AQA GCSE Biology | 8461

SPECIFICATION POINT 4.1.1.2

Animal and plant cells

Past-paper questions

Tier	**Higher**
Question groups	**25**
Available paper years	**2007–2022**

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.

4.1.1.2 Animal and plant cells

Question 01

March 2007 | BLY1B | Original Q2 | Legacy

QUESTION TWO

Some inherited diseases could be avoided if the nucleus of a fertilised egg is put into the cytoplasm of another woman's egg. This would mean that the child would have one father and two mothers. Some scientists want to carry out research into this way of preventing such diseases.

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

A parents

B politicians

C scientists

D society

Whether this type of research should be allowed will be decided by . . . **1** . . . .

It is the role of . . . **2** . . . to ensure that the conclusions from the research are fully presented so that a balanced account can be discussed by . . . **3** . . . .

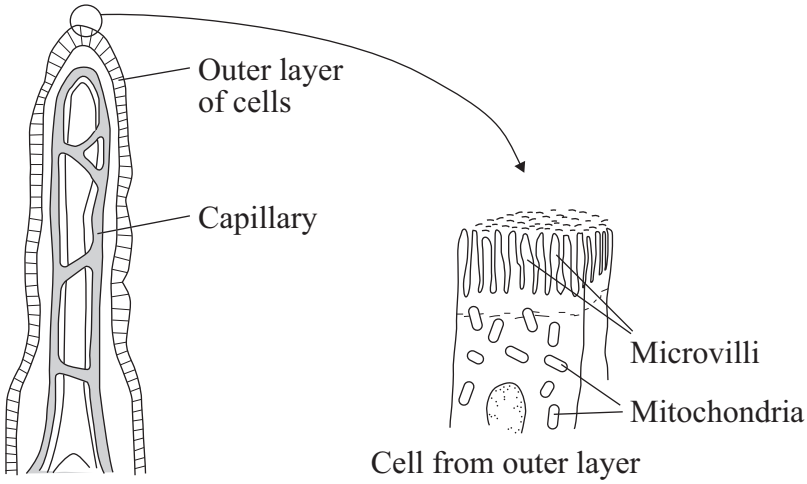
If the research is successful, then it is the decision of the . . . **4** . . . whether to go ahead with the procedure.

4.1.1.2 Animal and plant cells

Question 02

January 2008 | BLY3H | Original Q6 | Legacy

6 The small intestine is lined with millions of villi.
The diagram shows the structure of a villus.



In the small intestine, some of the products of digestion are absorbed into the blood by *active transport*.

(a) Explain what is meant by *active transport*.

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.....

.....

(2 marks)

(b) How do microvilli and mitochondria help in the active transport of the products of digestion from the small intestine into the blood?

Microvilli .....

.....

Mitochondria .....

.....

(2 marks)

4

4.1.1.2 Animal and plant cells

Question 03

June 2008 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

Cholesterol is a type of fat (lipid) found in cell membranes. It is transported around the body as lipoproteins in the blood.

6A High levels of cholesterol in the blood are likely to cause disease of the . . .

1 blood vessels.

2 brain.

3 liver.

4 lungs.

6B The balance of low-density lipoproteins (LDLs) to high-density lipoproteins (HDLs) in the blood is important for good health.

Which is the best balance for good health?

1 high levels of HDLs and low levels of LDLs

2 low levels of HDLs and low levels of LDLs

3 low levels of HDLs and high levels of LDLs

4 high levels of HDLs and high levels of LDLs

6C The amount of LDLs that the liver can remove from the blood depends on the number of LDL receptors in the cell membranes of liver cells.

Which of the following is most likely to influence the number of LDL receptors in the cell membranes of liver cells?

1 diet

2 the LDL level in the blood

3 inherited factors

4 amount of exercise

4.1.1.2 Animal and plant cells

6D Which substance is most likely to increase blood cholesterol levels?

1 monounsaturated fat

2 polyunsaturated fat

3 saturated fat

4 statins

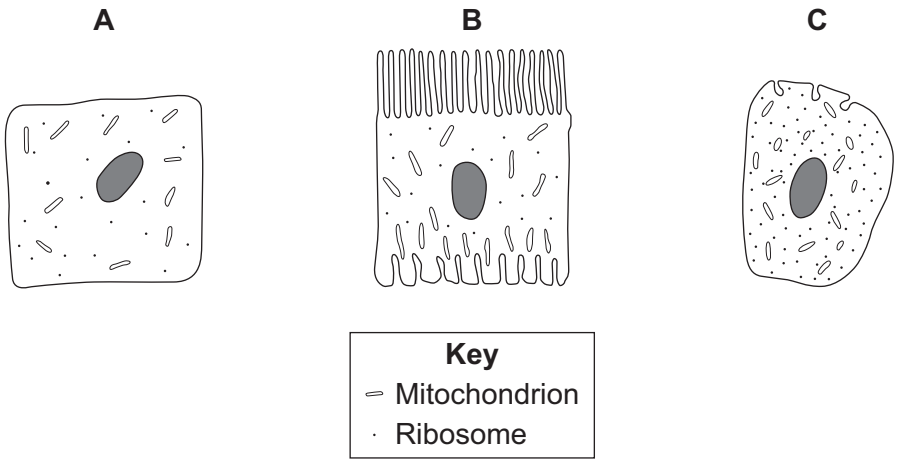
Turn over for the next question

4.1.1.2 Animal and plant cells

Question 04

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.

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(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

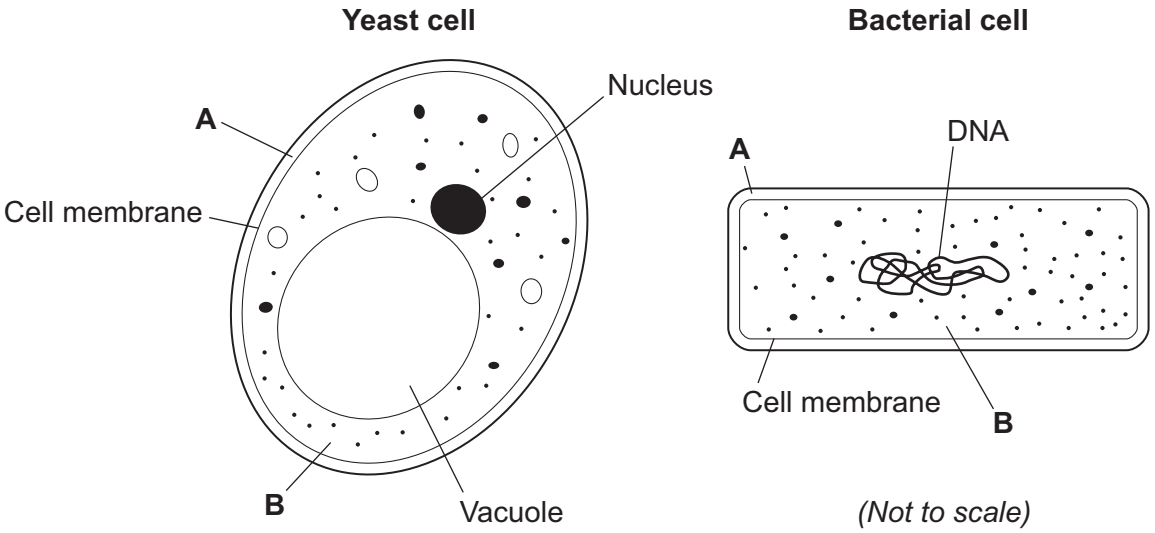
4.1.1.2 Animal and plant cells

Question 05

June 2010 | BLY3H | Original Q1 | Legacy

1 Sourdough bread is light in texture and tastes slightly sour. It is made using two types of microorganism, a yeast and a bacterium. The bacterium can make acids such as lactic acid. This acid makes the bread taste sour.

1 (a) The diagrams show the structures of the yeast cell and the bacterial cell.



1 (a) (i) Both the yeast cell and the bacterial cell have structures **A** and **B**.

Name structures **A** and **B**.

A .....

B .....

(2 marks)

1 (a) (ii) The yeast cell and the bacterial cell have different shapes.

Give **one** other way in which the structure of the bacterial cell is different from the structure of the yeast cell.

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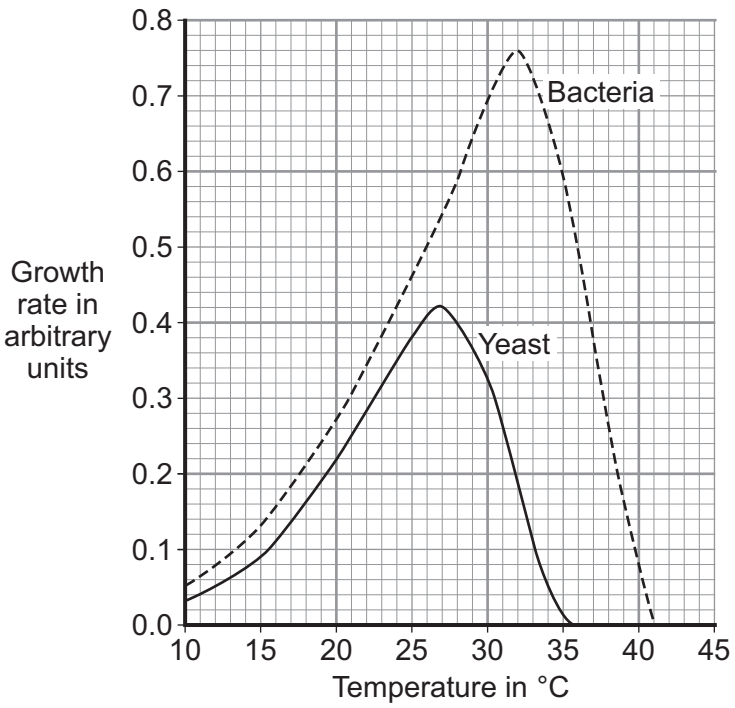
(1 mark)

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 05 · continued

1 (b) The graph shows how the growth rates of the yeast and the bacteria change with temperature.



1 (b) (i) Sourdough bread rises fastest at 27 °C.

Explain why.

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(2 marks)

1 (b) (ii) The bread has a sourer taste if it rises at 32 °C.

Explain why.

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(2 marks)

4.1.1.2 Animal and plant cells

Question 05 · continued

1 (b) (iii) The growth rate of the yeast is unaffected by pH in the range 3.5 to 7.0 pH units.

Why is this useful in the production of sourdough bread?

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(1 mark)

8

Turn over for the next question

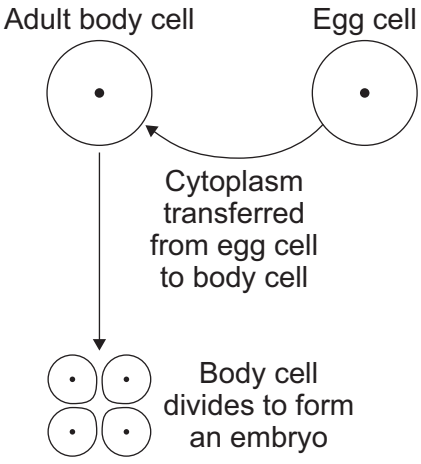
4.1.1.2 Animal and plant cells

Question 06

November 2010 | BLY1BP | Original Q7 | Legacy

QUESTION SEVEN

The diagram shows one method of cloning animals.



7A This method of cloning is called . . .

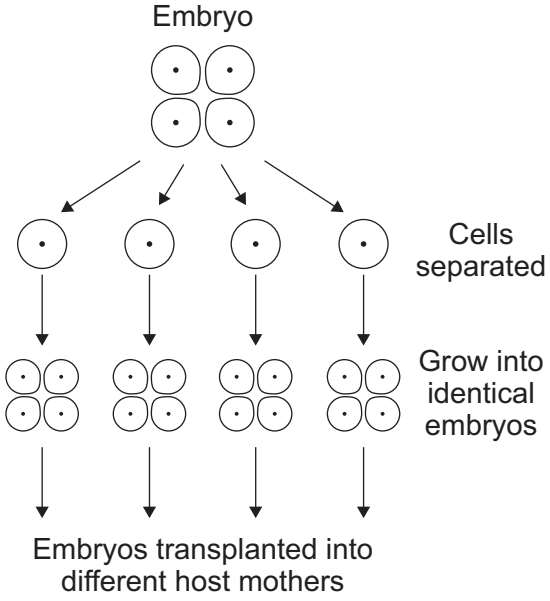
1 sexual reproduction.

2 embryo transplantation.

3 fusion cell cloning.

4 tissue culture.

The cells of the embryo can be separated and allowed to grow into identical embryos.
The embryos are then implanted into different host mothers.



4.1.1.2 Animal and plant cells

7B The offspring would . . .

1 all look like the animal from which the egg cell was taken.

2 all look like the animal from which the adult body cell was taken.

3 look like the host mother that they developed inside.

4 not look like any of the other animals.

Scientists are carrying out research on human cell cloning to produce unspecialised embryonic cells. Unspecialised embryonic cells could be used to treat incurable diseases. One incurable disease is Parkinson's disease. Parkinson's disease affects the nervous system.

7C Unspecialised embryonic cells are useful in the search for cures for different diseases.

This is because unspecialised embryonic cells . . .

1 are nerve cells.

2 can grow into human beings.

3 are easy to produce.

4 can be made to grow into many different types of cell.

7D An ethical argument **against** this type of research is that . . .

1 this research will probably not be successful for a long time.

2 the research will help only a small number of people.

3 embryos are made, and then some of these embryos are destroyed.

4 God would not like this research.

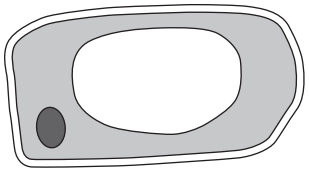
4.1.1.2 Animal and plant cells

Question 07

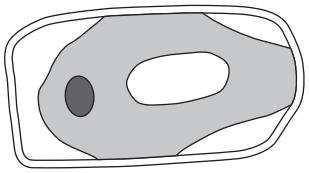
January 2011 | BLY2H | Original Q7 | Legacy

7 The diagram shows the same plant cell:

- after 1 hour in distilled water
- after 1 hour in strong sugar solution.



After 1 hour in distilled water



After 1 hour in strong sugar solution

7 (a) Describe **two** ways in which the cell in the strong sugar solution is different from the cell in distilled water.

1 .....

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2 .....

.....

(2 marks)

7 (b) Explain how the differences between the cell in the strong sugar solution and the cell in distilled water were caused.

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(2 marks)

4

4.1.1.2 Animal and plant cells

Question 08

5 Read the following information about how the small intestine absorbs sugars.

- The blood absorbs glucose and some other sugars, like xylose, from the small intestine.
- Glucose molecules are the same size as xylose molecules, but glucose is absorbed more quickly than xylose.
- Experiments with pieces of intestine show that the uptake of oxygen by the intestine is 50% higher in the presence of glucose than in the absence of glucose. Xylose does not have this effect on the uptake of oxygen.
- The cells lining the small intestine have many mitochondria.

Explain how this information provides evidence that glucose is absorbed by the small intestine using *active transport*.

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(4 marks)

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4.1.1.2 Animal and plant cells

Question 09

June 2011 | BLY2H | Original Q1 | Legacy

1 Cells contain a solution of salts and sugars.

A student is investigating how cells change when they are put into water.

1 (a) The student:

- looks at a plant cell using a microscope
- adds water to the cell.

The plant cell swells up.

Explain why, as fully as you can.

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(3 marks)

1 (b) When **animal** cells are put in water, they swell up, and then burst.
When **plant** cells are put in water, they swell up, but do **not** burst.

How does the structure of plant cells prevent them from bursting?

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(1 mark)

4

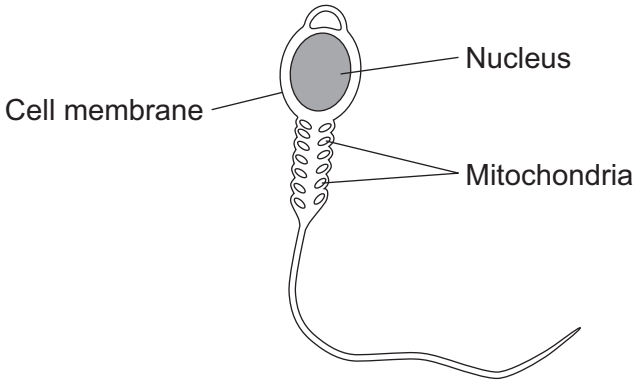
4.1.1.2 Animal and plant cells

Question 10

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?

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.....

(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

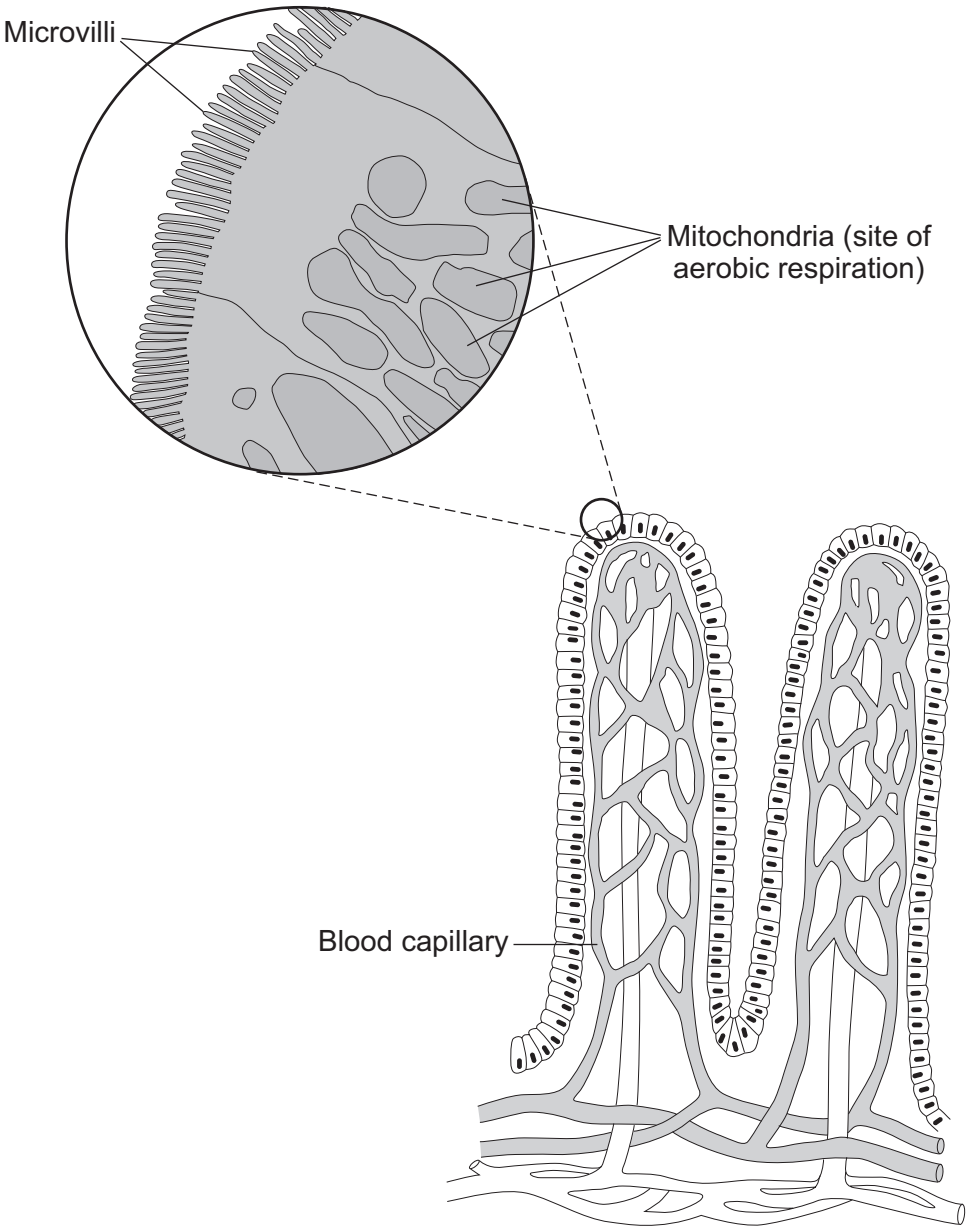
4.1.1.2 Animal and plant cells

Question 11

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.



4.1.1.2 Animal and plant cells

Question 11 · 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

4.1.1.2 Animal and plant cells

Question 12

January 2012 | BL1HP | Original Q6 | Legacy

6 Drugs must be trialled before the drugs can be used on patients.

6 (a) (i) Before the clinical trials, drugs are tested in the laboratory.
The laboratory trials are **not** trials on people.

What is the drug tested on in these laboratory trials?

.....

(1 mark)

6 (a) (ii) Drugs must be trialled before the drugs can be used on patients.

Give **three** reasons why.

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(3 marks)

6 (b) Read the information about cholesterol and ways of treating high cholesterol levels.

Diet and inherited factors affect the level of cholesterol in a person's blood.
Too much cholesterol may cause deposits of fat to build up in blood vessels and reduce the flow of blood. This may cause the person to have a heart attack.
Some drugs can lower the amount of cholesterol in the blood.

The body needs cholesterol. Cells use cholesterol to make new cell membranes and some hormones. The liver makes cholesterol for the body.

Some drugs can help people with high cholesterol levels.

Statins block the enzyme in the liver that is used to produce cholesterol.
People will normally have to take statins for the rest of their lives. Statins can lead to muscle damage and kidney problems. Using some statins for a long time has caused high numbers of deaths.

Cholesterol blockers reduce the absorption of cholesterol from the intestine into the blood.
Cholesterol blockers can sometimes cause problems if the person is using other drugs.

4.1.1.2 Animal and plant cells

Question 12 · continued

Evaluate the use of the two types of drug for a person with high cholesterol levels.

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(6 marks)

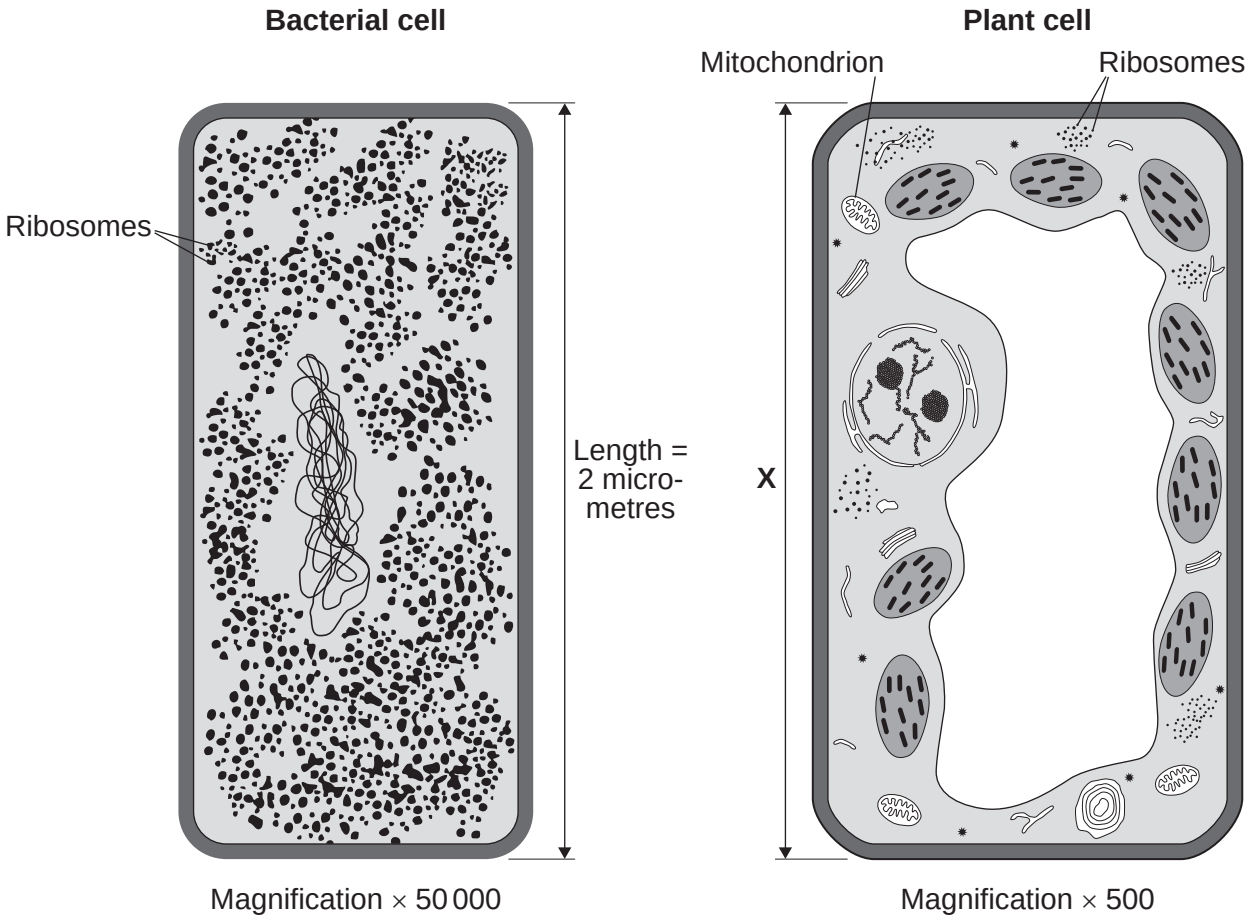
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4.1.1.2 Animal and plant cells

Question 13

June 2012 | BL2HP | Original Q2 | Legacy

2 The diagram shows two cells, a bacterial cell and a plant cell.



2 (a) (i) Both the bacterial cell and the plant cell contain ribosomes.

What is the function of a ribosome?

.....

.....

(1 mark)

2 (a) (ii) The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Give **one** other way in which the plant cell is different from the bacterial cell.

.....

.....

(1 mark)

4.1.1.2 Animal and plant cells

Question 13 · continued

2 (b) (i) Both cells are drawn the same length, but the magnification of each cell is different.

The real length of the bacterial cell is 2 micrometres.
Calculate the real length, **X**, of the plant cell. Give your answer in micrometres.

Show clearly how you work out your answer.

.....

.....

.....

X = ... micrometres
(2 marks)

2 (b) (ii) Most mitochondria are about 3 micrometres in length.

The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Use your answer to part **(b)(i)** and the information in the diagram to suggest why.

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(1 mark)

5

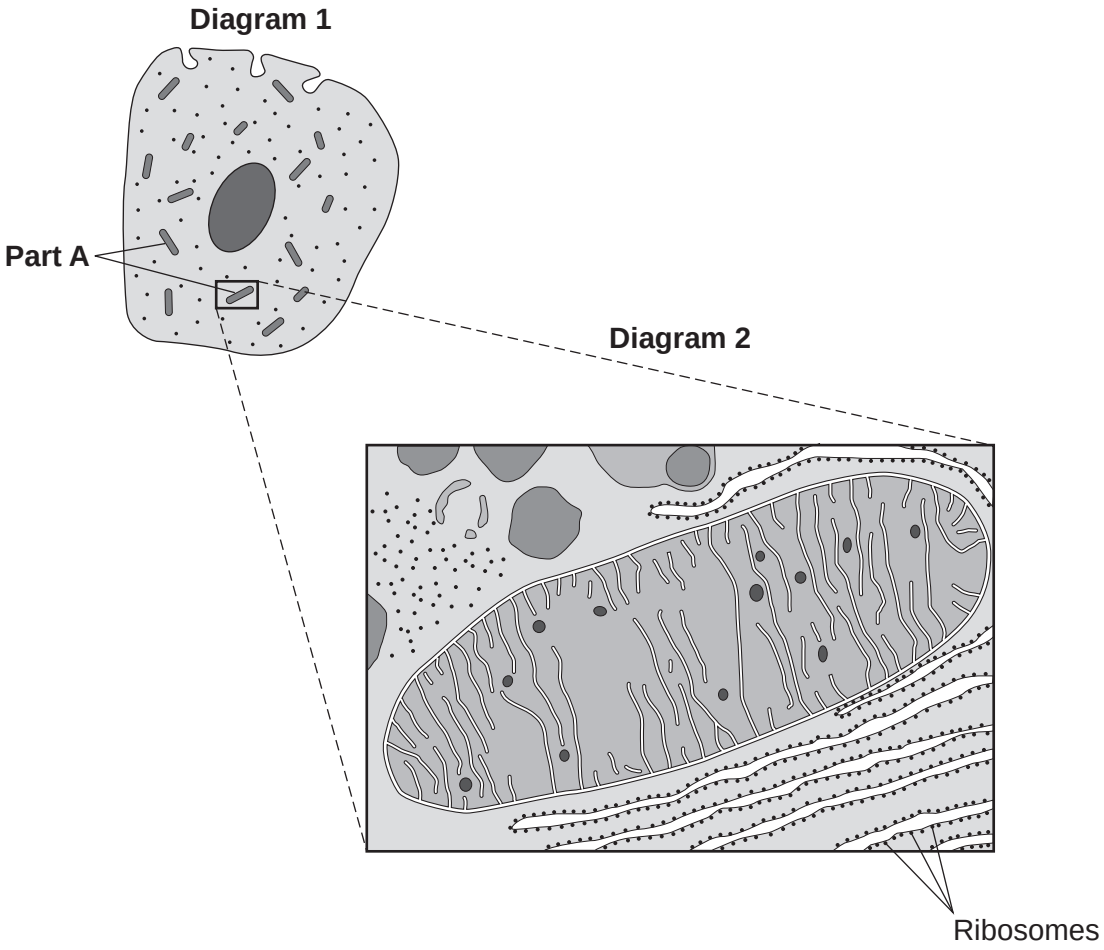
4.1.1.2 Animal and plant cells

Question 14

January 2013 | BL2HP | Original Q3 | Legacy

3 **Diagram 1** shows a cell from the pancreas.

Diagram 2 shows part of the cell seen under an electron microscope.



Part **A** is where most of the reactions of aerobic respiration happen.

3 (a) (i) Name part **A**.

.....

(1 mark)

3 (a) (ii) Complete the equation for aerobic respiration.

glucose + oxygen ⟶ ..... + ... (+ energy)

(2 marks)

4.1.1.2 Animal and plant cells

Question 14 · continued

3 (a) (iii) Part **A** uses oxygen.

Explain how oxygen passes from the blood to part **A**.

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(3 marks)

3 (b) The pancreas cell makes enzymes.

Enzymes are proteins.

Describe how the ribosomes and part **A** help the cell to make enzymes.

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(3 marks)

9

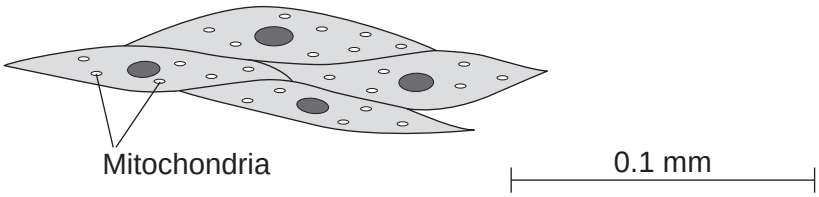
4.1.1.2 Animal and plant cells

Question 15

June 2015 | BL2HP | Original Q4 | Legacy

4 **Figure 6** shows some muscle cells from the wall of the stomach, as seen through a light microscope.

Figure 6



4 (a) Describe the function of muscle cells in the wall of the stomach.

[2 marks]

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.....

4 (b) **Figure 6** is highly magnified.

The scale bar in **Figure 6** represents 0.1 mm.

Use a ruler to measure the length of the scale bar and then calculate the magnification of **Figure 6**.

[2 marks]

.....

.....

.....

.....

Magnification = ... times

4.1.1.2 Animal and plant cells

Question 15 · continued

4 (c) The muscle cells in **Figure 6** contain many mitochondria.

What is the function of mitochondria?

[2 marks]

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.....

.....

.....

4 (d) The muscle cells also contain many ribosomes. The ribosomes cannot be seen in **Figure 6**.

4 (d) (i) What is the function of a ribosome?

[1 mark]

.....

.....

4 (d) (ii) Suggest why the ribosomes **cannot** be seen through a light microscope.

[1 mark]

.....

.....

8

4.1.1.2 Animal and plant cells

Question 16

June 2017 | BL1HP | Original Q7 | Legacy

7 Reproduction may be sexual or asexual.

7 (a) Describe **one** advantage to a species of sexual reproduction rather than asexual reproduction.

[1 mark]

_____

_____

7 (b) Mitochondria contain genes. The genes control some of the reactions in respiration.

In a person with mitochondrial disease, genes in the mitochondria are faulty. The person may have muscle weakness, blindness and heart failure.

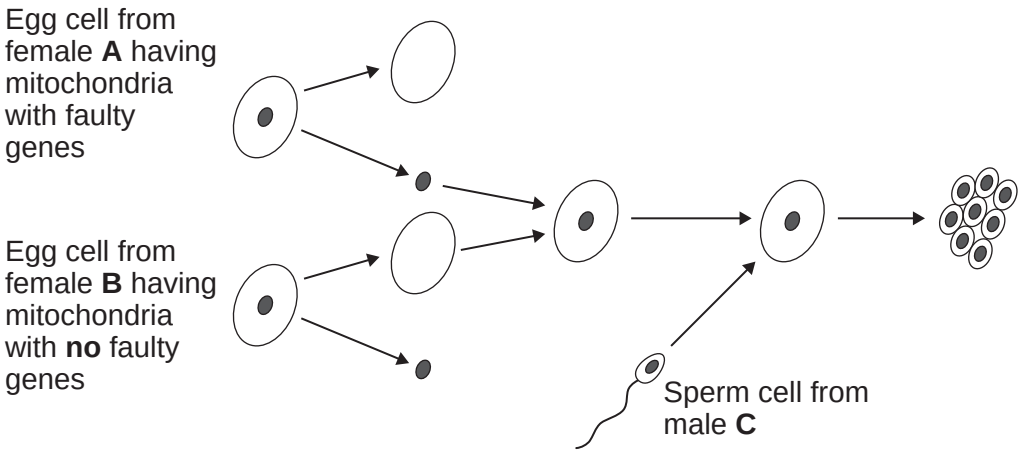
In human reproduction, an embryo will have mitochondria from the cytoplasm of the mother's egg cell.

Scientists have developed a way of solving the problem of a child inheriting mitochondrial disease.

Figure 6 shows the process.

The cells involved come from three different people, **A**, **B** and **C**.

Figure 6



4.1.1.2 Animal and plant cells

Question 16 · continued

7 (b) (i) Describe the process shown in **Figure 6**.

Use your knowledge of sexual reproduction and adult cell cloning.

[4 marks]

7 (b) (ii) Explain why the embryo formed from the process shown in **Figure 6** will **not** have mitochondrial disease.

[2 marks]

7 (b) (iii) Suggest **one** ethical objection to this process being used for reproduction in humans.

[1 mark]

8

4.1.1.2 Animal and plant cells

Question 17

June 2017 | BL2HP | Original Q1 | Legacy

1 There are many different types of cell in the human body.

1 (a) (i) Describe where epithelial cells are found in the human body.

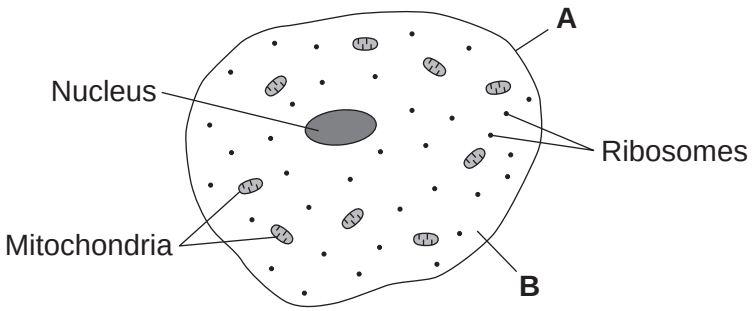
[1 mark]

_____

_____

1 (a) (ii) **Figure 1** shows an epithelial cell.

Figure 1



Name part **A** and part **B**.

[2 marks]

A _____

B _____

1 (b) What is the function of ribosomes?

[1 mark]

Tick (✓) **one** box.

Aerobic respiration ☐

Digestion ☐

Photosynthesis ☐

Protein synthesis ☐

4.1.1.2 Animal and plant cells

Question 17 · continued

1 (c) Carbon dioxide moves out of an epithelial cell by diffusion.

[2 marks]

What is diffusion?

_____

_____

_____

_____

6

Turn over for the next question

4.1.1.2 Animal and plant cells

Question 18

June 2018 | 8461/1H | Original Q4

0 4 A student carried out an investigation using chicken eggs.

This is the method used.

1. Place 5 eggs in acid for 24 hours to dissolve the egg shell.
2. Measure and record the mass of each egg.
3. Place each egg into a separate beaker containing 200 cm^3 of distilled water.
4. After 20 minutes, remove the eggs from the beakers and dry them gently with a paper towel.
5. Measure and record the mass of each egg.

Table 4 shows the results.

Table 4

Egg	Mass of egg without shell in grams	Mass of egg after 20 minutes in grams
1	73.5	77.0
2	70.3	73.9
3	72.4	75.7
4	71.6	73.1
5	70.5	73.8

0 4 . 1 Another student suggested that the result for egg **4** was anomalous.

Do you agree with the student?

Give a reason for your answer.

[1 mark]

4.1.1.2 Animal and plant cells

Question 18 · continued

0 4 . 2 Calculate the percentage change in mass of egg **3**.

[2 marks]

Percentage change in mass = _____

0 4 . 3 Explain why the masses of the eggs increased.

[3 marks]

0 4 . 4 Explain how the student could modify the investigation to determine the concentration of the solution inside each egg.

[3 marks]

4.1.1.2 Animal and plant cells

Question 18 · continued

Chicken egg shells contain calcium. Calcium ions are moved from the shell into the cytoplasm of the egg.

Table 5 shows information about the concentration of calcium ions.

Table 5

Location	Concentration of calcium ions in arbitrary units
Egg shell	0.6
Egg cytoplasm	2.1

0 4 . 5 Explain how calcium ions are moved from the shell into the cytoplasm of the egg.

[3 marks]

12

4.1.1.2 Animal and plant cells

Question 19

June 2018 | 8461/1H | Original Q6

0 6 Cystic fibrosis (CF) is a genetic disorder caused by a change in a gene.

0 6 . 1 What molecule are genes made of?

[1 mark]

0 6 . 2 CF affects the cell membranes of cells in the lungs and digestive system.

What is the function of the cell membrane?

[1 mark]

0 6 . 3 In a person with CF, cells lining the lungs and digestive system create too much mucus.

The mucus can:

- block the duct leading from the pancreas to the small intestine
- block the tubes leading to the alveoli in the lungs.

Explain why children with CF grow more slowly than children without CF.

[6 marks]

4.1.1.2 Animal and plant cells

Question 19 · continued

Table 6 shows information about people in the UK in 2015.

Table 6

	Median age in years
People with CF	19
Whole population	40

0 6 . 4 Describe how the median age of a group of people can be determined.

[2 marks]

0 6 . 5 Suggest **one** reason why the median age for people with CF is lower than the median age for the whole population.

[1 mark]

Question 19 · continued

0 6 . 6 People with a lung function below 30% may need a lung transplant.

Table 7 gives information about people with CF in 2015.

Table 7

Lung Function (%)	Percentage of people with CF
>75	22
51 – 75	72
30 – 50	4
<30	2

In 2015, the total number of people with CF in the UK was 10 800.

Calculate how many people with CF in the UK in 2015 would **not** need a lung transplant.

[2 marks]

Number of people = _____

4.1.1.2 Animal and plant cells

Question 19 · continued

0 6 . 7 Lung transplants from donors have risks. One risk is organ rejection.

Scientists are researching how to solve the problem of organ rejection and hope to use stem cells to create healthy lungs.

The healthy lungs can then be transplanted into CF patients without the risk of organ rejection.

Describe how scientists may use stem cells to create healthy lungs that are **not** rejected by the CF patient.

[4 marks]

0 6 . 8 Some people disagree with the use of stem cells because of the risk of cancer.

Give **one** other reason why some people disagree with the use of stem cells to create new organs for transplants.

[1 mark]

18

4.1.1.2 Animal and plant cells

Question 20

June 2019 | 8461/1H | Original Q1

0 1 **Figure 1** shows an animal cell viewed using a microscope.

Figure 1



0 1 . 1 The cell contains a nucleus.

What is the function of the nucleus?

[1 mark]

0 1 . 2 Name **one** type of cell that does **not** contain a nucleus.

[1 mark]

4.1.1.2 Animal and plant cells

Question 20 · continued

0 1 . 3 Draw a simple diagram of the cell in **Figure 1**.

Label **two** parts of the cell.

[2 marks]

0 1 . 4 Name **one** structure found in a plant cell but **not** found in an animal cell.

[1 mark]

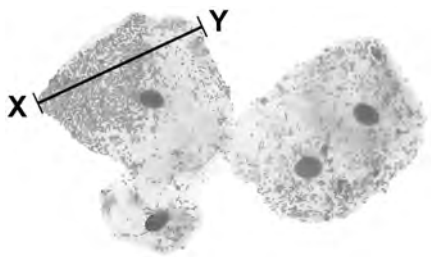
Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 20 · continued

Figure 2 shows some different cells.

Figure 2



0 1 . 5 The real length from point **X** to point **Y** is 0.06 mm

Calculate the magnification.

Use the equation:

$$\text{magnification} = \frac{\text{size of image}}{\text{real size of object}}$$

[3 marks]

Magnification = ×

4.1.1.2 Animal and plant cells

Question 20 · continued

0 1 . 6 The cells shown in **Figure 2** were viewed using a light microscope.

Give **two** advantages of using an electron microscope instead of a light microscope.

[2 marks]

1 _____

_____

2 _____

_____

10

Turn over for the next question

4.1.1.2 Animal and plant cells

Question 21

0 5 **Table 2** gives the classification of four plant species.

Table 2

Group	Species 1	Species 2	Species 3	Species 4
Kingdom	*Plantae*	*Plantae*	*Plantae*	*Plantae*
Phylum	*Spermatophyta*	*Spermatophyta*	*Spermatophyta*	*Spermatophyta*
Class	*Monocotyledonae*	*Dicotyledonae*	*Monocotyledonae*	*Dicotyledonae*
Order	*Poales*	*Fabales*	*Poales*	*Scrophulariales*
Family	*Cyperaceae*	*Fabaceae*	*Poaceae*	*Scrophulariaceae*
Genus	*Eriophorum*	*Pisum*	*Poa*	*Antirrhinum*
Species	*angustifolium*	*sativum*	*annua*	*majus*

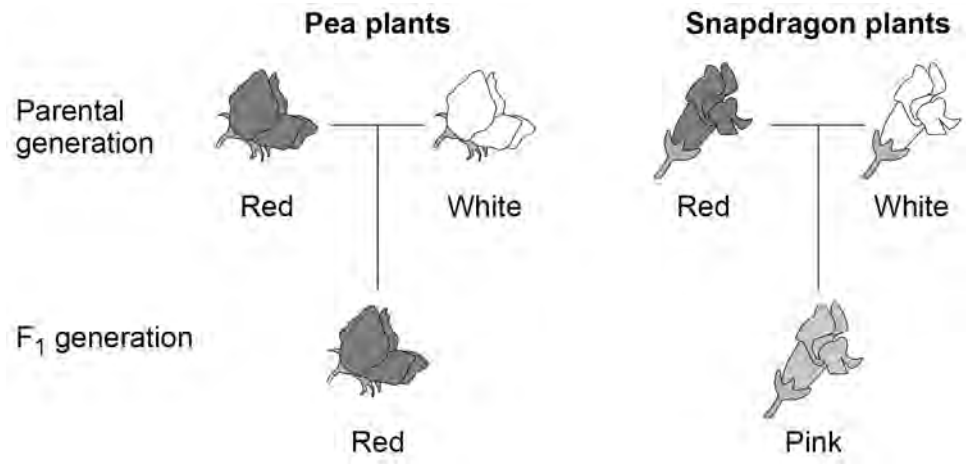
0 5 . 1 Species **1** and **3** are the most closely related.

What information in **Table 2** gives evidence for this?

[1 mark]

Figure 6 shows the inheritance of flower colour in two species of plant.

Figure 6



- In pea plants and in snapdragon plants, flower colour is controlled by one pair of alleles.
- In **Figure 6** the parental generation plants are homozygous for flower colour.
- In heterozygous **pea** plants, the allele for red flower colour is dominant.
- In heterozygous **snapdragon** plants, the alleles for flower colour are both expressed.

4.1.1.2 Animal and plant cells

Question 21 · continued

Use the following symbols for alleles in your answers to Questions **05.2** to **05.4**:

Pea plants	**Snapdragon plants**
R = allele for red flowers	C^R = allele for red flowers
r = allele for white flowers	C^W = allele for white flowers

0 5 . 2 What is the genotype of the red-flowered pea plants in the F_1 generation?

[1 mark]

_____

0 5 . 3 What is the genotype of a white-flowered snapdragon plant?

[1 mark]

_____

A gardener crossed two pink-flowered snapdragon plants.

0 5 . 4 Draw a Punnett square diagram to show why only some of the next generation plants had pink flowers.

Identify the phenotypes of all the offspring plants.

[3 marks]

0 5 . 5 What percentage of the offspring would you expect to have pink flowers?

[1 mark]

Percentage = _____ %

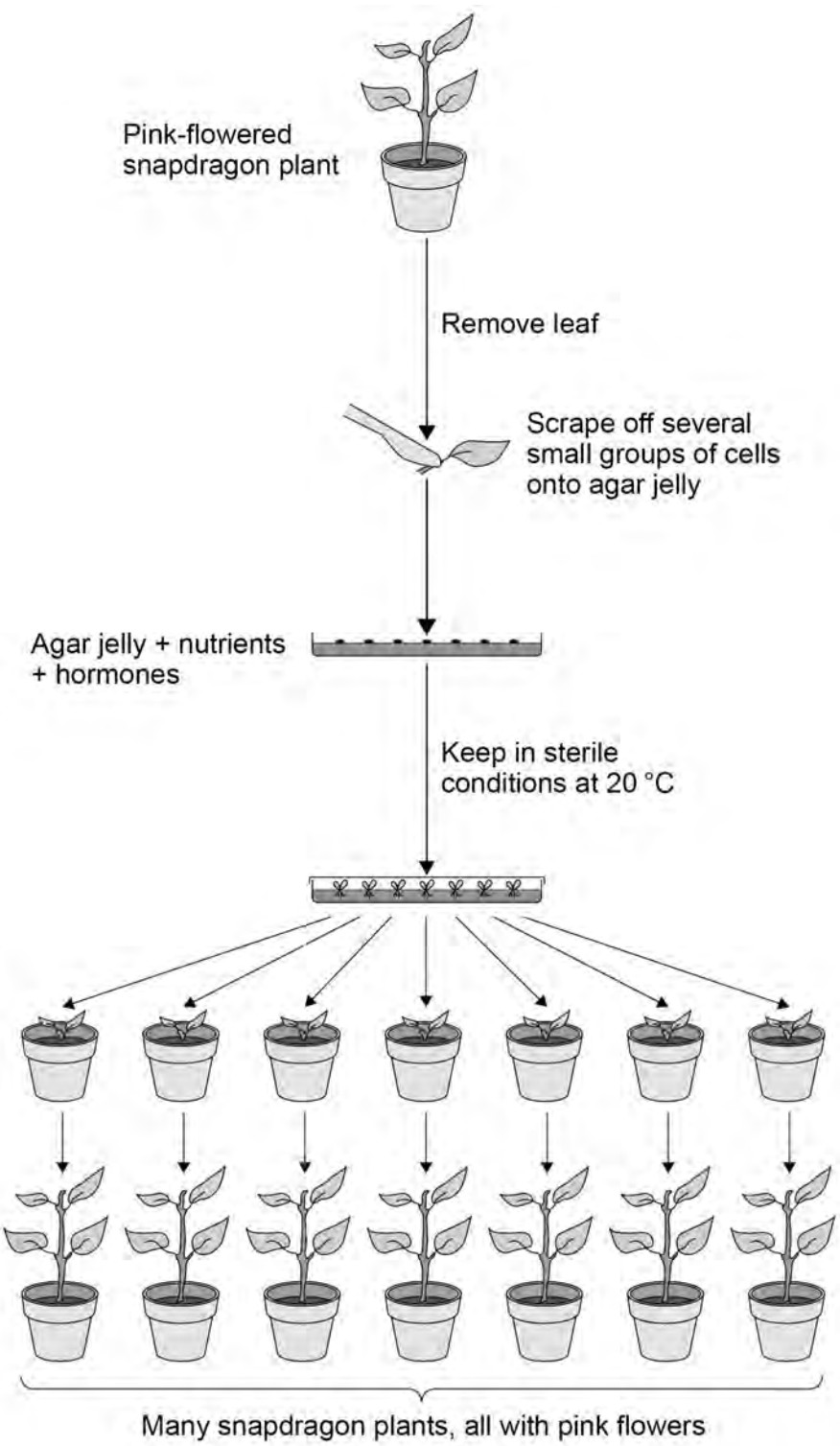
4.1.1.2 Animal and plant cells

Question 21 · continued

Commercially, hundreds of pink-flowered snapdragon plants can be produced from one pink-flowered plant.

Figure 7 shows a tissue culture technique used for producing many plants from one plant.

Figure 7



4.1.1.2 Animal and plant cells

Question 21 · continued

0 5 . 6 Give a reason for each of the following steps shown in **Figure 7**.

[5 marks]

Several groups of cells are scraped off the leaf: _____

Nutrients are added to the agar jelly: _____

Hormones are added to the agar jelly: _____

The plant cells are kept in **sterile** conditions: _____

The plant cells are kept at **20 °C**: _____

0 5 . 7 Explain why the method shown in **Figure 7** produces **only** pink-flowered plants.

[2 marks]

14

4.1.1.2 Animal and plant cells

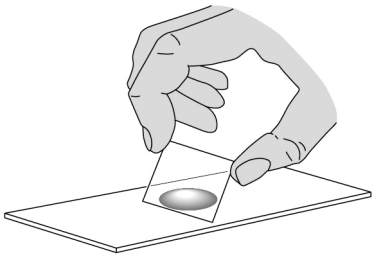
Question 22

November 2021 | 8461/1H | Original Q1

0 1 A student prepared some animal cells to view using a microscope.

Figure 1 shows the student preparing the cells.

Figure 1



0 1 . 1 Name **two** pieces of laboratory equipment the student could have used to **prepare** cells to view using a microscope.

[2 marks]

1 _____

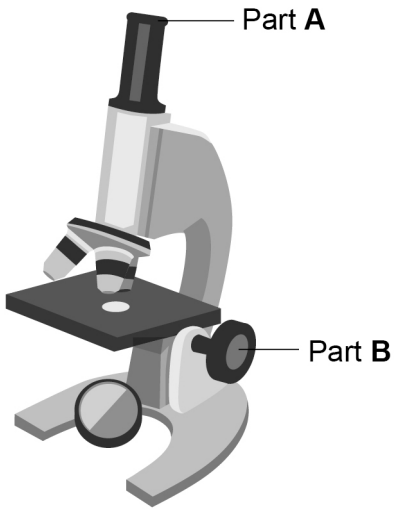
2 _____

4.1.1.2 Animal and plant cells

Question 22 · continued

Figure 2 shows the student's light microscope.

Figure 2



0 1 . 2 Name part **A**.

[1 mark]

0 1 . 3 What is the function of part **B**?

[1 mark]

0 1 . 4 The student tried to look at the cells using the microscope.

Suggest **one** reason why the student could **not** see any cells when looking through part **A**.

[1 mark]

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 22 · continued

0 1 . 5 Red blood cells are specialised animal cells.

Compare the structure of a red blood cell with the structure of a plant cell.

[6 marks]

0 1 . 6 When placed into a beaker of water:

- a red blood cell bursts
- a plant cell does **not** burst.

Explain why the red blood cell bursts but the plant cell does **not** burst.

[2 marks]

13

4.1.1.2 Animal and plant cells

Question 23

November 2021 | 8461/1H | Original Q4

0 4 All living organisms respire.

0 4 . 1 What is the chemical equation for aerobic respiration?

[1 mark]

Tick (✓) **one** box.

$6\,O_2 + 6\,CO_2 \rightarrow 6\,H_2O + C_6H_{12}O_6$ ☐

$6\,H_2O + C_6H_{12}O_6 \rightarrow 6\,H_2O + 6\,CO_2$ ☐

$6\,H_2O + 6\,CO_2 \rightarrow 6\,O_2 + C_6H_{12}O_6$ ☐

$6\,O_2 + C_6H_{12}O_6 \rightarrow 6\,H_2O + 6\,CO_2$ ☐

0 4 . 2 Name the sub-cellular structures where aerobic respiration takes place.

[1 mark]

_____

0 4 . 3 Energy is released in respiration.

Give **two** uses of the energy released in respiration.

[2 marks]

1 _____

_____

2 _____

_____

4.1.1.2 Animal and plant cells

Question 23 · continued

0 4 . 4 Describe **two** differences between aerobic and anaerobic respiration in humans.

Do **not** refer to oxygen in your answer.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 5 What are the **two** products of anaerobic respiration in plant cells?

[2 marks]

Tick (✓) **two** boxes.

- Carbon dioxide ☐
- Ethanol ☐
- Glucose ☐
- Lactic acid ☐
- Water ☐

Question 4 continues on the next page

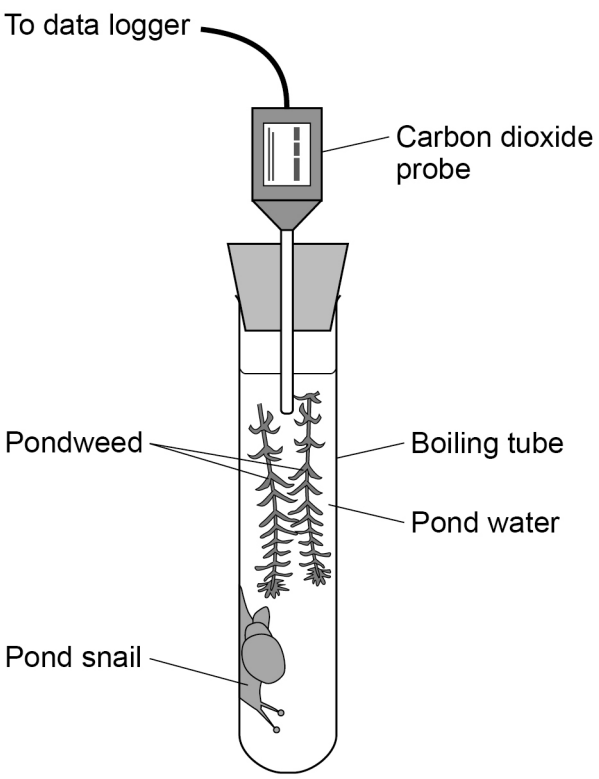
4.1.1.2 Animal and plant cells

Question 23 · continued

A scientist investigated respiration and photosynthesis using some pondweed and a pond snail.

Figure 6 shows the apparatus used.

Figure 6



The apparatus was left in a well-lit room for 5 days.

The data logger recorded the concentration of carbon dioxide continuously.

After 5 days, the scientist completely covered the boiling tube with black paper.

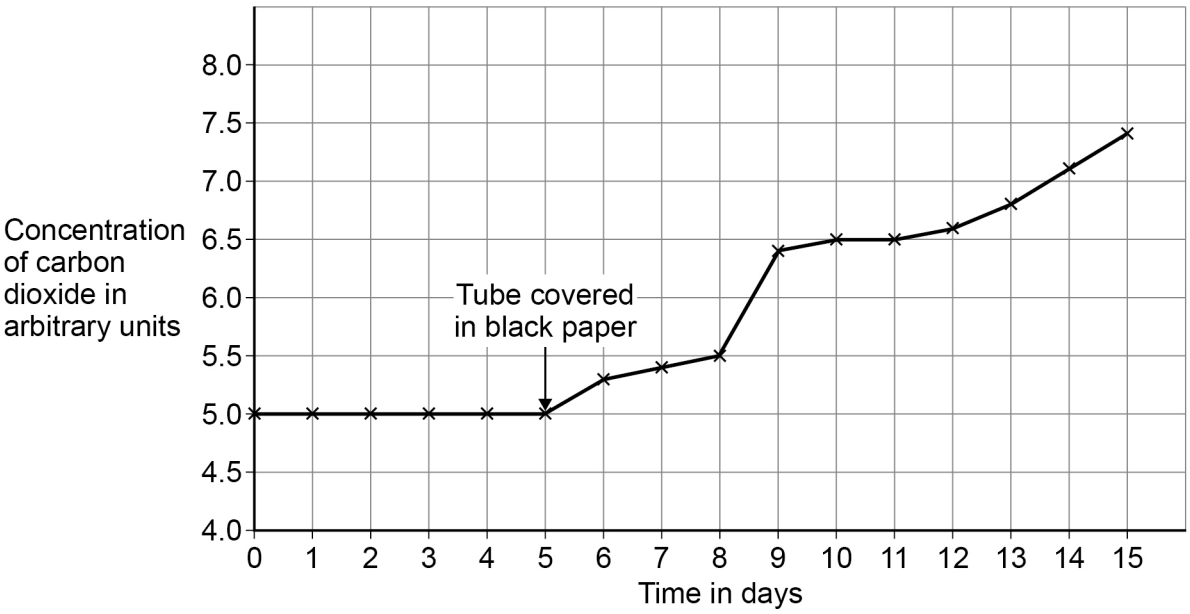
The data logger continued to record the concentration of carbon dioxide.

4.1.1.2 Animal and plant cells

Question 23 · continued

Figure 7 shows the concentration of carbon dioxide inside the boiling tube over 15 days.

Figure 7



0 4 . 6 Explain why the concentration of carbon dioxide in the tube stayed the same between day 0 and day 5.

[2 marks]

0 4 . 7 Suggest why the concentration of carbon dioxide increased between day 5 and day 10.

[1 mark]

Question 4 continues on the next page

4.1.1.2 Animal and plant cells

Question 23 · continued

0 4 . 8 On day 10, the pond snail died.

Explain why the death of the pond snail caused the concentration of carbon dioxide to increase after day 10.

[3 marks]

14

4.1.1.2 Animal and plant cells

Question 24

June 2022 | 8461/1H | Original Q1

0 1 This question is about cells and transport.

0 1 . 1 Complete **Table 1**.

[3 marks]

Table 1

Name of cell part	Function of cell part
	Contains genetic information
Mitochondria	
	Controls the movement of substances into and out of the cell

Cells in potatoes are plant cells.

Cells in potatoes do **not** contain chloroplasts.

0 1 . 2 What is the function of chloroplasts?

[1 mark]

0 1 . 3 Name **one** type of cell in a potato plant that does **not** contain chloroplasts.

[1 mark]

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 24 · continued

A student investigated the effect of salt concentration on pieces of potato.

This is the method used.

1. Cut three pieces of potato of the same size.
2. Record the mass of each potato piece.
3. Add 150 cm^3 of 0.4 mol/dm^3 salt solution to a beaker.
4. Place each potato piece into the beaker.
5. After 30 minutes, remove each potato piece and dry the surface with a paper towel.
6. Record the mass of each potato piece.
7. Repeat steps 1 to 6 using different concentrations of salt solution.

0 1 . 4 What is the independent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

- Concentration of salt solution ☐
- Mass of potato piece ☐
- Time potato is left in salt solution ☐
- Volume of salt solution ☐

0 1 . 5 Why did the student dry the surface of each potato piece with a paper towel in step **5**?

[1 mark]

4.1.1.2 Animal and plant cells

Question 24 · continued

The student calculated the percentage change in mass of each potato piece.

0 1 . 6 For one potato piece:

- the starting mass was 2.5 g
- the end mass was 2.7 g.

Calculate the percentage increase in mass of the potato piece.

[2 marks]

Use the equation:

$$\text{percentage increase in mass} = \frac{\text{increase in mass}}{\text{starting mass}} \times 100$$

Percentage increase in mass = _____ %

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 24 · continued

The student used the results from each potato piece to calculate the mean percentage change in mass at each concentration.

Table 2 shows the results.

Table 2

Concentration of salt solution in mol/dm^3	Mean percentage (%) change in mass
0.0	9.8
0.1	9.5
0.2	7.0
0.3	0.4
0.4	−1.4

0 1 . 7 Complete **Figure 1**.

You should:

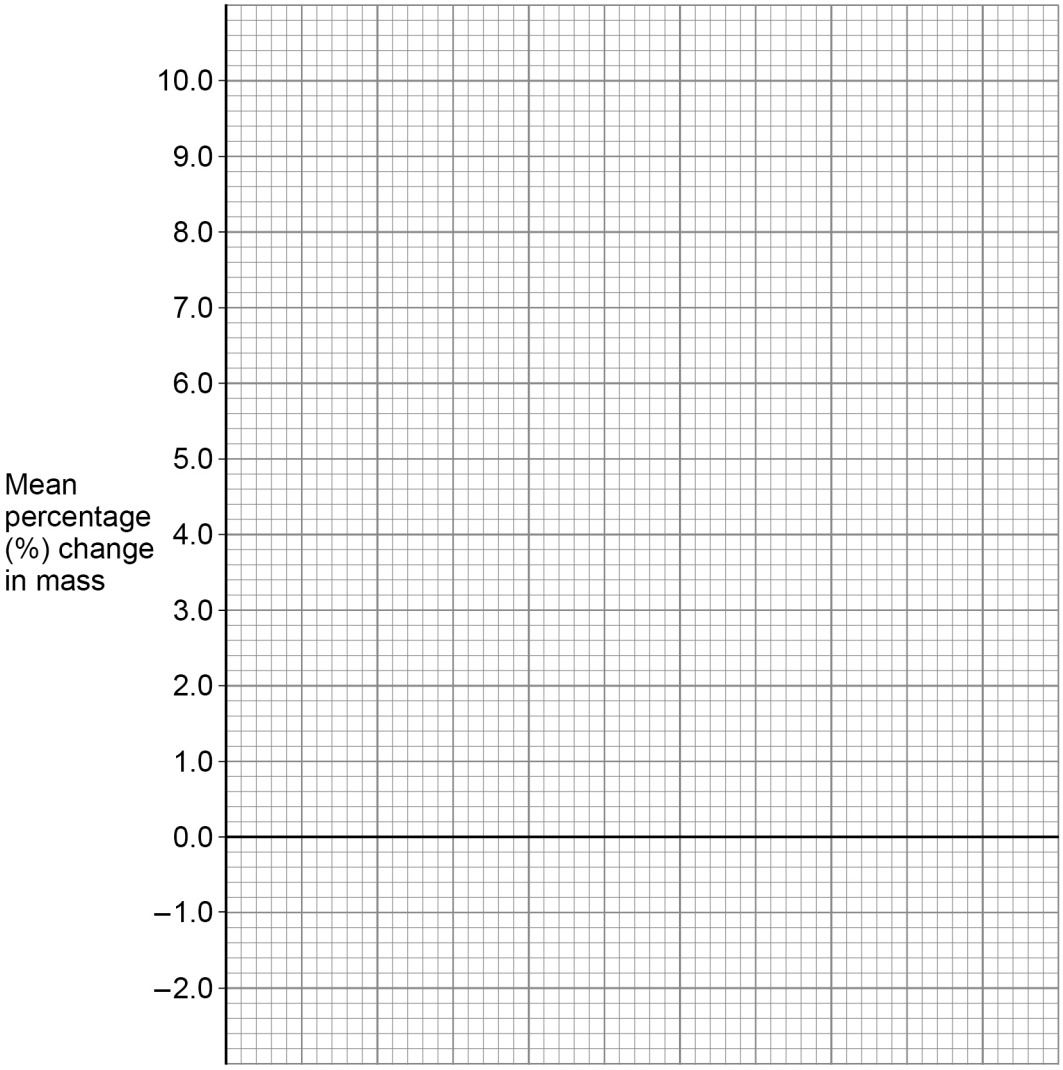
- label the x-axis
- use a suitable scale for the x-axis
- plot the data from **Table 2**
- draw a line of best fit.

[4 marks]

4.1.1.2 Animal and plant cells

Question 24 · continued

Figure 1



0 1 . 8 What concentration of salt solution was equal to the concentration of the solution inside the potato pieces?

Use **Figure 1**.

[1 mark]

Concentration = _____ mol/dm^3

Question 1 continues on the next page

4.1.1.2 Animal and plant cells

Question 24 · continued

0 1 . 9 Explain why the potato pieces in the 0.4 mol/dm^3 salt solution decreased in mass.

[3 marks]

17

4.1.1.2 Animal and plant cells

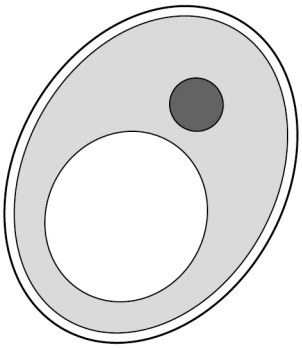
Question 25

June 2022 | 8461/1H | Original Q2

0 2 Plant cells and fungal cells are similar in structure.

Figure 2 shows a fungal cell.

Figure 2



0 2 . 1 Name **one** structure in **Figure 2** which is present in both plant cells and fungal cells but **not** in animal cells.

[1 mark]

0 2 . 2 Which disease is caused by a fungus?

[1 mark]

Tick (✓) **one** box.

- Gonorrhoea ☐
- Malaria ☐
- Measles ☐
- Rose black spot ☐

Question 2 continues on the next page

4.1.1.2 Animal and plant cells

Question 25 · continued

0 2 . 3 A fungal cell divides once every 90 minutes.

How many times would this fungal cell divide in 24 hours?

[2 marks]

Number of times cell divides in 24 hours = _____

4.1.1.2 Animal and plant cells

Question 25 · continued

Some types of fungal cell are grown to produce high-protein food.

The high-protein food can be used to make meat-free burgers.

0 2 . 4 Where is protein digested in the human digestive system?

[1 mark]

Tick (✓) **one** box.

- Large intestine ☐
- Liver ☐
- Salivary glands ☐
- Stomach ☐

0 2 . 5 Which chemical could be used to test if the burgers contain protein?

[1 mark]

Tick (✓) **one** box.

- Benedict's reagent ☐
- Biuret reagent ☐
- Ethanol ☐
- Iodine solution ☐

Question 2 continues on the next page

4.1.1.2 Animal and plant cells

Question 25 · continued

0 2 . 6 **Table 3** shows some information about burgers made from meat and meat-free burgers.

Table 3

	Mass per 100 g of burger	
	Burgers made from meat	**Meat-free burgers**
Protein in g	14.0	9.0
Fibre in g	0.9	5.5
Fat in g	16.0	5.2
Carbohydrate in g	15.5	15.1
Cholesterol in mg	120.0	0.0

Evaluate the use of burgers made from meat compared with meat-free burgers in providing humans with a healthy, balanced diet.

Use information from **Table 3** and your own knowledge.

[6 marks]

4.1.1.2 Animal and plant cells

Question 25 · continued

12

Turn over for next question