AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.3

The eye (biology only)

Past-paper questions

Tier	**Foundation**
Question groups	**12**
Available paper years	**2008–2024**

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.

4.5.2.3 The eye (biology only)

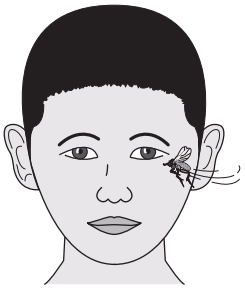
Question 01

June 2008 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

This question is about reflex actions.

An insect flies near to the eyes of a boy.



The boy blinks his eyes very quickly.

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

A blinking

B cells in the eye

C insect

D muscle in the eyelid

1	effector
2	response
3	stimulus
4	receptor

4.5.2.3 The eye (biology only)

Question 02

June 2008 | BLY2F | Original Q4 | Legacy

4 The volume of water that the body loses must balance the volume of water that it gains.

Tables 1 and **2** show losses and gains of water by the body in one day.

Table 1
Losses of water by the body

Method	Volume in cm^3
breathing	300
sweating	600
faeces	100
urine	
Total	**2400**

Table 2
Gains of water by the body

Method	Volume in cm^3
drinking	1300
food	800
chemical reactions	300
Total	**2400**

4 (a) (i) Calculate the volume of urine lost by the body.

Show clearly how you work out your answer.

.....

.....

Volume of urine lost by the body = ... cm^3

(2 marks)

4 (a) (ii) What proportion of water gained by the body comes from food?

Put a tick (✓) in the box next to your choice.

$\frac{1}{4}$ ☐

$\frac{1}{3}$ ☐

$\frac{1}{2}$ ☐

(1 mark)

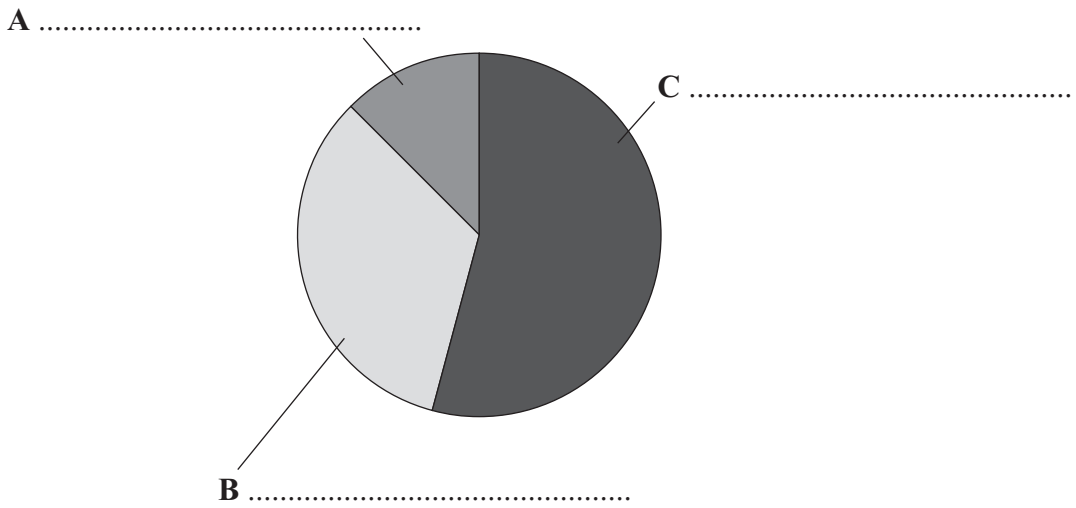
4.5.2.3 The eye (biology only)

Question 02 · continued

for mark

4 (b) One pupil decided to show the figures from **Table 2** as a pie chart.

Label sections **A**, **B** and **C** of the pie chart.



(1 mark)

4 (c) How does sweating help the body?

.....

.....

(1 mark)

4 (d) On a hotter day, the volumes of water lost and gained will be different.

What differences will there be?

Tick (✓) **two** answers from the list.

More sweat produced ☐

More faeces produced ☐

More food eaten ☐

Less urine produced ☐

Less liquid drunk ☐

(2 marks)

7

4.5.2.3 The eye (biology only)

Question 03

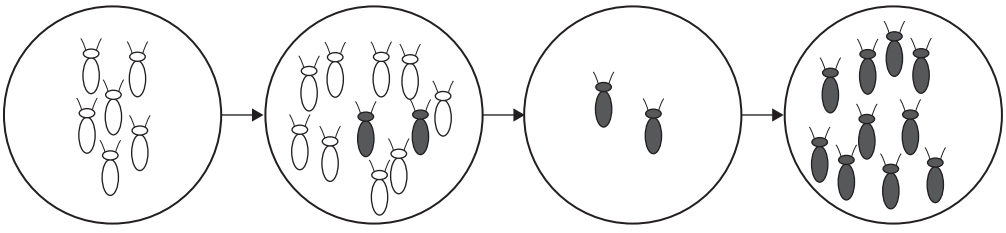
March 2009 | BLY1BP | Original Q9 | Legacy

QUESTION NINE

Head lice are insects that live in human hair. Hair can be treated with special shampoo containing an insecticide that kills head lice.

The diagrams show the development of the population of a new strain of head lice that appeared in the hair of pupils attending the same school.

Each diagram represents the number of head lice that were found in the hair of the pupils of one class at intervals over several months.



Stage P
Original population of head lice

Stage Q
Offspring of adults from **Stage P**

Stage R
Population after pupils were treated with shampoo containing the insecticide

Stage S
Population one month later

Key:  and represent different strains of head lice.

9A A mutation that produced a new strain of head lice occurred . . .

1 during **Stage R**.

2 between **Stage P** and **Stage Q**.

3 between **Stage Q** and **Stage R**.

4 between **Stage R** and **Stage S**.

4.5.2.3 The eye (biology only)

Question 03 · continued March 2009 | BLY1BP | Original Q9 | Legacy

9B The head lice in **Stage R** . . .

1 must be impossible to kill.

2 must be unable to reproduce.

3 have identical genes to those in **Stage P**.

4 must be resistant to the insecticide in the shampoo.

9C The composition of the population of head lice at **Stage R** is due to . . .

1 competition.

2 camouflage.

3 genetic engineering.

4 natural selection.

9D The head lice at **Stage S** will continue to multiply until . . .

1 all of them die through lack of food.

2 all of them change back to the strain shown in **Stage P**.

3 a new insecticide is developed.

4 they suffer from overcrowding.

END OF TEST

4.5.2.3 The eye (biology only)

Question 04

November 2009 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

A student designed an investigation to test two hypotheses about operating a remote-controlled car round a circuit.

Hypothesis 1
16-year-old boys would operate the car at a faster speed than 16-year-old girls.

Hypothesis 2
Boys and girls would make the same number of mistakes while operating the car.

This is the design of the student's investigation.

- Give a brief demonstration on how to operate the car.
- Let the person practise for one minute.
- Put the car at the starting point.
- When the person is ready, say 'go' and start the stopwatch.
- While the person operates the car, record the number of mistakes made and the time taken to complete the circuit.

She tested 27 boys and 28 girls.

9A The student got her idea for her second hypothesis from one of her teachers. This teacher said, 'some friends of mine have told me that nowadays both boys and girls operate remote-controlled cars'.

The teacher's statement is an example of . . .

1 hearsay.

2 a model.

3 a theory.

4 a survey.

Question 04 · continued

9B Which variable was **not** the same for both groups of pupils?

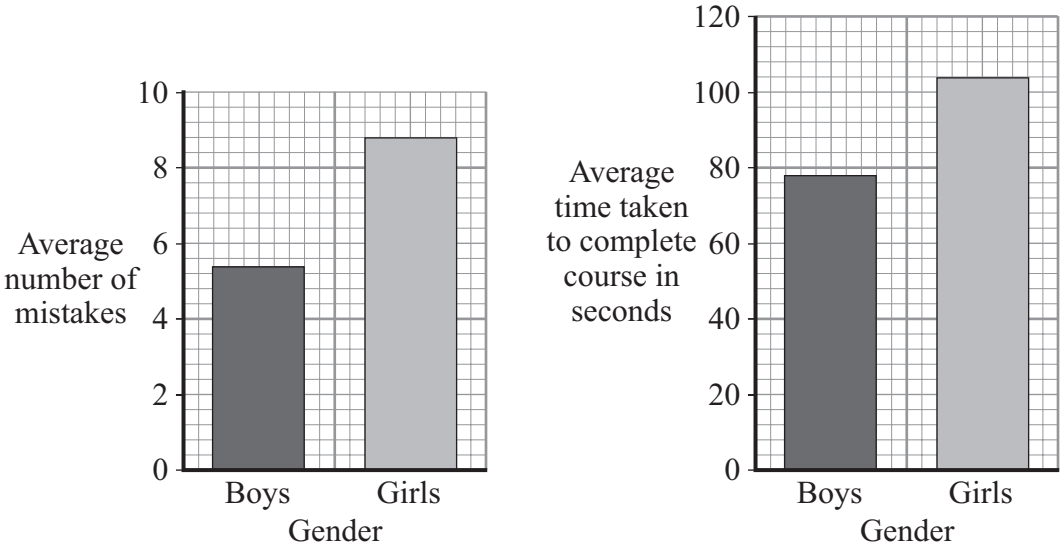
1 age of the pupils

2 number of pupils

3 practice time

4 length of the course

The graphs show the student's results.



9C What was the difference between the average number of mistakes made by boys and the average number of mistakes made by girls?

1 1.7

2 3.2

3 3.4

4 3.6

9D Which of the following is supported by the student's data?

1 hypothesis 1 only

2 hypothesis 2 only

3 both hypothesis 1 and hypothesis 2

4 neither hypothesis 1 nor hypothesis 2

END OF TEST

4.5.2.3 The eye (biology only)

Question 05

January 2010 | BLY2F | Original Q5 | Legacy

5 A group of pupils investigated the digestion of fat by the enzyme lipase.

5 (a) What **two** substances are produced when fats are digested?

Tick (✓) **two** boxes.

Glucose ☐

Fatty acids ☐

Glycerol ☐

Amino acids ☐

(2 marks)

In the investigation:

- the pupils set up five test tubes
- each tube contained 1 cm^3 of fat and 10 cm^3 of lipase solution
- each tube was kept at a different temperature for 24 hours.

5 (b) (i) Give **one** control variable in this investigation.

.....

(1 mark)

5 (b) (ii) What was the independent variable being investigated?

.....

(1 mark)

5 (c) The pH of the solution in each tube was tested at the beginning of the investigation and after 24 hours.

The results of the pupils' investigation are shown in the table.

Tube	Temperature in °C	pH at the beginning	pH after 24 hours
1	0	Neutral	Neutral
2	20	Neutral	'Weak' acid
3	40	Neutral	'Strong' acid
4	60	Neutral	'Weak' acid
5	80	Neutral	Neutral

4.5.2.3 The eye (biology only)

Question 05 · continued

for mark

One pupil said, "We might **not** have found the best temperature for the lipase to work".

What more could they do to find the best temperature?

.....

.....

.....

.....

.....

(2 marks)

5 (d) The pupils then placed **Tube 1** into a water-bath kept at 40 °C.
The tube was left in the water-bath for 24 hours.

5 (d) (i) What pH would you expect the contents of the tube to be after the extra 24 hours?

Tick (✓) **one** box.

Neutral ☐

'Strong' acid ☐

'Weak' acid ☐

(1 mark)

5 (d) (ii) Give the reason for your answer.

.....

.....

(1 mark)

8

4.5.2.3 The eye (biology only)

Question 06

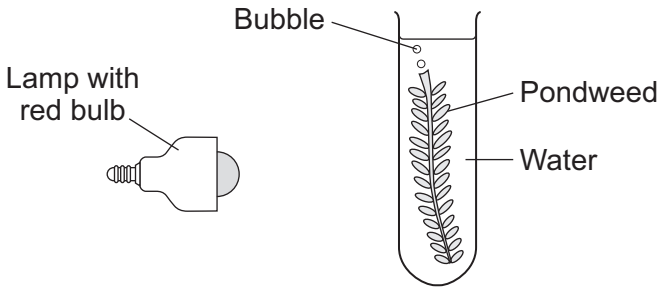
January 2011 | BLY2F | Original Q7 | Legacy

7 A group of pupils investigated the way in which the colour of light affects photosynthesis.

The pupils:

- put a piece of pondweed into a test tube of water
- shone light from a lamp with a red light bulb onto the pondweed
- counted the bubbles of gas produced by the pondweed every minute for three minutes.

The diagram shows the experiment.



The pupils repeated their experiment using a yellow light bulb, a green light bulb and a blue light bulb.

7 (a) (i) What was the independent variable in the investigation?

.....

(1 mark)

7 (a) (ii) To make the investigation fair the pupils needed to control some variables.

Suggest **one** variable that the pupils should have controlled during their investigation.

.....

(1 mark)

7 (a) (iii) It is better to count the bubbles every minute for three minutes than to count all the bubbles in three minutes.

Why?

.....

.....

(1 mark)

4.5.2.3 The eye (biology only)

Question 06 · continued

7 (b) The table shows the pupils' results.

Colour of bulb	Number of bubbles produced in one minute			
	1st minute	2nd minute	3rd minute	Mean
Red	24	19	21	21
Yellow	18	14	15	16
Green	6	4	3	4
Blue	32	34	32	33

Algae are tiny organisms that photosynthesise.
In natural light algae grow very quickly on the sides of a fish tank.
The algae make it difficult to see the fish.

7 (b) (i) What would be the best colour of light bulb to illuminate the fish tank to reduce the growth of algae?

Use the results in the table to help you to decide.

Draw a ring around **one** answer.

red **yellow** **green** **blue**

(1 mark)

7 (b) (ii) Explain why the colour you have chosen is the best.

.....

.....

.....

.....

(2 marks)

6

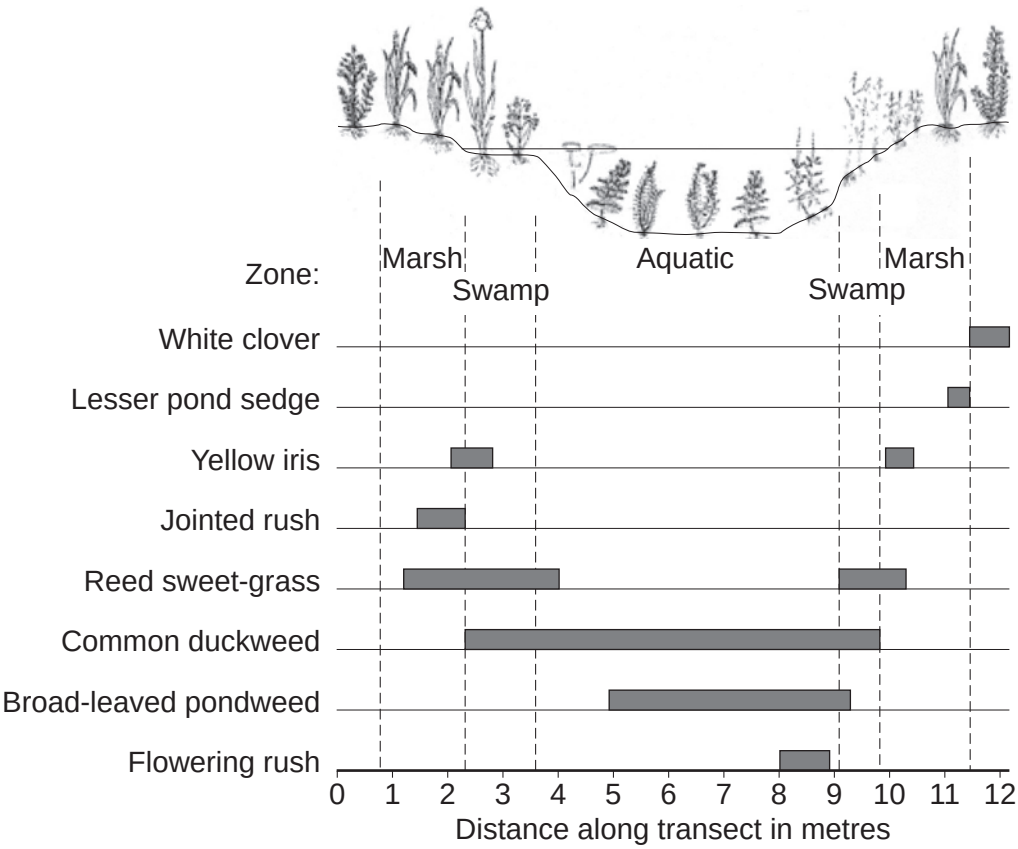
4.5.2.3 The eye (biology only)

Question 07

June 2012 | BL2FP | Original Q8 | Legacy

8 Some students investigated the distribution of some of the plants growing in and around a shallow stream. They sampled along a transect line.

The diagram shows their results.



8 (a) (i) Name the **one** species that grew only in the driest conditions.

.....

(1 mark)

8 (a) (ii) Only **one** species grew in the marsh, the swamp and in the aquatic zones.

Which species?

.....

(1 mark)

8 (a) (iii) Duckweed grows floating in water. What evidence is there for this in the students' results?

.....

.....

(1 mark)

4.5.2.3 The eye (biology only)

Question 07 · continued

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

Describe how you would use a $\frac{1}{2}$-metre $\times$ $\frac{1}{2}$-metre quadrat frame and a 30-metre tape measure to obtain data similar to the data shown in the diagram.

You should include details of how you would make sure that you would obtain valid results.

.....

.....

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.....

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.....

.....

(6 marks)

9

4.5.2.3 The eye (biology only)

Question 08

June 2018 | 8461/2F | Original Q9

0 9 Many human actions are reflexes.

0 9 . 1 Which **two** of the following are examples of reflex actions?

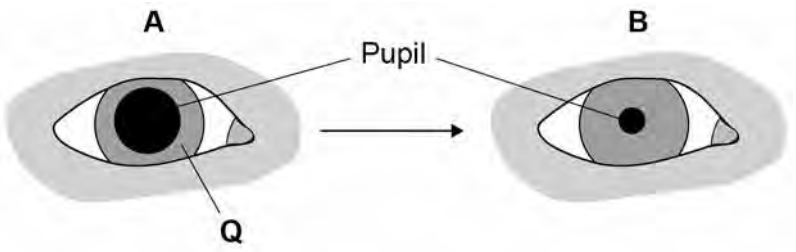
[2 marks]

Tick **two** boxes.

- Jumping in the air to catch a ball ☐
- Raising a hand to protect the eyes in bright light ☐
- Releasing saliva when food enters the mouth ☐
- Running away from danger ☐
- Withdrawing the hand from a sharp object ☐

Figure 12 shows how the size of the pupil of the human eye can change by reflex action.

Figure 12



0 9 . 2 Name **one** stimulus that would cause the pupil to change in size from **A** to **B**, as shown in **Figure 12**.

[1 mark]

_____

4.5.2.3 The eye (biology only)

Question 08 · continued

0 9 . 3 Structure **Q** causes the change in size of the pupil.

Name structure **Q**.

[1 mark]

_____

0 9 . 4 Describe how structure **Q** causes the change in the size of the pupil from **A** to **B**.

[1 mark]

_____

_____

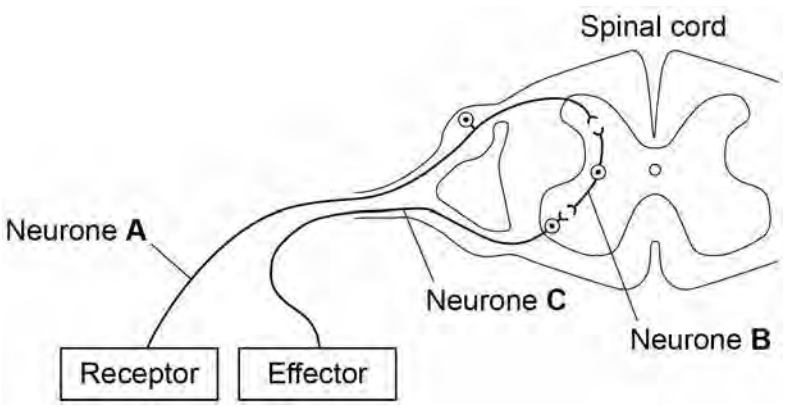
Question 9 continues on the next page

4.5.2.3 The eye (biology only)

Question 08 · continued

0 9 . 5 **Figure 13** shows some structures involved in the coordination of a reflex action.

Figure 13



Describe how the structures shown in **Figure 13** help to coordinate a reflex action.

[6 marks]

11

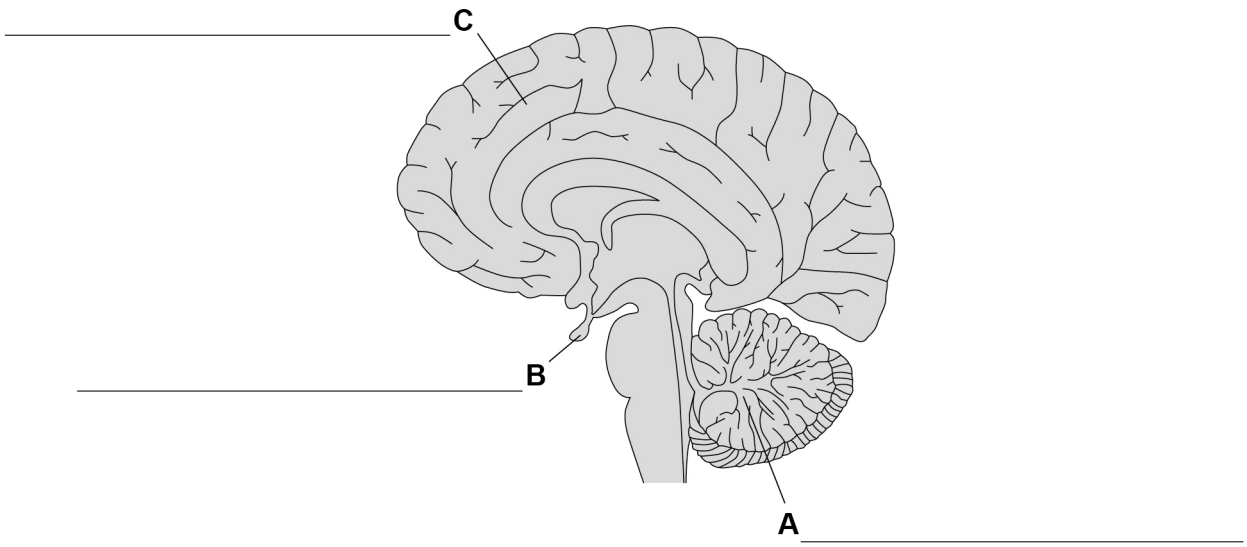
4.5.2.3 The eye (biology only)

Question 09

November 2020 | 8461/2F | Original Q5

0 5 **Figure 6** shows the brain.

Figure 6



0 5 . 1 Label **A**, **B** and **C** on **Figure 6**.

[3 marks]

Choose answers from the box.

cerebellum	**cerebral cortex**	**medulla**	**pituitary gland**

0 5 . 2 Which part of the brain controls balance when riding a bicycle?

[1 mark]

Tick (✓) **one** box.

Cerebellum ☐

Medulla ☐

Pituitary gland ☐

Question 5 continues on the next page

4.5.2.3 The eye (biology only)

Question 09 · continued

0 5 . 3 The ears send information about sound to the brain.

Which word describes the brain?

[1 mark]

Tick (✓) **one** box.

- Coordinator ☐
- Effector ☐
- Receptor ☐
- Stimulus ☐

0 5 . 4 What type of cell carries impulses from the ears to the brain?

[1 mark]

_____

0 5 . 5 Human eyes detect light.

Which part of the eye has cells that detect light?

[1 mark]

Tick (✓) **one** box.

- Iris ☐
- Lens ☐
- Retina ☐

4.5.2.3 The eye (biology only)

Question 09 · continued

0 5 . 6 The eyes of some birds have specialised cells to detect ultraviolet (UV) light.

Some fruits reflect UV light.

Explain why it is an advantage for birds to be able to detect UV light.

[2 marks]

Question 5 continues on the next page

4.5.2.3 The eye (biology only)

Question 09 · continued

Figure 7 shows a student reading a book.

Figure 7



There are trees on the far side of the field.

The student looks at the trees instead of looking at the book.

0 5 . 7 What process occurs in the eye when the student looks at the trees instead of looking at the book?

[1 mark]

Tick (✓) **one** box.

Accommodation ☐

Magnification ☐

Reflection ☐

4.5.2.3 The eye (biology only)

Question 09 · continued

0 5 . 8 What change happens in the student's eyes when they look up at the trees?

[1 mark]

Tick (✓) **one** box.

Light rays are refracted less ☐

More light is reflected ☐

The optic nerves move ☐

0 5 . 9 The student **cannot** see the trees in focus.

Name the common defect of the eye which causes distant objects to appear out of focus.

[1 mark]

_____

12

4.5.2.3 The eye (biology only)

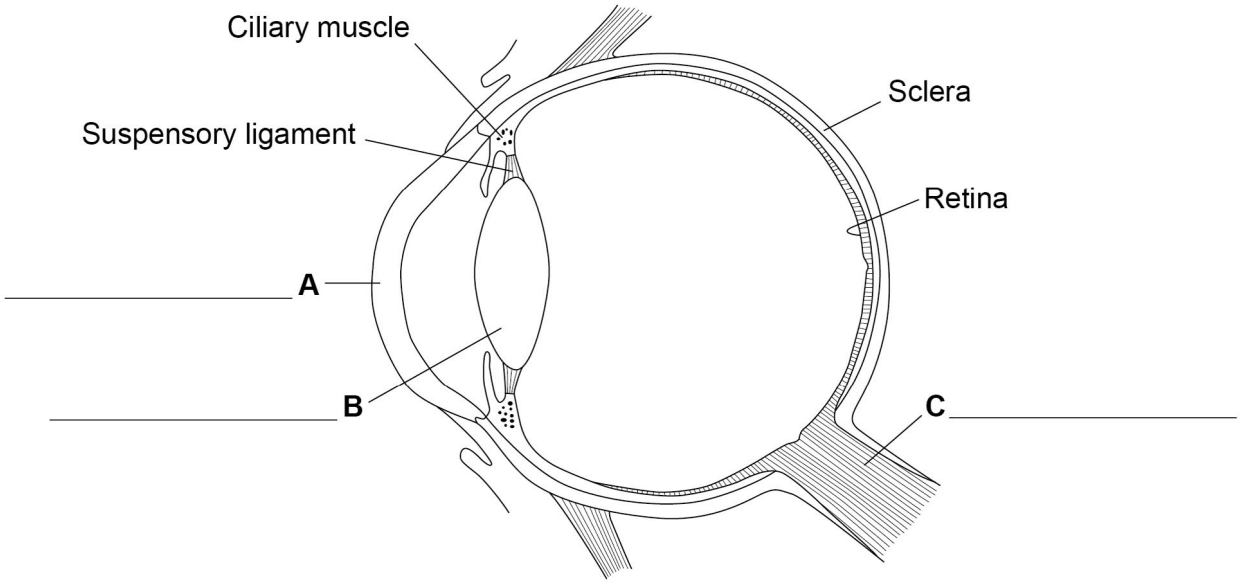
Question 10

November 2021 | 8461/2F | Original Q4

0 4 The human eye can form images of objects that are at different distances away from the eye.

Figure 7 is a diagram of the eye.

Figure 7



0 4 . 1 Label structures **A**, **B** and **C** on **Figure 7**.

[3 marks]

Choose answers from the box.

cornea	**eyelid**	**iris**	**lens**	**optic nerve**

4.5.2.3 The eye (biology only)

Question 10 · continued

The eye in **Figure 7** is focused on a distant object.

If the eye then focuses on the words in a book, changes would occur in the eye.

The light rays would be refracted more by the lens.

0 4 . 2 How does the lens refract the light more?

[1 mark]

Tick (✓) **one** box.

- By becoming longer ☐
- By becoming thicker ☐
- By becoming transparent ☐

0 4 . 3 Which **two** structures control the shape of the lens?

[2 marks]

Tick (✓) **two** boxes.

- Ciliary muscles ☐
- Cornea ☐
- Iris ☐
- Sclera ☐
- Suspensory ligaments ☐

0 4 . 4 To form a clear image, the light rays entering the eye must focus on one structure in the eye.

Name the structure.

[1 mark]

_____

Question 4 continues on the next page

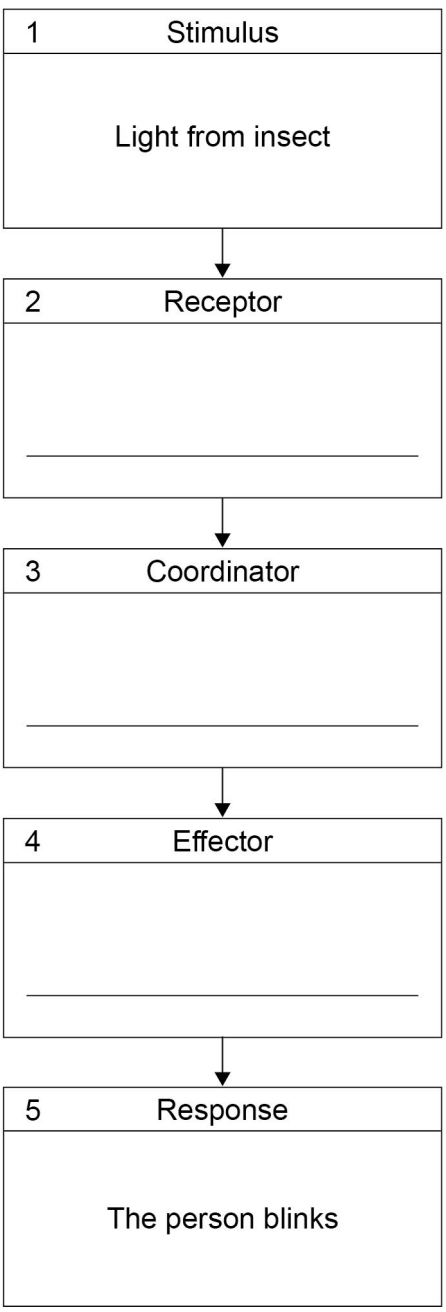
4.5.2.3 The eye (biology only)

Question 10 · continued

0 4 . 5 An insect flies near a person's eye. The person blinks.
This is a reflex action.

Figure 8 shows the coordination system for this reflex action.

Figure 8



Complete **Figure 8**.

[2 marks]

Choose answers from the box below.

Write **one** word in each of boxes **2**, **3** and **4** of **Figure 8**.

brain	**cornea**	**iris**	**muscles**	**retina**

9

4.5.2.3 The eye (biology only)

Question 11

June 2023 | 8461/2F | Original Q8

0 8 A person's eyes can focus on objects at different distances.

A person looks at a distant object.

The person then looks at a near object.

The person's eyes make adjustments so that the near object forms a clear image.

0 8 . 1 Which term describes the adjustment of focus from the distant object to the near object?

[1 mark]

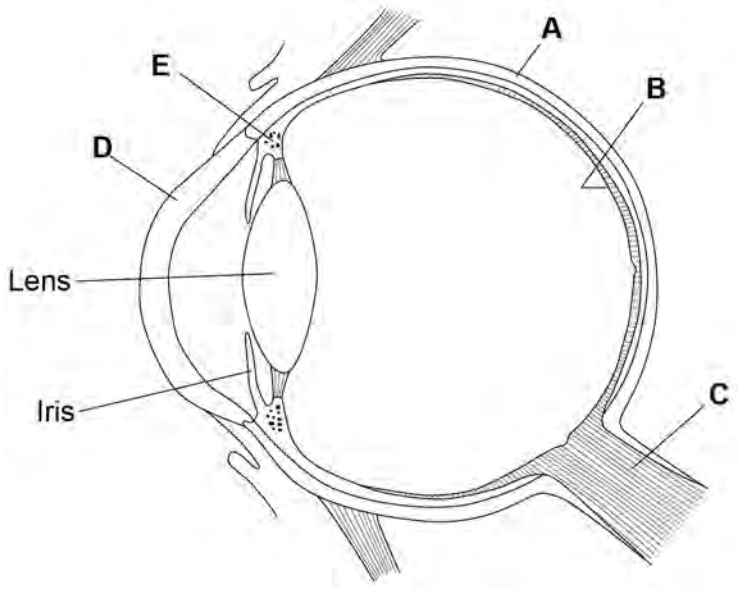
Tick (✓) **one** box.

- Accommodation ☐
- Adaptation ☐
- Hyperopia ☐
- Myopia ☐

Figure 14 shows the eye.

Figure 14

.



4.5.2.3 The eye (biology only)

Question 11 · continued

0 8 . 2 Which structure in **Figure 14** is where the image is focused?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 8 . 3 Which structure in **Figure 14** is a muscle that contracts when focusing on a near object?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 8 . 4 What happens to the shape of the lens when focusing on a near object?

[1 mark]

0 8 . 5 The eyes can function in dimly-lit areas and in brightly-lit areas.

The iris contains muscles.

Describe how muscles in the iris help the person to see clearly when moving from a dimly-lit area to a brightly-lit area.

[2 marks]

Question 8 continues on the next page

4.5.2.3 The eye (biology only)

Question 11 · continued

0 8 . 6 It is important to be able to react quickly.

Many people think that drinking coffee decreases reaction time.

Plan an investigation to test the effect of drinking coffee on reaction time.

You should include:

- the test for reaction time that you would use
- how to make the investigation valid.

[4 marks]

10

4.5.2.3 The eye (biology only)

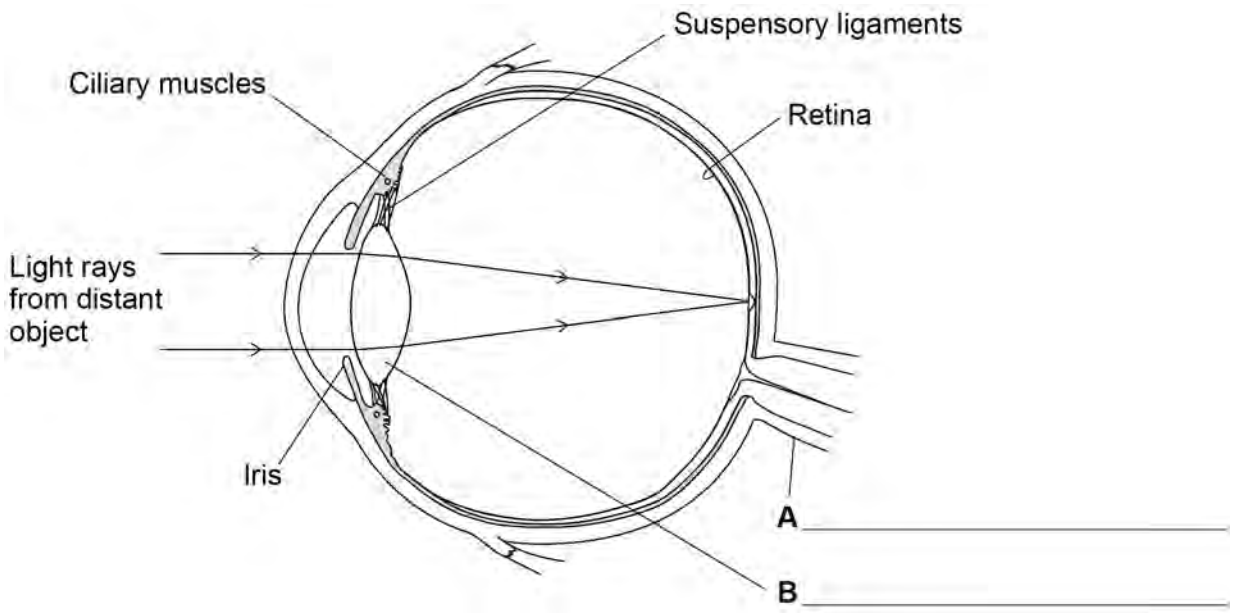
Question 12

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 _____.

4.5.2.3 The eye (biology only)

Question 12 · 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

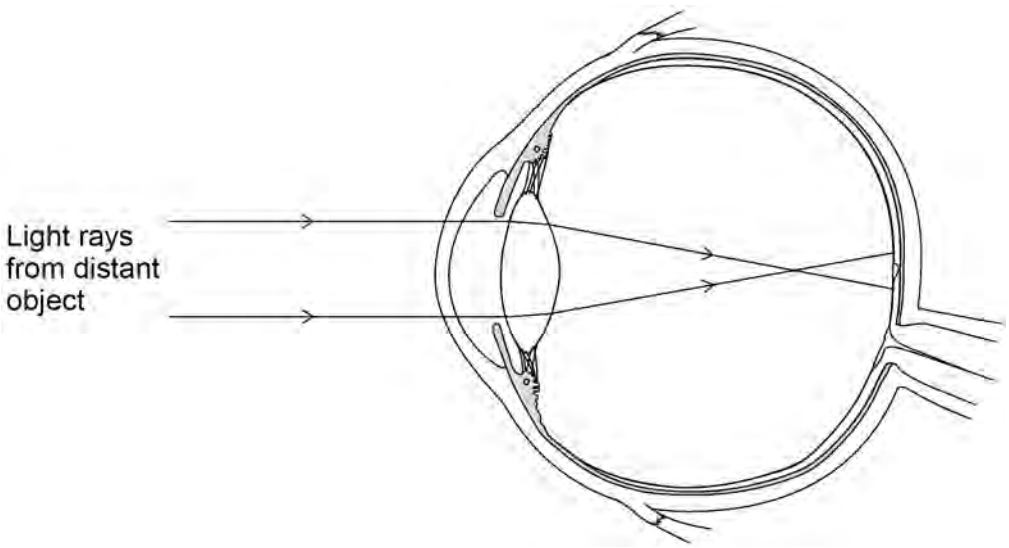
4.5.2.3 The eye (biology only)

Question 12 · 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