AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.1.4

Adaptations

Past-paper questions

Tier	**Higher**
Question groups	**33**
Available paper years	**2007–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.7.1.4 Adaptations

Question 01

March 2007 | BLY1B | Original Q5 | Legacy

QUESTION FIVE

5A What is an animal's territory?

1 an area defended by an animal against other members of the same species

2 an area defended by an animal against all other animals

3 the place where animals compete with other animals

4 an area to which an animal has become adapted

5B Which of the following is **not** an adaptation to living in arctic conditions?

1 white fur of polar bears

2 thick layer of body fat in seals

3 small ears of arctic foxes

4 large wings of birds

5C Which line, **1**, **2**, **3** or **4**, in the table is correct?

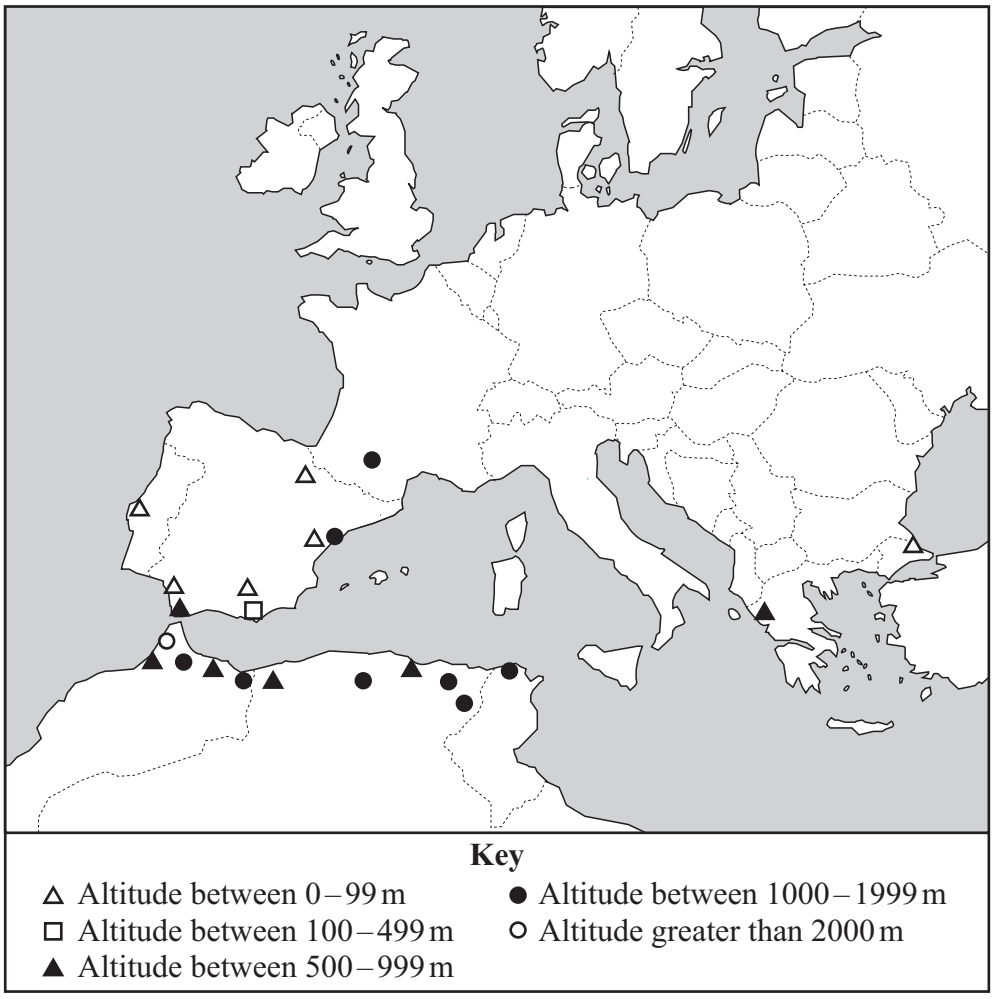
	Adaptation for protection against predators	
	Plants	**Animals**
1	long roots of cacti	warning colours of some snakes
2	thorns on berberis plants	camouflage colours of flatfish
3	poisonous seeds of the henbane plant	long neck of the giraffe
4	waxy leaves of the agave plant	long beak of humming birds

4.7.1.4 Adaptations

Question 01 · continued

5D The distribution of plants is affected by altitude (height above sea level in metres).

The map shows the altitudes of the only known sites where a rare plant grows.



The plant grows mainly at altitudes . . .

1 between 0 – 99 m

2 between 100 – 499 m

3 between 500 – 999 m

4 between 1000 – 1999 m

4.7.1.4 Adaptations

Question 02

June 2007 | BLY1B | Original Q8 | Legacy

QUESTION EIGHT

The limbs of animals have changed during the course of evolution.

Diagram 1 shows the ancestral limb plan for the forelimbs of all vertebrates (animals with backbones).

Diagram 1

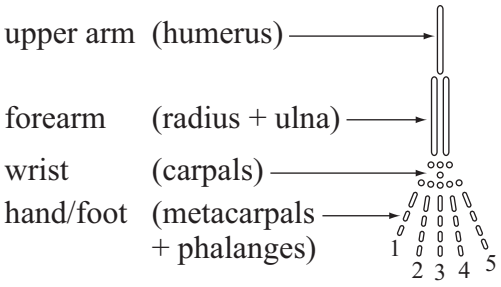
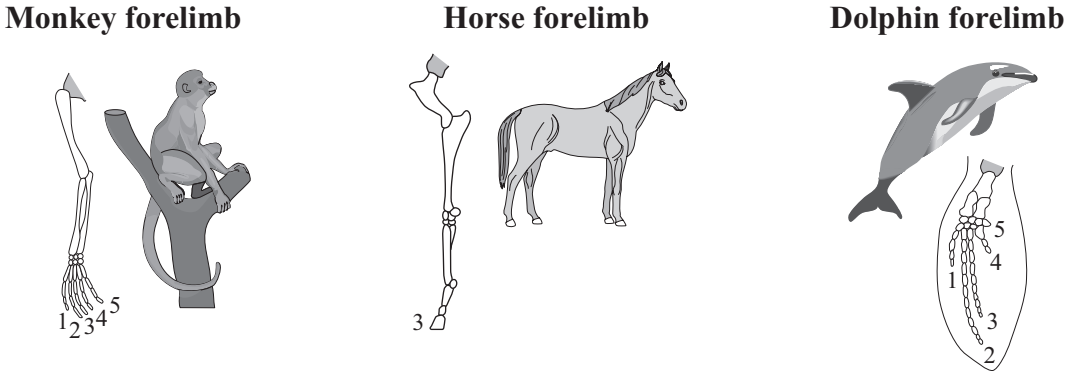


Diagram 2 shows the arrangement of the bones in the forelimbs of three mammals, a monkey, a horse and a dolphin.

Diagram 2



8A What does the pattern in the arrangement of the bones of the three mammals indicate about their evolutionary relationship?

1 They have adapted themselves to different forms of movement.

2 Mammals share a common ancestor with other vertebrates.

3 The bones remain in the same position in all vertebrates.

4 Evolution has caused the bones to change shape in different mammals.

4.7.1.4 Adaptations

Question 02 · continued

8B The bones of the front flippers of the dolphin are adapted for . . .

1 increasing surface area for exchange of gases.

2 supporting a large surface area of body tissue.

3 bearing the weight of the animal.

4 defending itself against predators.

8C The advantage to the horse of the evolution of its forelimbs is that . . .

1 its balance is improved.

2 the bones line up at the elbow joint.

3 the leg is longer so that the horse can run faster.

4 the carpals have become fused together.

8D Which process causes changes in the limb structure of animals?

1 competition

2 mutation

3 natural selection

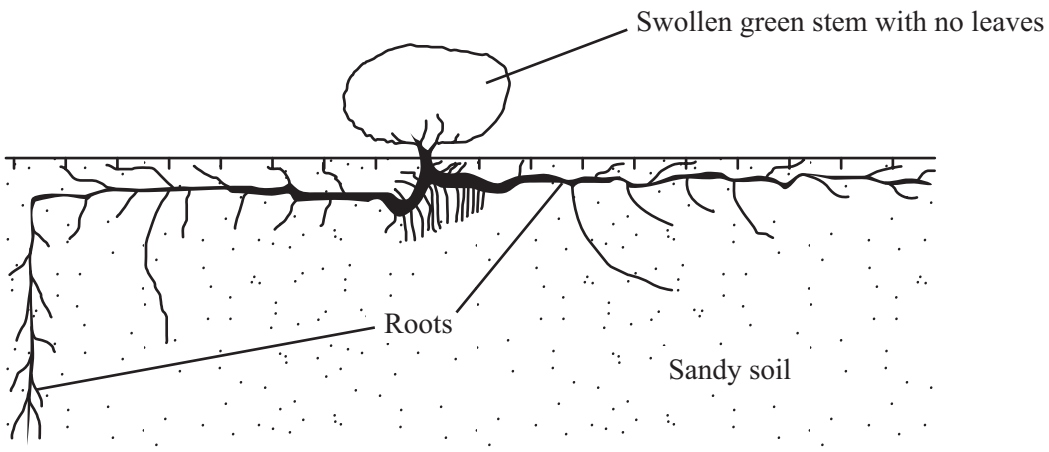
4 variation

4.7.1.4 Adaptations

Question 03

June 2007 | BLY1H | Original Q3 | Legacy

3 The drawing shows a bean caper plant.



The bean caper plant lives in hot desert conditions.

Explain **two** ways in which the bean caper is adapted for life in a hot desert.

Adaptation 1 .....

.....

How this adaptation helps the bean caper to survive

.....

.....

Adaptation 2 .....

.....

How this adaptation helps the bean caper to survive

.....

.....

(4 marks)

4

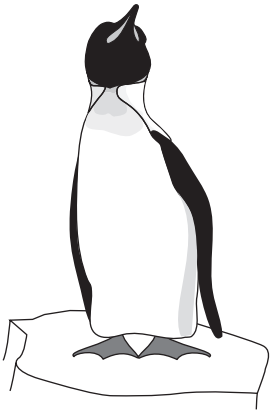
4.7.1.4 Adaptations

Question 04

November 2007 | BLY1B | Original Q2 | Legacy

QUESTION TWO

The drawing shows a penguin. Penguins live in the Antarctic. They swim underwater to catch fish.



Match adaptations **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A oil gland near the tail

B heavy, solid bones

C dark coloured feathers on back

D webbed feet

	The adaptation . . .
1	helps the penguin to swim quickly
2	helps the penguin to absorb heat from the Sun
3	helps the penguin to stay underwater when fishing
4	helps to keep the surface of the penguin waterproof

4.7.1.4 Adaptations

Question 05

November 2007 | BLY1B | Original Q3 | Legacy

QUESTION THREE

Rabbits and hares are closely related species.

They are thought to have descended from a common ancestor that is now extinct.

3A Extinction may be caused by . . .

1 an increase in variation.

2 a lack of new competitors.

3 fossilisation.

4 changes in the environment.

3B The evidence that rabbits and hares have evolved from a common ancestor would be shown by . . .

1 comparing modern rabbits and hares with other related species.

2 studying the fossil record of rabbits and hares.

3 studying the fossils of predators of rabbits and hares.

4 comparing the behaviour of rabbits and hares.

3C Rabbits and hares both feed on plants and have teeth adapted for this.

Which one of the following is **not** a possible factor for the development of the specialised teeth of rabbits and hares?

1 adaptation to the environment

2 changes in the environment

3 evolution of predators

4 natural selection

4.7.1.4 Adaptations

3D What is a mutation?

1 a change in the physical appearance of an organism

2 a change in a gene

3 a form of natural selection

4 a change in the environment

Turn over for the next question

4.7.1.4 Adaptations

Question 06

June 2008 | BLY1H | Original Q1 | Legacy

1 Organisms have adaptations that enable them to survive in extreme conditions.

1 (a) The photograph shows an arctic fox.



This fox lives in the arctic, where it is very cold.

Suggest **two** ways in which the arctic fox is adapted for life in very cold conditions.
Explain how each adaptation helps the arctic fox to survive in very cold conditions.

Adaptation 1 .....

.....

How this adaptation helps the arctic fox to survive in very cold conditions.

.....

.....

.....

Adaptation 2 .....

.....

How this adaptation helps the arctic fox to survive in very cold conditions.

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(4 marks)

4.7.1.4 Adaptations

Question 06 · continued

for mark

1 (b) The photograph shows an antelope that lives in a sandy desert.



The antelope is prey to large cats such as cheetah.

Suggest **two** adaptations that help this antelope to avoid being killed by predators.
Explain how each adaptation helps the antelope to avoid being killed by predators.

Adaptation 1 .....

.....

How this adaptation helps the antelope to avoid being killed by predators.

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Adaptation 2 .....

.....

How this adaptation helps the antelope to avoid being killed by predators.

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(4 marks)

8

4.7.1.4 Adaptations

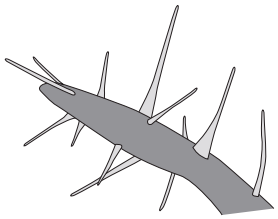
Question 07

November 2008 | BLY1BP | Original Q2 | Legacy

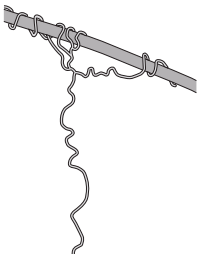
QUESTION TWO

The plants shown in drawings **1–4** are adapted in different ways for survival.

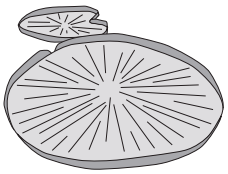
1



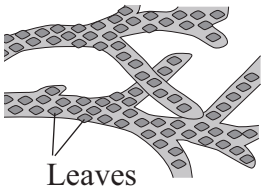
2



3



4



Match statements, **A**, **B**, **C** and **D**, with the drawings **1–4**.

The plant has leaves adapted . . .

A for floating.

B to deter predators.

C for climbing.

D for reducing water loss.

4.7.1.4 Adaptations

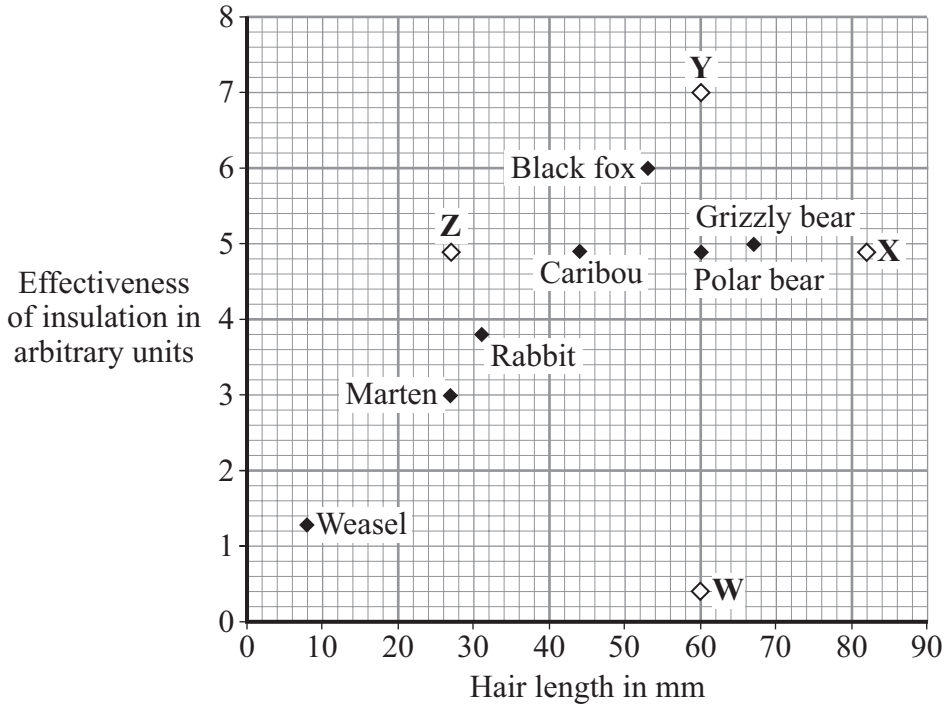
Question 08

March 2009 | BLY1BP | Original Q5 | Legacy

QUESTION FIVE

Some animals are adapted for life in cold conditions.

The graph shows the association between hair length and the effectiveness of insulation provided by the dry coats of different animals.



5A From the information in the graph, which one of the following animals is best adapted for life in the Arctic?

1 grizzly bear

2 caribou

3 polar bear

4 black fox

An animal loses heat more rapidly when its coat is wet than when its coat is dry.

5B Which letter on the graph indicates data for a polar bear when its coat is wet?

1 **W**

2 **X**

3 **Y**

4 **Z**

4.7.1.4 Adaptations

Question 08 · continued

5C Polar bears often swim to catch their food. The black fox lives on land.

Which adaptation would be more suitable for the polar bear than the black fox in reducing the rate of heat loss?

1 larger ears

2 longer hair

3 thicker layer of fat under the skin

4 wider feet

The table compares the grizzly bear with the black bear.

	Grizzly bear	Black bear
Hair colour	Varies from black to blonde	Varies from black to white
Ear size	Short	Long
Claw length	10 cm	4 cm
Shoulder muscles	Large	Small

5D Which feature suggests that grizzly bears live in colder regions than black bears?

1 hair colour

2 ear size

3 claw length

4 shoulder muscles

4.7.1.4 Adaptations

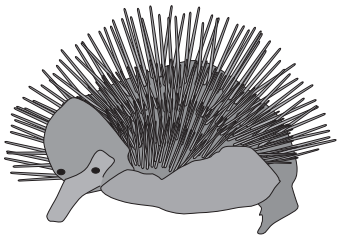
Question 09

June 2009 | BLY1BP | Original Q7 | Legacy

QUESTION SEVEN

The pictures show an echidna and a hedgehog.

Echidna



Hedgehog



Read the information about echidnas and hedgehogs.

- Echidnas and hedgehogs look similar, but they are unrelated species.
- Echidnas live in Australia; hedgehogs live in many countries, including Britain.
- Both echidnas and hedgehogs are covered with sharp spines.
- Echidnas lay eggs; hedgehogs give birth to live babies.
- There is no evidence that echidnas have ever lived in Britain.
- There is no evidence that hedgehogs have ever lived in Australia.

7A The information above indicates that echidnas and hedgehogs . . .

1 have a similar diet.

2 have a similar life expectancy.

3 evolved from the same ancestor.

4 evolved spines completely independently of each other.

7B The information above suggests that echidnas and hedgehogs . . .

1 are adapted to similar environments.

2 have spines of the same length.

3 are the same colour.

4 have bodies that allow them to curl up into a ball.

4.7.1.4 Adaptations

7C The outer covering of echidnas and hedgehogs is an adaptation for . . .

1 attracting mates.

2 camouflage.

3 defence.

4 insulation.

7D The outer covering of the echidna and the hedgehog developed initially . . .

1 in response to changes in their environments.

2 as a result of being attacked by predators.

3 as a result of mutations.

4 as a result of variation.

Turn over for the next question

4.7.1.4 Adaptations

Question 10

June 2009 | BLY1H | Original Q1 | Legacy

1 Swallows and swifts migrate between Britain and South Africa every year.

1 (a) **Photograph 1** shows a swallow.

Photograph 1



Swallows can fly very quickly.

Use information from the photograph to give **one** way in which the swallow is adapted for flying very quickly.

.....

.....

(1 mark)

1 (b) **Photograph 2** shows swifts.

Photograph 2



Swallows and swifts both feed on flying insects.
They both spend the summer in Britain and then migrate to South Africa in the autumn.

Suggest **one** reason why swallows and swifts do not stay in Britain in the winter.

.....

.....

(1 mark)

4.7.1.4 Adaptations

Question 10 · continued

for mark

1 (c) The table gives data about swallows and swifts.

	Swallows	Swifts
Arrival date in Britain	April	Early May
Leaving date from Britain	October	Early August
Food	Flying insects	Flying insects
Height at which the birds feed	Near ground level	Up to 350 m above ground level
Times at which birds feed	Mainly when it is light	Almost 24 hours per day

1 (c) (i) There is very little competition between swallows and swifts for food.

Use information from the table to suggest **two** reasons for this.

1 .....

.....

2 .....

.....

(2 marks)

(Extra space) .....

1 (c) (ii) Swallows and swifts do compete for some factors.

Suggest **one** of these factors.

.....

.....

(1 mark)

5

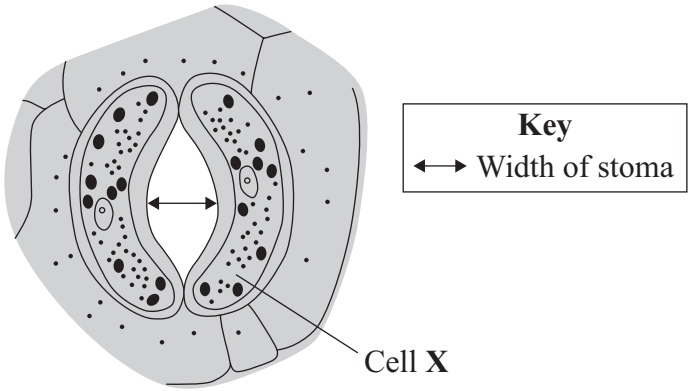
4.7.1.4 Adaptations

Question 11

June 2009 | BLY3H | Original Q4 | Legacy

4 Plant leaves have many stomata.

The diagram shows a stoma.



4 (a) Name cell **X** .....

(1 mark)

4 (b) The table shows the mean widths of the stomata at different times of the day for two different species of plant.
Species **A** normally grows in hot, dry deserts.
Species **B** grows in the UK.

	Time of day in hours	Mean width of stomata as a percentage of their maximum width	
		Species A	Species B
Dark	0	95	5
	2	86	5
	4	52	6
Light	6	6	40
	8	4	92
	10	2	98
	12	1	100
	14	0	100
	16	1	96
	18	5	54
Dark	20	86	6
	22	93	5
	24	95	5

4.7.1.4 Adaptations

Question 11 · continued

for mark

The data in the table show that species **A** is better adapted than species **B** to living in hot, dry deserts.

Explain how.

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(4 marks)

(Extra space) .....

.....

.....

5

4.7.1.4 Adaptations

Question 12

January 2010 | BLY1H | Original Q1 | Legacy

1 The photograph shows a musk ox.



The musk ox lives in the Arctic. An adult musk ox is 2.5m long and 1.4m high at the shoulder. Adults usually have a mass of about 400kg.

Use this information and information from the photograph to explain **two** ways in which a musk ox is adapted for survival in the Arctic.

1 (a) (i) Adaptation 1 .....

(1 mark)

1 (a) (ii) How this adaptation helps the musk ox to survive in the Arctic.

.....

.....

(1 mark)

1 (b) (i) Adaptation 2 .....

(1 mark)

1 (b) (ii) How this adaptation helps the musk ox to survive in the Arctic.

.....

.....

(1 mark)

4

4.7.1.4 Adaptations

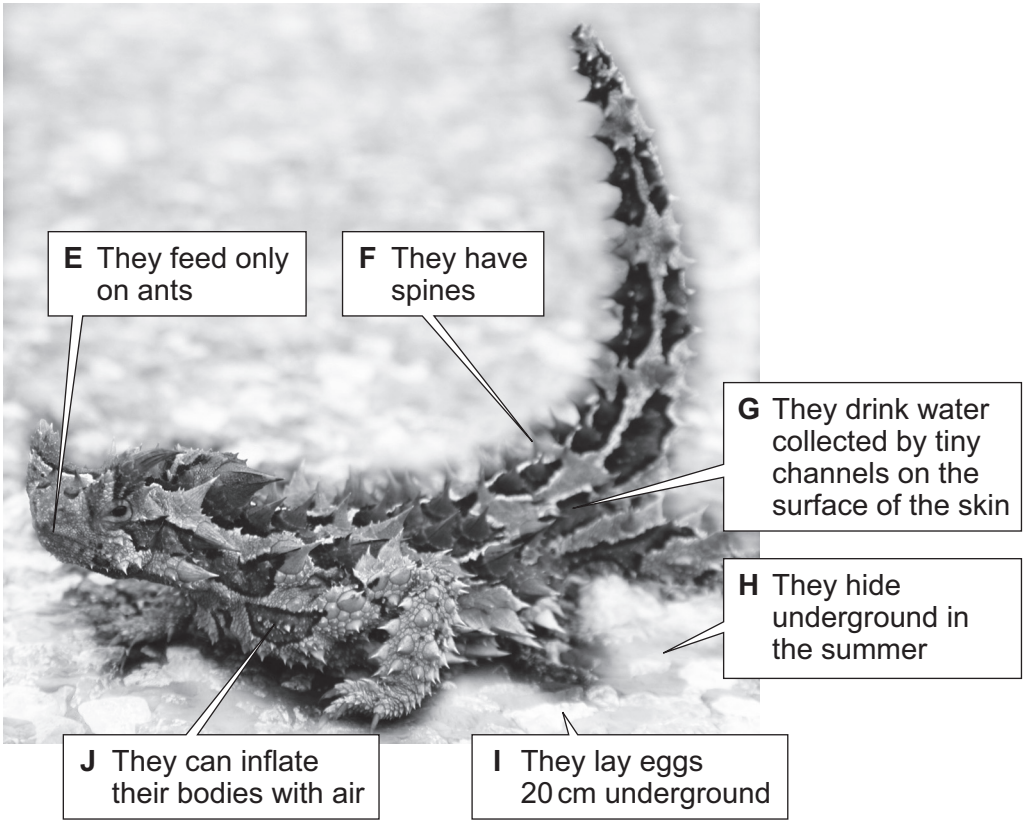
Question 13

June 2010 | BLY1BP | Original Q5 | Legacy

QUESTION FIVE

The photograph shows an animal that lives only in the Australian desert. It is called a moloch.

Some of its features are labelled **E–J**.



5A Which of the features are adaptations to survival in a dry environment?

1 **G**, **H** and **I**

2 **E**, **F** and **J**

3 **F**, **G** and **H**

4 **E**, **G** and **I**

5B Which of the features are adaptations to protect the moloch from being eaten?

1 **E**, **F** and **H**

2 **F**, **H** and **J**

3 **G**, **H** and **I**

4 **E**, **F** and **G**

4.7.1.4 Adaptations

Question 13 · continued

5C Which feature might lead to the moloch becoming extinct if there was a change in the environment?

1 **E**

2 **F**

3 **H**

4 **I**

5D Local people say that the moloch lays its eggs on the cooler side of small hills.

How might scientists test this hearsay?

1 keep equal numbers of molochs captive on each side of a hill

2 watch where females spend most of their time

3 survey each side of hills in areas where molochs live

4 check the internet for opinions from other scientists

4.7.1.4 Adaptations

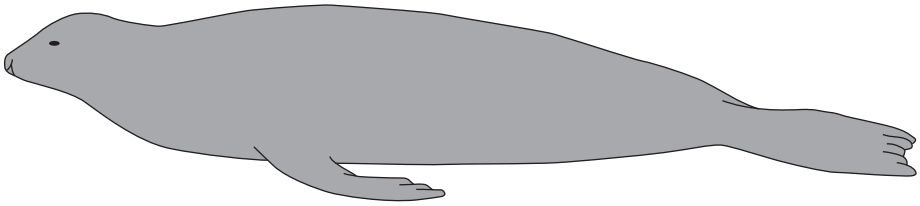
Question 14

June 2010 | BLY1H | Original Q1 | Legacy

1 Seals are adapted for life in the sea.
Use information from the drawings to answer the questions.

This drawing shows seal **X**.

Seal X



1 (a) Give **two** ways in which seal **X** is adapted for swimming.

1 .....

.....

2 .....

.....

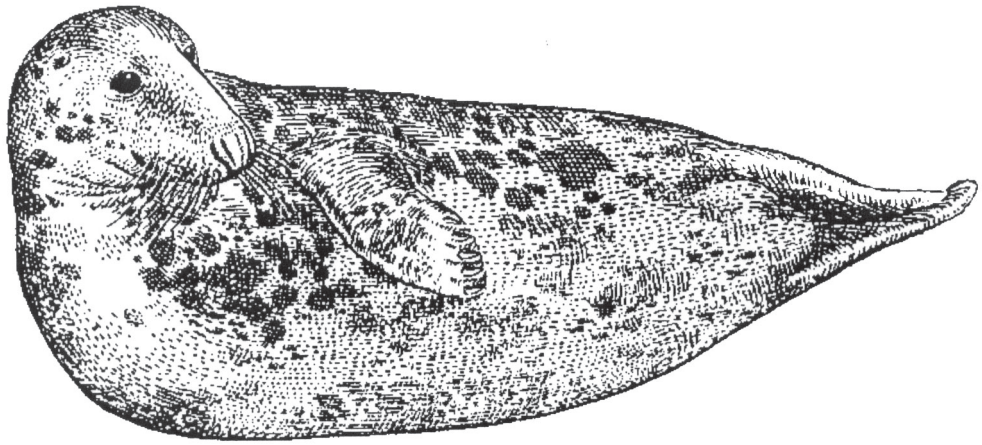
(2 marks)

4.7.1.4 Adaptations

Question 14 · continued

1 (b) This drawing shows seal **Y**, drawn to the same scale as seal **X**.

Seal Y



Seal **Y** lives in much colder seas than seal **X**.

Explain **one** way in which seal **Y** is adapted for surviving in cold seas.

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.....

.....

.....

(2 marks)

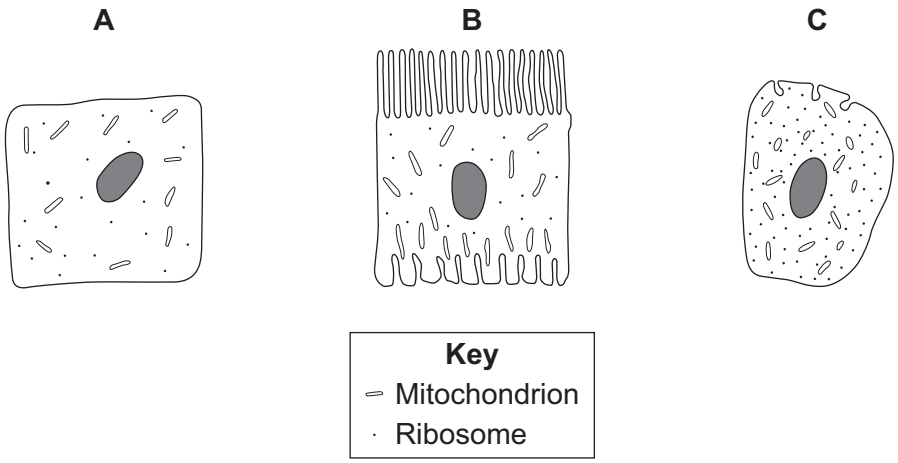
4

4.7.1.4 Adaptations

Question 15

June 2010 | BLY2H | Original Q4 | Legacy

4 Diagrams **A**, **B** and **C** show cells from different parts of the human body, all drawn to the same scale.



4 (a) Which cell, **A**, **B** or **C**, appears to have adaptations to increase diffusion into or out of the cell? ☐

Give **one** reason for your choice.

.....

.....

(1 mark)

4 (b) (i) Cell **C** is found in the pancreas.

Name **one** useful substance produced by the pancreas.

.....

(1 mark)

4 (b) (ii) Use information from the diagram to explain how cell **C** is adapted for producing this substance.

.....

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(2 marks)

4

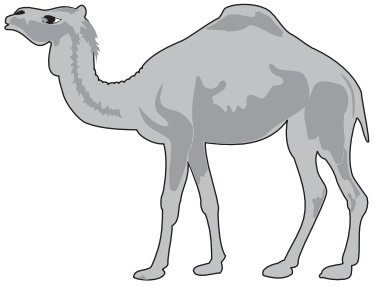
4.7.1.4 Adaptations

Question 16

November 2010 | BLY1BP | Original Q1 | Legacy

QUESTION ONE

Camels live in deserts. Deserts are dry and hot in the day, but can be very cold at night. Camels have adaptations. These adaptations help camels to survive in desert conditions.



Match desert conditions, **A**, **B**, **C** and **D**, with the adaptations **1–4** in the table.

A the wind blows sand around

B very cold nights

C soft ground

D dry conditions

	Adaptation
1	camels produce very little sweat
2	camels have feet with a large surface area
3	camels can shut their nostrils
4	camels have thick fur to trap air

4.7.1.4 Adaptations

Question 17

January 2011 | BLY1H | Original Q1 | Legacy

1 Desert plants are adapted for survival in a dry climate.

1 (a) Joshua trees live in deserts.



Joshua trees have two different types of root:

- a system of shallow roots spread out over a large area
- roots about 1 m in diameter, shaped like bulbs, deep in the soil.

Explain the advantage to the Joshua tree of having:

1 (a) (i) shallow roots spread out over a large area

.....

.....

.....

.....

(2 marks)

1 (a) (ii) large, bulb-like roots deep in the soil.

.....

.....

(1 mark)

4.7.1.4 Adaptations

Question 17 · continued

1 (b) Creosote bushes also live in deserts.



The leaves of creosote bushes:

- are covered with a layer of wax
- fold together during the day.

Explain how the leaves of the Creosote bush help it to survive in deserts.

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(3 marks)

6

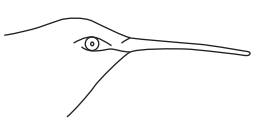
4.7.1.4 Adaptations

Question 18

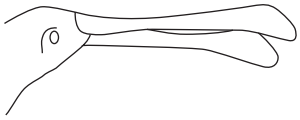
March 2011 | BLY1BP | Original Q2 | Legacy

QUESTION TWO

Birds have beaks which are adapted to the way the birds feed.



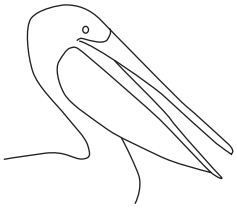
1



2



3



4

Match feeding methods, **A**, **B**, **C** and **D**, with the birds **1**–**4**.

A catches fish and carries them inside its lower beak

B sucks nectar from deep inside a flower

C shovels up the mud at the bottom of water to find food

D rips animal prey to pieces

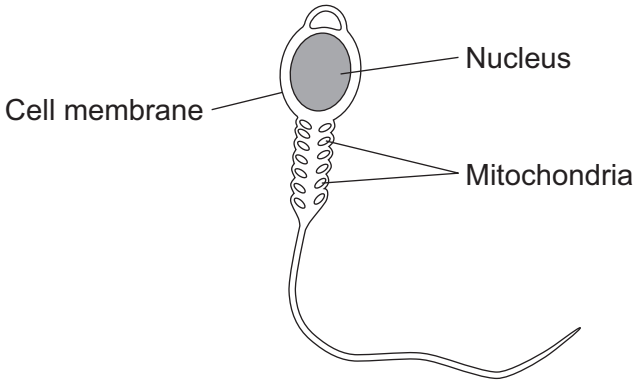
4.7.1.4 Adaptations

Question 19

June 2011 | BLY2H | Original Q4 | Legacy

4 Cells in the human body are specialised to carry out their particular function.

4 (a) The diagram shows a sperm cell.



The sperm cell is adapted for travelling to, then fertilising, an egg.

4 (a) (i) How do the mitochondria help the sperm to carry out its function?

.....

.....

(1 mark)

4 (a) (ii) The nucleus of the sperm cell is different from the nucleus of body cells.

Give **one** way in which the nucleus is different.

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(1 mark)

4 (b) Stem cells from human embryos are used to treat some diseases in humans.

Explain why.

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(2 marks)

4

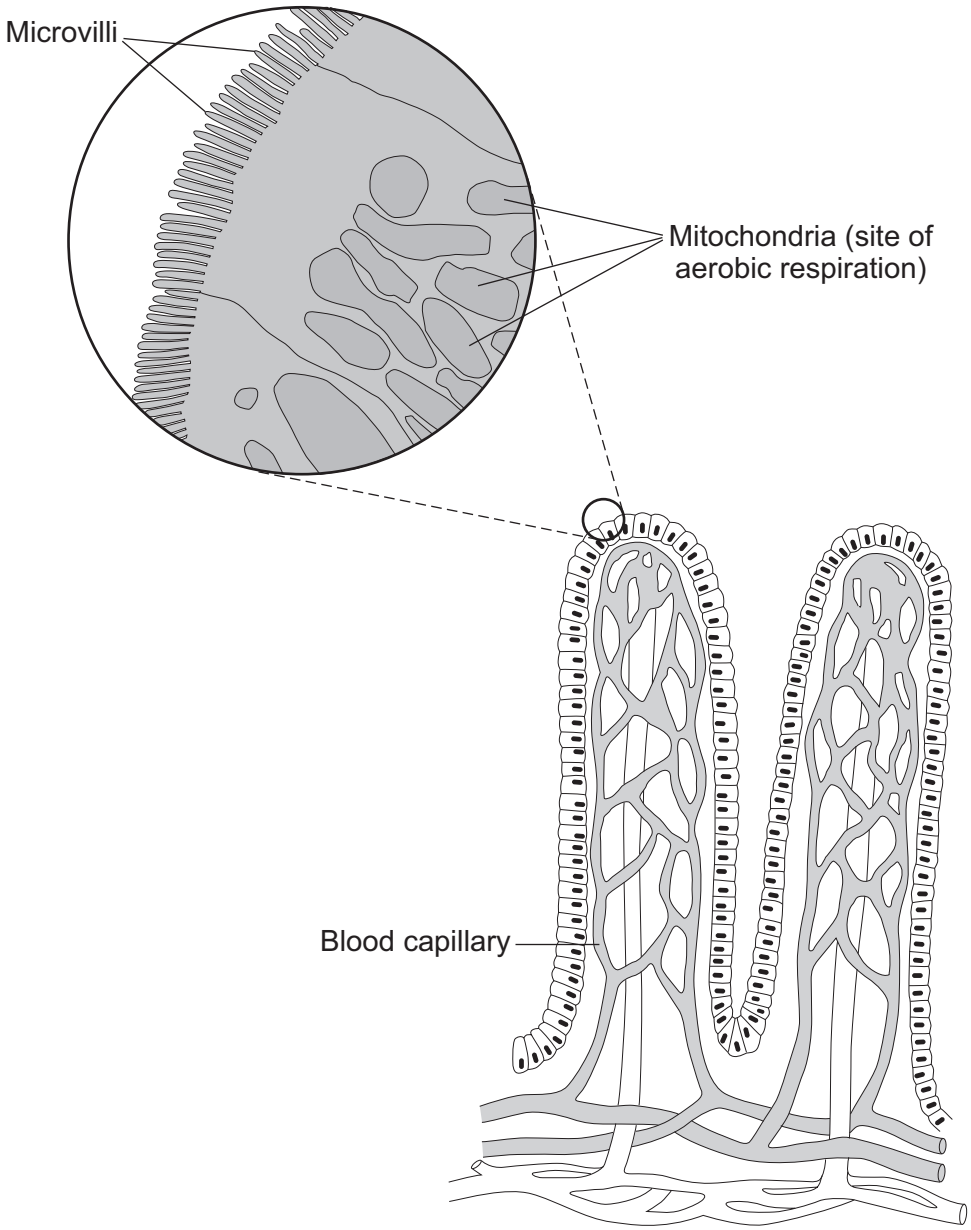
4.7.1.4 Adaptations

Question 20

June 2011 | BLY3H | Original Q5 | Legacy

5 The villi of the small intestine absorb the products of digestion.

The diagram shows two villi. It also shows parts of some of the surface cells of a villus, as seen with an electron microscope.



4.7.1.4 Adaptations

Question 20 · continued

Describe and explain how the villi are adapted to maximise the rate of absorption of the products of digestion.

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(5 marks)

5

4.7.1.4 Adaptations

Question 21

November 2011 | BLY1BP | Original Q2 | Legacy

QUESTION TWO

Some birds have feet adapted to their lifestyle.

Match adaptations, **A**, **B**, **C** and **D**, with the drawings of birds' feet labelled **1**–**4**.

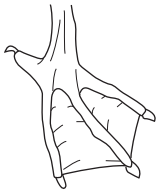
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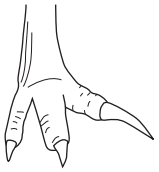
2



3



4



A used for swimming

B holds animal prey strongly and tightly

C used to wade through deep mud in lakes

D used to dig for food in hard soil

4.7.1.4 Adaptations

Question 22

June 2012 | BL1HP | Original Q3 | Legacy

3 *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Plants and animals have become adapted in many different ways to reduce the risk of being eaten by predators.

Describe these adaptations.

Give examples of animals and plants adapted in the ways you describe.

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(6 marks)

6

4.7.1.4 Adaptations

Question 23

June 2014 | BL1HP | Original Q2 | Legacy

2 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Animals and plants have features (adaptations) that allow them to survive in the conditions in which they normally live.

Describe how animals and plants are adapted to survive in dry conditions such as deserts.

For each adaptation that you give, describe how the adaptation helps the animal or plant to survive in dry conditions.

To obtain full marks you should refer to **both** animals and plants.

[6 marks]

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Extra space .....

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4.7.1.4 Adaptations

Question 24

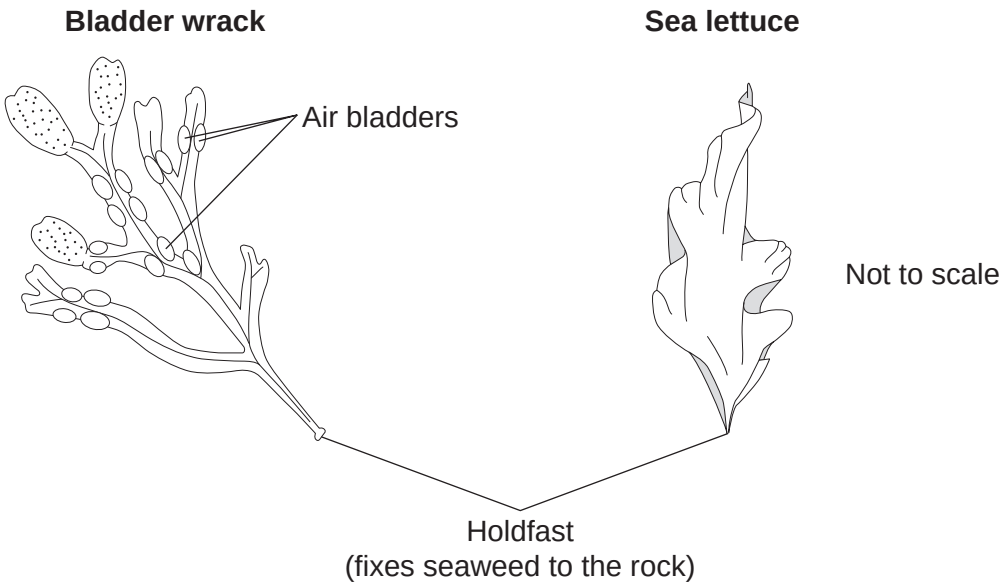
June 2014 | BL2HP | Original Q5 | Legacy

5 At the seashore, the tide comes in and goes out twice each day.

Some students investigated whether two different species of seaweed could live only at certain positions on a rocky shore.
Seaweeds are plant-like organisms that make their food by photosynthesis.

Figure 6 shows the two species of seaweed that the students investigated.

Figure 6



5 (a) The students:

1 placed a 50-metre tape measure on the rocks at right angles to the sea

2 placed a quadrat next to the tape measure

3 recorded whether each species was present or not.

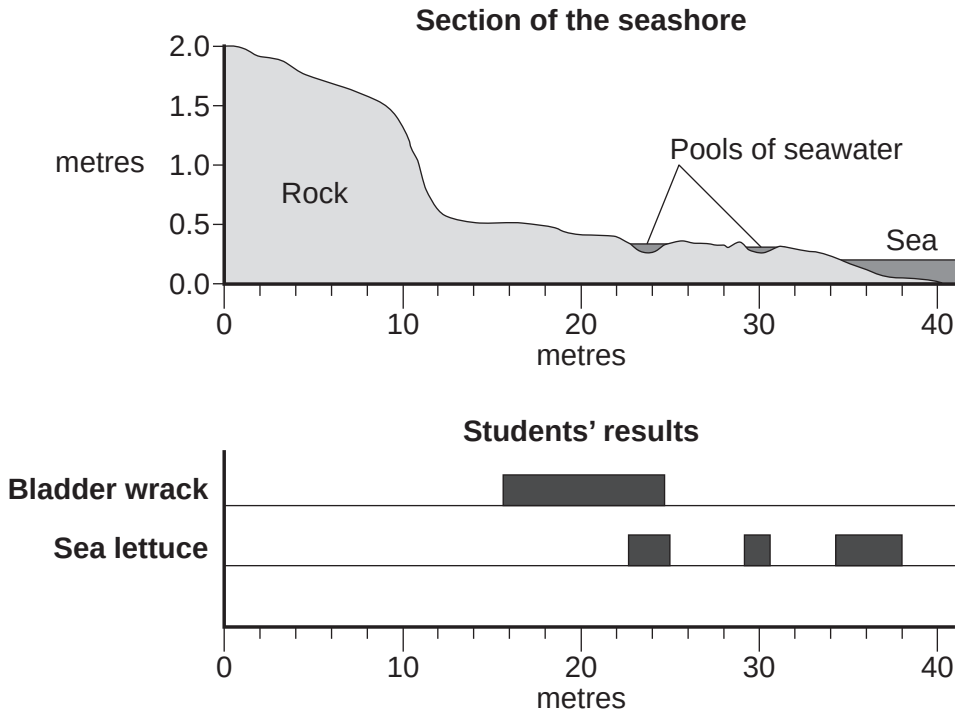
The students repeated steps 2 and 3 every metre down the shore.

Figure 7 shows a section of the seashore and the students' results.

4.7.1.4 Adaptations

Question 24 · continued

Figure 7



5 (a) (i) The students placed the quadrat at regular intervals along a transect line rather than placing the quadrat at random positions anywhere on the rocky shore.

Explain why.

[2 marks]

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5 (a) (ii) How could the students have improved their investigation to ensure that they produced valid data?

[2 marks]

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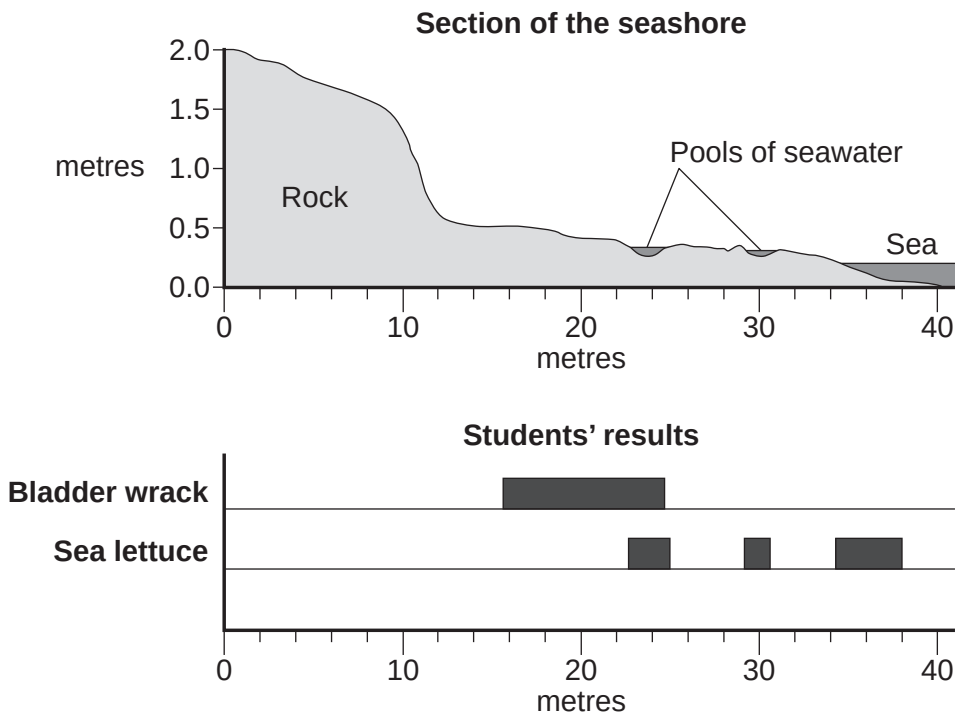
Question 5 continues on the next page

4.7.1.4 Adaptations

Question 24 · continued

5 (a) (iii) **Figure 7** is repeated here to help you answer this question.

Figure 7



The students concluded that bladder wrack is better adapted than sea lettuce to survive in dry conditions.

What is the evidence for this conclusion?

Use information from **Figure 7**.

[2 marks]

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4.7.1.4 Adaptations

Question 24 · continued

5 (b) The bladder wrack has many air bladders.
The air bladders help the bladder wrack to float upwards when the sea covers it.

Suggest how this helps the bladder wrack to survive.

[2 marks]

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8

Turn over for the next question

4.7.1.4 Adaptations

Question 25

June 2014 | BL3HP | Original Q3 | Legacy

3 Plant roots absorb water from the soil by osmosis.

3 (a) What is osmosis?

[3 marks]

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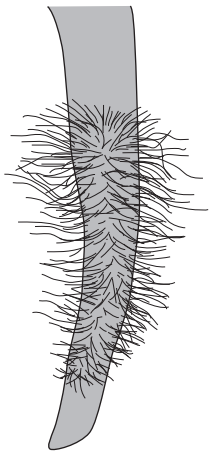
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3 (b) **Figure 3** shows part of a plant root.

Figure 3



The plant root is adapted for absorbing water from the soil.

Use information from **Figure 3** to explain how this plant root is adapted for absorbing water.

[3 marks]

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4.7.1.4 Adaptations

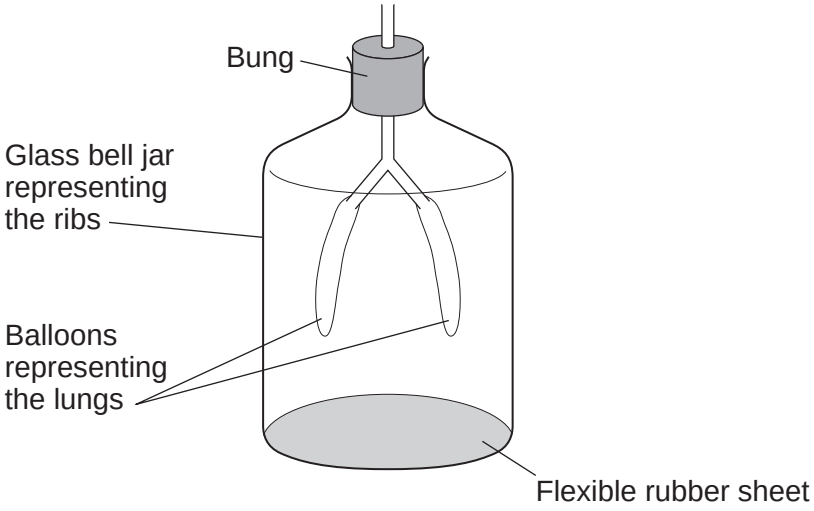
Question 26

June 2015 | BL3HP | Original Q6 | Legacy

6 **Figure 5** shows a model representing the human breathing system.

The different parts of the model represent different parts of the human breathing system.

Figure 5



6 (a) (i) Which part of the human breathing system does the flexible rubber sheet represent?

[1 mark]

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6 (a) (ii) Explain why the balloons inflate when the flexible rubber sheet is pulled down.

[3 marks]

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4.7.1.4 Adaptations

Question 26 · continued

June 2015 | BL3HP | Original Q6 | Legacy

6 (b) (i) During breathing, oxygen moves into the blood.

Explain how oxygen moves into the blood.

[2 marks]

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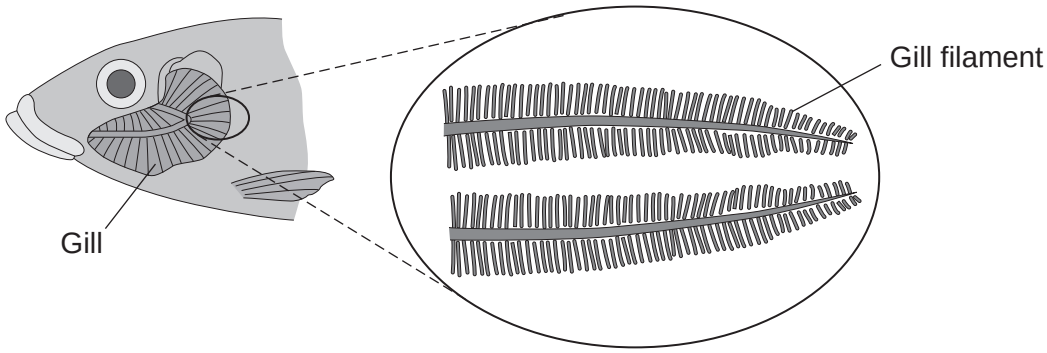
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6 (b) (ii) **Figure 6** shows a fish head and gill.

Figure 6



Fish absorb oxygen from the water. Oxygen is absorbed through the gills of the fish.

Explain **one** way in which the gills are adapted for rapid absorption of oxygen.

[2 marks]

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8

4.7.1.4 Adaptations

Question 27

June 2016 | BL3HP | Original Q1 | Legacy

1 Cells, tissues and organs are adapted to take in different substances and get rid of different substances.

Table 1 shows the concentration of four ions outside cells and inside cells.

Table 1

Ion	Concentration outside cells in mmol per dm^3	Concentration inside cells in mmol per dm^3
Sodium	140	9
Potassium	7	138
Calcium	2	27
Chloride	118	3

1 (a) Use information from **Table 1** to complete the following sentences.

[2 marks]

Sodium ions will move into cells by the process

of _____ .

Potassium ions will move into cells by the process

of _____ .

1 (b) Some students investigated the effect of the different concentrations of sugar in four drinks, **A**, **B**, **C** and **D**, on the movement of water across a partially permeable membrane.

The students:

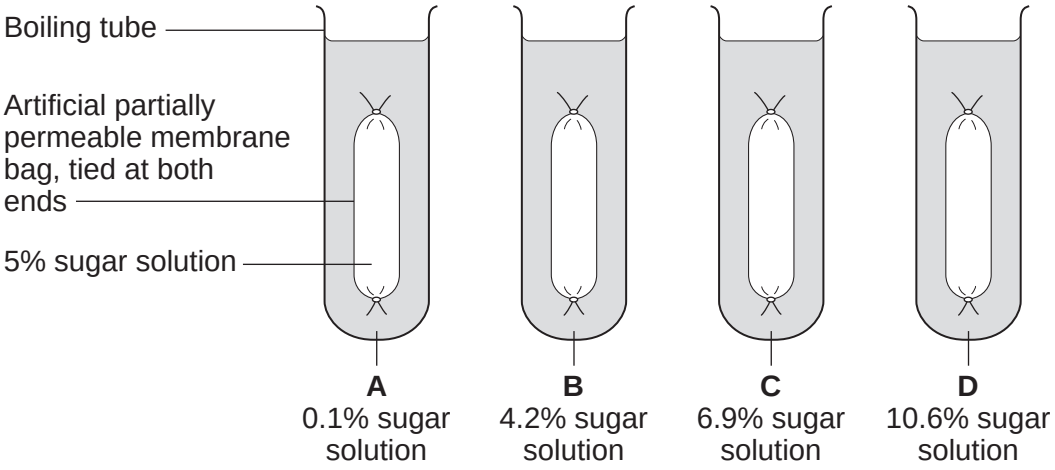
- made four bags from artificial partially permeable membrane
- put equal volumes of 5% sugar solution in each bag
- weighed each bag containing the sugar solution
- placed one bag in each of the drinks, **A**, **B**, **C** and **D**
- after 20 minutes removed the bags containing the sugar solution and weighed them again.

4.7.1.4 Adaptations

Question 27 · continued

Figure 1 shows how they set up the investigation.

Figure 1



1 (b) (i) The bag in drink **A** got heavier after 20 minutes.

Explain why.

[3 marks]

1 (b) (ii) In which drink, **A**, **B**, **C** or **D**, would you expect the bag to show the smallest change in mass?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

1 (b) (iii) Explain why you think the bag you chose in part **(b)(ii)** would show the smallest change.

[2 marks]

8

4.7.1.4 Adaptations

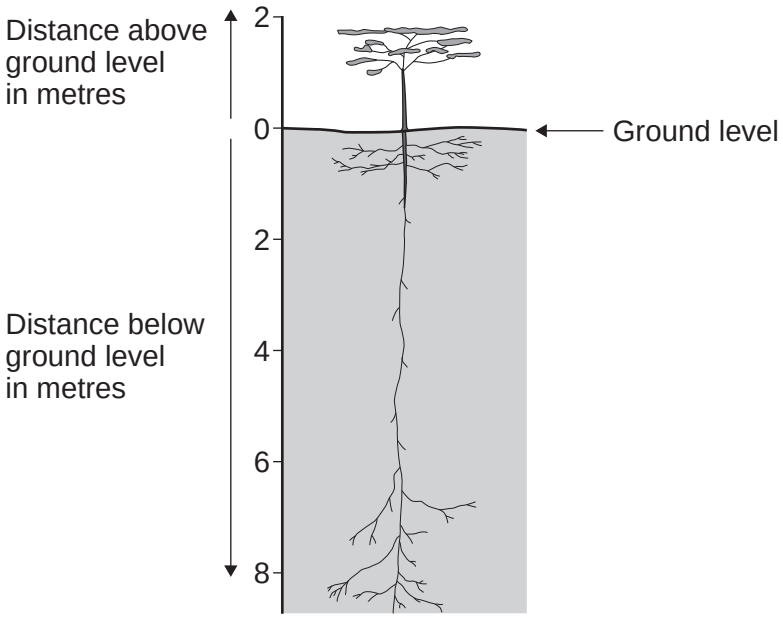
Question 28

June 2017 | BL1HP | Original Q5 | Legacy

5 Plants and animals living in hot, dry habitats have adaptations to survive.

5 (a) **Figure 3** shows an acacia tree.

Figure 3



5 (a) (i) Describe the root system of the acacia tree, shown in **Figure 3**.

Suggest how the root system helps the acacia tree to survive in dry habitats.

[3 marks]

Question 5 continues on the next page

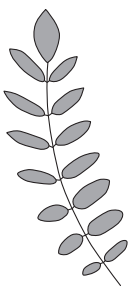
4.7.1.4 Adaptations

Question 28 · continued

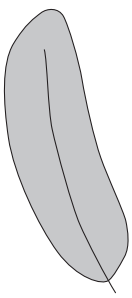
5 (a) (ii) **Figure 4** shows one leaf from an acacia tree and one leaf from a tree that lives in a cool, moist habitat. The leaves are drawn to the same scale.

Figure 4

One leaf from an acacia tree living in a hot, dry habitat



One leaf from a tree living in a cool, moist habitat



Use information from **Figure 4** to suggest how the leaf of the acacia tree helps the tree to survive in hot, dry habitats.

[2 marks]

5 (b) The branches of acacia trees have long, sharp thorns.

What is the advantage to the tree of having long, sharp thorns?

[1 mark]

4.7.1.4 Adaptations

Question 28 · continued

5 (c) Most animals store fat in their bodies.

5 (c) (i) Suggest **one** reason why animals store fat.

[1 mark]

5 (c) (ii) **Figure 5** shows a camel and a llama.

Camels live in hot environments. Llamas live in cold environments.

Figure 5

Camel



Llama



Table 2 gives information about stored fat in a camel and in a llama.

Table 2

	Percentage of body mass which is stored fat	Part of the body where most fat is stored
Camel	21	In the hump
Llama	20	In a layer under the skin

Suggest why most of the fat is found in different parts of the body of the two animals.

[2 marks]

9

4.7.1.4 Adaptations

Question 29

June 2019 | 8461/1H | Original Q6

0 6 People with diabetes have difficulty controlling their blood glucose concentration.

0 6 . 1 Which part of the blood transports glucose?

[1 mark]

Tick (✓) **one** box.

- Lymphocytes ☐
- Plasma ☐
- Platelets ☐
- Red blood cells ☐

Glucose is often found in the urine of people with diabetes.

0 6 . 2 Name a chemical used to test for glucose.

[1 mark]

_____

0 6 . 3 Describe a test that could be used to show that a person's urine contains glucose.

[2 marks]

Test _____

_____

Positive result _____

_____

4.7.1.4 Adaptations

Question 29 · continued

0 6 . 4 The body cells of a person with untreated diabetes lose more water than the body cells of a person who does **not** have diabetes.

Explain how diabetes can cause the body cells to lose more water.

[3 marks]

0 6 . 5 Glucose is absorbed into the blood in the small intestine by both diffusion and active transport.

Describe how the small intestine is adapted for efficient absorption.

[5 marks]

12

4.7.1.4 Adaptations

Question 30

November 2020 | 8461/1H | Original Q2

0 2 Diffusion is an important process in animals and plants.

0 2 . 1 What is meant by the term diffusion?

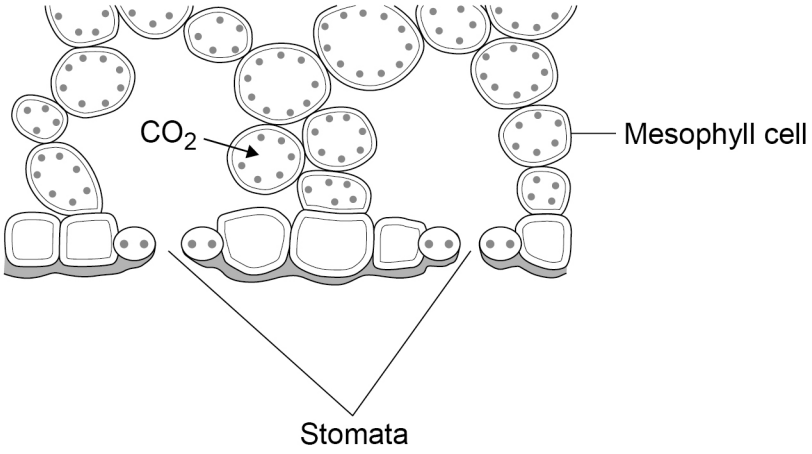
[2 marks]

4.7.1.4 Adaptations

Question 30 · continued

0 2 . 2 **Figure 2** shows part of a leaf.

Figure 2



Molecules of carbon dioxide diffuse from the air into the mesophyll cells.

Which **two** changes will increase the rate at which carbon dioxide diffuses into the mesophyll cells?

[2 marks]

Tick (✓) **two** boxes.

- Decreased number of chloroplasts in the cells ☐
- Decreased surface area of cells in contact with the air ☐
- Increased carbon dioxide concentration in the air ☐
- Increased number of stomata that are open ☐
- Increased oxygen concentration in the air ☐

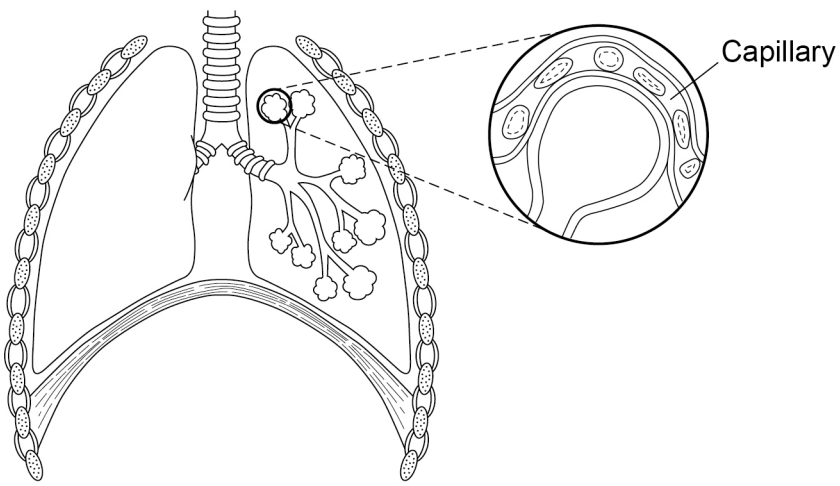
4.7.1.4 Adaptations

Question 30 · continued

0 2 . 3 Diffusion also happens in the human lungs.

Figure 3 shows the human breathing system.

Figure 3



Explain how the human lungs are adapted for efficient exchange of gases by diffusion.

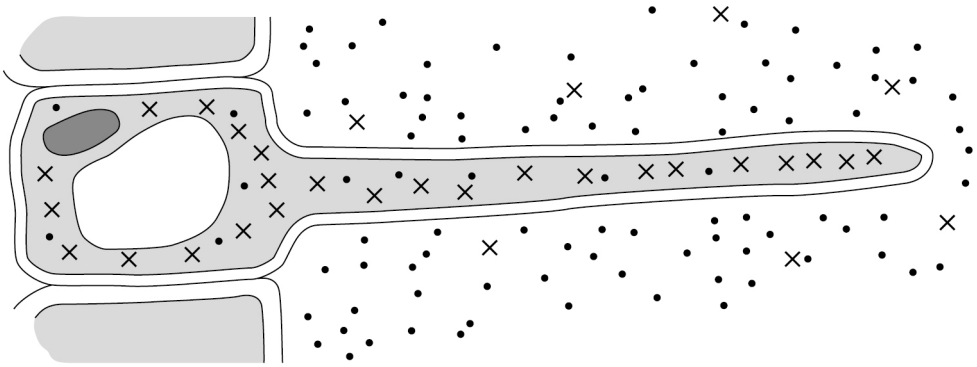
[6 marks]

4.7.1.4 Adaptations

Question 30 · continued

Figure 4 shows a root hair cell.

Figure 4



Key

Water molecules

Nitrate ions

0 2 . 4 Name the process by which water molecules enter the root hair cell.

[1 mark]

0 2 . 5 Nitrate ions need a different method of transport into the root hair cell.

Explain how the nitrate ions in **Figure 4** are transported into the root hair cell.

Use information from **Figure 4** in your answer.

[3 marks]

Name of process

Explanation

14

4.7.1.4 Adaptations

Question 31

June 2022 | 8461/1H | Original Q4

0 4 Plants and animals have many defence responses.

0 4 . 1 **Table 5** shows some plant defences.

Identify whether each defence is a chemical response or a physical response.

[2 marks]

Tick (✓) **one** box in each row.

Table 5

	Type of response	
Plant defence	**Chemical**	**Physical**
Thick, waxy layer on leaf surface		
Berries that are poisonous		
Bark on trees that falls off		

4.7.1.4 Adaptations

Question 31 · continued

Mimicry is a mechanical adaptation seen in both plants and animals.

Figure 5 shows two insects.

Figure 5



Hornet **Hornet Moth**

0 4 . 2 Hornets are insects that sting other animals and cause pain.

Hornet moths do **not** sting other animals.

Suggest how mimicry helps the **hornet moth** survive.

[1 mark]

Question 4 continues on the next page

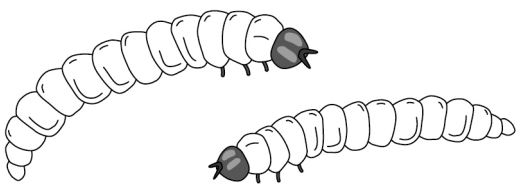
4.7.1.4 Adaptations

Question 31 · continued

Adult hornet moths lay eggs that hatch into larvae.

Figure 6 shows the larvae of a hornet moth.

Figure 6



0 4 . 3 The larvae of the hornet moth:

- live inside the roots of trees
- use the tree roots as a source of food
- cause damage to the tree roots.

Explain why a tree might die if the roots of the tree are damaged.

[6 marks]

4.7.1.4 Adaptations

Question 31 · continued

0 4 . 4 The larvae of the hornet moth form when fertilised eggs divide by mitosis.

Describe how mitosis produces two genetically identical cells.

[4 marks]

0 4 . 5 The cells which are first formed from the fertilised eggs of the hornet moth are stem cells.

Name the process by which these stem cells then form specialised cells.

[1 mark]

14

4.7.1.4 Adaptations

Question 32

June 2022 | 8461/1H | Original Q6

0 6 **Table 6** shows information about five different organisms.

Table 6

Organism	Surface area in m^2	Volume in m^3	Surface area to volume ratio
A	6.04×10^{-8}	1.65×10^{-12}	36606:1
B	3.21×10^{-3}	1.25×10^{-6}	2568:1
C	9.96×10^{-3}	1.35×10^{-4}	**X**:1
D	4.61×10^{-1}	1.57×10^{-2}	29:1
E	1.99×10^{1}	6.12×10^{0}	3:1

0 6 . 1 Calculate value **X** in **Table 6**.

Give your answer to the nearest whole number.

[3 marks]

X (nearest whole number) = _____

0 6 . 2 What is the relationship between the size of an organism and its surface area to volume ratio?

Use **Table 6**.

[1 mark]

4.7.1.4 Adaptations

Question 32 · continued

0 6 . 3 Organism **B** exchanges gases with the environment directly through its skin.

Organism **D** exchanges gases with the environment using its respiratory system.

Explain why organism **D** requires a respiratory system, but organism **B** does **not** require a respiratory system.

[2 marks]

Question 6 continues on the next page

4.7.1.4 Adaptations

Question 32 · continued

Table 6 is repeated below.

Table 6

Organism	Surface area in m^2	Volume in m^3	Surface area to volume ratio
A	6.04×10^{-8}	1.65×10^{-12}	36606:1
B	3.21×10^{-3}	1.25×10^{-6}	2568:1
C	9.96×10^{-3}	1.35×10^{-4}	**X**:1
D	4.61×10^{-1}	1.57×10^{-2}	29:1
E	1.99×10^{1}	6.12×10^{0}	3:1

Table 7 shows information about organism **D** and organism **E**.

Table 7

Organism	Metabolic rate in arbitrary units
D	890
E	75

4.7.1.4 Adaptations

Question 32 · continued

0 6 . 4 Organisms **D** and **E** both keep a constant body temperature (warm-blooded).

Explain why the metabolic rate of organism **D** is greater than the metabolic rate of organism **E**.

Use information from **Table 6** and **Table 7**.

[4 marks]

Question 6 continues on the next page

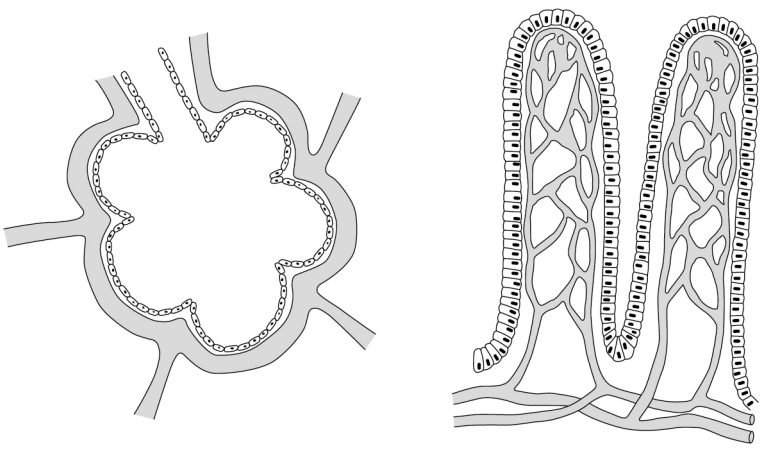
4.7.1.4 Adaptations

Question 32 · continued

0 6 . 5 Organism **D** and organism **E** both have alveoli in the lungs and villi in the small intestine.

Figure 8 shows some alveoli and some villi.

Figure 8



Alveoli **Villi**

Describe how the alveoli and the villi are adapted to increase absorption.

[4 marks]

14

4.7.1.4 Adaptations

Question 33

June 2025 | 8461/1H | Original Q6

0 6 Diffusion is important for gas exchange.

0 6 . 1 Define the term ‘diffusion’.

[1 mark]

Question 6 continues on the next page

4.7.1.4 Adaptations

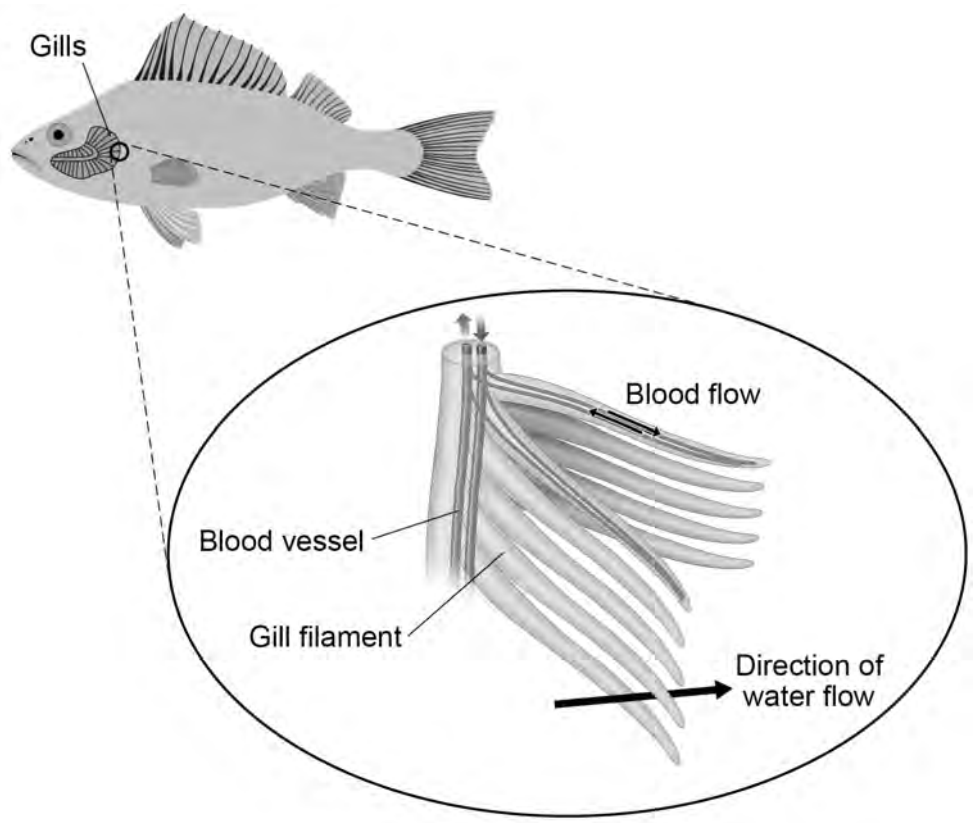
Question 33 · continued

0 6 . 2 Fish exchange gases through gills.

Oxygen from the water enters the blood of a fish through the gills.

Figure 8 shows part of a gill.

Figure 8



Explain how gills are adapted to maximise the exchange of oxygen between the water and the blood.

[4 marks]

4.7.1.4 Adaptations

Question 33 · continued

0 6 . 3 Some fish rest on the sea floor.

Explain why the metabolic rate of a fish is higher when swimming compared with when resting.

[4 marks]

9