AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.1.1.3

Cell specialisation

Past-paper questions

Tier	**Foundation**
Question groups	**7**
Available paper years	**2021–2025**

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.

4.1.1.3 Cell specialisation

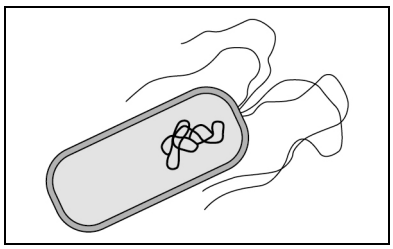
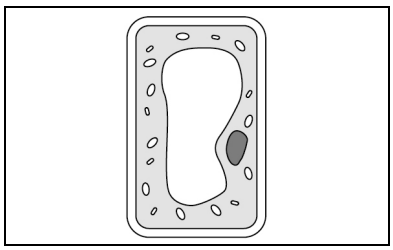
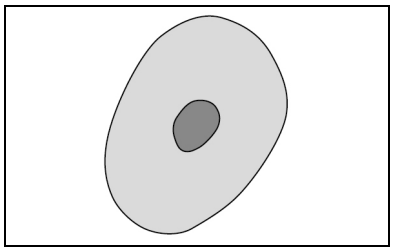
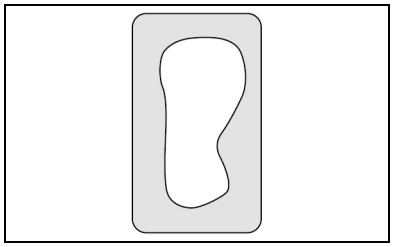
Question 01

November 2021 | 8464/B/1F | Original Q1

0 1 Cells are the building blocks of life.

0 1 . 1 Draw **one** line from each type of organism to the diagram of one of its cells.

[3 marks]

Type of organism	Diagram of one cell
Animal	
Bacterium	
Plant	
	

4.1.1.3 Cell specialisation

Question 01 · continued

0 1 . 2 Cells contain structures. These structures have different functions.

Draw **one** line from each function to the correct structure.

[3 marks]

Function	Structure
Contains genetic information	Cell membrane
Controls what enters and leaves a cell	Cell wall
Where photosynthesis happens	Chloroplast
	Nucleus

Question 1 continues on the next page

4.1.1.3 Cell specialisation

Question 01 · continued

0 1 . 3 Chemicals are produced in cells.

Complete the sentences.

Choose answers from the box.

[4 marks]

cellulose	**DNA**	**glycogen**	**starch**	**urea**

A chemical excreted by animals is _____ .

A chemical stored in animal cells is _____ .

A chemical stored in plant cells is _____ .

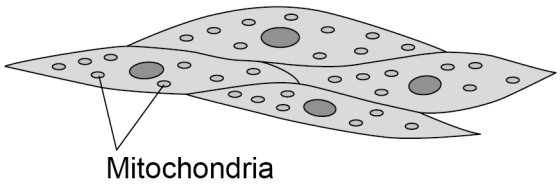
A chemical that strengthens plant cell walls is _____ .

4.1.1.3 Cell specialisation

Question 01 · continued

Figure 1 shows a diagram of muscle cells.

Figure 1



0 1 . 4 Give **one** function of muscle cells.

[1 mark]

0 1 . 5 Explain how muscle cells are adapted for their function.

Use **Figure 1**.

[2 marks]

Question 1 continues on the next page

4.1.1.3 Cell specialisation

Question 01 · continued

0 1 . 6 One muscle cell was 0.05 mm wide.

When viewed using a microscope the image of the muscle cell was 2 mm wide.

Calculate the magnification used to view the cell.

Use the equation:

$$\text{magnification} = \frac{\text{width of image}}{\text{width of real cell}}$$

[2 marks]

Magnification = × _____

15

4.1.1.3 Cell specialisation

Question 02

November 2021 | 8464/B/2F | Original Q1

0 1 A human body cell contains 46 chromosomes.

0 1 . 1 How many chromosomes does a human sperm cell contain?

[1 mark]

Tick (✓) **one** box.

22 ☐ 23 ☐ 46 ☐

0 1 . 2 Draw **one** line from each word to the meaning of that word.

[3 marks]

Word	Meaning
Gene	A small ring of DNA in the cytoplasm
Genome	All the genetic material of an organism
Nucleus	A small section of DNA which codes for a protein
	A structure which contains chromosomes

4.1.1.3 Cell specialisation

Question 02 · continued

Some plants contain a harmful chemical called PTC.

Some people can taste PTC.

0 1 . 3 Suggest **one** advantage of being able to taste PTC.

[1 mark]

Only people with a dominant allele **T** can taste PTC.

People with **only** the allele **t** cannot taste PTC.

0 1 . 4 A person has the genotype **Tt**.

What word describes the person's genotype?

[1 mark]

Tick (✓) **one** box.

- Heterozygous ☐
- Phenotype ☐
- Recessive ☐

0 1 . 5 Give the genotype of a person who **cannot** taste PTC.

[1 mark]

4.1.1.3 Cell specialisation

Question 02 · continued

0 1 . 6 A woman and a man plan to have a child.

The woman and the man both have the genotype **Tt**.

Complete **Figure 1** to show the possible genotypes of the child.

[2 marks]

Figure 1

		Woman	
		T	**t**
Man	**T**	**T T**	
	t		

0 1 . 7 What is the chance of the child being able to taste PTC?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

25% ☐ 50% ☐ 75% ☐ 100% ☐

10

4.1.1.3 Cell specialisation

Question 03

June 2022 | 8464/B/1F | Original Q6

0 6 This question is about cell division.

0 6 . 1 Write the biological structures from the box in the correct order of size.

[1 mark]

cell	**chromosome**	**gene**	**nucleus**

Smallest ↓ Largest

_____

_____

_____

_____

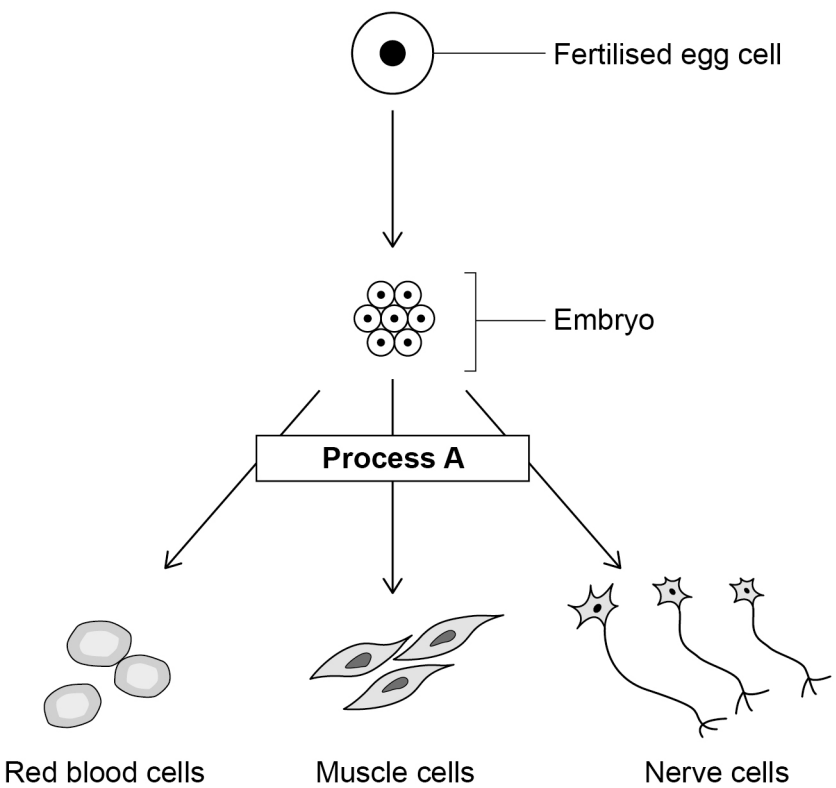
Question 6 continues on the next page

4.1.1.3 Cell specialisation

Question 03 · continued

Figure 9 shows how a fertilised egg cell can produce specialised cells.

Figure 9



0 6 . 2 Name **Process A**.

[1 mark]

0 6 . 3 How many cell divisions are needed to form a 16-cell embryo from the original fertilised egg cell?

[1 mark]

Number of cell divisions = _____

4.1.1.3 Cell specialisation

Question 03 · continued

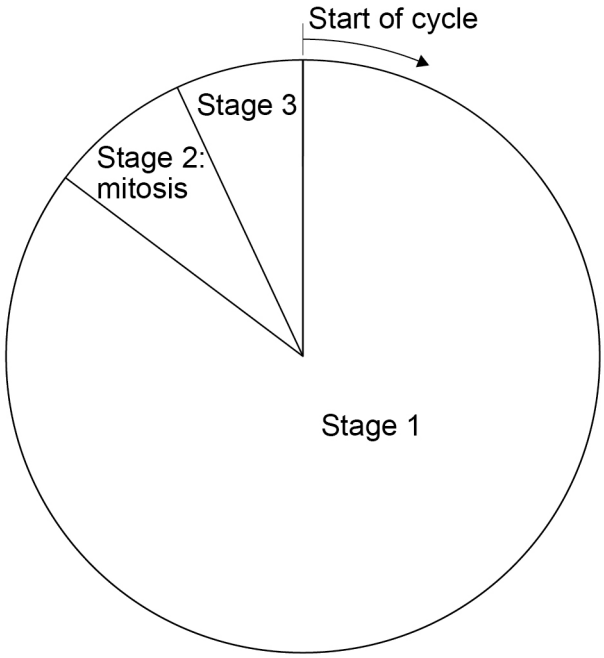
0 6 . 4 In humans a fertilised egg cell contains 23 pairs of chromosomes.

How many chromosomes will there be in each of the embryo cells?

[1 mark]

0 6 . 5 **Figure 10** represents a cell cycle for a human embryonic cell.

Figure 10



Describe **one** change in the cell that occurs during **each** of the stages of the cell cycle.

[3 marks]

Stage 1 _____

Stage 2 _____

Stage 3 _____

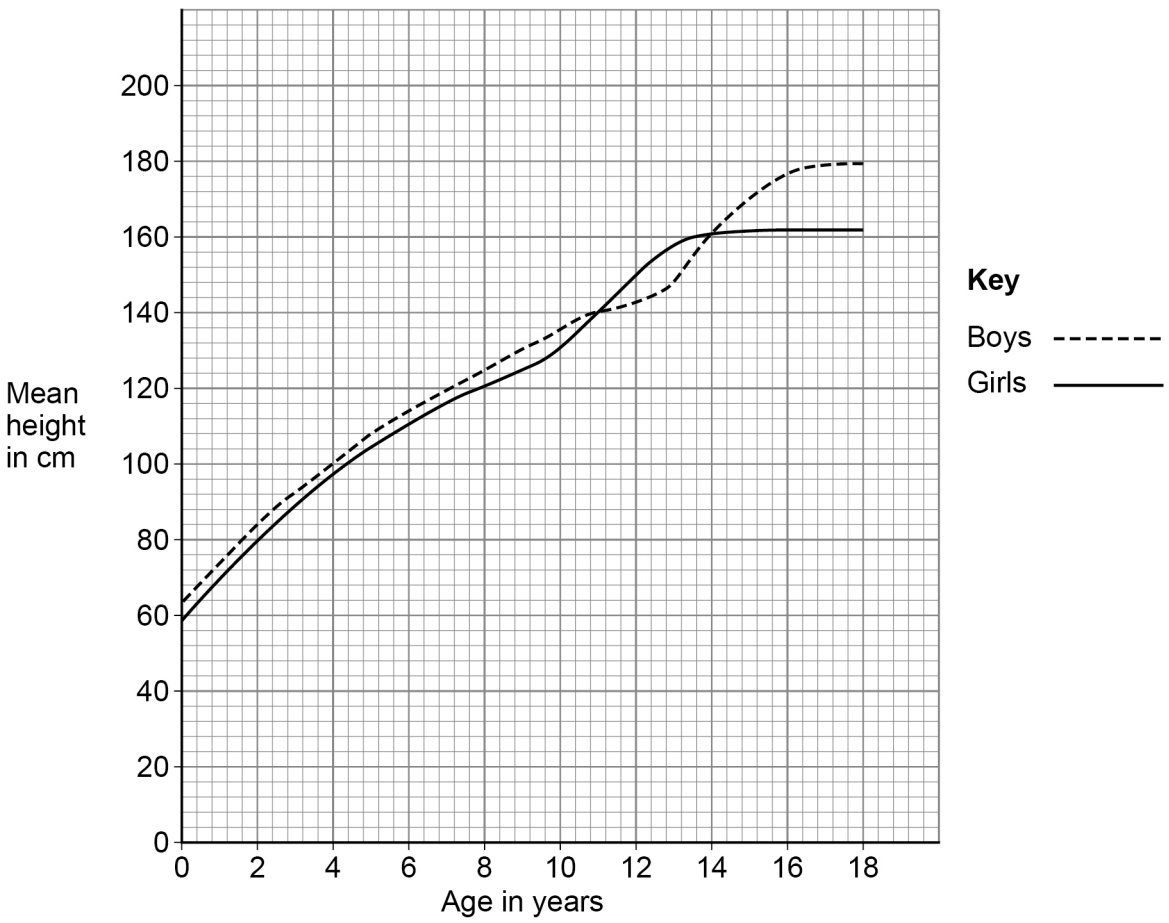
4.1.1.3 Cell specialisation

Question 03 · continued

Cell division is important in the growth of multicellular organisms.

0 6 . 6 **Figure 11** shows the mean height of boys and of girls from birth to age 18 years.

Figure 11



4.1.1.3 Cell specialisation

Question 03 · continued

Compare the growth of boys with the growth of girls.

Use data from **Figure 11** in your answer.

[6 marks]

0 6 . 7 Give **one** way that cell division by mitosis is important in **fully grown** animals.

[1 mark]

14

4.1.1.3 Cell specialisation

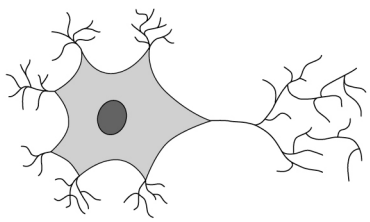
Question 04

June 2023 | 8464/B/1F | Original Q1

0 1 The human body is made of different types of cell.

0 1 . 1 Draw **one** line from each type of cell to the organ system where the cell is found.

[3 marks]

Type of cell	Organ system
 Brain cell	Circulatory system
 Red blood cell	Nervous system
	Reproductive system
 Sperm cell	Respiratory system

4.1.1.3 Cell specialisation

Question 04 · continued

0 1 . 2 Explain **one** way a sperm cell is adapted for its function.

[2 marks]

Question 1 continues on the next page

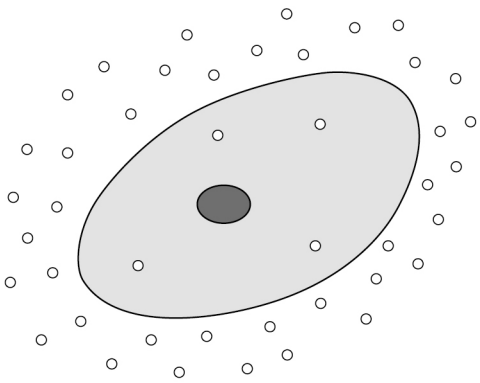
4.1.1.3 Cell specialisation

Question 04 · continued

Figure 1 shows a cell.

Oxygen molecules are shown inside and outside the cell.

Figure 1



Key

○ Oxygen molecule

0 1 . 3 Give **one** way you can tell that the cell in **Figure 1** is **not** a plant cell.

[1 mark]

0 1 . 4 Which part of a cell controls the movement of substances into and out of the cell?

[1 mark]

Tick (✓) **one** box.

Cell membrane ☐

Cytoplasm ☐

Nucleus ☐

4.1.1.3 Cell specialisation

Question 04 · continued

0 1 . 5 What is the name of the process that moves oxygen molecules into the cell in **Figure 1**?

Give the reason for your answer.

[2 marks]

Tick (✓) **one** box.

Active transport ☐

Diffusion ☐

Osmosis ☐

Reason _____

_____

0 1 . 6 Name **two** substances that move **into** most cells in the body from the blood.

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

[2 marks]

1 _____

2 _____

11

4.1.1.3 Cell specialisation

Question 05

June 2023 | 8464/B/2F | Original Q6

0 6 Sexual reproduction in humans involves the production of egg cells and sperm cells.

0 6 . 1 Name the type of cell division that produces egg cells and sperm cells.

[1 mark]

_____

0 6 . 2 Sexual reproduction produces offspring that are genetically different from each other.

Give **two** reasons why sexual reproduction causes variation in the offspring.

[2 marks]

1 _____

_____

2 _____

_____

Question 6 continues on the next page

4.1.1.3 Cell specialisation

Question 05 · continued

Polydactyly is an inherited disorder.

The allele for polydactyly is dominant, **D**.

A person with two copies of the allele **d** will **not** have polydactyly.

0 6 . 3 A person with the genotype **DD** is homozygous.

What word describes the genotype **Dd**?

[1 mark]

_____

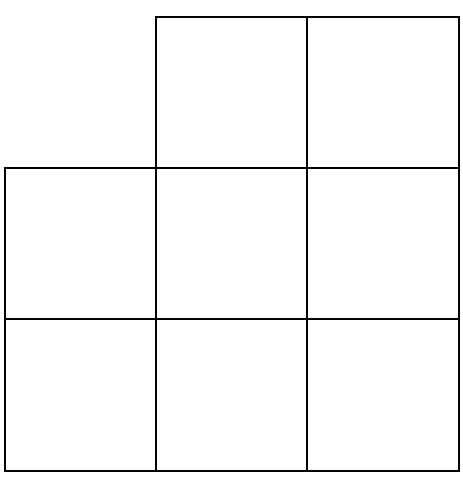
0 6 . 4 A person with the genotype **Dd** and a person with the genotype **dd** plan to have a child.

Determine the probability that the child will have polydactyly.

You should:

- complete the Punnett square diagram
- identify any offspring genotype that would have polydactyly.

[5 marks]



Probability that the child will have polydactyly = _____

4.1.1.3 Cell specialisation

Question 05 · continued

0 6 . 5 Embryos can be screened for the alleles that cause inherited disorders.

Give **two** advantages of embryo screening.

[2 marks]

1 _____

_____

2 _____

_____

11

Turn over for the next question

4.1.1.3 Cell specialisation

Question 06

June 2024 | 8464/B/2F | Original Q3

0 3 Students used a reaction test card in an investigation.

The reaction test card can be used to test the reactions of car drivers.

Figure 4 shows the reaction test card.

Figure 4

Reaction score	How fast are your reactions?
5	Too slow
4	A bit slow
3	OK
2	Good
1	Super

0 3 . 1 Suggest why fast reactions are important for car drivers.

[1 mark]

4.1.1.3 Cell specialisation

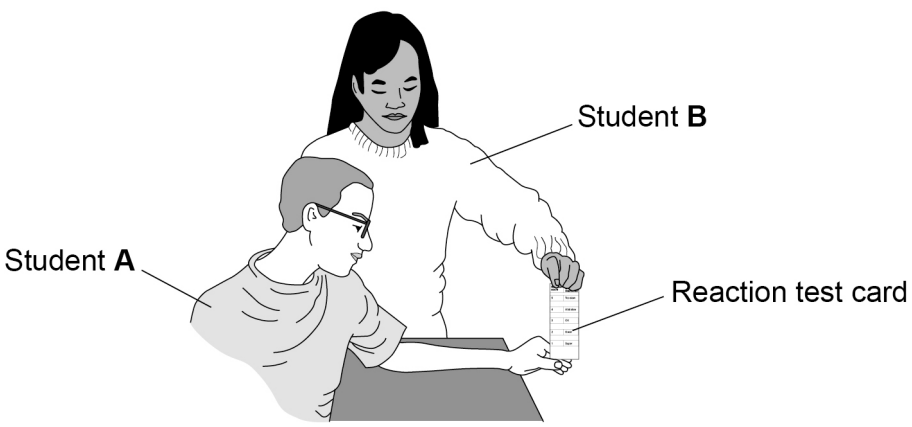
Question 06 · continued

Students investigated the effect of number of hours of sleep on reaction time.

The students used the reaction test card shown in **Figure 4** on page 11.

Figure 5 shows the method used.

Figure 5



This is the method used.

1. Record the number of hours of sleep student **A** had the night before the test.
2. Student **B** holds the lower edge of the card level with the top of student **A**'s thumb.
3. Student **A** holds their thumb and forefinger slightly apart, with space for the card to drop.
4. Student **B** drops the card.
5. Student **A** catches the card as quickly as possible.
6. Record the number shown at the top of student **A**'s thumb.
7. Repeat steps 1 to 6 with seven other students.

4.1.1.3 Cell specialisation

Question 06 · continued

0 3 . 2 Draw **one** line from each type of variable to the example of that variable in the investigation.

[3 marks]

Type of variable	Example
Control variable	Number nearest top of thumb when student catches card
Dependent variable	Number of hours of sleep
Independent variable	Number of students tested
	Start with lower edge of card level with top of thumb

Question 3 continues on the next page

4.1.1.3 Cell specialisation

Question 06 · continued

Figure 4 is repeated below.

Figure 4

Reaction score	How fast are your reactions?
5	Too slow
4	A bit slow
3	OK
2	Good
1	Super

0 3 . 3 A student said:

'It would be better to use a ruler showing millimetres instead of the card in **Figure 4**.'

Why is the student correct?

[1 mark]

Tick (✓) **one** box.

Students are familiar with a ruler but the card is new. ☐

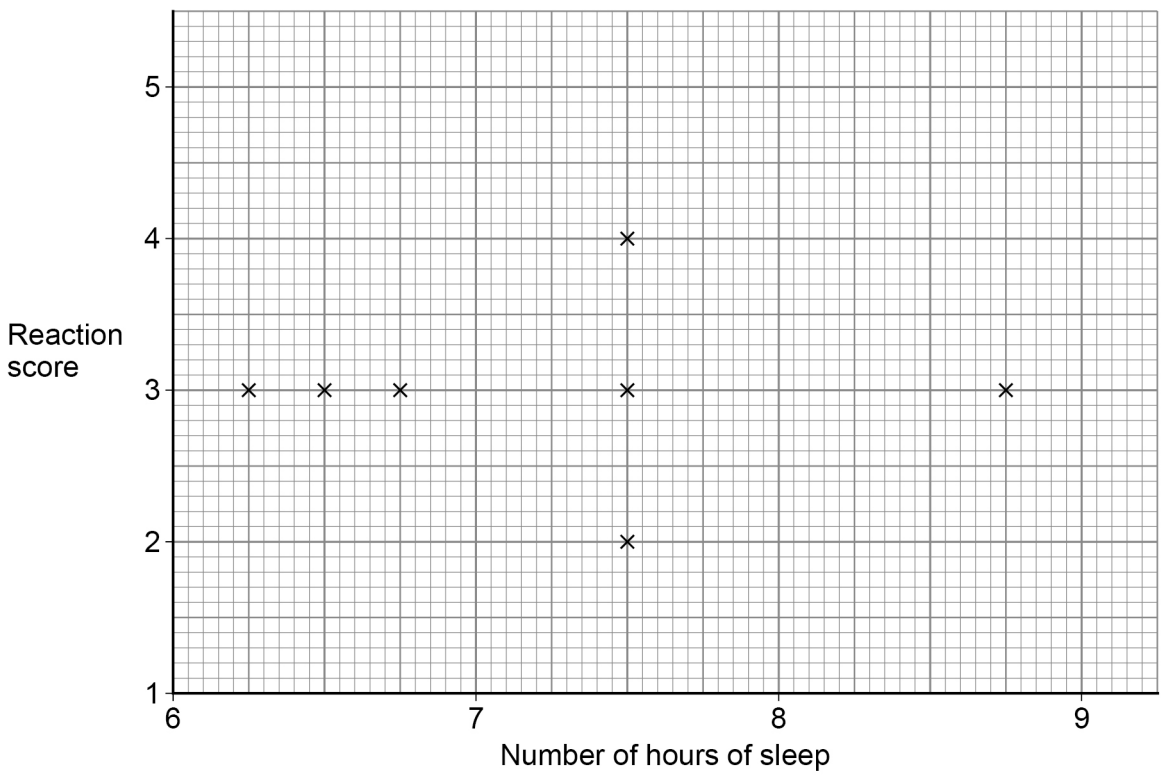
Students have very fast reactions. ☐

Students may catch the card between scores. ☐

Question 06 · continued

Figure 6 shows the results for the seven other students.

Figure 6



0 3 . 4 Student **A** had 8 hours and 30 minutes of sleep and a reaction score of 3

Plot the result for student **A** on **Figure 6**.

[1 mark]

0 3 . 5 The mean number of hours of sleep for all students was 7.4

What was the **mode** for the number of hours of sleep?

[1 mark]

Mode = _____ hours

4.1.1.3 Cell specialisation

Question 06 · continued

0 3 . 6 A lower reaction score means a faster reaction.

What was the effect of increasing the number of hours of sleep on reaction time?

Use **Figure 6**.

[1 mark]

Tick (✓) **one** box.

Reaction time decreased ☐

Reaction time stayed the same ☐

Reaction time increased ☐

0 3 . 7 Suggest **two** ways the students could improve the investigation.

Do **not** refer to using a ruler in your answer.

[2 marks]

1 _____

_____

2 _____

_____

Question 3 continues on the next page

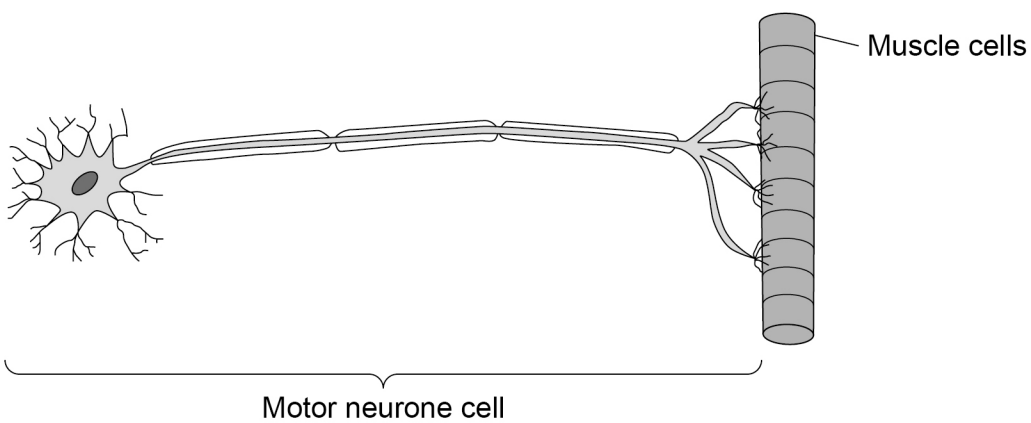
4.1.1.3 Cell specialisation

Question 06 · continued

0 3 . 8 Motor neurones are involved in reactions.

Figure 7 shows a motor neurone.

Figure 7



Explain **one** way the motor neurone cell is adapted for its function.

[3 marks]

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4.1.1.3 Cell specialisation

Question 07

June 2025 | 8464/B/2F | Original Q5

0 5 This question is about genetics.

The fur colour of rabbits is controlled by two alleles.

0 5 . 1 Draw **one** line from each term to the meaning of the term relating to genetics in rabbits.

[3 marks]

Term	Meaning of the term
Chromosome	A fur colour that is seen
Gene	A whole strand of DNA found in the nucleus of a rabbit cell
Genome	Codes for a protein that affects fur colour
	The complete genetic composition of a rabbit

Question 5 continues on the next page

4.1.1.3 Cell specialisation

Question 07 · continued

0 5 . 2 In rabbits:

- the allele for brown fur (**B**) is dominant
- the allele for white fur (**b**) is recessive.

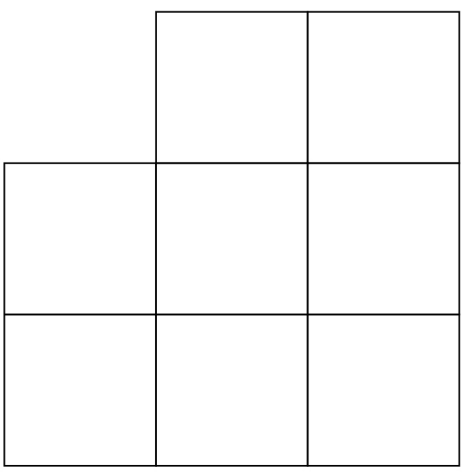
A rabbit with the alleles **Bb** and a rabbit with the alleles **bb** breed together.

Determine the probability that one of the offspring will have white fur.

You should:

- complete the Punnett square diagram
- identify any offspring that will have white fur.

[5 marks]



Probability = _____

4.1.1.3 Cell specialisation

Question 07 · continued

0 5 . 3 A male rabbit is heterozygous for fur colour.

The rabbit's body cells have the genotype **Bb**.

One of the sperm cells from the rabbit has the allele **b**.

Explain why the alleles in the rabbit's body cells and the allele in the sperm cell are different.

[2 marks]

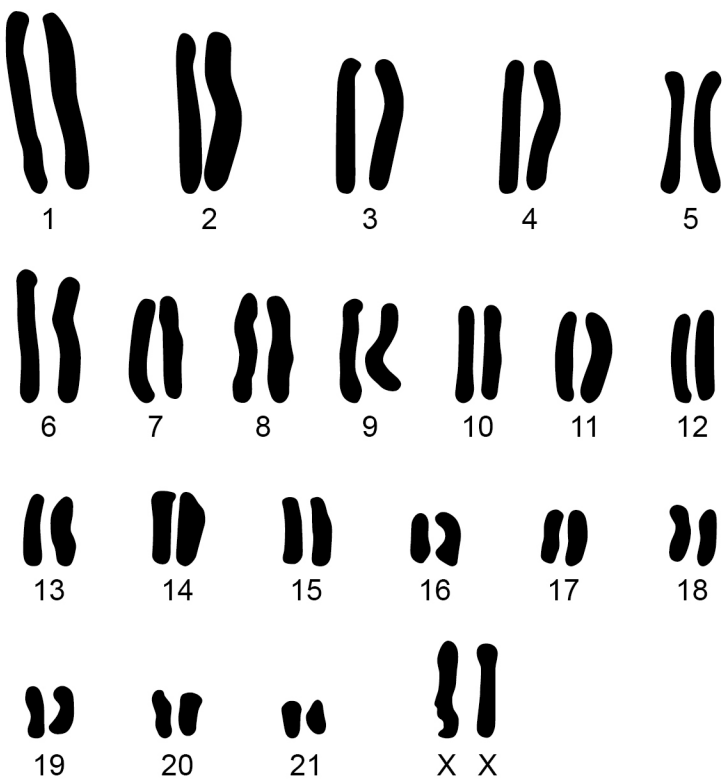
Question 5 continues on the next page

4.1.1.3 Cell specialisation

Question 07 · continued

Figure 7 shows the chromosomes of a rabbit.

Figure 7



0 5 . 4 How many chromosomes would be found in a skin cell of a rabbit?

Use **Figure 7**.

[1 mark]

Number of chromosomes = _____

0 5 . 5 The sex of a rabbit is controlled in the same way as the sex of a human.

Give the evidence from **Figure 7** that the rabbit is female.

[1 mark]

_____

_____

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