AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.3.1.6

Human defence systems

Past-paper questions

Tier	**Higher**
Question groups	**1**
Available paper years	**2025–2025**

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.

4.3.1.6 Human defence systems

Question 01

June 2025 | 8464/B/1H | Original Q6

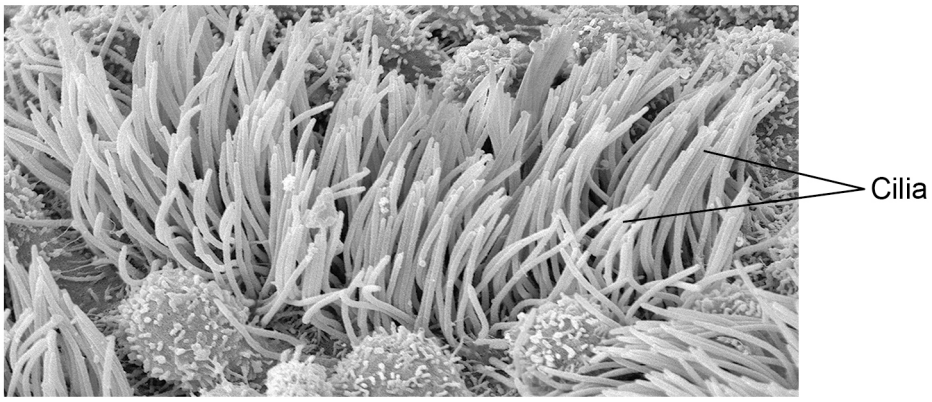
0 6 Ciliated cells have small hair-like structures called cilia on the cell surface.

Ciliated cells are found in the trachea and in the oviducts.

Oviducts are part of the female reproductive system.

Figure 7 shows cilia lining an oviduct.

Figure 7



0 6 . 1 Give **one** piece of evidence that an electron microscope was used to produce the image shown in **Figure 7**.

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

[1 mark]

0 6 . 2 Describe the function of ciliated cells in the **oviduct**.

[1 mark]

4.3.1.6 Human defence systems

Question 01 · continued

0 6 . 3 The mean length of the cilia in an image was 6 mm.

The cilia were viewed at a magnification of 1.5×10^3

Calculate the real mean length of the cilia.

Give your answer in micrometres (μm).

[5 marks]

Real mean length = _____ μm

Question 6 continues on the next page

4.3.1.6 Human defence systems

Question 01 · continued

Red blood cells are a type of cell found in humans.

People with anaemia do **not** have enough red blood cells.

0 6 . 4 Explain why a person with anaemia is likely to experience muscle fatigue.

[2 marks]

4.3.1.6 Human defence systems

Question 01 · continued

Scientists have produced red blood cells from stem cells in a laboratory.

The scientists:

- collected a sample of blood from a donor
- extracted 5×10^5 stem cells from the sample.

Each stem cell was developed into 100 000 red blood cells.

35% of the red blood cells made from stem cells are suitable to use in a patient.

0 6 . 5 Calculate the number of red blood cells made from the donor's sample that could be used in a patient.

Give your answer in standard form.

[4 marks]

Number of red blood cells (in standard form) = _____

Question 6 continues on the next page

Question 01 · continued

0 6 . 6 Patients with anaemia are sometimes given a blood transfusion.

A blood transfusion is when a patient is given blood.

The patient can be given red blood cells:

- produced from stem cells in a laboratory

  or

- from a whole blood donation.

Table 2 gives information about the two sources of red blood cells.

Table 2

Red blood cells produced from stem cells	Red blood cells from a whole blood donation
• A small sample of blood is collected from the patient. • The total cost is £15 per 10 cm^3 of cells produced. • All of the new cells can function for 120 days.	• 470 cm^3 of blood is collected from a donor. • The blood donation is separated into its different parts. • Red blood cells make up 45% of whole blood. • The total cost of a blood donation is £130. • The cells can function for between 1 and 120 days.

4.3.1.6 Human defence systems

Question 01 · continued

Evaluate the use of red blood cells:

- produced from stem cells in a laboratory
- from a whole blood donation.

You should refer to costs in your answer.

[6 marks]

Extra Space

19