Exercise walk-through

7.2

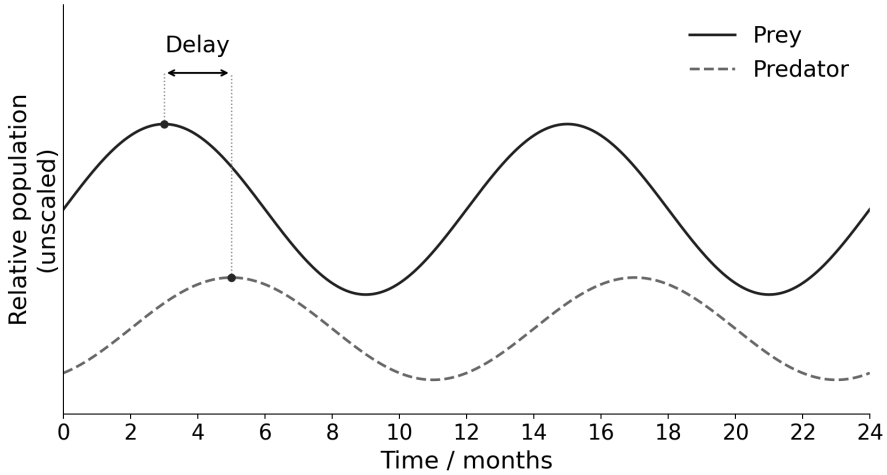
Organisation of an ecosystem and material cycles (4.7.2, RP9/RP10)

AQA · GCSE · Biology

Food chains and sampling

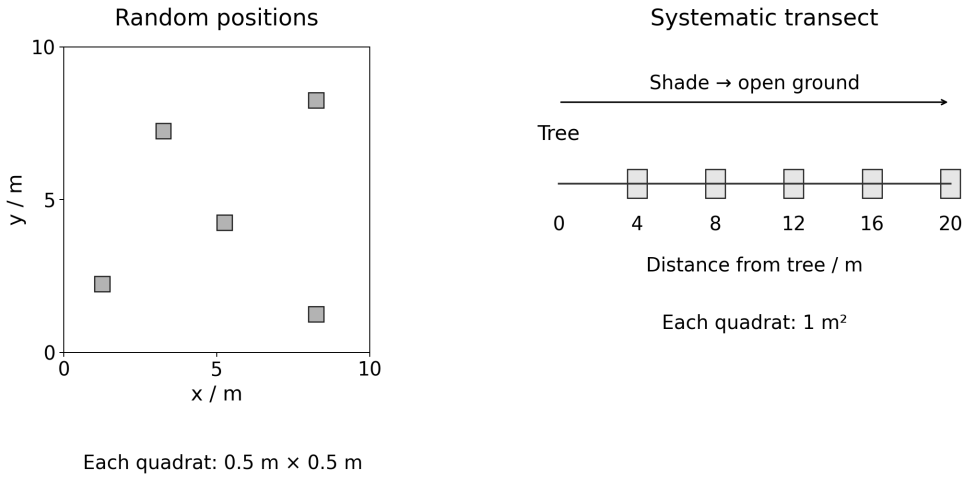
- To estimate a **population** in a field, place quadrats at random positions, using random numbers as coordinates, count the organisms in each, and calculate a mean.
- To see how a species changes across a habitat, for example from shade into open ground, lay a tape measure as a **transect** and place quadrats at regular distances along it. At each one, count the organisms and measure a factor such as light intensity.

Figure: Food chains and sampling



- **Predator** peaks come two months after **prey** peaks.
- Match each part of the diagram to the text.

Figure: Food chains and sampling (2)



- Random 0.25 m^2 quadrats (left) and 1 m^2 quadrats at regular distances along a **transect** (right).
- Match each part of the diagram to the text.

Figure: Food chains and sampling (3)

Table 2

	Distance from the tree in metres				
	4	**8**	**12**	**16**	**20**
Mass of fresh soil in grams	250	266	260	248	252
Mass of dried soil in grams	225	234	209	184	181
Mass of water lost from soil in grams	25	32	51	64	71
Percentage of water in soil	10	12	20	26	**X**
Number of daisies per m^2	0	7	15	28	32

- Soil water and daisies at five distances (AQA GCSE Biology Paper 2H, June 2025, Table 2).
- Match each part of the diagram to the text.

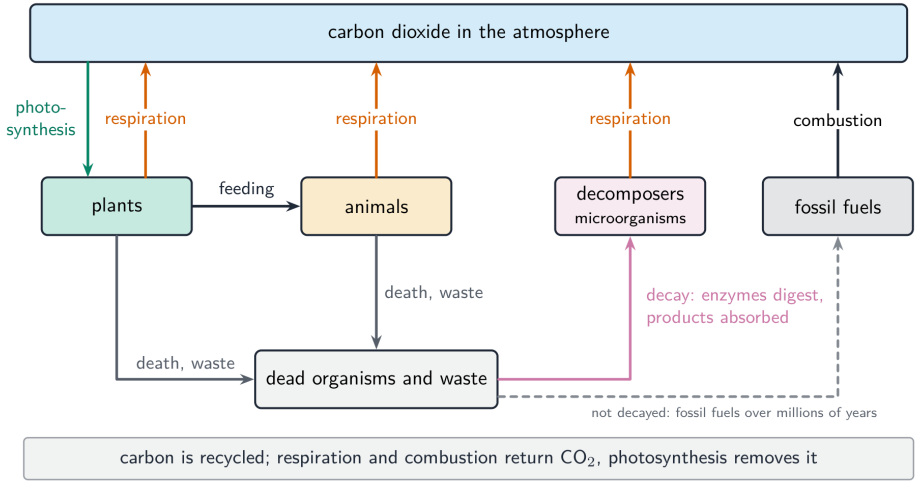
Recycling materials

- Photosynthesis by plants and algae takes carbon dioxide from the air and turns it into glucose and other carbon compounds.
- Feeding passes these carbon compounds along **food chains**.
- Respiration by plants, animals and microorganisms releases carbon dioxide back into the air.

Recycling materials (2)

- When organisms die, microorganisms (decomposers) break down their bodies and waste, and their respiration releases carbon dioxide.
- Combustion of wood and fossil fuels also releases carbon dioxide.

Figure: Recycling materials



- Feeding, decay and respiration are separate processes; combustion releases CO_2 but is not respiration.
- Match each part of the diagram to the text.

Decay (biology only)

- it is warm, because the microorganisms' enzymes work faster (but very high temperatures denature them);
- it is moist, because microorganisms need water;
- there is plenty of oxygen, for aerobic respiration.

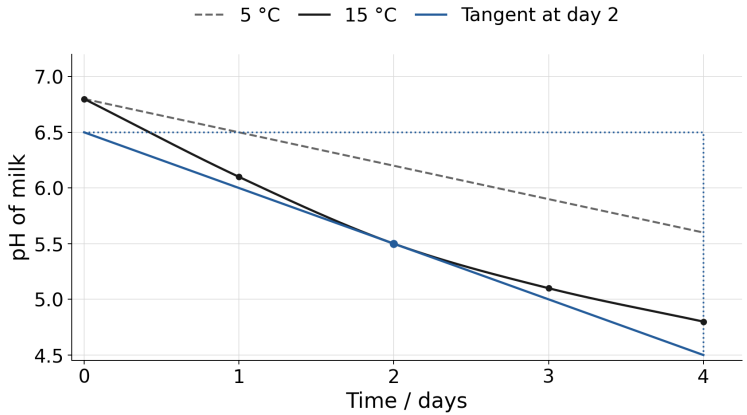
Figure: Decay (biology only)

Table 1

Time in days	pH of milk		
	5 °C	15 °C	25 °C
0	6.8	6.8	6.8
1	6.5	6.1	5.3
2	6.2	5.5	4.9
3	5.9	5.1	4.8
4	5.6	4.8	4.8

- Milk pH over time at three temperatures (AQA GCSE Biology Paper 2H, June 2023, Table 1).
- Match each part of the diagram to the text.

Figure: Decay (biology only) (2)



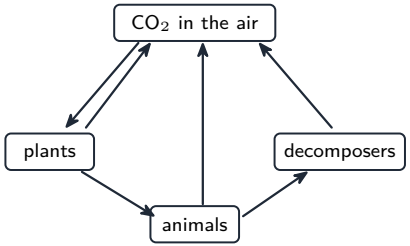
- The milk data plotted, with a **tangent** drawn at day 2 on the 15 °C curve.
- Read the axes and units first.

Exercises 2.1·2.2

2.1 In this food chain, name the producer and the secondary consumer. [2]



2.2 Give **two** processes that put carbon dioxide back into the air. [2]



Exercises 2.1·2.2

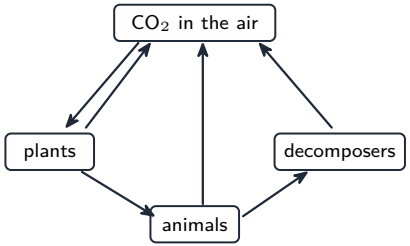
2.1 In this food chain, name the producer and the secondary consumer. [2]



2.1

- producer: **algae**; secondary consumer: **stickleback**

2.2 Give **two** processes that put carbon dioxide back into the air. [2]



2.2

- any two: respiration; decay by microorganisms; combustion (burning)

Exercise 2.3

2.3 Give **two** conditions that make garden waste in a compost heap decay faster. [2]



garden waste

Exercise 2.3

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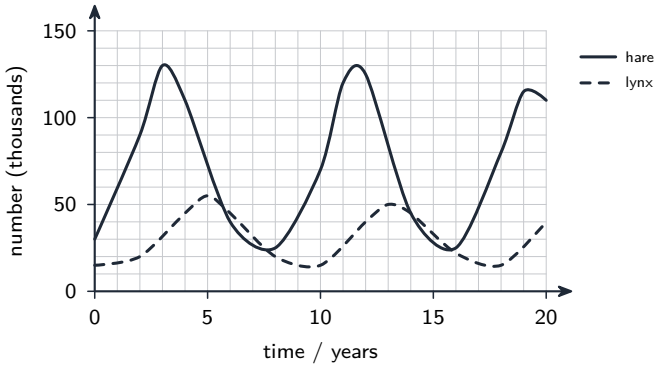
garden waste

2.3

- any two: warm; moist; plenty of oxygen

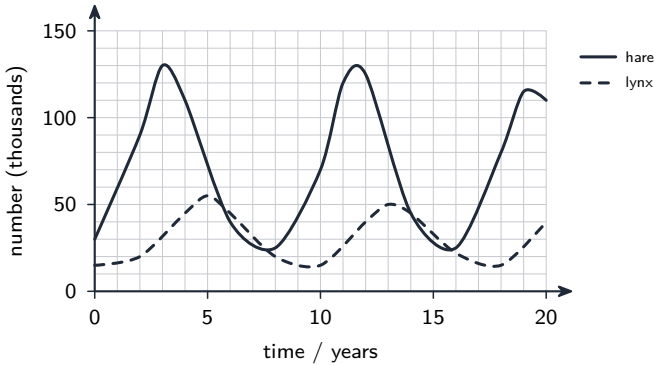
Exercise 3.1

3.1 The graph shows the numbers of lynx (a predator) and hares (its prey) over 20 years. Explain why the changes in lynx numbers come after the changes in hare numbers. [3]



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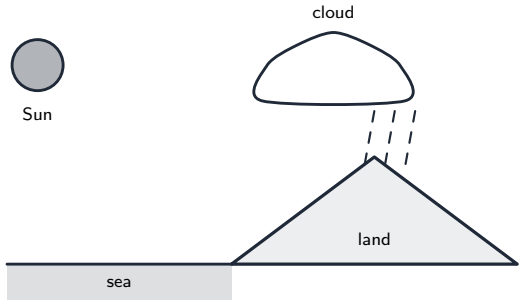


3.1

- when there are more hares there is more food, so more lynx survive and breed
- more lynx eat more hares, so the hare numbers fall
- then the lynx have less food and their numbers fall; it takes time for them to breed or starve, so their peak comes later

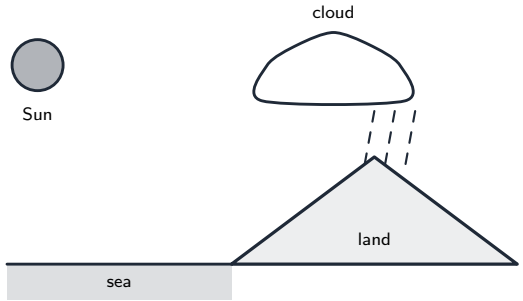
Exercise 3.2

3.2 Describe how water from the sea falls as rain on the land. [3]



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3.2

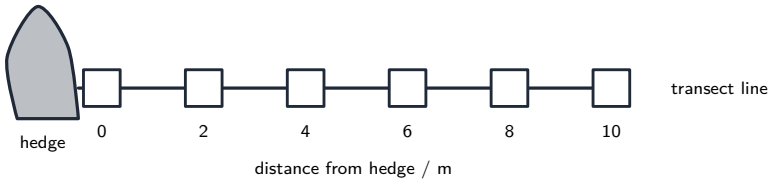
- heat from the Sun makes water evaporate from the sea
- the water vapour rises, cools and condenses into clouds
- the clouds move over the land and the water falls as rain (precipitation)

Exercise 3.3 (a)

3.3 Students put 0.25 m^2 quadrats every 2 m along a transect from a hedge into a field. They counted the daisies and measured the light intensity.

distance from hedge / m	**0**	**2**	**4**	**6**	**8**	**10**
light intensity / lux	1200	3500	6800	9200	9800	10 000
daisies per quadrat	0	3	8	14	15	16

(a) Describe the relationship between light intensity and the number of daisies. [2]

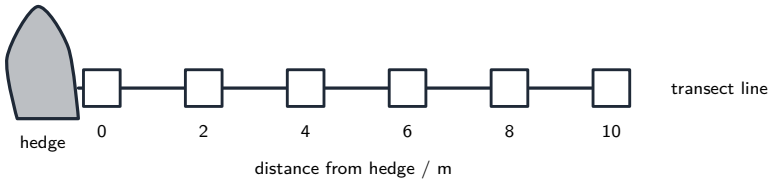


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light intensity / lux	1200	3500	6800	9200	9800	10 000
daisies per quadrat	0	3	8	14	15	16

(a) Describe the relationship between light intensity and the number of daisies. [2]



(a) as the light intensity increases, the number of daisies increases; it levels off above about 9000 lux

Exercise 3.3 (b)

3.3 Students put 0.25 m^2 quadrats every 2 m along a transect from a hedge into a field. They counted the daisies and measured the light intensity.

distance from hedge / m	**0**	**2**	**4**	**6**	**8**	**10**
light intensity / lux	1200	3500	6800	9200	9800	10 000
daisies per quadrat	0	3	8	14	15	16

(b) The open part of the field (from 6 m) has an area of 600 m^2. Use the results from 6, 8 and 10 m to estimate the number of daisies there. [3]

Exercise 3.3 (b)

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(b) The open part of the field (from 6 m) has an area of 600 m^2. Use the results from 6, 8 and 10 m to estimate the number of daisies there. [3]

(b) mean $= (14 + 15 + 16) \div 3 = 15$; $600 \div 0.25 = 2400$ quadrats; $15 \times 2400 =$ **36 000**

Exercise 3.3 (c)

3.3 Students put 0.25 m^2 quadrats every 2 m along a transect from a hedge into a field. They counted the daisies and measured the light intensity.

distance from hedge / m	**0**	**2**	**4**	**6**	**8**	**10**
light intensity / lux	1200	3500	6800	9200	9800	10 000
daisies per quadrat	0	3	8	14	15	16

(c) Suggest **two** reasons why there are no daisies next to the hedge. [2]

Exercise 3.3 (c)

3.3 Students put 0.25 m^2 quadrats every 2 m along a transect from a hedge into a field. They counted the daisies and measured the light intensity.

distance from hedge / m	**0**	**2**	**4**	**6**	**8**	**10**
light intensity / lux	1200	3500	6800	9200	9800	10 000
daisies per quadrat	0	3	8	14	15	16

(c) Suggest **two** reasons why there are no daisies next to the hedge. [2]

(c) any two: too little light for photosynthesis; the hedge competes for water and mineral ions; the hedge roots take up the space

Exercise 3.3 (d)

3.3 Students put 0.25 m^2 quadrats every 2 m along a transect from a hedge into a field. They counted the daisies and measured the light intensity.

distance from hedge / m	**0**	**2**	**4**	**6**	**8**	**10**
light intensity / lux	1200	3500	6800	9200	9800	10 000
daisies per quadrat	0	3	8	14	15	16

(d) Describe how the students could use random quadrats to compare the number of daisies in the shady area near the hedge with the open field. [6]

Exercise 3.3 (d)

3.3 Students put 0.25 m^2 quadrats every 2 m along a transect from a hedge into a field. They counted the daisies and measured the light intensity.

distance from hedge / m	**0**	**2**	**4**	**6**	**8**	**10**
light intensity / lux	1200	3500	6800	9200	9800	10 000
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(d) Describe how the students could use random quadrats to compare the number of daisies in the shady area near the hedge with the open field. [6]

(d) points to include:

- mark out the same size of area in each place
- use random numbers as coordinates on two tape measures
- place many quadrats, e.g. 10, in each area
- count the daisies in each quadrat
- work out the mean per quadrat for each area and compare
- use the same quadrat size and count on the same day

Levels: **5–6** a full, logical answer with correct biology and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.