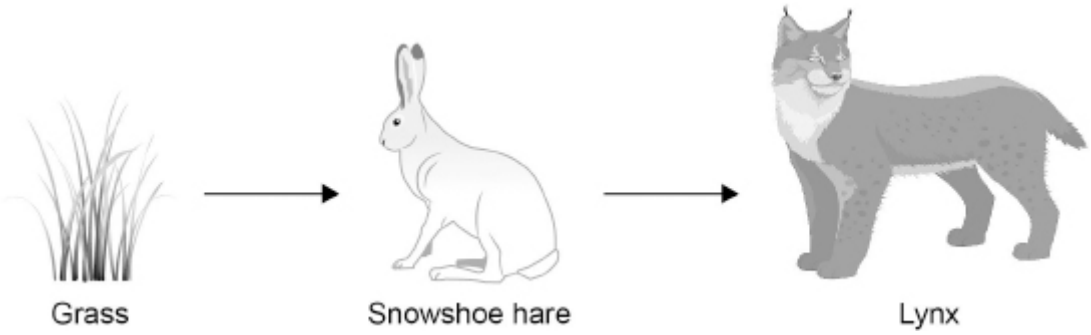
Questions are for both separate science and combined science students unless indicated in the question

Q1.

Different species in a habitat may depend on each other for food.

Figure 1 shows a food chain.

Figure 1



(a) The grass needs energy to grow.

What is the source of energy for the grass?

_____

(1)

(b) The table below lists different types of feeding relationship.

Feeding relationship	Organism
Secondary consumer	Lynx
Primary consumer	
Producer	
Herbivore	
Carnivore	
Prey	
Predator	

Write the name of **one** organism from **Figure 1** in each box in the table above.

Each organism may be written in one box or in more than one box.

The first box has been completed for you.

(3)

(c) **Figure 2** shows the appearance of the snowshoe hare in the summer and in the winter.

Figure 2

Snowshoe hare in summer

Snowshoe hare in winter

The snowshoe hare has a different fur colour in the summer than in the winter.

Explain how the different fur colour increases the chance of survival of the snowshoe hare.

_____

_____

_____

_____

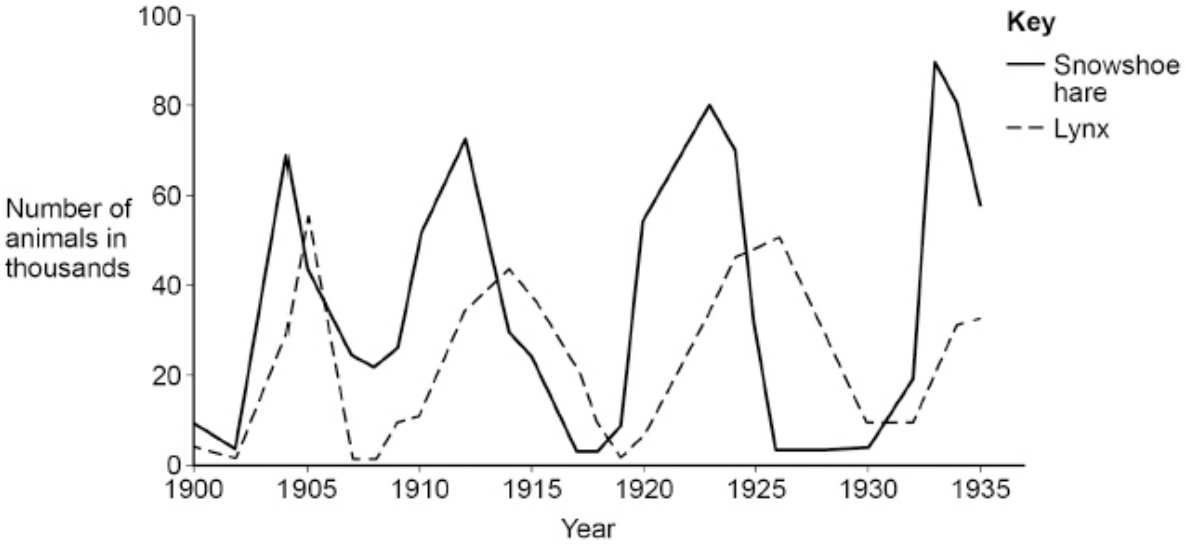
_____

_____

(3)

Figure 3 shows how the number of snowshoe hares and the number of lynx varied in one area between 1900 and 1935.

Figure 3



(d) **Figure 3** shows that the number of snowshoe hares and the number of lynx increase and decrease several times.

Suggest **two** reasons why the number of **snowshoe hares** increases.

1 _____

_____

2 _____

_____

(2)

(e) The number of snowshoe hares increased and decreased four times between 1900 and 1935.

What effect does an **increase** in the number of snowshoe hares have on the number of lynx?

_____

_____

(1)

(f) Suggest **one** reason why the number of lynx decreased from 1915 to 1919.

Use information from **Figure 3**.

_____

_____

(1)

(g) When the snowshoe hare eats grass, about 90% of the biomass of the grass is lost.

Give **two** ways the biomass is lost. **(biology only)**

1 _____

_____

2 _____

_____

(2)

(Total 13 marks)

Q2.

Many different species can live together in the same habitat.

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

Tick (✓) **one** box.

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

(1)

Figure 1 shows four species of bird from the same habitat in the UK.

Figure 1

Brambling (*Fringilla montifringilla*)

Bullfinch (*Pyrrhula pyrrhula*)

Chaffinch (*Fringilla coelebs*)

Goldfinch (*Carduelis carduelis*)

(b) Which species of bird in **Figure 1** do scientists think are most closely related?

Tick (✓) **one** box.

- Brambling and chaffinch ☐
- Brambling and goldfinch ☐
- Bullfinch and chaffinch ☐
- Bullfinch and goldfinch ☐

(1)

(c) Scientists think the brambling and the bullfinch belong to different species.

What evidence is used by scientists to classify the brambling and the bullfinch as different species?

Tick (✓) **one** box.

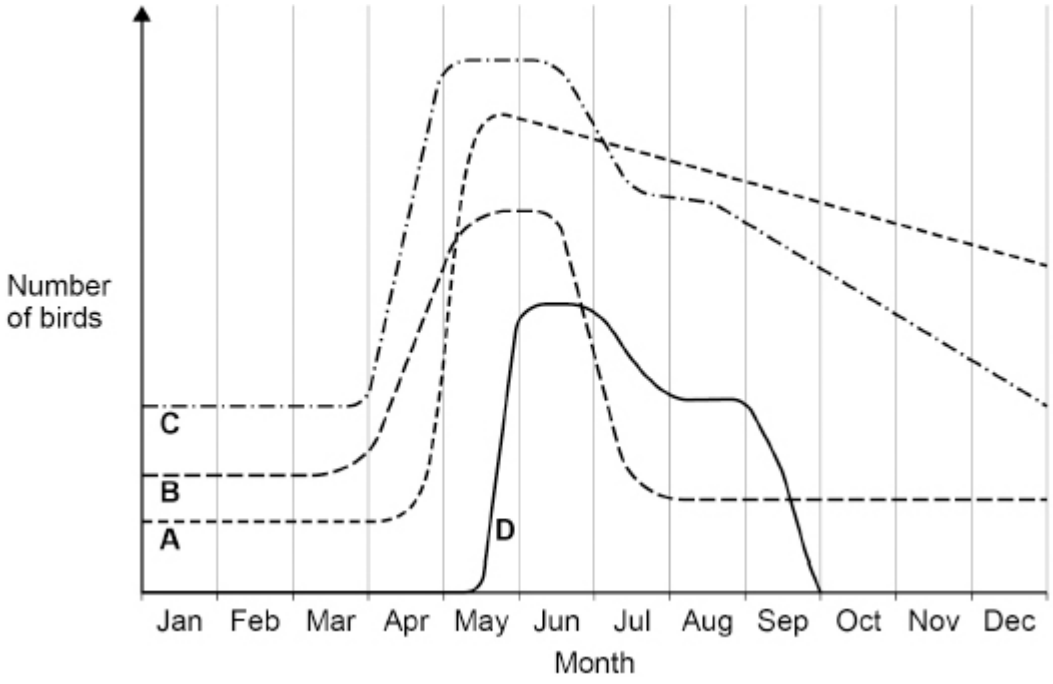
- The brambling and the bullfinch are different sizes. ☐
- The brambling and the bullfinch cannot breed together to give fertile offspring. ☐
- The brambling and the bullfinch live in different parts of the habitat. ☐
- The brambling eats mainly seeds and the bullfinch eats mainly insects. ☐

(1)

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

Figure 2 shows how the numbers of each species of bird varied during one year.

Figure 2



Use information from **Figure 2** to answer parts (d) to (f)

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

_____

_____

_____

_____

_____

_____

(3)

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

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

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(f) One species migrates between the UK and other countries.

Which species migrates between the UK and other countries?

Give a reason for your answer.

Species _____

Reason _____

_____

_____

(1)

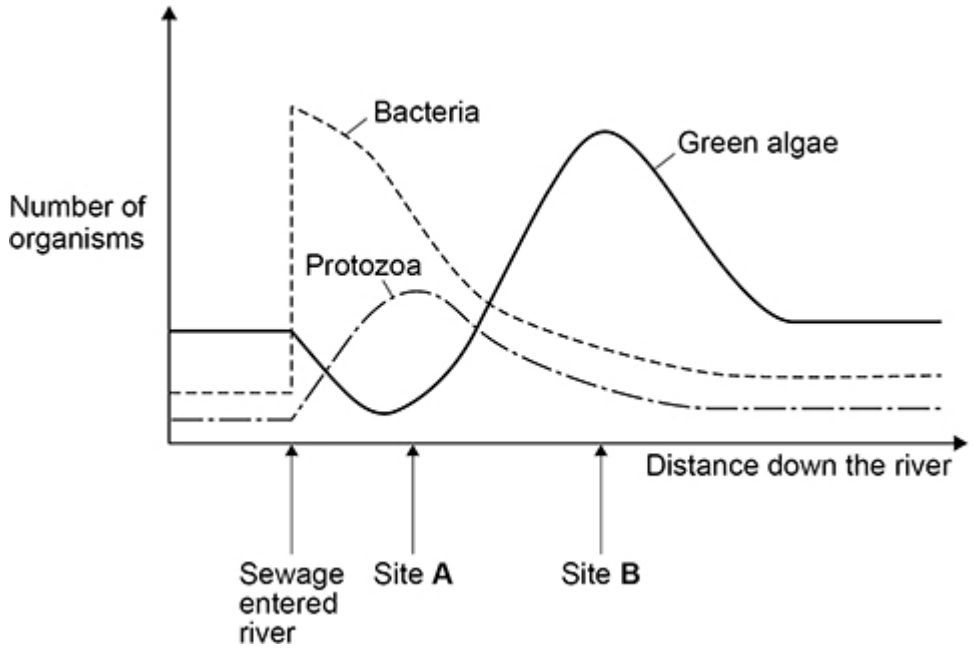
(Total 8 marks)

Q3.

Rivers are sometimes polluted with untreated sewage.

Figure 1 shows some changes that occurred when untreated sewage entered a river.

Figure 1



(a) Which type of organism had the most rapid increase in numbers when sewage entered the river?

Tick (✓) **one** box.

Bacteria ☐

Green algae ☐

Protozoa ☐

(1)

(b) Protozoa are single-celled organisms.

Describe **two** ways **Figure 1** shows that the protozoa in the river feed on bacteria.

1 _____

_____

2 _____

_____

(2)

(c) When sewage enters a river, the concentration of dissolved oxygen decreases.

The decrease in oxygen concentration is caused by organisms in the water.

What process in living organisms uses oxygen?

_____

(1)

(d) As the numbers of green algae in the river increase, the concentration of dissolved oxygen increases.

Explain why the concentration of dissolved oxygen increases.

_____

_____

_____

_____

(2)

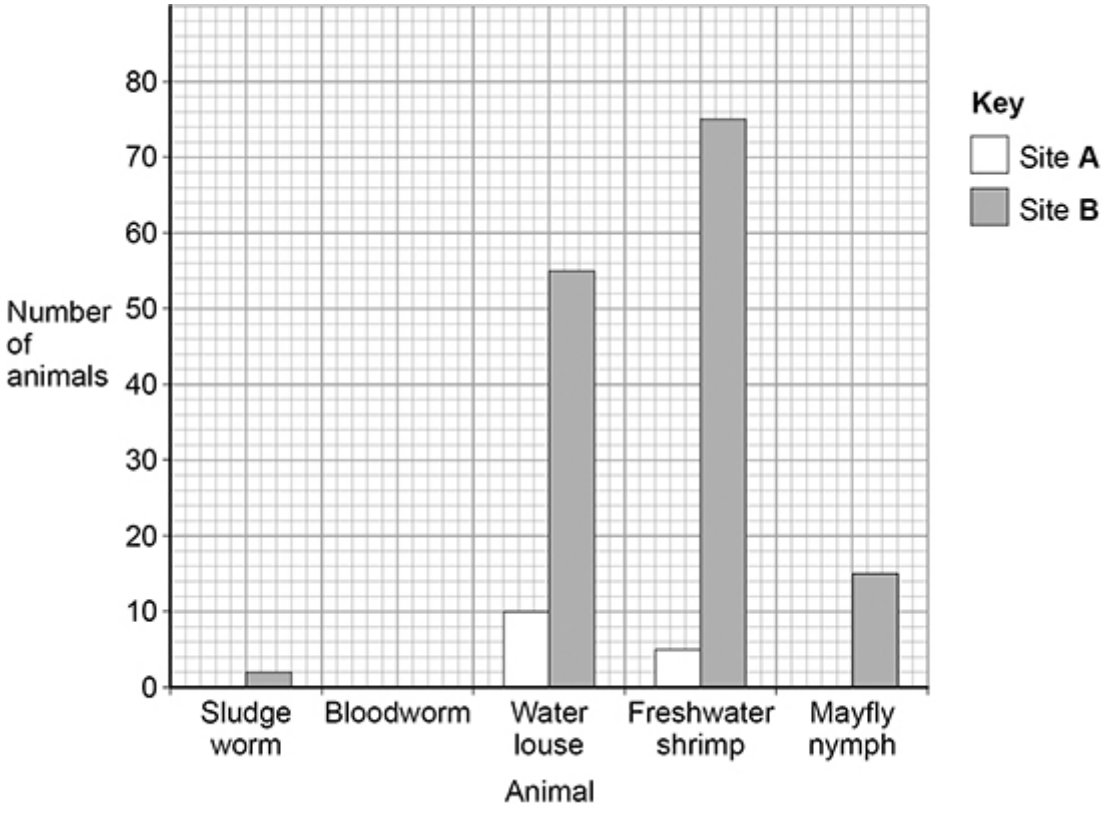
Scientists counted the numbers of five different animals in the river at sites **A** and **B**, shown in **Figure 1** above.

The table below shows the results.

Animal	**Number of animals**	
	Site A	**Site B**
Sludge worm	80	2
Bloodworm	36	8
Water louse	10	55
Freshwater shrimp	5	75
Mayfly nymph	0	15

Figure 2 shows some of the data from above table.

Figure 2



(e) Complete **Figure 2**.

You should use data from above table for the sludge worm and the bloodworm.

(2)

(f) The concentration of oxygen in the water at site **A** is much lower than at site **B**.

- Sludge worms live in places which have a low concentration of oxygen.
- Mayfly nymphs need a high concentration of oxygen.

Give evidence from the table above for the difference in oxygen concentration at sites **A** and **B**.

Refer to sludge worms and to mayfly nymphs in your answer.

_____

_____

_____

_____

_____

(2)

(Total 10 marks)

Q4.

Earthworms:

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

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

Abiotic factors

1 _____

_____

2 _____

_____

Biotic factors

1 _____

_____

2 _____

(4)

(b) 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)

(Total 10 marks)