

28 Which methods can transmit HIV?

- 1 hugging a person infected with HIV
- 2 sharing a needle with a person infected with HIV
- 3 using a plate that a person infected with HIV has used

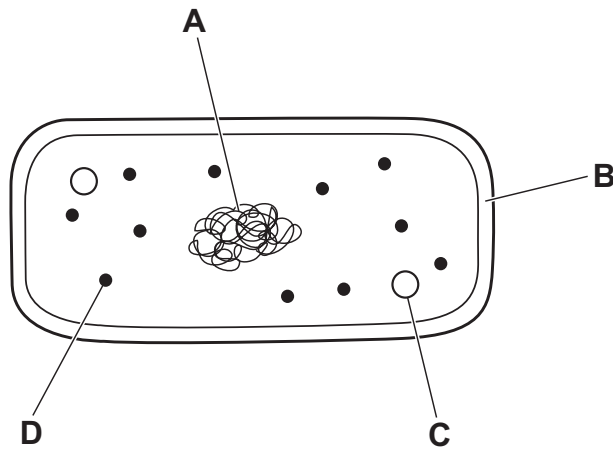
A 1, 2 and 3 **B** 1 only **C** 2 and 3 only **D** 2 only

29 Which chromosomes can be found in a single sperm?

A X and X **B** X and Y **C** X or X **D** X or Y

40 The diagram shows a bacterium.

Which structure is cut to form sticky ends during genetic modification?



- 3 (a) Fig. 3.1 shows the percentage of water in different structures of the human body.

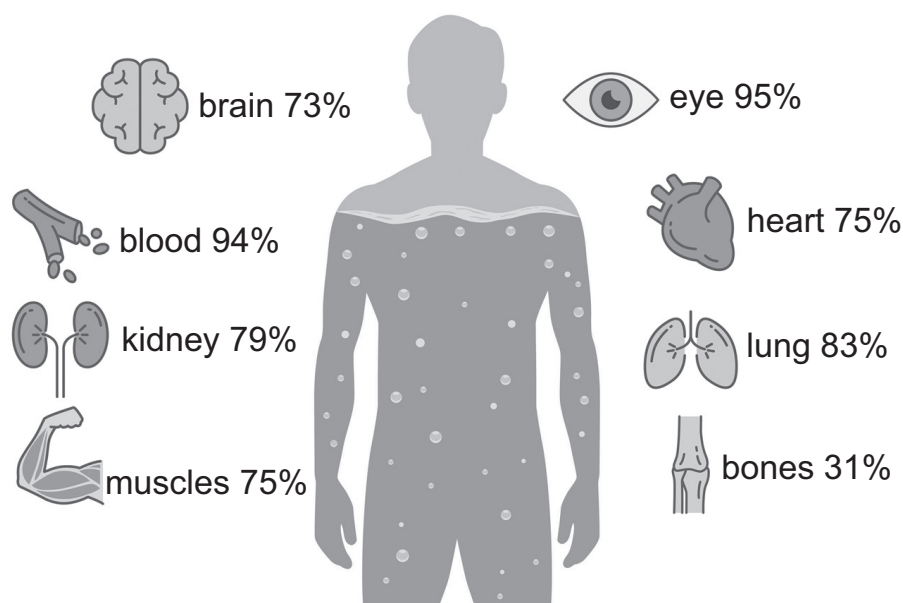


Fig. 3.1

- (i) The mean mass of a human eye is 28 g.

Using information from Fig. 3.1, calculate the mass of water in a human eye.

Give your answer to **two** significant figures.

..... 9
[2]

- (ii) Describe the importance of water in the human body.

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.....
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.....
.....
..... [3]

- (b) Cholera is a disease caused by a pathogen in contaminated water.

Fig. 3.2 is a diagram of the cholera pathogen.

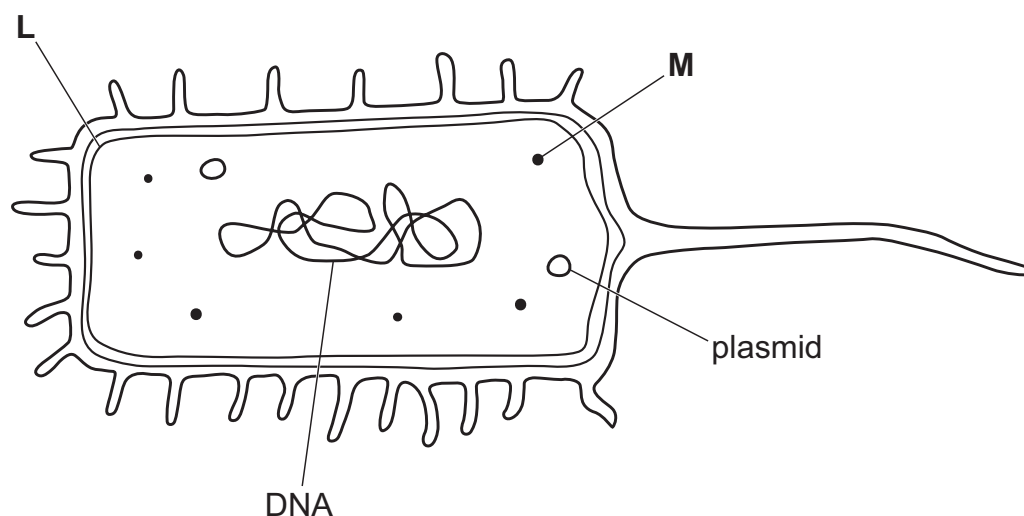


Fig. 3.2

- (i) State the name of structures **L** and **M** shown in Fig. 3.2.

L

M

[2]

- (ii) Identify **two** features shown in Fig. 3.2 that are typical of prokaryotes.

1

2

[2]

- (iii) State the type of pathogen that causes cholera.

..... [1]

- (iv) The scientific name for the pathogen that causes cholera is *Vibrio cholerae*.

State the genus name for this pathogen.

..... [1]

(v) Explain how the cholera pathogen causes dehydration of the human body.

.....

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.....

.....

..... [3]

(vi) Complete the sentences about the use of plasmids in genetic modification.

During genetic modification, human DNA and plasmid DNA are cut with a restriction enzyme. This creates which are joined together using an enzyme called The modified plasmid containing the human gene is called a plasmid.

[3]

[Total: 17]

24 Which part of an amino acid is removed during deamination?

- A** the carbon-containing part
- B** the nitrogen-containing part
- C** the oxygen-containing part
- D** the iron-containing part

25 Which process happens in a glomerulus in the kidney?

- A** assimilation
- B** deamination
- C** filtration
- D** reabsorption

27 Which responses occur in the iris of the eye when a person walks from a brightly lit area to a dimly lit area?

	circular muscles	radial muscles
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

22 Two molecules of glucose are aerobically respired.

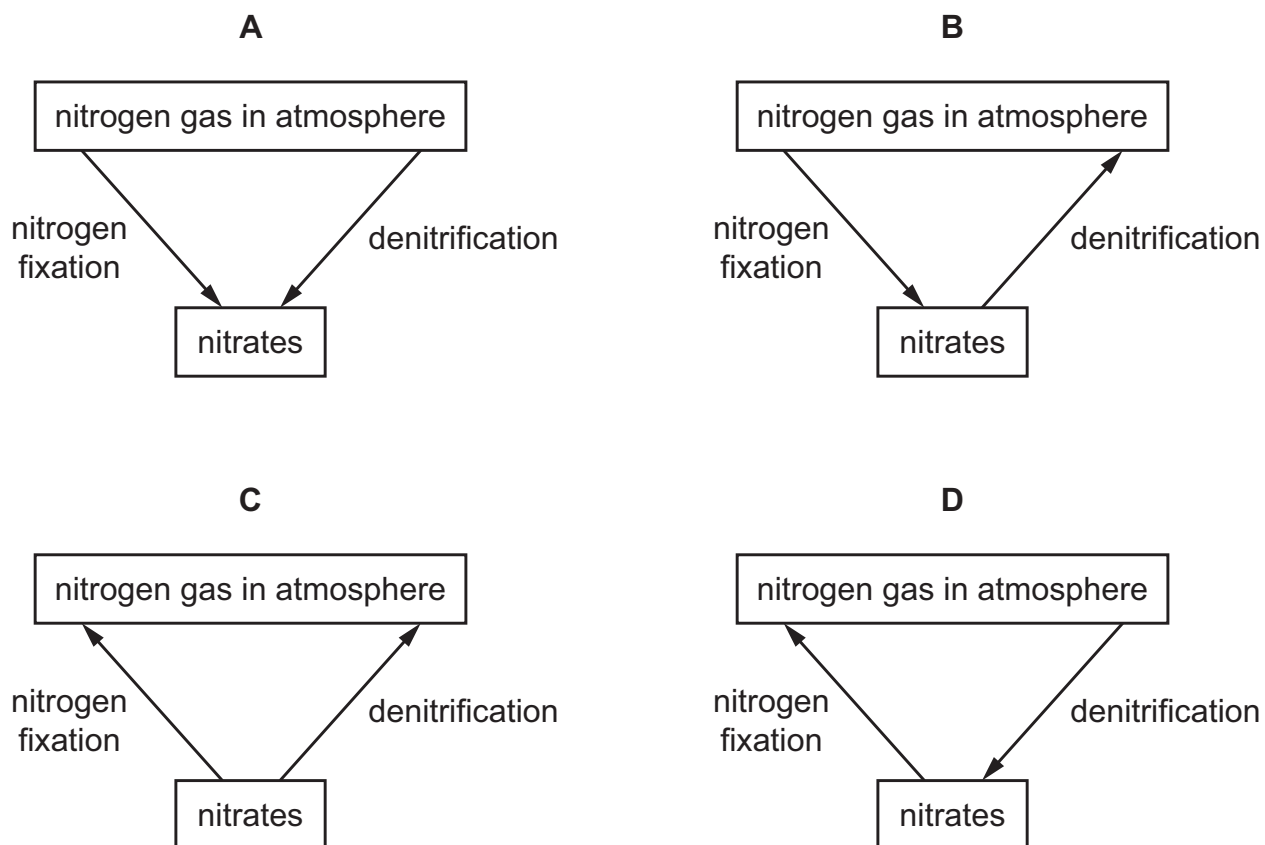
How many molecules of water are produced?

- A** 1 **B** 2 **C** 6 **D** 12

25 Which process moves neurotransmitters across a synapse?

- A** active transport
B diffusion
C gravity
D osmosis

37 Which diagram shows part of the nitrogen cycle?



2 (a) When a seed germinates it grows into a seedling.

Fig. 2.1 is a photograph of a seedling.



Fig. 2.1

(i) Make a large drawing of the seedling shown in Fig. 2.1.



(ii) Line **AB** represents the width of the seedling.

Measure the length of line **AB** on Fig. 2.1.

length of line **AB** mm

The actual width of the seedling is 9mm.

Calculate the magnification of the seedling in Fig. 2.1 using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{AB} \text{ in Fig. 2.1}}{\text{actual width of the seedling}}$$

Give your answer to **two** significant figures.

Space for working.

.....
[3]



(iii) Fig. 2.2 shows photographs of two different seedlings, **P** and **Q**.

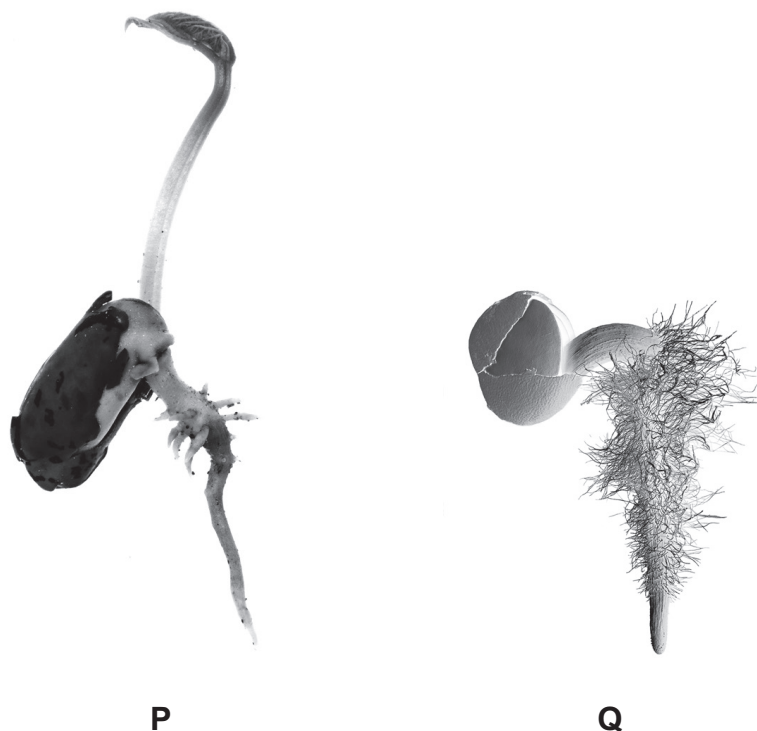


Fig. 2.2

Describe **one** visible similarity and **two** visible differences between seedling **P** and seedling **Q** in Fig. 2.2.

similarity 1

.....

difference 1

.....

difference 2

.....

[3]

(b) As seedlings grow, they change starch into reducing sugars.

Describe the methods you would use to test a sample of seedlings for starch and reducing sugars.

starch test

.....

.....

reducing sugar test

.....



(c) When light shines from one side, seedlings grow towards the light.

Fig. 2.3 shows a diagram of a seedling growing towards a light source. The angle of growth is shown on the diagram.

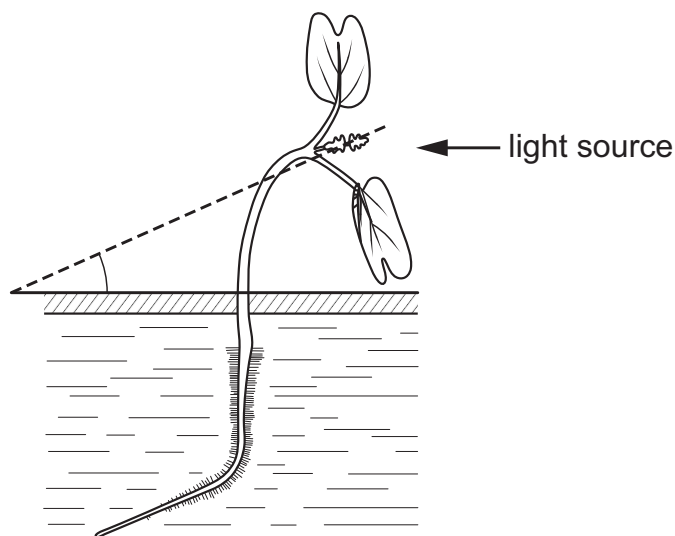


Fig. 2.3

Plan an investigation to find out how light intensity affects the angle at which the seedling grows.

[6]

[6]

[Total: 19]

28 What is defined as a substance that is taken into the body and modifies or affects chemical reactions in the body?

- A** antibody
- B** drug
- C** hormone
- D** pathogen

- 2 (a) Some plants lose their leaves in the winter and grow new leaves in the spring.

A scientist measured the total leaf area of the leaves on one grapevine plant. They repeated this on 100 grapevine plants and found the mean total leaf area per plant.

This procedure was done every two months for one year. The results are shown in Fig. 2.1.

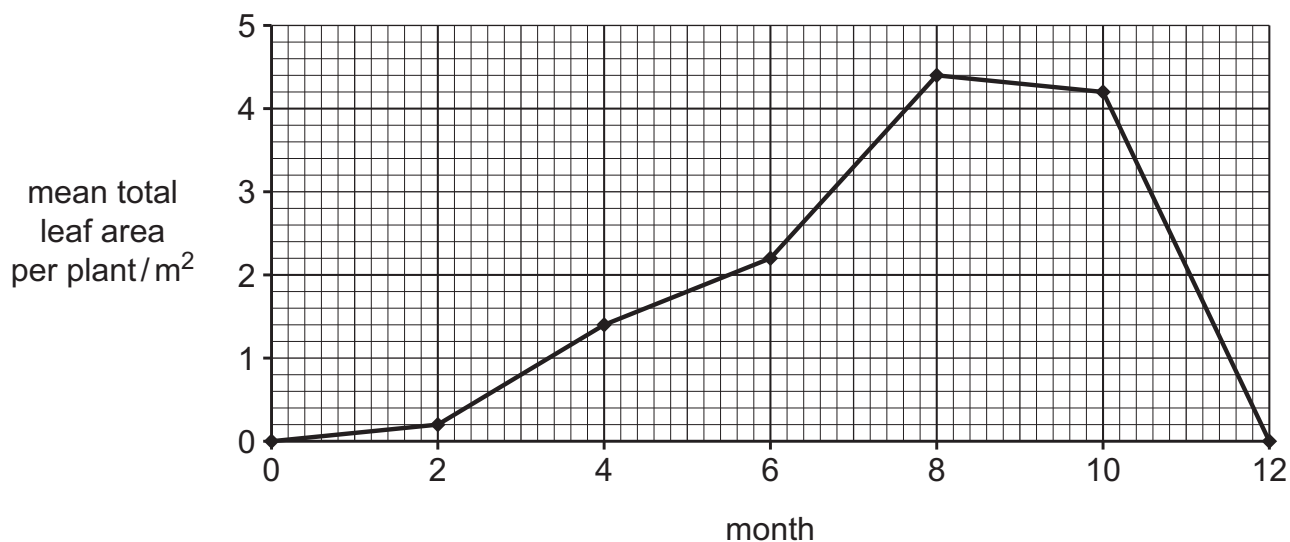


Fig. 2.1

- (i) Suggest why a large number of plants were sampled.

.....
.....
..... [1]

- (ii) Estimate the mean total leaf area per plant for month 7.

Show on Fig. 2.1 how you estimated this value.

..... m^2
[2]

- (iii) Using the information in Fig. 2.1, calculate the percentage increase in the mean total leaf area per plant from month 4 to month 6.

Give your answer to **two** significant figures.

Space for working.

..... %
[3]

(b) Fig. 2.2 shows a leaf from a grapevine plant.

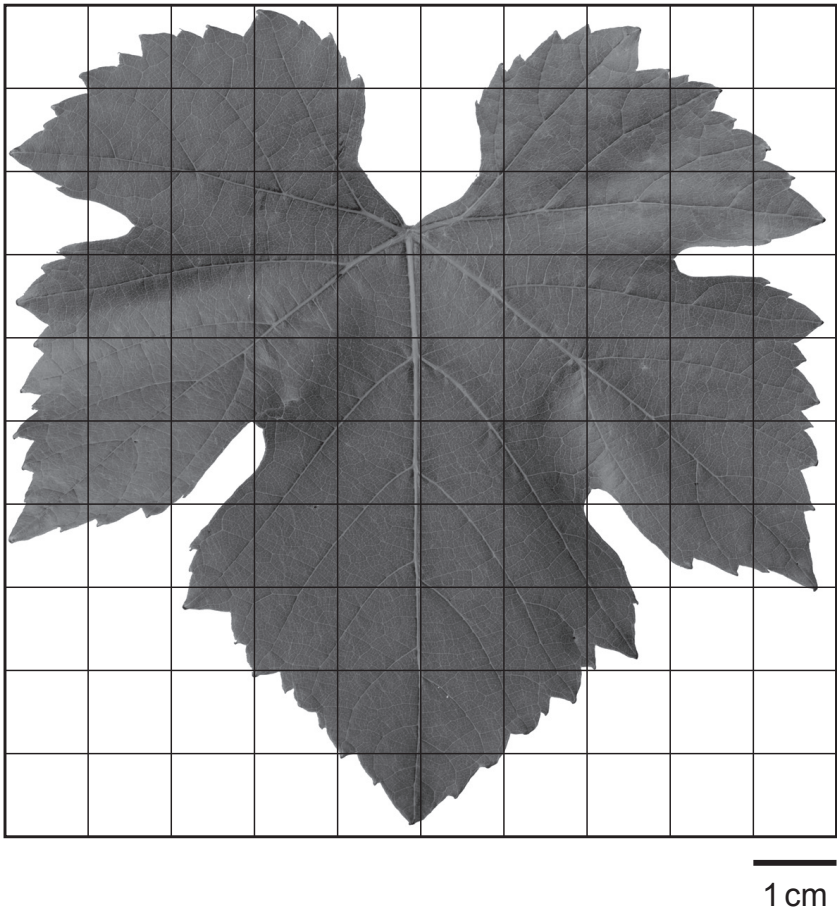


Fig. 2.2

Use the grid to determine the area of the grapevine leaf shown in Fig. 2.2 by counting the squares containing the leaf.

Only count squares that are more than half-filled by the leaf.

Include the unit.

..... [2]

(c) Grapevines produce fruits called grapes. A large leaf area is important when growing grapes because the leaves supply reducing sugars to the grapes.

Describe the method for testing for reducing sugars. Include the result for a positive test.

method

.....

.....

positive test

[3]

(d) Fig. 2.3 is a photograph of a leaf from a fig plant.



Fig. 2.3

Make a large drawing of the leaf in Fig. 2.3.

(e) State **one** similarity and **one** difference between the grapevine leaf in Fig. 2.2 and the fig leaf in Fig. 2.3.

similarity

.....

difference

.....

[2]

[Total: 17]

- 4 (a) Fig. 4.1 is a flow chart showing some of the processes that occur in a biofuels power plant.

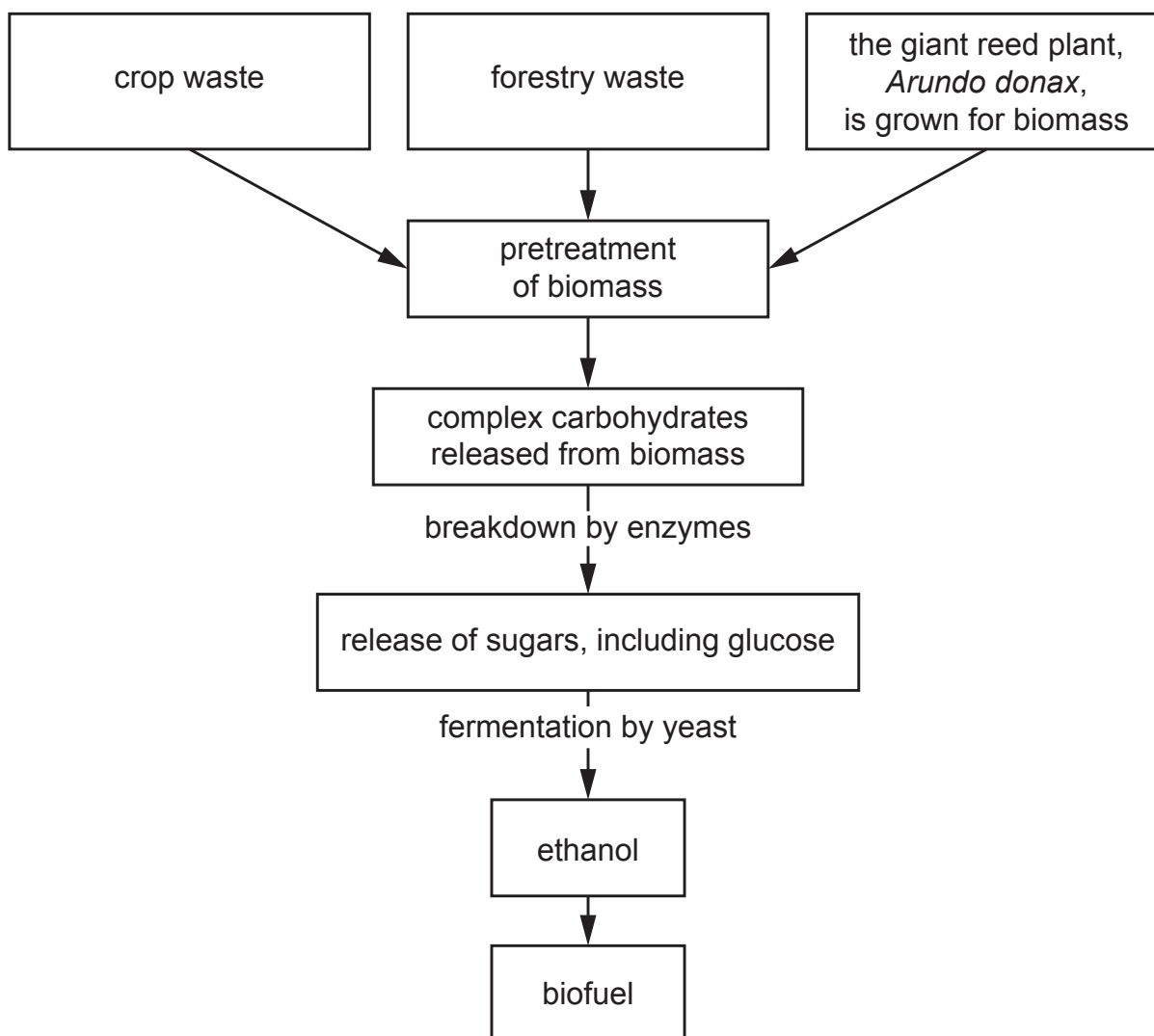


Fig. 4.1

- (i) The fermentation stage shown in Fig. 4.1 requires yeast.

Complete the balanced chemical equation to show how ethanol is produced by yeast respiration.

..... $\longrightarrow$ + [2]

- (ii) Using the information in Fig. 4.1, suggest the environmental advantages of using ethanol as a fuel.

.....

.....

.....

.....

.....

.....

(iii) Farmers grow giant reed plants as monocultures.

Describe the disadvantages of growing giant reed plants to provide biomass for the production of biofuels.

.....

.....

.....

.....

..... [2]

(b) One problem with using biomass in the process shown in Fig. 4.1 is that the breakdown stage produces a sugar called xylose and ethanoic acid. Yeast cannot use xylose, and ethanoic acid is toxic to yeast.

Scientists genetically engineered a type of yeast that can use xylose and ethanoic acid.

Fig. 4.2 shows the results of one of the trial experiments done by the scientists using their new genetically engineered yeast.

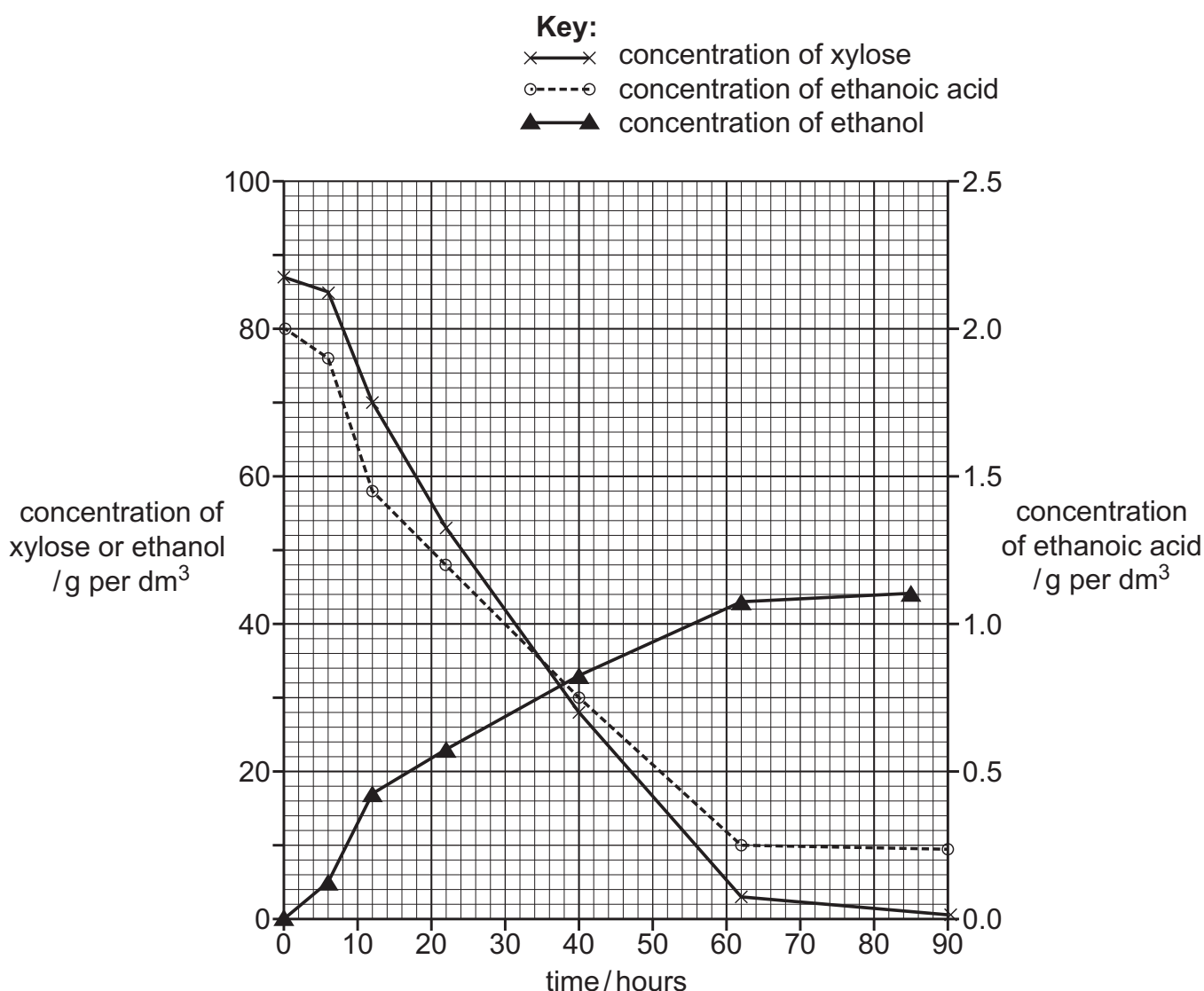


Fig. 4.2

(i) Describe the results shown in Fig. 4.2.

[3]

(ii) The experiment was done at 30 °C.

The scientists repeated the experiment at 20 °C.

Predict the results that you would expect for the concentration of ethanol.

[1]

[Total: 11]

- 5 Fig. 5.1 shows Mackinlay's cuckoo-dove, *Macropygia mackinlayi*, which is found on most of the islands in the south-west of the Pacific Ocean.



Fig. 5.1

- (a) Karkar Island is one island where Mackinlay's cuckoo-dove is found. This species is part of many communities that are adapted to the different habitats on the island.

- (i) Define the term community.

.....
.....
..... [1]

- (ii) Complete the passage with the most appropriate word or phrase.

Adaptation is sometimes defined as the process resulting from
....., by which populations become more suited to their
..... over many generations.

[2]

(b) The highest point on Karkar Island is 1800 m above sea level.

In 1969, a researcher surveyed the bird species on Karkar Island. He recorded the vertical distribution of the birds between sea level and 1600 m.

In 2013, other researchers repeated the survey.

Fig. 5.2 shows the ranges of four species, as recorded in the two surveys. The vertical lines represent the range of heights where the birds were seen on the island.

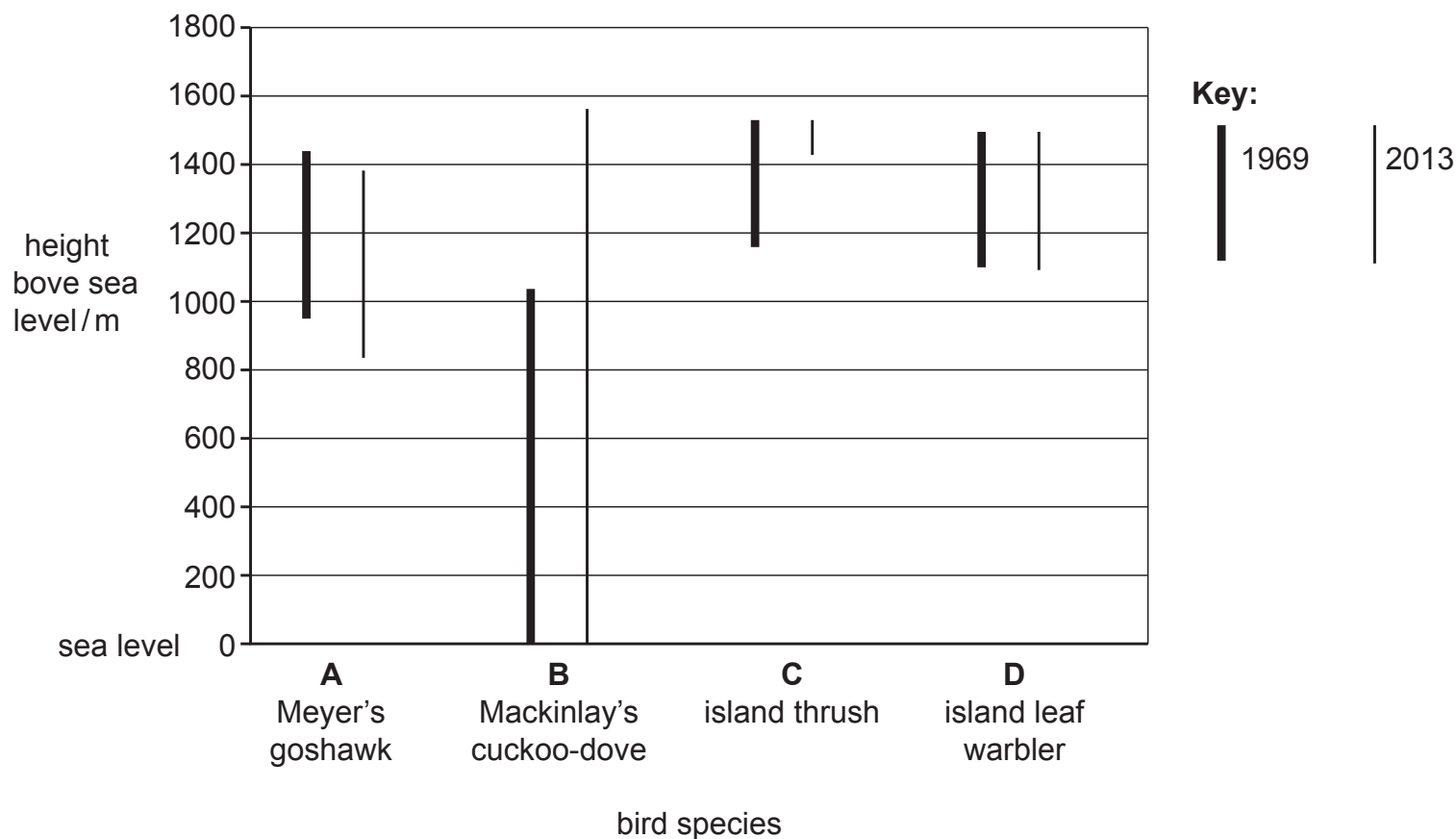


Fig. 5.2

(i) Compare the range in 1969 with the range in 2013 for each of the bird species shown in Fig. 5.2.

A

.....

B

.....

C

.....

D

.....

(ii) Using the information in Fig. 5.2, suggest reasons for the change in the range of the island thrush (C) on Karkar Island.

[3]

(c) Small oceanic islands are often inhabited by species of birds that are found nowhere else. Many of these species have decreasing populations and are often endangered.

Explain the risks to these species of birds that have decreasing populations.

[3]

[Total: 13]