $\frac{1}{10}$

- $11 \div 110 / \frac{11}{110}$ (1)
- $\frac{1}{10}$ (1)

Notes: An unsimplified fraction such as $\frac{11}{110}$ scores 1 mark.

05.3 [2 marks]

- not all of the plant material is eaten (e.g. roots) (1)
- not all ingested material is absorbed / some is egested as faeces (1)
- carbon dioxide and water are lost as waste products of respiration (1)
- water and urea are lost in urine (1)
- large amounts of glucose are used in respiration (1)

Any 2 of the points above.

Question 6 (7 marks)

06.1 [3 marks]

- only about 10% of the biomass is transferred from one trophic level to the next (1)
 - so the biomass decreases rapidly along the food chain (1)
 - there is not enough biomass at the top to support another trophic level (1)
-

06.2 [2 marks]

Answer: 50 kg

- $50\,000 \times 0.1 \times 0.1 \times 0.1$ (1)
- 50 (kg) (1)

Notes: 5 kg (four transfers) scores 1 mark.

06.3 [2 marks]

- there is less biomass at each higher trophic level (1)
 - so fewer organisms can be supported at higher trophic levels (especially as they are often larger) (1)
-