1 The photograph shows a mammal called a mountain hare.



©Author: Alan Wolfe

Mountain hares eat plants.

Foxes, cats and eagles are predators that eat mountain hares.

(a) (i) Use this information to draw a food web.

(2)

(ii) Give the name used to describe animals that eat plants.

(1)

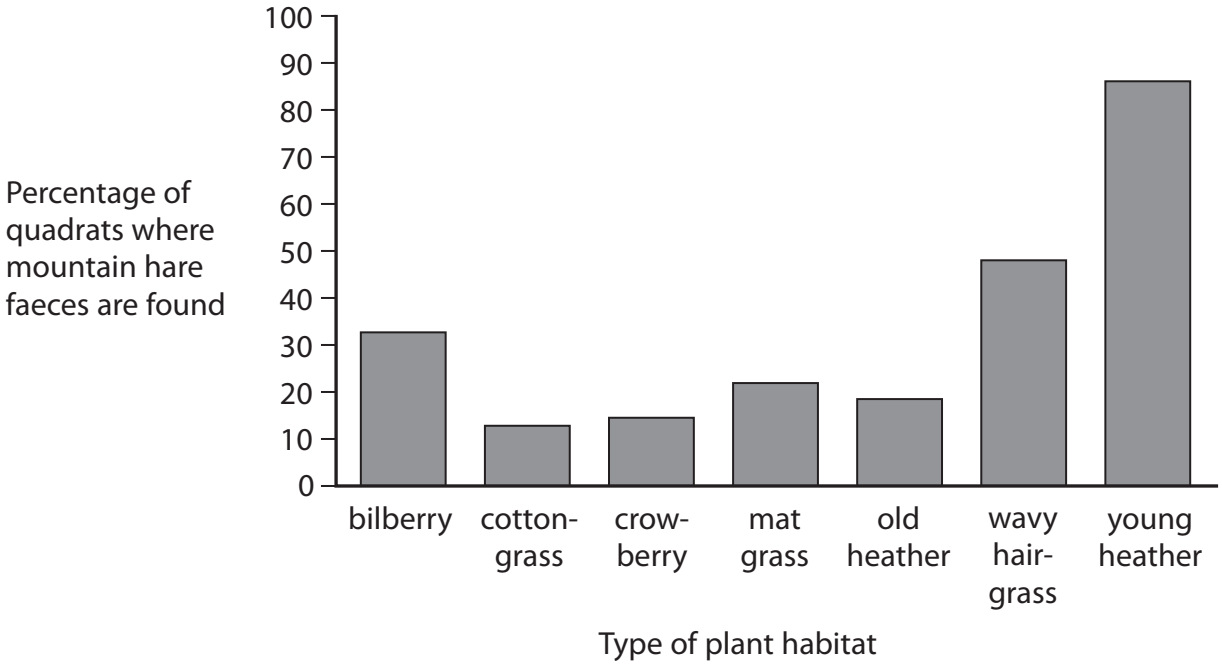
(b) Scientists want to find out which type of plant habitat mountain hares prefer.

They use quadrats to sample seven habitats.

Each habitat contains a different type of plant.

The scientists calculate the percentage of quadrats in each habitat where mountain hare faeces are found.

The graph shows the results.



(i) Name the type of plant habitat that the mountain hares like best.

(1)

.....

(ii) Suggest three reasons why mountain hares may prefer to eat the plants in some habitats rather than plants in other habitats.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(c) The scientists use 700 quadrats in one plant habitat and find that 224 quadrats contain mountain hare faeces.

(i) Calculate the percentage of quadrats containing mountain hare faeces in this habitat.

Show your working.

(2)

percentage of quadrats = ... %

(ii) Name the type of plant habitat where the scientists collected these results.

(1)

.....

(d) The scientists use a large number of quadrats to make sure the data collected is reliable.

Describe a procedure they should follow to make sure the data collected using quadrats is valid.

(1)

.....

.....

.....

(Total for Question = 11 marks)

2 When plants die they may decompose.

(a) Explain what is meant by the term **decompose**.

(2)

.....

.....

.....

.....

(b) The dead plant material in soil is called humus and is used as food by earthworms. These worms are eaten by birds.

Use this information to draw a food chain.

(2)

(c) It is possible to measure the mass of humus in soil. The method involves drying the soil and then burning the dried soil.
The formula below can then be used to calculate the percentage humus.

$$\frac{\text{mass of dried soil} - \text{mass of burnt soil}}{\text{mass of dried soil}} \times 100$$

A robbery took place at a bank. The robber used the garden to gain entry to the bank. Three people were suspected of robbing the bank. The table gives data about the soil in the garden and on the shoes of suspects A, B and C.

(i) Complete the table by using the formula to calculate the percentage humus in the soil from the shoe of suspect B.

(1)

Soil from	Mass of dried soil in g	Mass of burnt soil in g	Percentage humus
garden	10	9	10
shoe of suspect A	5	4.2	16
shoe of suspect B	5	4	
shoe of suspect C	5	4.5	10

(ii) Which suspect is most likely to be the robber?

(1)

.....

(iii) The suspect who was accused of being the robber claimed that the result was not reliable.

Do you agree with the suspect? Give a reason for your answer.

(1)

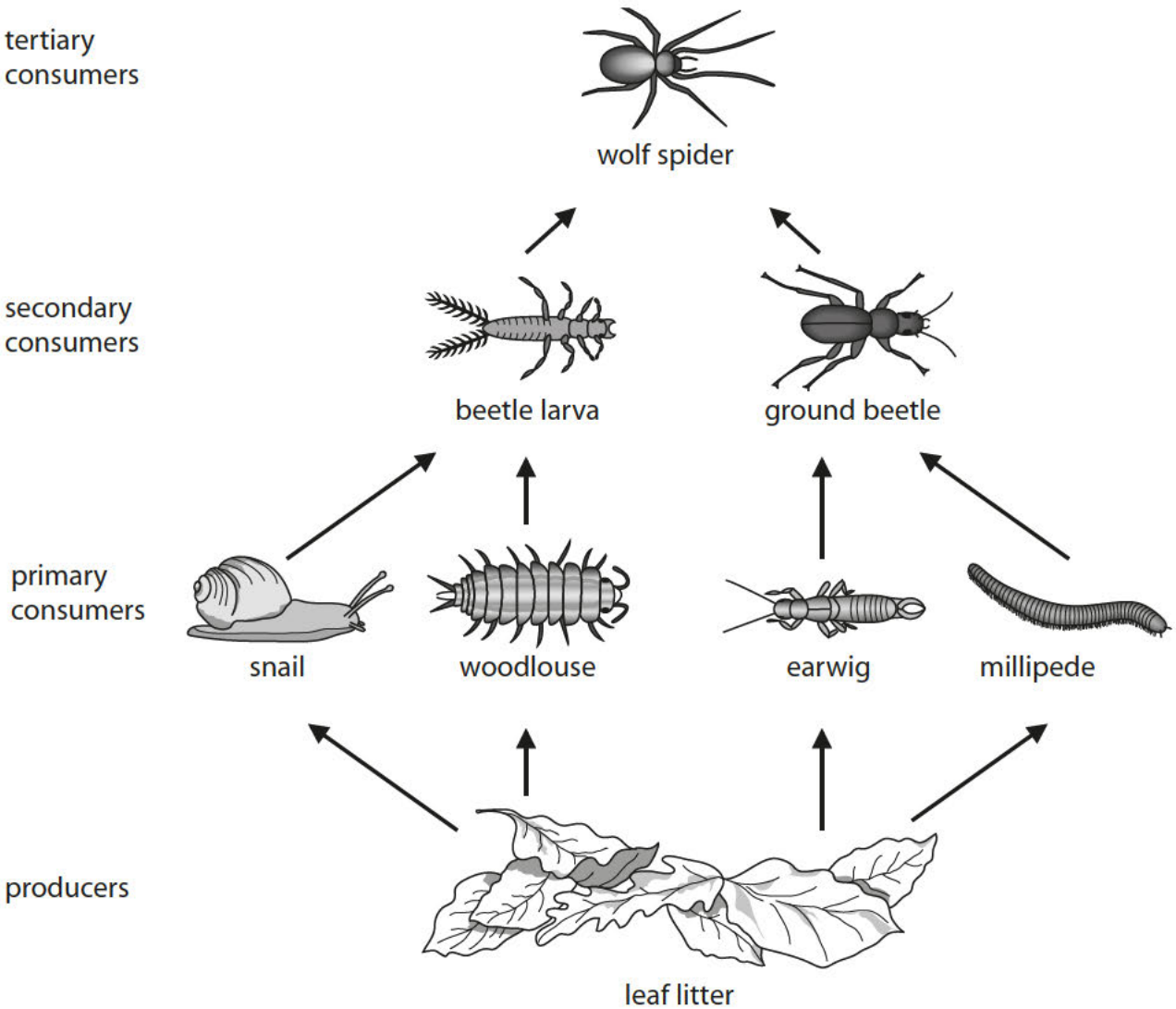
.....

.....

.....

(Total for Question = 7 marks)

3 When trees lose leaves, they fall to the ground and form leaf litter. The leaf litter provides food for many animals. The diagram shows a food web that includes leaf litter.



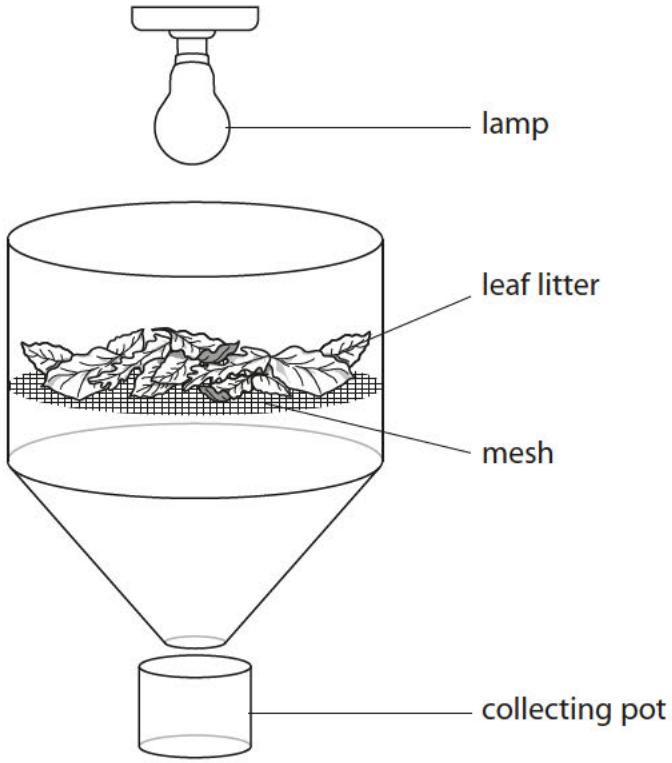
(a) Use information in the food web to complete the table.

The first one has been done for you.

(4)

	Number
the number of different tertiary consumers	1
the number of trophic levels	
the number of food chains	
the number of different predators	
the number of different consumers	

(b) The following apparatus is called a Tullgren funnel. It is used to sample the number of animals living in leaf litter. The animals move away from the light and fall into the collecting pot.



A student used a Tullgren funnel to sample the number of millipedes living in leaf litter in two areas of a forest. The student took leaf litter from 5 quadrats in the centre of the forest and from 5 quadrats near the edge of the forest.

The table shows the student's results.

Quadrat	Number of millipedes per m^2 of leaf litter	
	Centre of forest	Edge of forest
1	10	4
2	8	2
3	8	3
4	13	6
5	12	4

(i) One stimulus that the millipedes respond to in the Tullgren funnel is light. Suggest two other stimuli that might cause millipedes to fall into the collecting pot.

(2)

1 .....

2 .....

(ii) State the difference in the number of millipedes found in the leaf litter samples from the two areas of the forest and suggest two reasons for this difference.

(3)

difference .....

reason 1 .....

.....

.....

.....

reason 2 .....

.....

.....

.....

(iii) The student collects leaf litter using a quadrat. Draw a quadrat in the space below.

(1)

(Total for Question = 10 marks)

4 The photograph shows an Arabian oryx.



Arabian oryx live in the desert where there is no free-standing water. Most of their habitat is sand. Plants, such as grass and small trees, cover only a small area. Oryx feed mainly on grass.

Summers are hot. Daytime temperatures can be as high as 41 °C and temperatures at night only fall to 24 °C. Oryx are less active in summer than in winter. In summer, they reduce their energy use by changing their behaviour and body processes.

(a) Suggest why oryx are less active in summer than in winter.

(3)

.....

.....

.....

.....

.....

.....

(b) In summer, oryx rest under trees during the day and feed at night. Suggest why they do this.

(2)

(c) Suggest where the oryx get their water from in the absence of free-standing water.

(1)

(d) Oryx and humans can control water loss by making their urine very concentrated. Describe how this is done.

(6)

(Total for Question = 12 marks)

5 This food chain shows feeding relationships in paddy fields in Sri Lanka and India.



(a) (i) Name the producer.

(1)

.....

(ii) Name the secondary consumer.

(1)

.....

(b) Give **two** environmental factors that could affect the growth of the rice crop.

(2)

1 .....

2 .....

(c) Suggest why a farmer might choose to use a chemical pesticide in his paddy field.

(2)

.....

.....

.....

(d) Describe how the farmer could use biological control in his paddy field.

(2)

.....

.....

.....

.....

.....

(Total for Question = 8 marks)