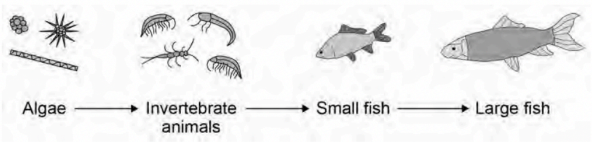
(Levels of organisation (food chains, food webs, predator–prey cycles))

Q1.a)(2018)

Figure 1 shows a food chain in a river.

Figure 1



Draw **one** line from each scientific term to the correct organism in the food chain.

[3 marks]

Scientific term	Organism in the food chain
	Algae
Apex predator	Invertebrate animals
Primary consumer	Large fish
Producer	Small fish

Q1.b)(2018)

Table 1 shows the biomass of the organisms at each stage in the food chain.

Table 1

Organism	Biomass in arbitrary units
Algae	840
Invertebrate animals	200
Small fish	40
Large fish	10

Calculate the percentage of the biomass of the invertebrate animals that is transferred to the large fish.

[2 marks]

Use the equation:

$$\text{percentage} = \frac{\text{biomass of large fish}}{\text{biomass of invertebrate animals}} \times 100$$

Percentage = _____

Q1.c)(2018)

A large amount of biomass is lost from the food chain.

Complete the sentences.

[3 marks]

Choose answers from the box.

coordination	**digestion**	**excretion**
filtration	**ingestion**	**respiration**

When the small fish eat the invertebrate animals, not all of this material is broken down during _____ .

Materials absorbed from the gut may enter the body cells of the small fish. These materials are broken down into carbon dioxide and water by _____ .

The carbon dioxide and other waste materials from the body cells are removed from the small fish by _____ .

Q1.d)(2018)

A disease kills many of the small fish.

Why does the number of invertebrate animals increase?

[1 mark]

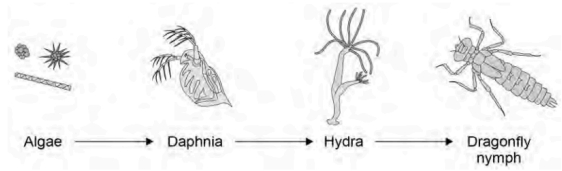
_____

_____

Q2.a)(2019)

Figure 14 shows a food chain in a pond.

Figure 14



Which term describes the Daphnia in this food chain?

[1 mark]

Tick (✓) **one** box.

- Apex predator ☐
- Primary consumer ☐
- Producer ☐
- Secondary consumer ☐

Q2.b)(2019)

Give **one** reason why the total biomass of the Daphnia in the pond is different from the total biomass of the algae.

[1 mark]

Q2.c)(2019)

Students investigated the size of the population of Daphnia in the pond.

This is the method used.

1. Collect 1 dm^3 of pond water from near the edge of the pond.
2. Pour the water through a fine net.
3. Count the number of Daphnia caught in the net.
4. Repeat steps 1–3 four more times.

Table 3 shows the results.

Table 3

Sample number	Number of Daphnia in 1 dm^3 water
1	5
2	21
3	0
4	16
5	28

Calculate the mean number of Daphnia in 1 m^3 of pond water.

1 m^3 = 1000 dm^3

[2 marks]

Mean number of Daphnia in 1 m^3 of pond water = _____

Q2.d)(2019)

The pond was a rectangular shape, measuring:

- length = 2.5 metres
- width = 1.5 metres
- depth = 0.5 metres.

Calculate the estimated number of Daphnia in the pond.

Use your answer from Question **07.4**.

Give your answer in standard form.

[4 marks]

Number of Daphnia in the pond = _____

Q2.e)(2019)

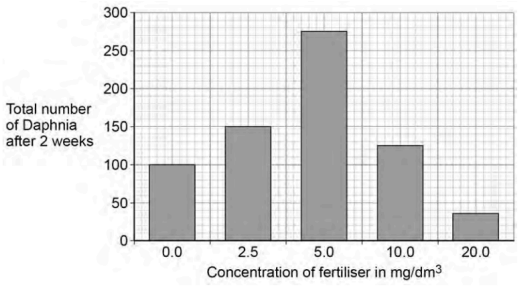
Rainfall can cause fertiliser to be washed from farmland into a pond.

The students investigated the effect of fertiliser on the population of Daphnia in water from the pond.

- The students put 20 Daphnia in each of five different concentrations of fertiliser.
- The students counted the total number of Daphnia in each concentration of fertiliser after 2 weeks.

Figure 15 shows the results.

Figure 15



A concentration of 5.0 mg/dm^3 of fertiliser caused a large increase in the population of Daphnia.

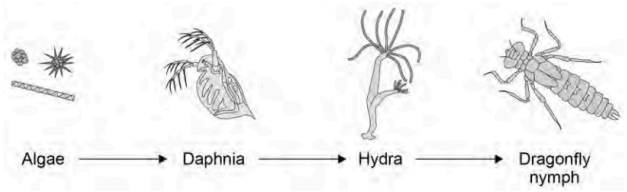
Explain why.

[2 marks]

Q2.f)(2019)

Figure 14 is repeated below.

Figure 14



The population of **Hydra** will decrease when 20 mg/dm^3 of fertiliser is added to the pond.

Explain why.

[2 marks]

Q3.(2020)

Draw **one** line from each organism to the description of the organism's position in the food chain.

[3 marks]

Organism	**Description**
Chicken	Herbivore
Dog	Producer
Wheat	Secondary consumer
	Tertiary consumer

Q4.a)(2022)

Earthworms:

- live in soil
- feed on dead and decaying plant matter
- have soft, moist skin
- exchange gases through their skin.

Give **two** abiotic factors and **two** biotic factors that could affect the size of an earthworm population.

[4 marks]

Abiotic factors

1 _____

_____

2 _____

_____

Biotic factors

1 _____

_____

2 _____

_____

Q4.b)(2022)

Students investigated the populations of earthworms in the soil in two different areas:

- Area **A**: a grass lawn
- Area **B**: a farmer's field.

Chemical **X** can be mixed with water and poured onto the soil.

The mixture brings earthworms to the surface of the soil but does **not** harm the earthworms.

Plan an investigation using chemical **X** to compare the number of earthworms per m^2 in areas **A** and **B**.

[6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Q5.(2023)

Many different species can live together in the same habitat.

What name is given to all of the organisms living in the same habitat?

[1 mark]

Tick (✓) **one** box.

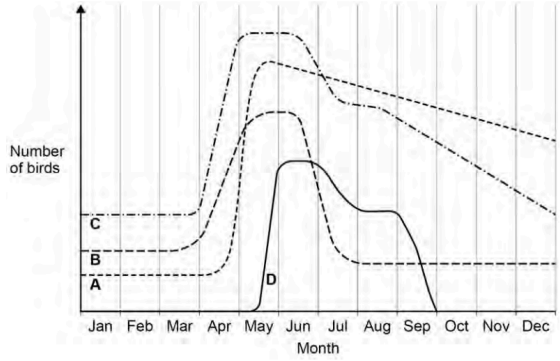
- A community ☐
- A food chain ☐
- A population ☐
- An ecosystem ☐

Q6.a)(2023)

Four other species of bird (**A**, **B**, **C** and **D**) live in a habitat in the UK.

Figure 13 shows how the numbers of each species of bird varied during one year.

Figure 13



Use information from **Figure 13** to answer Questions **07.4** to **07.6**

Describe what happens to the number of birds of species **A** during the year.

[3 marks]

Q6.b)(2023)

In June and July, a disease affected the populations of some of the species.

Which species had the **lowest** resistance to the disease?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Q6.c)(2023)

One species migrates between the UK and other countries.

Which species migrates between the UK and other countries?

Give a reason for your answer.

[1 mark]

Species _____

Reason _____

_____

_____

Q7.(2024)

Genetic engineering can also be used in agriculture.

Weeds are a problem for farmers because the weeds compete with crop plants.

Give **three** factors that the weeds and crop plants compete for.

[3 marks]

1 _____

2 _____

3 _____