AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.1.6

Human defence systems

Past-paper questions

Tier	**Foundation**
Question groups	**15**
Available paper years	**2007–2024**

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

January 2007 | BLY1F | Original Q4 | Legacy

4 (a) Use words from the box to complete the sentences about curing disease.

antibiotics	**antibodies**	**antitoxins**	**painkillers**	**statins**

The substances made by white blood cells to kill pathogens are called ..... .

The substances made by white blood cells to counteract poisons produced by pathogens are called ..... .

Medicines which kill bacteria are called ..... .

(3 marks)

(b) The MMR vaccine protects people against three diseases.

Write down the names of **two** of these diseases.

1 .....

2 .....

(2 marks)

(c) All vaccinations involve some risk.

The table shows the risk of developing harmful effects:

- from the disease if a child is **not** given the MMR vaccine;
- if a child **is** given the MMR vaccine.

Harmful effect	Risk of getting the harmful effect from the disease (if not vaccinated)	Risk of getting the harmful effect from MMR vaccine
Convulsions	1 in 200	1 in 1000
Meningitis	1 in 3000	Less than 1 in 1 000 000
Brain damage	1 in 8000	0

4.3.1.6 Human defence systems

Question 01 · continued

BLANK

A mother is considering if she should have her child vaccinated with the MMR vaccine.

Use information from the table to persuade the mother that she should have her child vaccinated.

.....

.....

.....

.....

(2 marks)

(d) The vaccine used to protect us from the Hepatitis B virus is produced by genetic engineering.

Yeast cells are used to produce the vaccine.

Use words from the box to complete the sentence.

chromosomes	**drugs**	**enzymes**	**genes**	**hormones**

To produce the vaccine ..... are used to cut out .....

from the Hepatitis B virus which are then inserted into the yeast cells.

(2 marks)

9

4.3.1.6 Human defence systems

Question 02

June 2008 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

Our bodies defend themselves naturally against infections. We also use other methods to protect ourselves against infections and to relieve the symptoms of disease.

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

A antibiotics

B painkillers

C antibodies

D vaccines

1	given to people to provide immunity
2	medicines that kill bacteria
3	produced by white blood cells
4	relieve symptoms of disease

4.3.1.6 Human defence systems

Question 03

June 2008 | BLY1F | Original Q5 | Legacy

5 Pathogens can enter the body and cause disease.

5 (a) (i) Name **one** type of medicine which kills bacteria in the body.

.....

(1 mark)

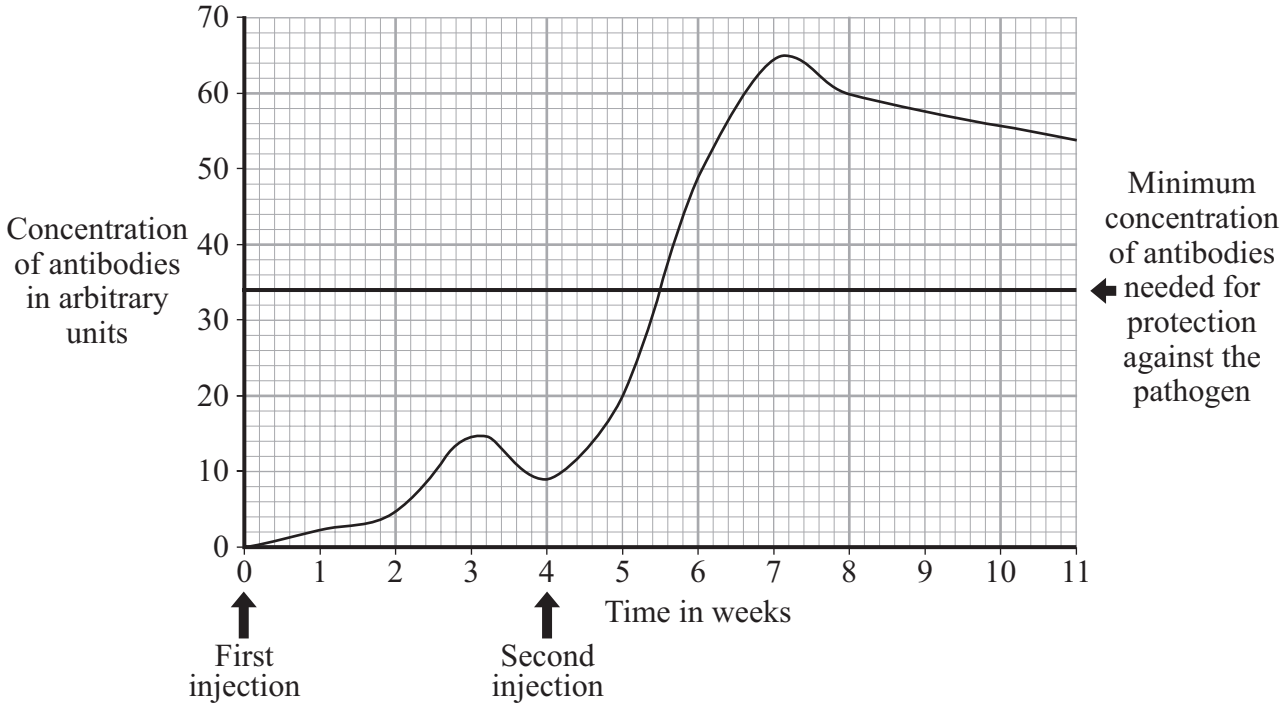
5 (a) (ii) Name **one** type of medicine which helps to relieve the symptoms of infectious disease.

.....

(1 mark)

5 (b) Vaccination protects us from pathogens.

The graph shows the concentration of antibodies in the blood of a person after two injections of vaccine given four weeks apart.



5 (b) (i) How long after the first injection did it take for the concentration of antibodies to reach the minimum level for protection against the pathogen?

..... weeks

(1 mark)

4.3.1.6 Human defence systems

Question 03 · continued

for mark

5 (b) (ii) Describe what happened to the concentration of antibodies in the blood from week 0 to week 7.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

5 (b) (iii) Would you expect the concentration of antibodies to stay above the level needed for protection against the pathogen over the next ten years?

Draw a ring around your answer. **Yes / No**

Give a reason for your answer.

.....

.....

(1 mark)

7

4.3.1.6 Human defence systems

Question 04

March 2010 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Measles is a dangerous viral disease which kills about one person in every 1000 people infected. It gives long-term complications for many others. Worldwide, almost 350 000 people, mainly of school age, are killed by measles every year.

After a UK health scare, some parents refused to have their children vaccinated.

In England and Wales:

- in 2006 there were 756 cases of measles
- in 2007 there were 971 cases of measles
- in 2008 there were more than 1300 cases of measles.

8A Approximately how many people are **infected** by measles across the world each year?

1 971

2 350 000

3 350 000 000

4 It is impossible to tell from the data.

8B The rise in the number of people suffering from measles in the UK in recent years . . .

1 can be described as a pandemic.

2 is due to measles viruses mutating.

3 is due to antibiotic resistance.

4 can be described as an epidemic.

4.3.1.6 Human defence systems

Question 04 · continued March 2010 | BLY1AP | Original Q8 | Legacy

8C White blood cells can protect us from pathogens.

Which row in the table shows the way(s) in which this protection can occur?

	Ingesting pathogens	Producing antitoxins	Producing antibodies
1	✓	✓	✗
2	✓	✗	✓
3	✗	✓	✓
4	✓	✓	✓

8D School-age children are more likely to catch measles than adults.

This is because . . .

1 large numbers of children are often close together.

2 children have a poorly developed immune system.

3 the virus multiplies in the soil in playing fields.

4 new vaccines are less effective than older ones in protecting against measles.

4.3.1.6 Human defence systems

Question 05

June 2010 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Our bodies defend themselves against attack by pathogens.

8A Our white cells produce antibodies which destroy . . .

1 all types of bacteria and all types of viruses.

2 all types of bacteria but no viruses.

3 all types of viruses but no bacteria.

4 some types of bacteria and some types of viruses.

8B Our white cells also produce antitoxins which . . .

1 counteract poisons produced by pathogens.

2 destroy both bacteria and viruses.

3 destroy bacteria but not viruses.

4 ingest pathogens.

8C Antibiotics destroy . . .

1 all types of bacteria and all types of viruses.

2 some types of bacteria and some types of viruses.

3 some types of bacteria but no viruses.

4 some types of viruses but no bacteria.

8D Vaccines . . .

1 can be made from dead pathogens.

2 can give protection against bacteria but not viruses.

3 can give protection against viruses but not bacteria.

4 destroy pathogens.

4.3.1.6 Human defence systems

Question 06

June 2011 | BLY1F | Original Q9 | Legacy

9 The body's immune system protects us from diseases.

Describe the different ways in which white blood cells protect us from infectious diseases.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

4

4.3.1.6 Human defence systems

Question 07

November 2011 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

Infectious diseases make us feel ill.

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

A antibodies

B antibiotics

C toxins

D painkillers

Bacteria make us feel ill because bacteria produce . . . **1** . . . .

To kill bacteria, a doctor might give a patient . . . **2** . . . .

To kill bacteria, our white blood cells produce . . . **3** . . . .

To relieve disease symptoms quickly, a doctor might give a patient . . . **4** . . . .

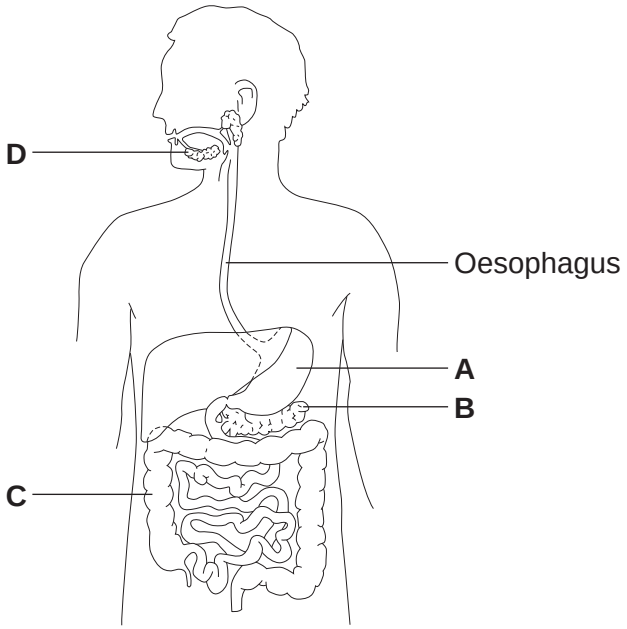
Turn over for the next question

4.3.1.6 Human defence systems

Question 08

June 2012 | BL2FP | Original Q5 | Legacy

5 The diagram shows the human digestive system.



5 (a) *Heartburn* is a burning feeling caused when acid enters the oesophagus. The acid comes from the stomach.

5 (a) (i) Which letter on the diagram shows the stomach? ☐

(1 mark)

5 (a) (ii) Name the acid the stomach produces.

.....

(1 mark)

5 (a) (iii) Medicines taken to treat *heartburn* contain chemicals that neutralise excess stomach acid.

What type of chemical will neutralise stomach acid?

.....

(1 mark)

4.3.1.6 Human defence systems

Question 08 · continued

5 (b) Use words from the box and your own knowledge to describe how carbohydrates are digested.

amylase	starch	sugars

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5 marks)

5 (c) Where in the body are the products of digestion absorbed?

.....

(1 mark)

9

4.3.1.6 Human defence systems

Question 09

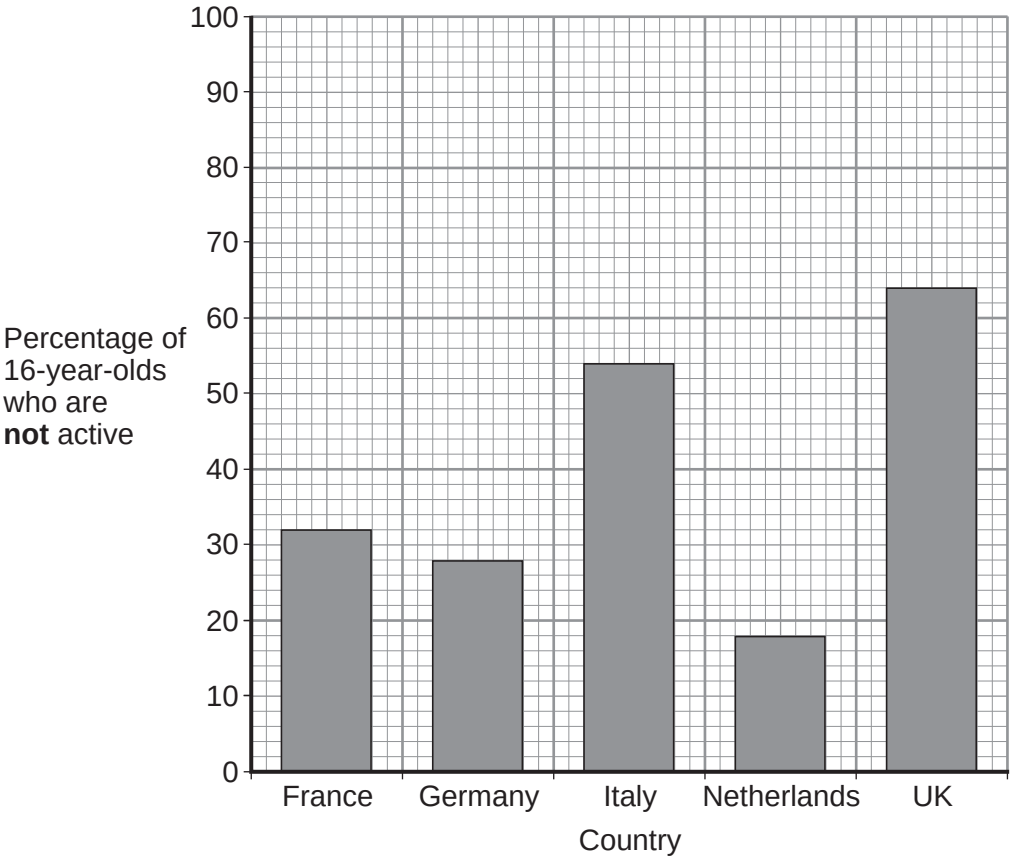
June 2015 | BL1FP | Original Q2 | Legacy

2 Scientists investigated the effect of different factors on health.

2 (a) People who are **not** active may have health problems.

Figure 3 shows the percentage of 16-year-olds in some countries who are **not** active.

Figure 3



2 (a) (i) What percentage of 16-year-olds in the UK are **not** active?

[1 mark]

..... %

2 (a) (ii) What percentage of 16-year-olds in the UK are **active**?

[1 mark]

..... %

2 (a) (iii) A newspaper headline states:

People in the UK are the laziest in the world.

Information in **Figure 3** does **not** support the newspaper headline.

Suggest **one** reason why the newspaper headline may be wrong.

[1 mark]

.....

.....

2 (b) Doctors gave a percentage rating to the health of 16-year-olds.
100% is perfect health.

Table 2 shows the amount of exercise 16-year-olds do and their health rating.

Table 2

Amount of exercise done in minutes every week	Health rating as %
Less than 30	72
90	76
180	82
300	92

What conclusion can be made about the effect of exercise on health?

Use information from **Table 2**.

[1 mark]

.....

.....

Question 2 continues on the next page

4.3.1.6 Human defence systems

Question 09 · continued

2 (c) Inherited factors can also affect health.

Give **one** health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

[1 mark]

being malnourished	**having a high cholesterol level**	**having a deficiency disease**

2 (d) White blood cells are part of the immune system.

Use the correct answer from the box to complete each sentence.

antibiotics	**antibodies**	**pathogens**	**vaccines**

2 (d) (i) When we are ill, white blood cells produce ..... to kill microorganisms.

[1 mark]

2 (d) (ii) Many strains of bacteria, including MRSA, have developed resistance to drugs called ..... .

[1 mark]

7

4.3.1.6 Human defence systems

Question 10

June 2017 | BL1FP | Original Q5 | Legacy

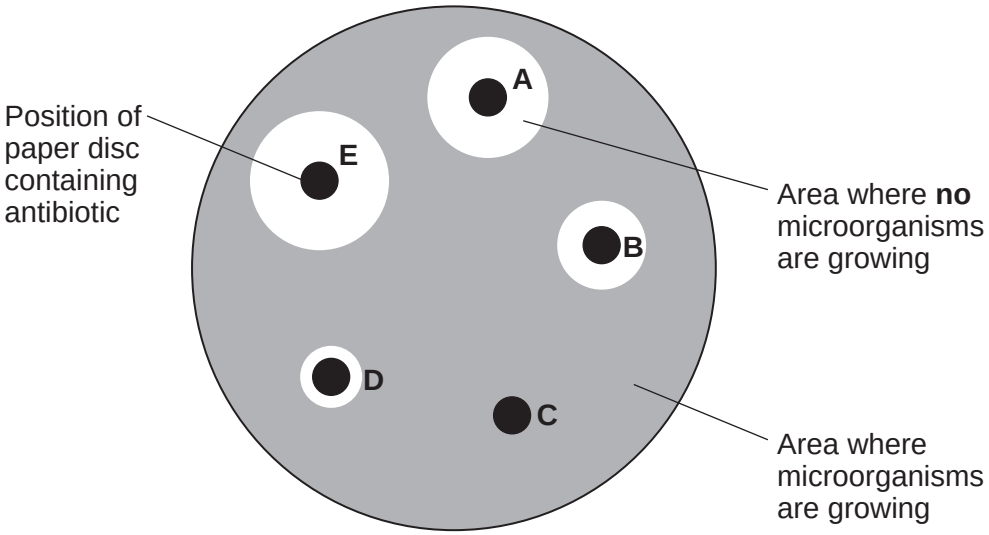
5 Some students investigated antibiotics.

The students:

- spread one type of microorganism on a sterile Petri dish containing an agar culture medium
- added five paper discs, each with one drop of a different antibiotic, **A**, **B**, **C**, **D** and **E**
- secured the lid on the dish with adhesive tape
- incubated the dish for 3 days at 25° C.

Figure 6 shows the Petri dish after the 3 days.

Figure 6



5 (a) Give **one** safety precaution that the students used in their investigation.

State why this safety precaution is needed.

[2 marks]

Safety precaution used _____

_____

Why the safety precaution is needed _____

_____

Question 10 · continued

5 (b) One student made a conclusion:

'Doctors should always give antibiotic **E** to get rid of any disease.'

5 (b) (i) Describe the evidence from **Figure 6** which supports the student's conclusion.

[1 mark]

_____

_____

5 (b) (ii) Suggest **one** reason why the student's conclusion may **not** be correct.

[1 mark]

_____

_____

5 (c) Antibiotics can be given to farm animals as well as to humans.

Table 2 shows the mass of different antibiotics that have been given to farm animals and to humans.

Table 2

Antibiotic	Mass of antibiotic in kilograms	
	Given to farm animals	Given to humans
A	121 600	314 500
B	323 000	47 500
C	37 000	5 400
D	71 200	47 700
E	42 000	49 000

5 (c) (i) Write down **all** of the antibiotics, **A**, **B**, **C**, **D** or **E**, which have been used **more** for farm animals than for humans.

[1 mark]

_____

Question 5 continues on the next page

4.3.1.6 Human defence systems

Question 10 · continued

5 (c) (ii) Farmers in some countries use antibiotics to prevent disease in farm animals. This prevents the animals becoming ill or dying.

Suggest **one** other advantage to the farmer of giving antibiotics to farm animals.

[1 mark]

Tick (✓) **one** box.

The antibiotics will be passed to people who consume the animals. ☐

Healthy animals will produce a higher yield. ☐

The antibiotics will build up in the animals. ☐

5 (c) (iii) What is the possible effect of using too much antibiotic?

[1 mark]

Tick (✓) **one** box.

Animals become resistant to the antibiotic. ☐

Microorganisms become resistant to the antibiotic. ☐

People become immune to the antibiotic. ☐

People become resistant to the antibiotic. ☐

5 (d) The human body defends itself against pathogens using one type of blood cell.

5 (d) (i) Complete the sentence.

[1 mark]

Pathogens in the body can be killed by _____ blood cells.

4.3.1.6 Human defence systems

Question 10 · continued

5 (d) (ii) Give **two** ways in which the blood cells you have named in part **(d)(i)** protect the body from disease.

[2 marks]

Tick (✓) **two** boxes.

These blood cells produce antibiotics. ☐

These blood cells produce antibodies. ☐

These blood cells ingest pathogens. ☐

These blood cells reproduce pathogens. ☐

These blood cells produce toxins. ☐

10

4.3.1.6 Human defence systems

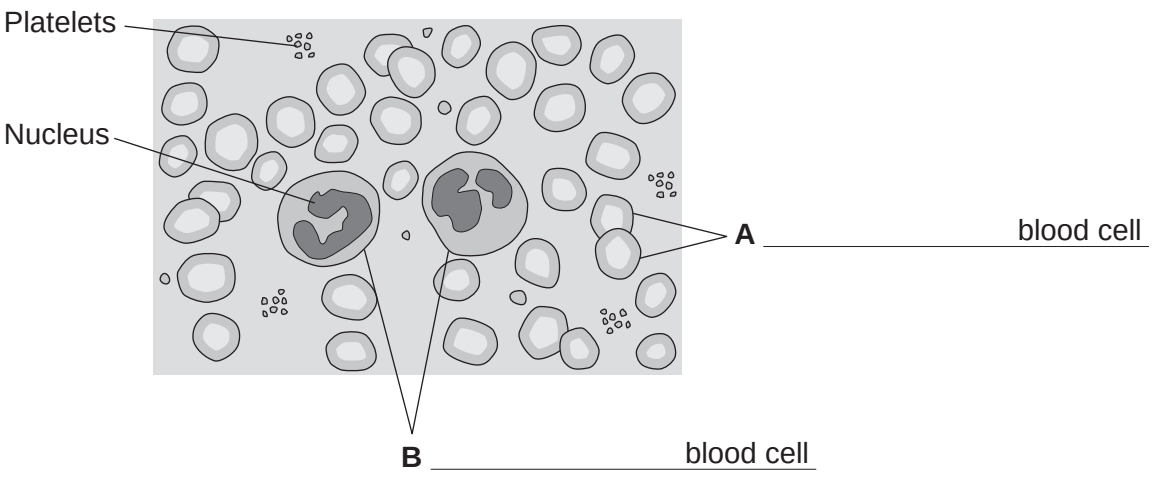
Question 11

June 2017 | BL3FP | Original Q3 | Legacy

3 Blood is a tissue.

Figure 4 is a diagram of the parts of the blood.

Figure 4



3 (a) **A** and **B** are different types of blood cell.

Label cells **A** and **B** in **Figure 4**.

[2 marks]

3 (b) A man has a bad cut on his arm that continues to bleed.

The man goes to hospital and has a blood test.

Table 1 shows the results of the man's blood test.

Table 1

Blood test results

Test	Normal range	Result	Healthy	Abnormal
Platelets	140 – 400	98		✓
Cholesterol	112 – 328	297	✓	
Iron	12 – 300	120	✓	

4.3.1.6 Human defence systems

Question 11 · continued

3 (b) (i) Use information from **Table 1** and your own knowledge to explain why the man's cut does not stop bleeding.

[2 marks]

_____

_____

_____

_____

_____

3 (b) (ii) The doctor gives the man a blood transfusion.

Suggest why the blood needs to be the same blood group as the man.

[1 mark]

Tick (✓) **one** box.

So the donor is not harmed ☐

To prevent rejection of the new blood cells ☐

To reduce the number of blood cells ☐

To suppress the immune system ☐

3 (c) Blood plasma carries substances around the body.

Use the correct answers from the box to complete the sentences.

[3 marks]

bladder	**carbon dioxide**	**kidneys**	**lungs**
oxygen	**small intestine**	**starch**	

Blood plasma carries _____ from the organs to the lungs.

Blood plasma carries the soluble products of digestion from the _____ to other organs.

Blood plasma carries urea from the liver to the _____ to be removed.

8

4.3.1.6 Human defence systems

Question 12

November 2020 | 8461/1F | Original Q3

0 3 The human body can defend itself against microorganisms that cause disease.

Viruses are one type of microorganism that cause disease.

0 3 . 1 Name **one** type of microorganism that causes disease in humans.

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

[1 mark]

---

0 3 . 2 Which **two** defence systems prevent microorganisms infecting the human body?

[2 marks]

Tick (✓) **two** boxes.

- Air is warmed as it is breathed into the lungs. ☐
- Hairs on the skin trap microorganisms. ☐
- Hydrochloric acid is produced by the stomach. ☐
- Teeth in the mouth crush and kill microorganisms. ☐
- The skin is a barrier covering the whole body. ☐

0 3 . 3 If microorganisms enter the human body the immune system can destroy the microorganisms.

How does the immune system destroy microorganisms?

[1 mark]

Tick (✓) **one** box.

- Platelets kill the microorganisms. ☐
- Red blood cells stick to the microorganisms. ☐
- White blood cells engulf the microorganisms. ☐

4.3.1.6 Human defence systems

Question 12 · continued

0 3 . 4 Vaccinations prevent people becoming ill with diseases such as measles.

Complete the sentences.

[2 marks]

Choose answers from the box.

active	fast	resistant	slow	weakened

In a vaccine the measles virus is _____.

If the measles virus enters the body after vaccination the immune system reaction will be _____.

0 3 . 5 How is the measles virus spread from one person to another?

[1 mark]

_____

_____

Question 3 continues on the next page

Question 12 · continued

Doctors investigated the spread of the virus that causes chickenpox.

The first symptom of chickenpox after exposure to the virus is spots on the body.

23 children were playing together at a party.

On the day of the party one of the children developed chickenpox spots.

Every two days after the party, the doctors recorded when the other 22 children first showed chickenpox spots.

Table 1 shows the results.

Table 1

Day when chickenpox spots first showed	Number of children
2	0
4	0
6	0
8	0
10	1
12	1
14	6
16	4
18	2
20	0
Total	**14**

0 3 . 6 What was the range for the days on which children first showed chickenpox spots?

Use **Table 1**.

[1 mark]

From day _____ to day _____

0 3 . 7 Incubation time is the usual time from exposure to a pathogen until the first symptoms appear.

Suggest the most likely incubation time for chickenpox.

[1 mark]

Incubation time = _____ days

4.3.1.6 Human defence systems

Question 12 · continued

0 3 . 8 Suggest **one** reason why some of the children did **not** develop chickenpox.

[1 mark]

0 3 . 9 One mother gave antibiotics to her child who had chickenpox.

Suggest why this child did **not** recover more quickly than the other children who had chickenpox.

[1 mark]

11

Turn over for the next question

4.3.1.6 Human defence systems

Question 13

June 2023 | 8461/1F | Original Q2

0 2 Viruses cause disease.

0 2 . 1 What name is given to microorganisms that cause disease?

[1 mark]

Tick (✓) **one** box.

- Pathogens ☐
- Predators ☐
- Producers ☐

0 2 . 2 The body has defences to stop viruses entering.

Draw **one** line from each defence to the part of the body that provides the defence.

[2 marks]

Defence	Part of the body that provides the defence
A physical barrier that stops viruses entering	Brain
Mucus that traps viruses	Heart
	Nose
	Skin

4.3.1.6 Human defence systems

Question 13 · continued

Some viruses can cause tumours to develop.

0 2 . 3 Complete the sentence.

Choose the answer from the box.

[1 mark]

digestion	division	metabolism

A tumour can form when changes to cells cause uncontrolled cell _____.

0 2 . 4 Malignant tumours are cancers.

Which **two** sentences describe malignant tumours?

[2 marks]

Tick (✓) **two** boxes.

- Malignant tumours are only found in the reproductive system. ☐
- Malignant tumours contain digestive enzymes. ☐
- Malignant tumours do not change in size. ☐
- Malignant tumours have cells that can spread to other parts of the body. ☐
- Malignant tumours may form secondary tumours. ☐

Question 2 continues on the next page

Question 13 · continued

HPV is a virus that can cause one type of cancer in females.

In the UK since 2008, most 12 to 13-year-old females have been vaccinated against HPV.

Scientists investigated the percentage of 16 to 18-year-old females with HPV.

Table 2 shows the results.

Table 2

Year	Percentage (%) of 16 to 18-year-old females with HPV
2010	8.2
2012	3.2
2014	2.0
2016	1.6

0 2 . 5 What does **Table 2** show about the percentage of females with HPV from 2010 to 2016?

[1 mark]

0 2 . 6 Suggest the reason for the change you described in Question **02.5**.

[1 mark]

4.3.1.6 Human defence systems

Question 13 · continued

The HPV vaccine contains an inactive form of the virus.

The inactive form of the virus is injected into the body.

0 2 . 7 Which part of the blood responds to the inactive virus?

[1 mark]

Tick (✓) **one** box.

- Platelets ☐
- Red blood cells ☐
- White blood cells ☐

0 2 . 8 What is produced by the body in response to the inactive virus?

[1 mark]

Tick (✓) **one** box.

- Antibiotics ☐
- Antibodies ☐
- Antiseptics ☐

0 2 . 9 Suggest **one** reason why some **parents** refuse to allow their children to have the HPV vaccine.

Do **not** refer to the pain of the injection in your answer.

[1 mark]

_____

_____

11

4.3.1.6 Human defence systems

Question 14

0 2 Pathogens cause disease.

0 2 . 1 How does the skin defend the human body against pathogens?

[1 mark]

The stomach contains acid to kill pathogens.

A scientist investigated the effect of acid on the survival of bacteria.

This is the method used.

1. Prepare four test tubes each with 10 cm^3 of culture solution.
2. Use acid to adjust the pH of the solutions to be pH1, pH2, pH3 and pH5
3. Add 1 cm^3 of bacteria mixture to each test tube.
4. Take a 0.1 cm^3 sample from each test tube and record the number of live bacteria.
5. Keep the test tubes at 37 °C for 24 hours.
6. Repeat step 4.

Table 1 shows some of the results.

Table 1

Time in hours	Number of live bacteria			
	pH1	pH2	pH3	pH5
0	210	210	210	216
24	23	**X**	63	185

4.3.1.6 Human defence systems

Question 14 · continued

0 2 . 2 What fraction of the bacteria present at 0 hours for **pH3** survived for 24 hours?

Give your answer in its simplest form.

[2 marks]

Fraction surviving = _____

0 2 . 3 How many more bacteria were killed at pH1 than at pH5 in 24 hours?

Complete the following steps.

[3 marks]

Calculate the number of bacteria killed at pH1 _____

Calculate the number of bacteria killed at pH5 _____

Calculate how many more bacteria were killed at pH1 than at pH5 _____

Number = _____

0 2 . 4 A student calculated value **X** in **Table 1** to be 43

Suggest how the student calculated this value.

[2 marks]

8

4.3.1.6 Human defence systems

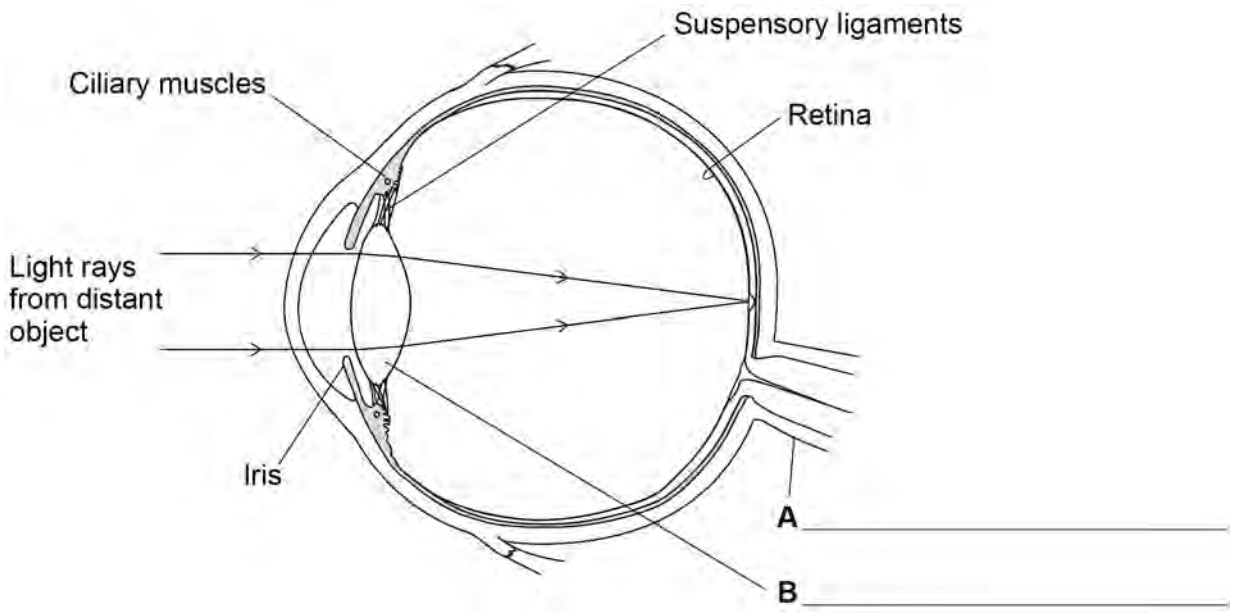
Question 15

June 2024 | 8461/2F | Original Q4

0 4 The human eye can make clear images of objects.

Figure 4 shows how the human eye focuses light rays from a distant object onto the retina.

Figure 4



0 4 . 1 Label structures **A** and **B** on **Figure 4**.

Choose answers from the box.

[2 marks]

cornea	**lens**	**optic nerve**	**sclera**

The eye in **Figure 4** is focused on a distant object.

0 4 . 2 Complete the sentence.

Choose the answer from the box.

[1 mark]

contract	**expand**	**stretch**

To focus on a **near** object the ciliary muscles _____.

4.3.1.6 Human defence systems

Question 15 · continued

0 4 . 3 Complete the sentence.

Choose the answer from the box.

[1 mark]

longer	**thicker**	**thinner**

To focus on a **near** object structure **B** in **Figure 4**

becomes _____.

0 4 . 4 The eye in **Figure 4** is looking at an object in dim light.

Complete the sentence.

Choose the answer from the box.

[1 mark]

iris	**retina**	**suspensory ligaments**

When the eye looks at an object in **bright** light the pupil gets smaller.

The size of the pupil is controlled by the _____.

0 4 . 5 The retina is sensitive to light.

How does information from the retina reach the brain via structure **A** in **Figure 4**?

[1 mark]

_____

_____

Question 4 continues on the next page

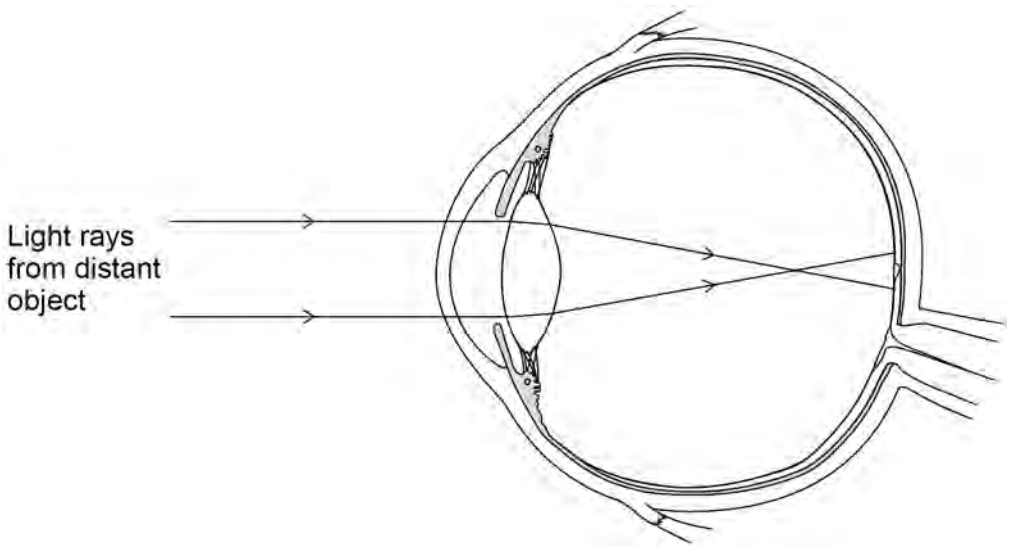
4.3.1.6 Human defence systems

Question 15 · continued

Figure 5 shows the eye of a person who is short sighted looking at a distant object.

The person **cannot** see the object clearly.

Figure 5



0 4 . 6 Give the reason why the person **cannot** see the object clearly.

[1 mark]

0 4 . 7 Short sightedness can be corrected using spectacle lenses.

Give **one** other way short sightedness can be corrected.

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

[1 mark]

8