1 **(a** Table 1.1 shows some features of the five groups of vertebrates.

Complete Table 1.1 to compare the five groups of vertebrates using a tick (✓) to indicate if the group shows the feature, or a cross (✗) if not.

The first row has been completed for you.

Table 1.1

group of vertebrates	scaly skin	external ear (pinna)	feathers	glands
birds	✓	✗	✓	✗
bony fish				
amphibians				
reptiles				
mammals				

[4]

Fig. 1.1 shows a southern cassowary, *Casuarius casuarius*, which is a large bird that cannot fly. It lives in rainforests in northern Australia and southern New Guinea.

The cassowary feeds on fruits and helps to disperse seeds for many tree species, such as the cassowary plum.

Fig. 1.1

(b) Suggest why the cassowary can digest the **fruit** but not the **seeds** of rainforest trees.

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(c) Describe **one** method of seed dispersal that does **not** require animals.

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(d) State **two** environmental conditions that seeds require so that they can germinate.

1. .....

2. ..... [2]

(e) Cassowaries are an endangered species. Many are killed on the roads and development threatens their rainforest habitat.

Cassowaries, as with many other rainforest species, cannot survive in small nature reserves.

Suggest why species, such as cassowaries, cannot survive in small nature reserves.

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[Total: 13]

2 Fig. 2.1 shows part of the nitrogen cycle.

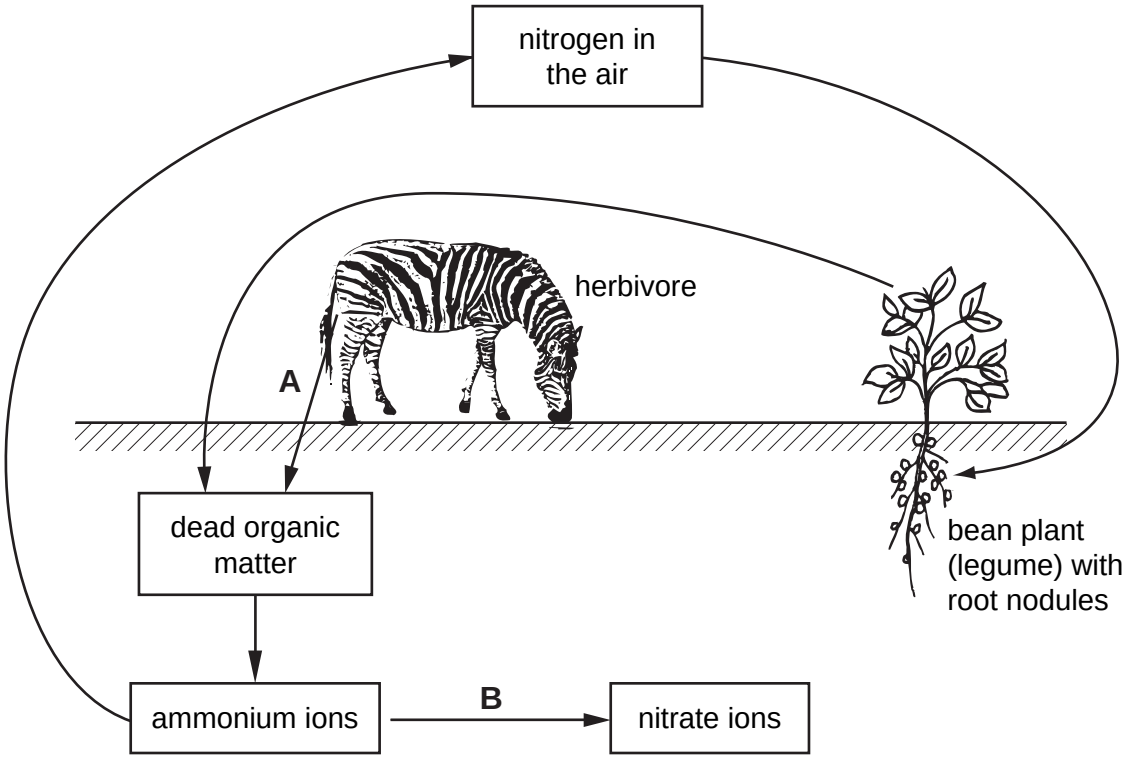

Fig. 2.1

(a) Name the processes **A** and **B** shown in Fig. 2.1.

A .....

B ..... [2]

(b) Fig. 2.1 shows that legumes have root nodules.

Explain why these root nodules are important in the nitrogen cycle.

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(c) Proteins and DNA are important nitrogen-containing compounds in cells.

Describe the roles of proteins and DNA in cells.

proteins .....

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DNA .....

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(d) Many inorganic fertilisers contain compounds of nitrogen. If crop plants do not absorb the fertilisers they can be lost from the soil and pollute freshwater ecosystems, such as lakes and rivers.

Describe how fertilisers may affect freshwater ecosystems.

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[Total: 15]

3 The brown plant hopper is a serious insect pest of rice. Spraying with pesticides is a common way to control it. However, brown plant hoppers have become resistant to pesticides.

Fig. 6.1 shows the effect of spraying pesticides against populations of this insect pest.

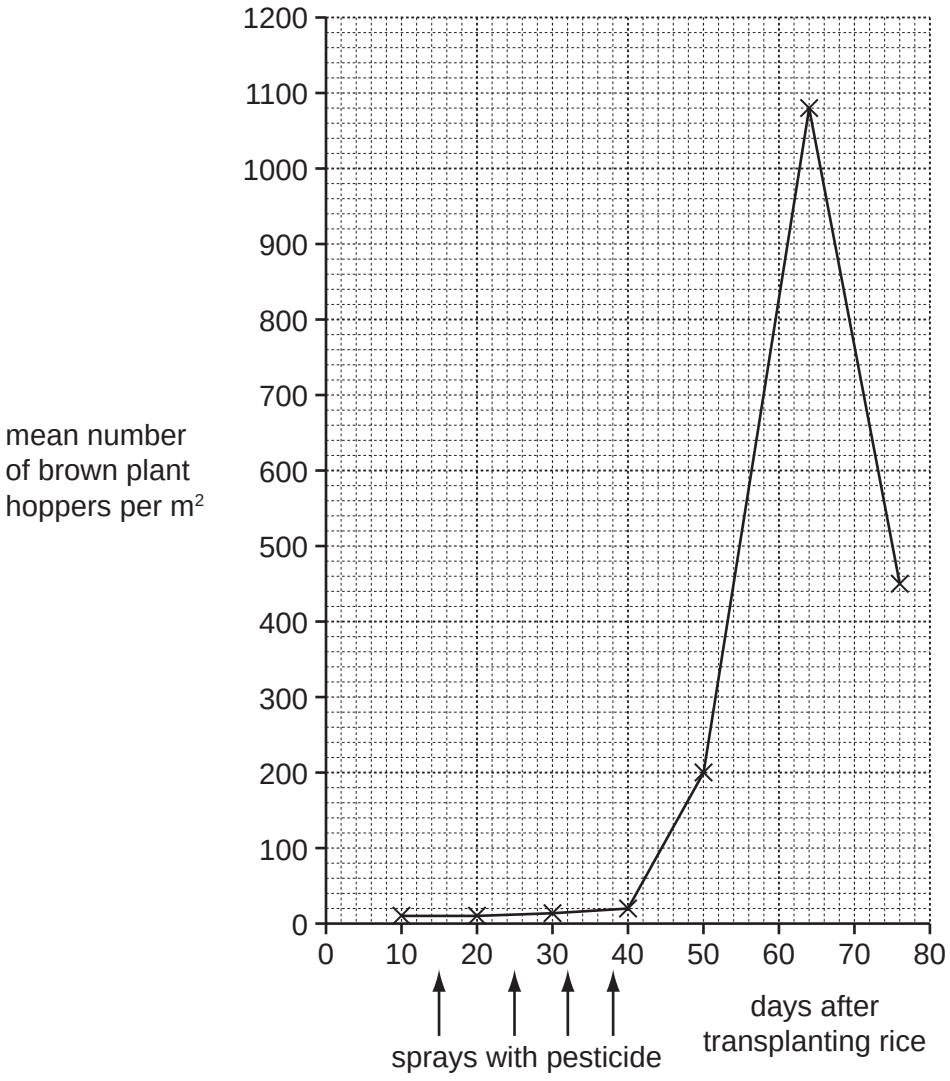

Fig. 6.1

(a) Define the term *population*.

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(b) Use Fig. 6.1 to describe the effect of pesticides on populations of the brown plant hopper.

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(c) Some pesticides used against insects kill them on contact. Others are systemic pesticides.

Explain how these systemic pesticides kill insects.

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(d) As an alternative to spraying pesticides, some farmers use predatory animals, such as the hunting spider, *Lycosa pseudoannulata*, to control brown plant hoppers.

During an investigation into the effectiveness of this method, brown plant hoppers were put into cages in rice fields. The plant hoppers could not leave the cages but were able to feed. Predators, such as hunting spiders, could enter some of the cages to feed.

Fig. 6.2 shows the change in numbers of brown plant hoppers in these cages over a period of time.

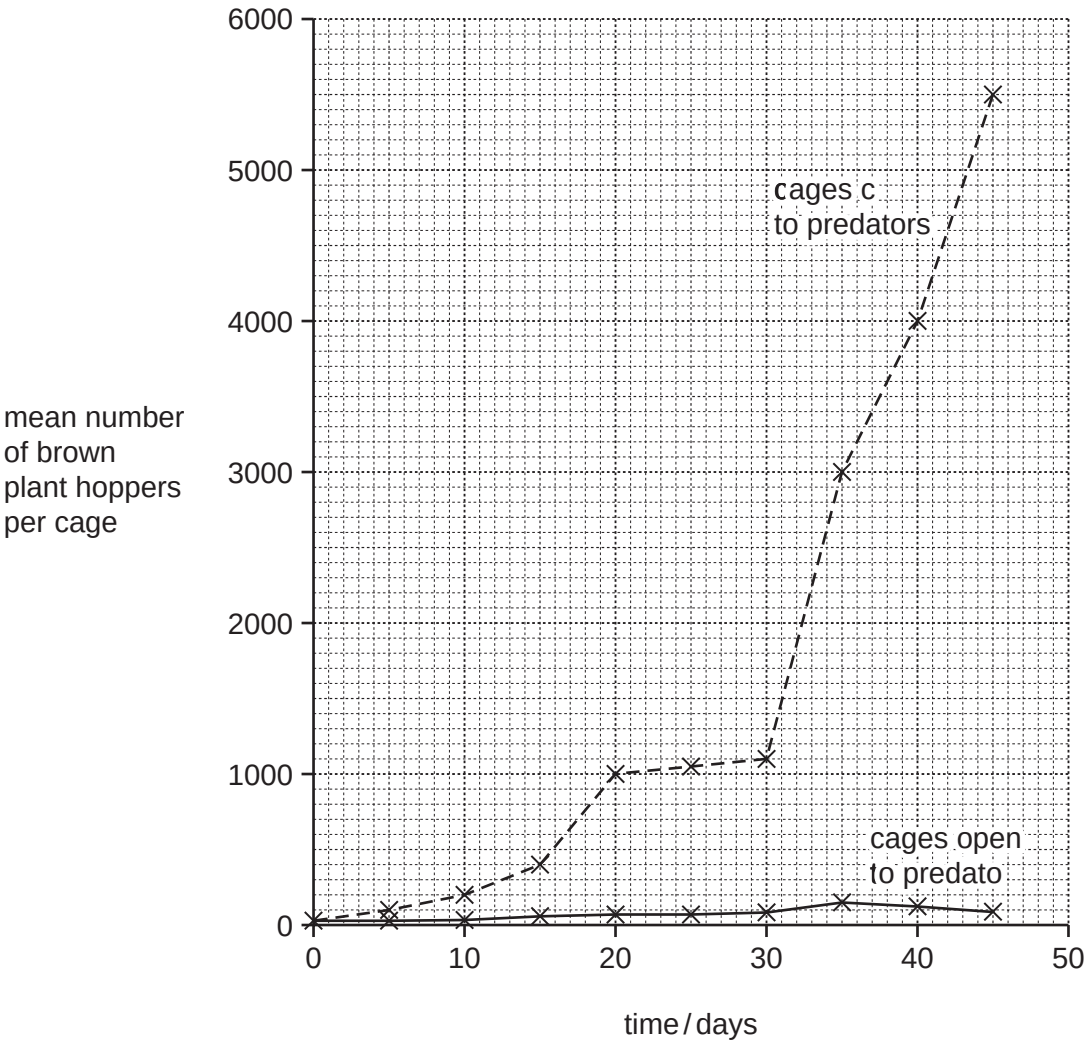

Fig. 6.2

Use the information in Fig. 6.2 to explain the advantages of using predators, such as spiders, to control brown plant hoppers.

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(e) Rice growing has involved the destruction of forests.

Describe the long-term effects of deforestation on the environment.

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[Total: 14]

4 Sewage disposal involves the removal of human waste in pipes from houses to sewage treatment works.

Fig. 6.1 is a diagram that shows how sewage is treated.

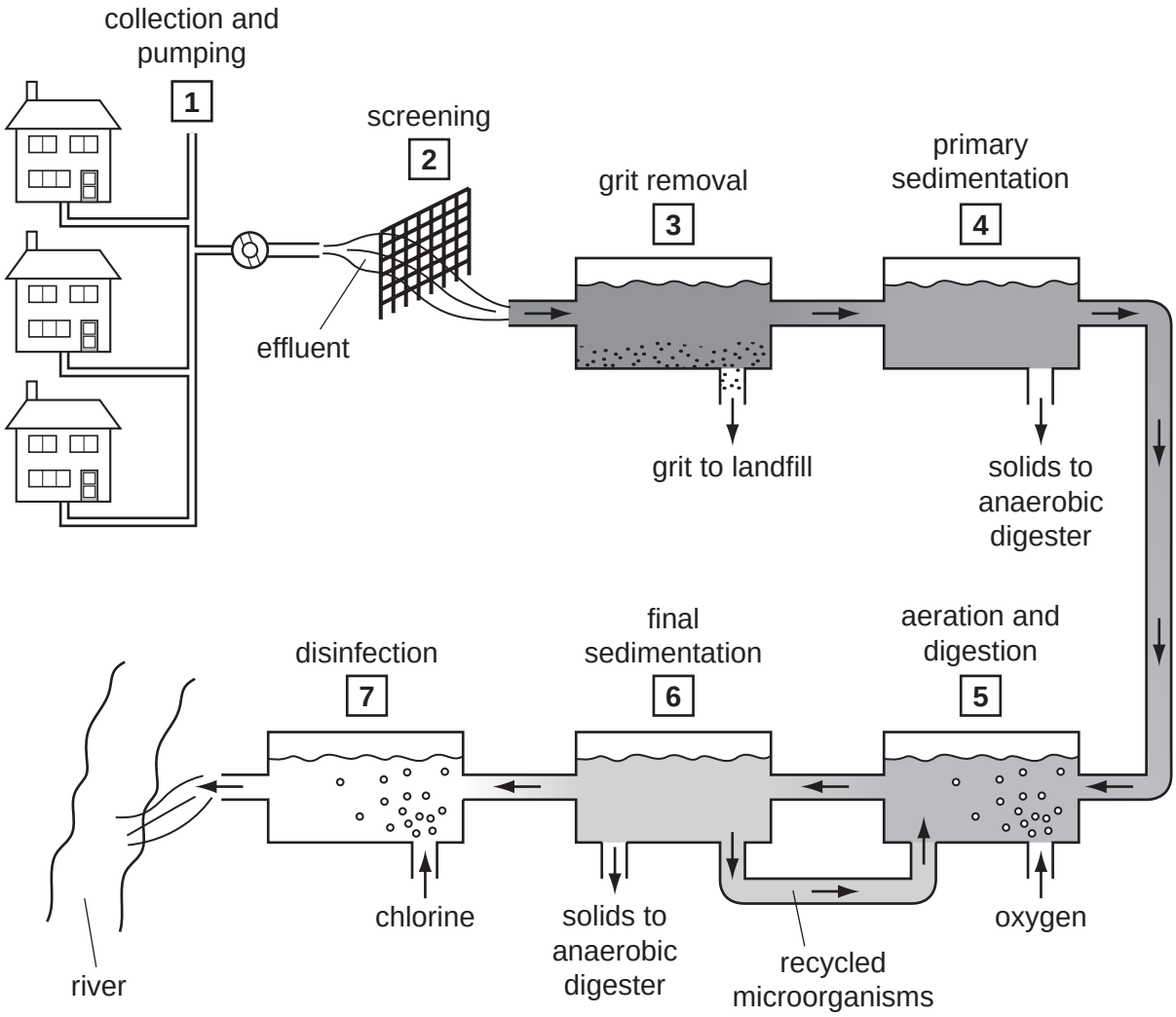

Fig. 6.1

(a) During stage **5** microorganisms break down organic matter consisting of cellulose, starch, protein and lipid (fat). The microorganisms multiply during this stage and are recycled.

Complete Fig. 6.2 by writing in the boxes the names of the enzymes used to catalyse the reactions shown. The first box has been completed for you.

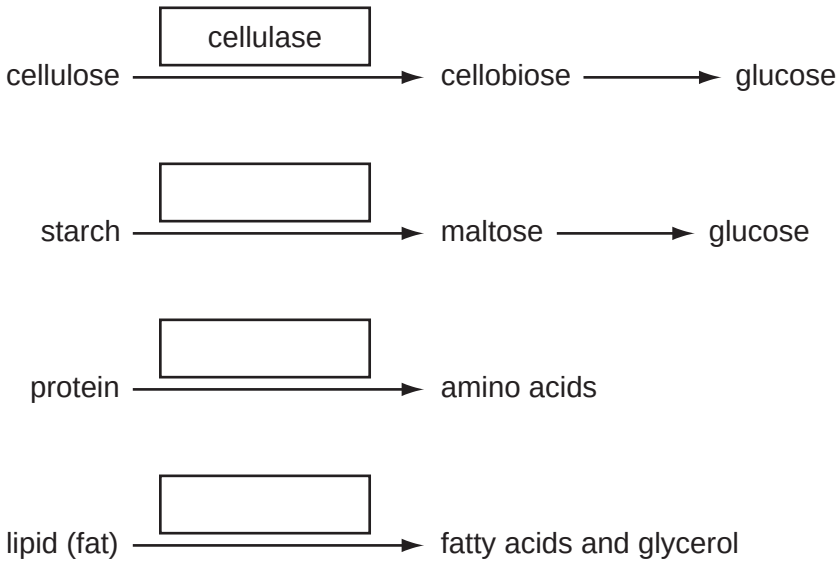

Fig. 6.2 [3]

(b) State why it is important that sewage is treated.

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(c) At stage **5** in Fig. 6.1, oxygen and microorganisms are added.

Explain why oxygen is bubbled through the tank at this stage.

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(d) Suggest **and** explain the advantage of recycling microorganisms from stage **6** to stage **5** as shown in Fig. 6.1.

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(e) Explain why chlorine is added at stage **7**.

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[Total: 13]