AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.3

The eye (biology only)

Past-paper questions

Tier	**Higher**
Question groups	**9**
Available paper years	**2009–2023**

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

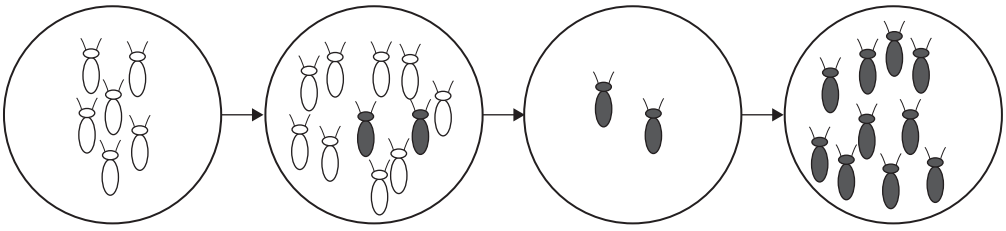
March 2009 | BLY1BP | Original Q4 | Legacy

QUESTION FOUR

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.

4A 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 01 · continued March 2009 | BLY1BP | Original Q4 | Legacy

4B 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.

4C The composition of the population of head lice at **Stage R** is due to . . .

1 competition.

2 camouflage.

3 genetic engineering.

4 natural selection.

4D 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.

4.5.2.3 The eye (biology only)

Question 02

November 2009 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

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.

4A 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 02 · continued

4B Which variable was **not** the same for both groups of pupils?

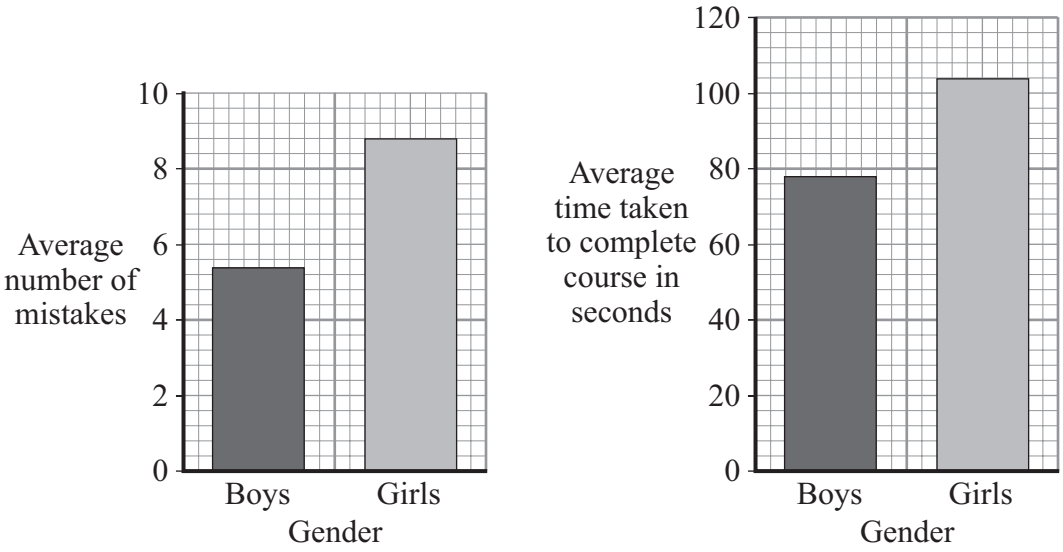
1 age of the pupils

2 number of pupils

3 practice time

4 length of the course

The graphs show the student's results.



4C 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

4D 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

4.5.2.3 The eye (biology only)

Question 03

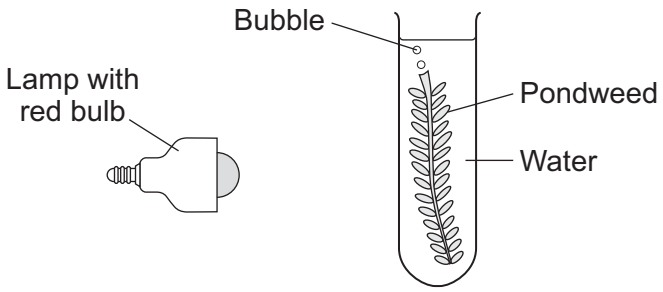
January 2011 | BLY2H | Original Q1 | Legacy

1 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.

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

.....

(1 mark)

1 (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)

1 (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 03 · continued

1 (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.

1 (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)

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

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(2 marks)

6

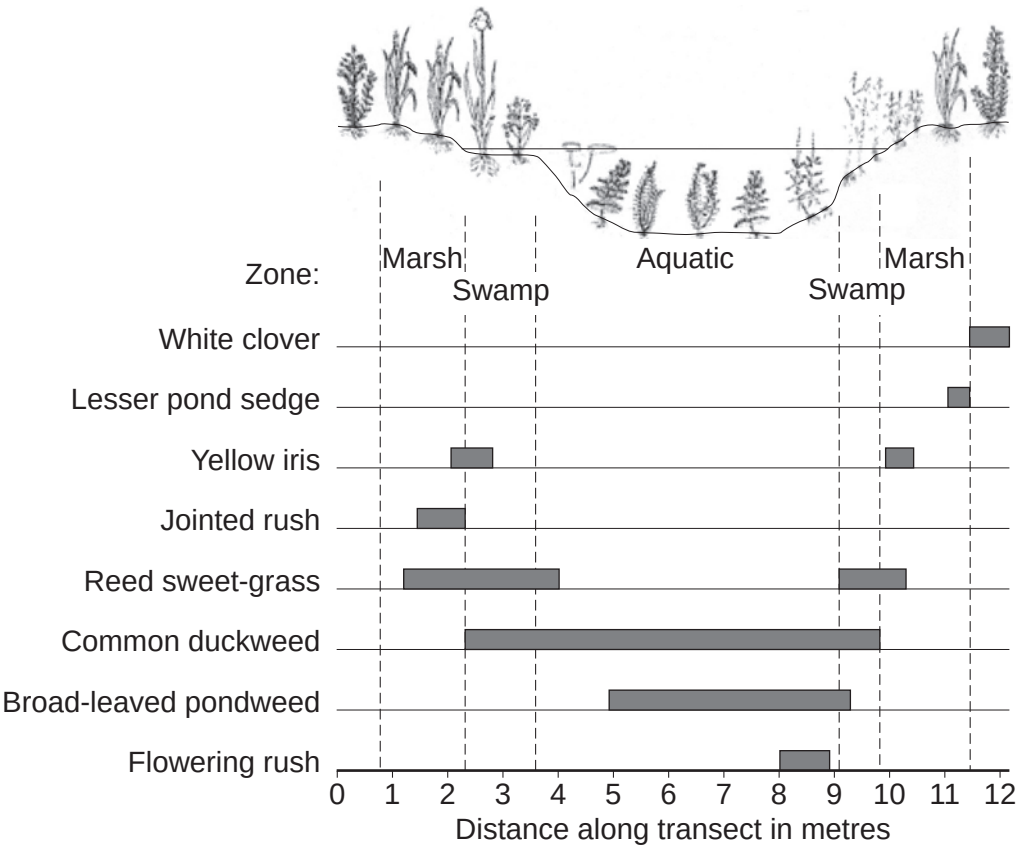
4.5.2.3 The eye (biology only)

Question 04

June 2012 | BL2HP | Original Q3 | Legacy

3 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.



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

.....

(1 mark)

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

Which species?

.....

(1 mark)

3 (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 04 · continued

3 (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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(6 marks)

9

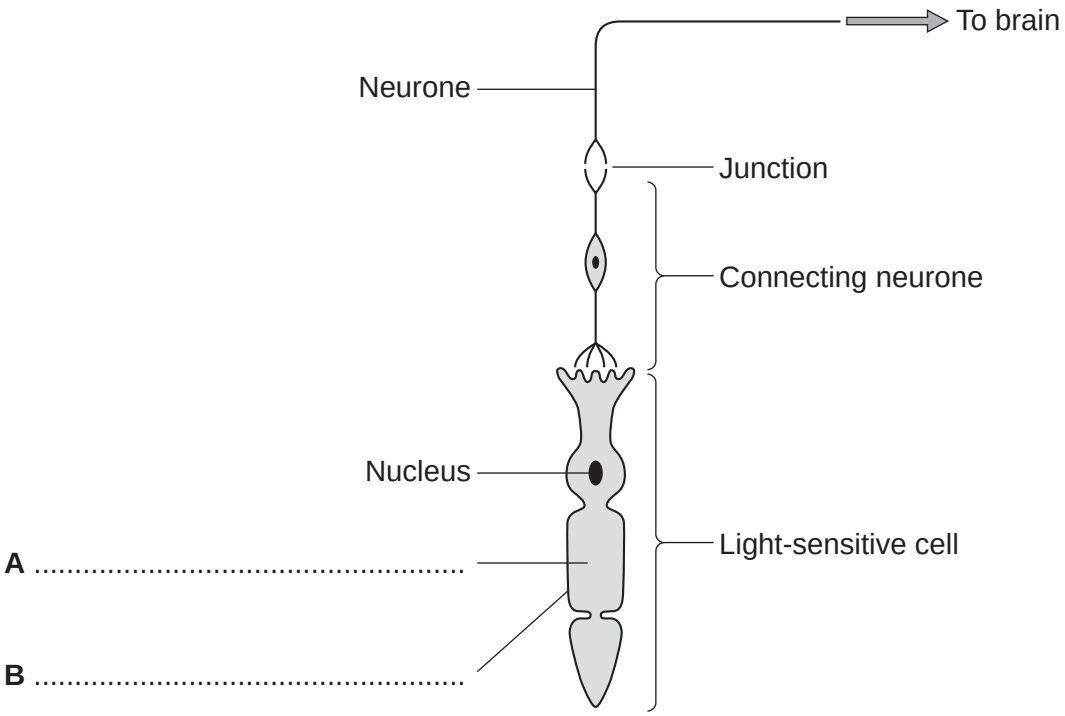
4.5.2.3 The eye (biology only)

Question 05

June 2013 | BL1HP | Original Q7 | Legacy

7 **Diagram 1** shows cells from the light-sensitive layer in the eye.

Diagram 1



7 (a) On **Diagram 1**, add labels to name part **A** and part **B** of the light-sensitive cell.

(2 marks)

7 (b) There is a junction between the connecting neurone and the neurone carrying the impulse to the brain.

7 (b) (i) What name is given to the junction?

.....

(1 mark)

7 (b) (ii) In what form is information passed across the junction?

.....

.....

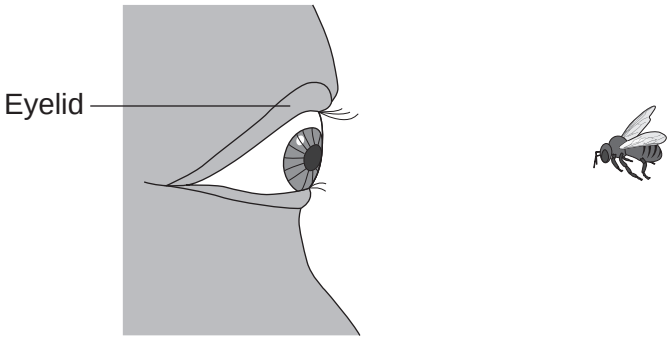
(1 mark)

4.5.2.3 The eye (biology only)

Question 05 · continued

7 (c) **Diagram 2** shows a bee flying towards a man's eye.

Diagram 2



In the *blink reflex*, light from the bee reaches the light-sensitive cell in the eye. The muscles in the eyelid shut the man's eye before the bee hits the eye.

Describe the pathway taken by the nerve impulse in the *blink reflex*.

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(4 marks)

8

4.5.2.3 The eye (biology only)

Question 06

June 2018 | 8461/2H | Original Q1

0 1 Many human actions are reflexes.

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

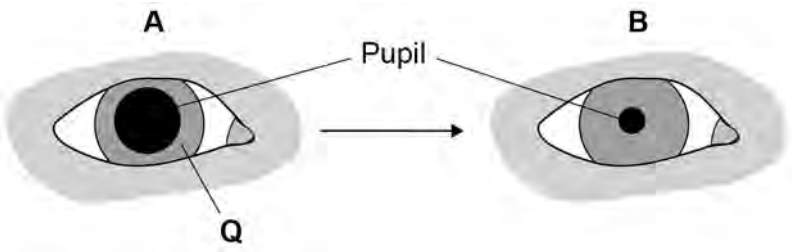
[2 marks]

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

Figure 1



0 1 . 2 Name **one** stimulus that would cause the pupil to change in size from **A** to **B**, as shown in **Figure 1**.

[1 mark]

_____

4.5.2.3 The eye (biology only)

Question 06 · continued

0 1 . 3 Structure **Q** causes the change in size of the pupil.

Name structure **Q**.

[1 mark]

_____

0 1 . 4 Describe how structure **Q** causes the change in the size of the pupil from **A** to **B**.

[1 mark]

_____

_____

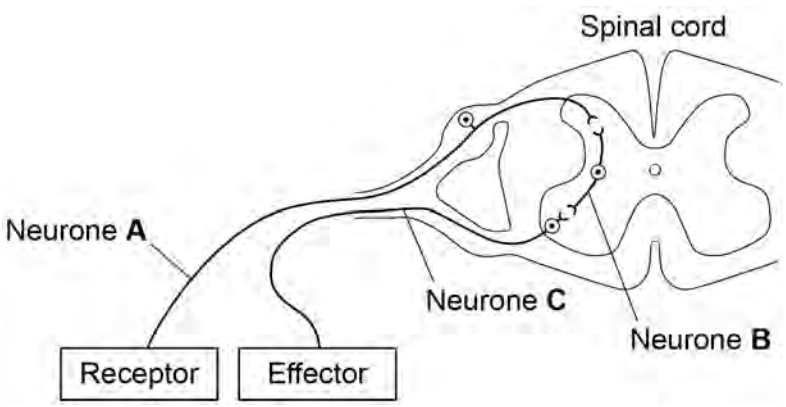
Question 1 continues on the next page

4.5.2.3 The eye (biology only)

Question 06 · continued

0 1 . 5 **Figure 2** shows some structures involved in the coordination of a reflex action.

Figure 2



Describe how the structures shown in **Figure 2** help to coordinate a reflex action.

[6 marks]

11

4.5.2.3 The eye (biology only)

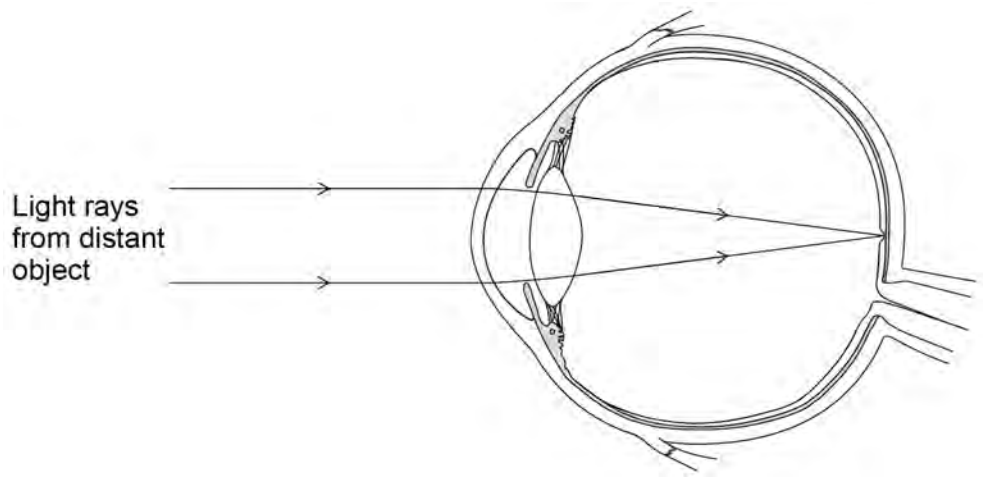
Question 07

June 2019 | 8461/2H | Original Q4

0 4 The human eye can focus on objects at different distances.

Figure 5 shows how a clear image of a **distant** object is formed in a person's eye.

Figure 5



0 4 . 1 Explain how the person's eye could adjust to form a clear image of a **nearer** object.

[6 marks]

4.5.2.3 The eye (biology only)

Question 07 · continued

0 4 . 2 Explain why a long-sighted person has difficulty seeing near objects clearly.

[2 marks]

0 4 . 3 Long-sightedness can be corrected by wearing spectacles.

Describe how spectacle lenses can correct long-sightedness.

[3 marks]

11

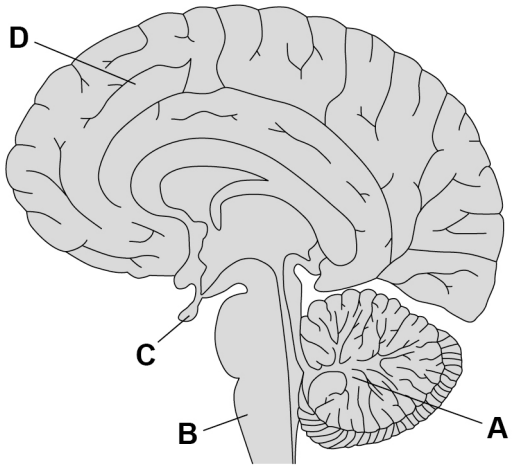
4.5.2.3 The eye (biology only)

Question 08

November 2020 | 8461/2H | Original Q6

0 6 **Figure 7** shows the brain.

Figure 7



0 6 . 1 Which part of the brain becomes more active if a person balances on one leg instead of standing on two legs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 2 Name the part of the brain that is responsible for making a decision.

[1 mark]

_____

4.5.2.3 The eye (biology only)

Question 08 · continued

0 6 . 3 In most MRI scanners the person being scanned needs to stay completely still.

A functional MRI (fMRI) scanner allows a person to move while the scanner makes images of the person's brain activity.

Suggest how the fMRI scanner could help to find out more about the brain damage a person has.

[3 marks]

0 6 . 4 Describe how the brain receives information about light entering the eye.

You should include the names of structures in your answer.

[3 marks]

Question 6 continues on the next page

4.5.2.3 The eye (biology only)

Question 08 · continued

0 6 . 5 The eyes of some birds contain cells that detect ultraviolet (UV) light.

UV light is reflected by some fruits and the urine of small mammals.

Explain how birds that detect UV light have evolved from birds that could not detect UV light.

[6 marks]

14

4.5.2.3 The eye (biology only)

Question 09

June 2023 | 8461/2H | Original Q2

0 2 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 2 . 1 Which term describes the adjustment of focus from the distant object to the near object?

[1 mark]

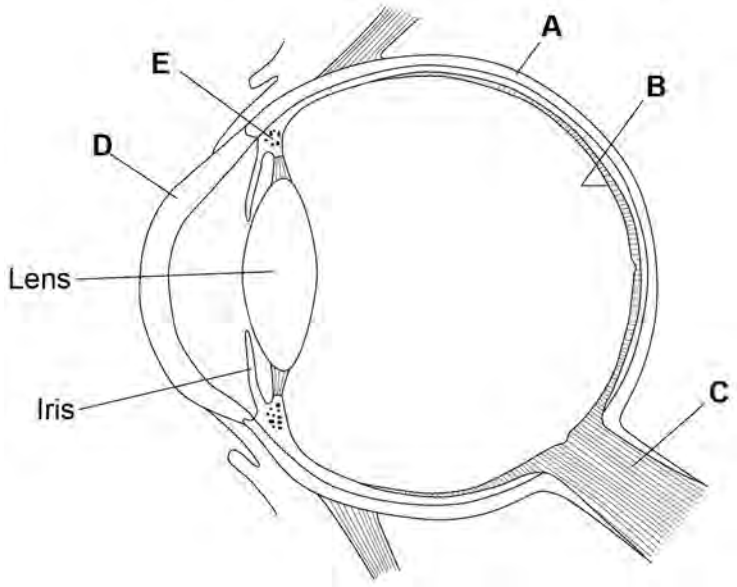
Tick (✓) **one** box.

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

Figure 3 shows the eye.

Figure 3

.



4.5.2.3 The eye (biology only)

Question 09 · continued

0 2 . 2 Which structure in **Figure 3** is where the image is focused?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 2 . 3 Which structure in **Figure 3** is a muscle that contracts when focusing on a near object?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

0 2 . 4 What happens to the shape of the lens when focusing on a near object?

[1 mark]

0 2 . 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]

4.5.2.3 The eye (biology only)

0 2 . 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