# The human body – 2022 GCSE 21st GCSE Biology B

**1.** May/2022/Paper_J257/03/No.7

**(a)** **Fig. 7.1** shows the structure of the brain.
Three areas of the brain have been labelled **A**, **B** and **C**.

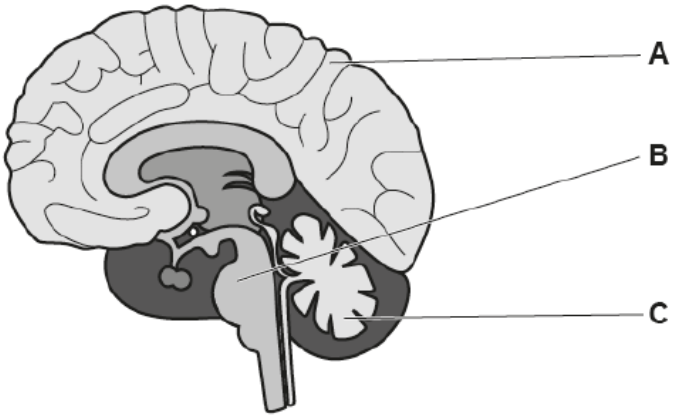


**Fig. 7.1**

**(i)** Draw lines to connect each **labelled** part of the brain to its **name** and **function**.

| Label | Name | Function |
|---|---|---|
| A | Cerebellum | Conscious movement |
| B | Brain stem | Intelligence, memory, and language |
| C | Cerebral cortex | Regulation of heart and breathing rate |

**[3]**

**(ii)** Name **two** additional parts of the brain **and** state their functions.

1 .....

.....

2 .....

.....

**[2]**

Dementia is a term used to describe a decline in mental ability.

**Fig. 7.2** shows the number of people diagnosed with dementia in the UK.

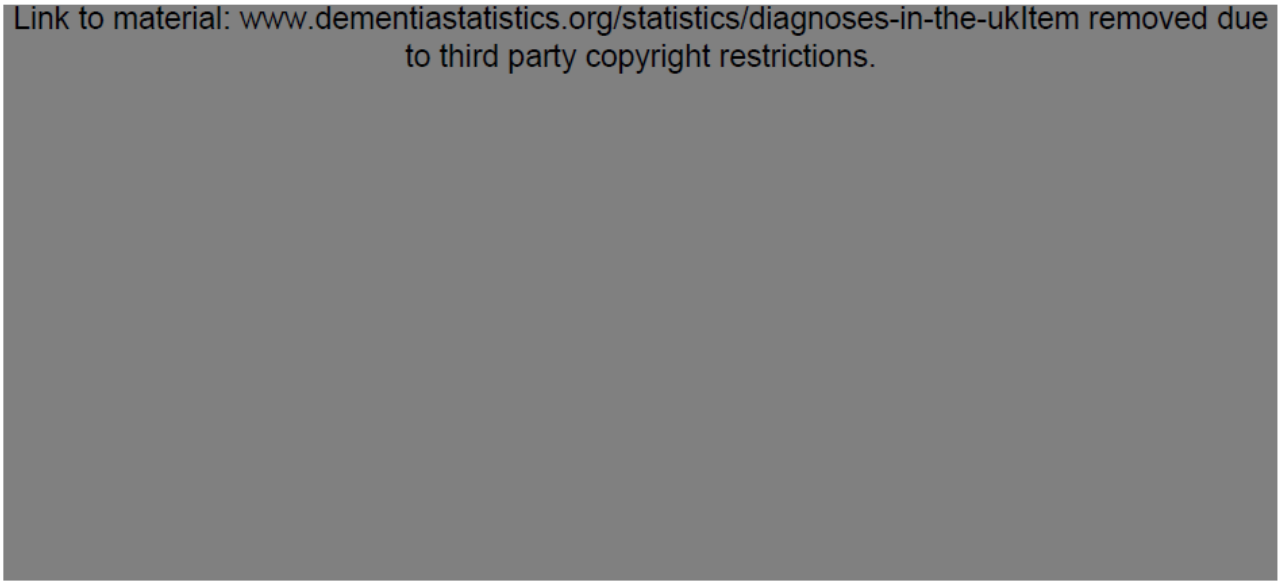


**Fig. 7.2**

**(b)** State **two** conclusions that can be drawn from the data in **Fig. 7.2**.

1 .....

.....

2 .....

..... **[2]**

**(c)** Alzheimer's is a form of dementia. Alzheimer's is caused by a build-up of proteins around the cells in the brain.

**(i)** What name is given to the cells found in the brain?

..... **[1]**

The build-up of these proteins reduces the amount of transmitter substance produced in the brain.

**(ii)** What is the role of a transmitter substance?

..... **[1]**

**(iii)** The level of transmitter substance released by brain cells is lower in people with Alzheimer's.

Suggest how this could affect the person with Alzheimer's.

.....

..... **[1]**

**(iv)** Scientists are investigating the use of stem cells to treat Alzheimer's disease.

They implanted human stem cells into the brains of mice.

They observed changes in the mice 4 weeks after transplant and 16 weeks after transplant. They found that the mice had improved brain function.

Suggest what the scientists should do next in this research.
Explain your suggestions.

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..... **[3]**

**2.** May/2022/Paper_J257/04/No.1

The pupil of the human eye changes size in different light levels.

**(a)** A diagram of the eye is shown in **Fig. 1.1**.

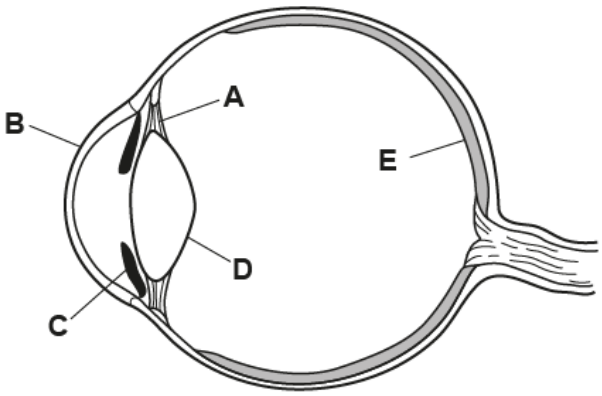


**Fig. 1.1**

Which structure in the eye changes the size of the pupil?

Tick (✓) **one** box.

| | | |
|---|---|---|
| **A** | Ciliary muscles | ☐ |
| **B** | Cornea | ☐ |
| **C** | Iris | ☐ |
| **D** | Lens | ☐ |
| **E** | Retina | ☐ |

**[1]**

**(b)** The pupil changing size is a reflex action that happens in response to light. It uses a reflex arc in the nervous system.

The pupil reflex arc includes a sensory neuron that connects the eye to the spinal cord.

State **two other** types of neurons that must be part of the pupil reflex arc.

1 .....

2 ..... **[2]**

**(c)** Ali plans to investigate the effect of light brightness on the diameter of the pupil of a person's eye.

The method Ali plans to use is shown in **Fig. 1.2**.

| |
|---|
| 1. Shine a bright light into the person's eye. |
| 2. Hold a ruler up to their eye and measure the diameter of the pupil. |
| 3. Repeat with light at a different brightness. |

**Fig. 1.2**

Ali's teacher says that Ali's method is not safe and could damage the person's eye.

**(i)** Identify the structure in the person's eye that could be damaged by step **1**, and suggest why the damage would affect the person's vision.

Structure that could be damaged .....

Why this would affect the person's vision .....

.....

.....

**[2]**

**(ii)** Identify the structure in the person's eye that could be damaged by step **2**, and suggest why the damage would affect the person's vision.

Structure that could be damaged .....

Why this would affect the person's vision .....

.....

.....

**[2]**

**(d)** A scientist uses a safer method to collect the data as shown in the graph in **Fig. 1.3**.

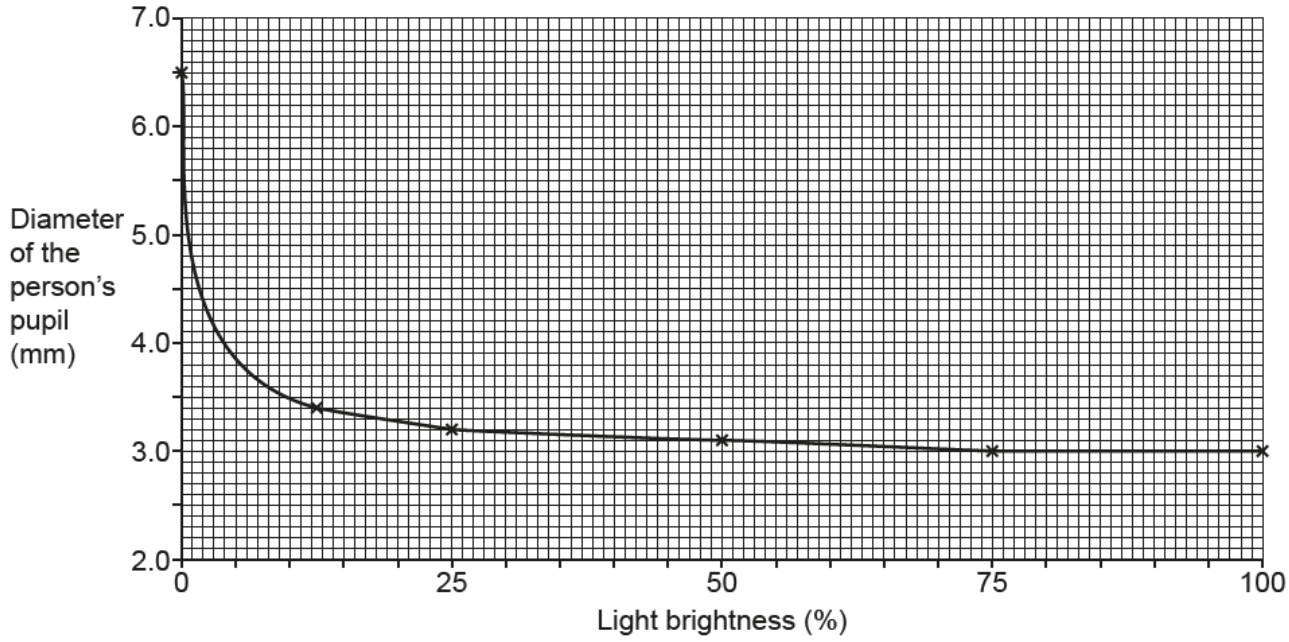


**Fig. 1.3**

Use **Fig. 1.3** to answer the following questions.

**(i)** What was the diameter of the person's pupil in complete darkness?

Diameter = ..... mm **[1]**

**(ii)** What would you conclude is the smallest possible diameter of the person's pupil?

Explain your answer.

Smallest possible diameter = ..... mm

Explanation .....

.....

**[2]**

**(iii)** Calculate the rate at which the pupil diameter changed between 25% and 50% light brightness.

Rate = ..... mm / % **[2]**

**(e)*** Describe a method that can be used to collect the data shown in **Fig. 1.3**.
Assume that 100% light brightness is a normally lit room.

In your answer you should describe:

- how you would safely change the light brightness and measure the results
- things you would do or control to make sure the measurements are as accurate as possible.

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..... **[6]**

**3.** May/2022/Paper_J257/01/No.2

Hormones in the human body are produced by the endocrine system.

**(a)** Draw **three** lines to identify the **features** of hormones.

| | Features |
|---|---|
| Hormones | Are transported in the blood |
| | Are transported as an electrical impulse |
| | Are secreted by a gland |
| | Are made of nerve cells |
| | Have effects that can last a long time |

**[3]**

**(b)** Insulin is an example of a hormone produced by the human body.

Which disease can insulin be used to treat?

..... **[1]**

**4.** May/2022/Paper_J257/01/No.4

Complete each sentence about structures in the human body.

Use words from the list.

| | | | | | |
|---|---|---|---|---|---|
| **artery** | **brain stem** | **cerebellum** | **heart** | **kidney** | **lens** |
| **motor** | **pancreas** | **retina** | **sensory** | **vein** | |

**(a)** A neuron that connects a receptor to the central nervous system. ..... **[1]**

**(b)** The organ that secretes insulin. ..... **[1]**

**(c)** A blood vessel that contains valves and returns blood to the heart. ..... **[1]**

**(d)** An organ that removes water and urea from the blood. ..... **[1]**

**(e)** The part of the eye where an image forms. ..... **[1]**

**(f)** The part of the brain that regulates heart rate. ..... **[1]**

**5.** May/2022/Paper_J257/01/No.11

Sepsis is an illness. It happens when an infection changes the body's normal immune response to infection.

Sepsis causes the immune system to damage the body's organs and tissues.

**(a)** Which type of cell in the blood is responsible for the damage to the tissues and organs?

..... **[1]**

**(b)** Sepsis can cause blood clots to form.

Name the part of the blood that starts the clotting process.

..... **[1]**

**(c)** Sepsis can be prevented by stopping the spread of microorganisms between people.

Suggest **one** way members of a community could help prevent the spread of microorganisms within the community.

.....

..... **[1]**

**(d)** **(i)** Sepsis affects 30 million people worldwide each year.

Put a (ring) around the number that shows 30 million in standard form.

**$3.0 \times 10^7$** **$30 \times 10^6$** **$30 \times 10^7$** **$30\,000\,00 \times 10$**

**[1]**

**(ii)** Of the 30 million people affected by sepsis each year, 1.2 million are children.

Calculate the percentage of people affected by sepsis each year who are children.

Percentage affected who are children = ..... % **[2]**

Doctors in the USA tried a new treatment for sepsis.

47 patients were given the new treatment. 43 of these patients made a full recovery.

**(e)** Should this treatment be used on all patients with sepsis?

Give **one** reason why the treatment should be used and **two** reasons why it should not.

Reason to use the treatment .....

.....

Reasons **not** to use the treatment.

1 .....

.....

2 .....

.....

**[3]**

**6.** May/2022/Paper_J257/02/No.7

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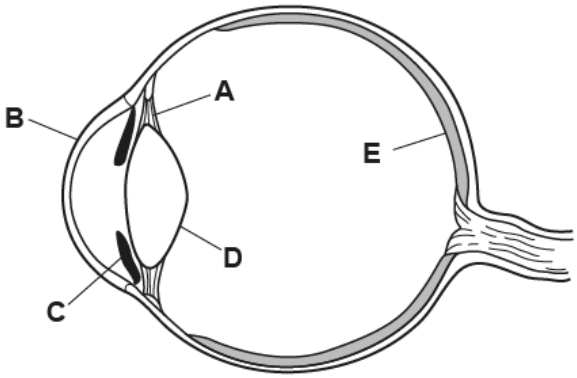


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Why this would affect the person's vision .....

.....

.....

**[2]**

**(ii)** Identify the structure in the person's eye that could be damaged by step **2**, and suggest why the damage would affect the person's vision.

Structure that could be damaged .....

Why this would affect the person's vision .....

.....

.....

**[2]**

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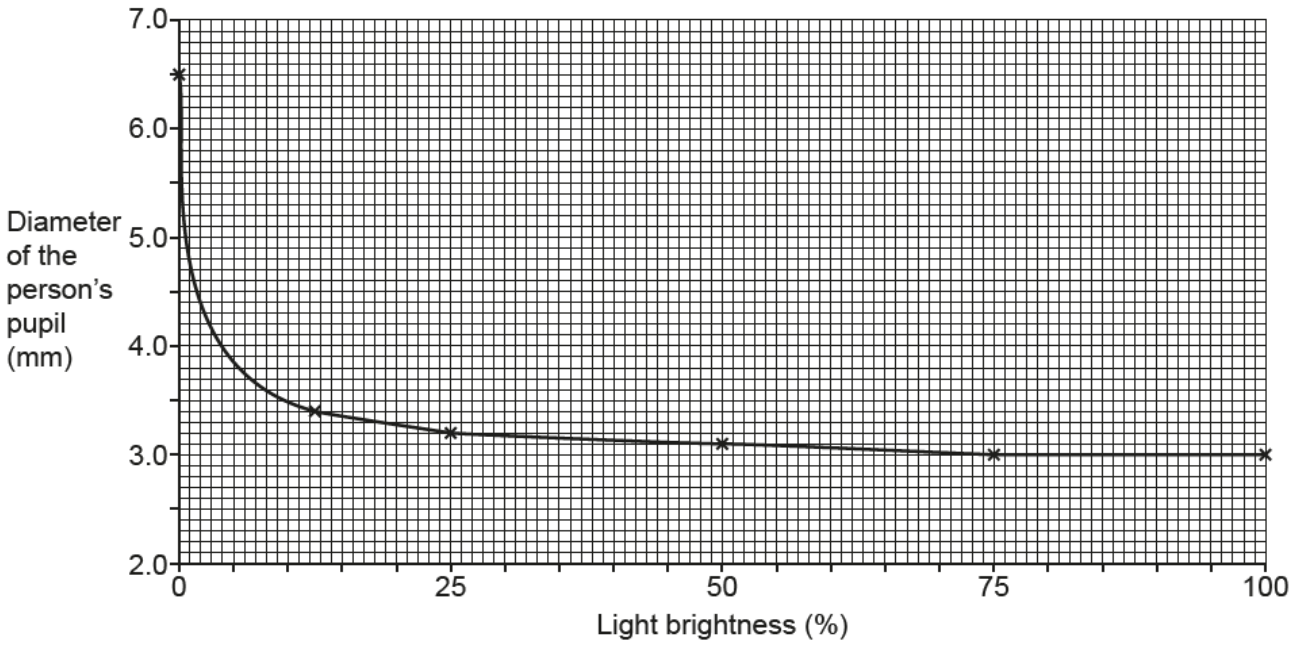


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Explanation .....

.....

**[2]**

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