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8362666462

BIOLOGY **0610/33**

Paper 3 Theory (Core) **May/June 2022**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Any blank pages are indicated.

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1 The human circulatory system contains blood vessels.

(a) Fig. 1.1 shows some names of blood vessels and organs.

The boxes on the left show the names of some blood vessels that deliver blood to organs.

The boxes on the right show the names of some organs that receive blood.

Draw straight lines from each blood vessel to the organ that it delivers blood to.

Draw **four** straight lines.

blood vessel that delivers blood	**organ receiving blood**
pulmonary artery	heart
pulmonary vein	kidney
renal artery	lungs
vena cava	

Fig. 1.1

[4]

(b) Table 1.1 shows three types of blood vessel, the thickness of their walls and whether they contain valves.

Complete the descriptions of the blood vessels in Table 1.1.

Table 1.1

type of blood vessel	thickness of wall	presence of valves
artery	thick	no
capillary		
vein		

[4]

[Total: 8]

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2 Photosynthesis is a process that occurs in plant cells.

(a) (i) State the word equation for photosynthesis.

..... [2]

(ii) State the type of energy required for photosynthesis.

..... [1]

(b) Fig. 2.1 is a diagram of a section through a leaf.

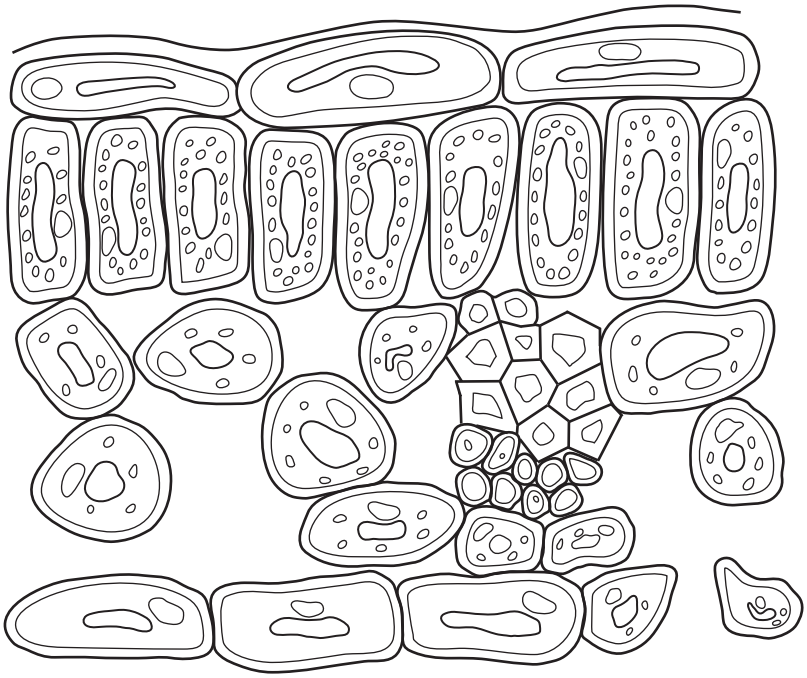


Fig. 2.1

(i) On Fig. 2.1:

- label with a label line **and** the letter **A** the type of cell where most photosynthesis takes place.
- label with a label line **and** the letter **B** the type of cell which conducts water through the plant.

[2]

(ii) State the name of the cell structure where photosynthesis happens.

..... [1]

(c) A student investigated the rate of photosynthesis in a plant at different temperatures.

The results are shown in Table 2.1.

Table 2.1

temperature / °C	rate of photosynthesis / arbitrary units
20	42
25	61
30	77
35	92
40	45

(i) State the temperature at which the rate of photosynthesis is highest.

..... °C [1]

(ii) Calculate the percentage increase in the rate of photosynthesis from 20 °C to 30 °C.

Give your answer to **three** significant figures.

Space for working.

..... %
[3]

[Total: 10]

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3 During puberty, the hormones oestrogen and testosterone are involved in the development of the secondary sexual characteristics.

(a) (i) State the name of the gland that produces each hormone.

oestrogen .....

testosterone .....

[2]

(ii) Complete Table 3.1 by placing ticks (✓) in the boxes to show which hormones are involved in the development of each secondary sexual characteristic.

Table 3.1

secondary sexual characteristic	testosterone	oestrogen
body shape changes		
breast development		
facial hair		
voice deepening		

[4]

(b) Fig. 3.1 is a diagram of the uterus during pregnancy.

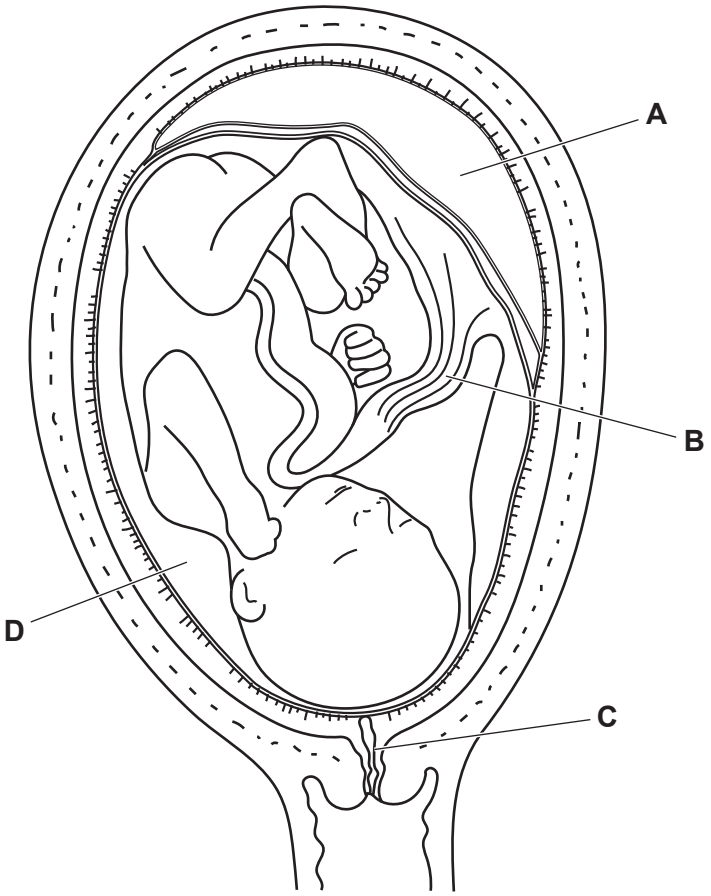


Fig. 3.1

State the letter on Fig. 3.1 that identifies the structure which performs each of these functions.

- exchange of substances between the fetus and the mother .....
- protects the fetus from mechanical shock .....
- transfers blood between the fetus and the placenta .....

[3]

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(c) Outline the processes involved in labour and birth.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) The birthweights of 75 rats were measured and recorded within different birthweight ranges.

The number of rats in each birthweight range is recorded in Table 3.2.

Table 3.2

birthweight / g	number of rats
5.5 – 5.9	8
6.0 – 6.4	11
6.5 – 6.9	13
7.0 – 7.4	18
7.5 – 7.9	15
8.0 – 8.4	8
8.5 – 8.9	2

(i) State the most common birthweight range in Table 3.2.

..... [1]

(ii) State the number of rats that are heavier than 6.9 g at birth in Table 3.2.

..... [1]

(iii) State the type of variation shown by the data in Table 3.2.

..... [1]

[Total: 16]

4 Sewage treatment reduces water pollution.

(a) **(i)** State the names of **two** of the stages of sewage treatment.

1 .....

2 .....
[2]

(ii) Raw sewage is a major source of water pollution.

State the name of **one other** source of water pollution.

..... [1]

(b) Urea is found in sewage. Urea is made in the human body and excreted in urine.

(i) State the name of the biological molecules that are broken down to make urea.

..... [1]

(ii) State the name of the organ that produces urea.

..... [1]

(c) Raw sewage can be produced by intensive livestock farming.

State **two other** negative impacts of intensive livestock farming.

1 .....

.....

2 .....

.....
[2]

[Total: 7]

5 **(a)** Complete the sentences about the features of the human gas exchange system.

Gas exchange surfaces have a ..... surface area.

The distance across the gas exchange surfaces is very ..... .

The gas exchange system has a ..... blood supply and good

..... with air.

[4]

(b) Fig. 5.1 shows part of the gas exchange system in the lungs of a human.

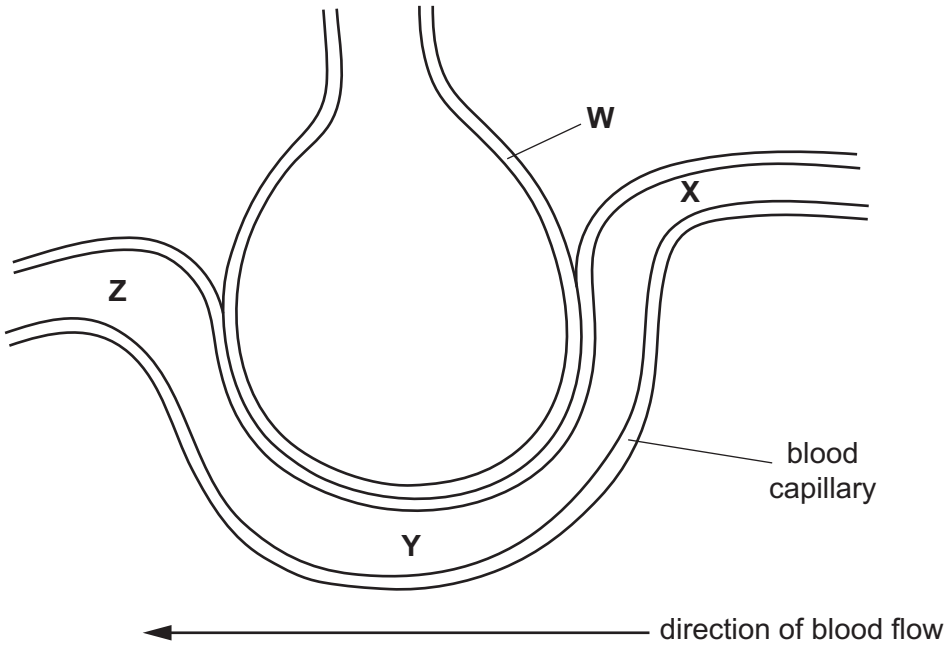


Fig. 5.1

(i) State the name of structure **W** in Fig. 5.1.

..... [1]

(ii) State the letter in Fig. 5.1 that shows where the concentration of:

- carbon dioxide in the blood is highest .....
- oxygen in the blood is highest .....

[2]

(iii) State the name of the process where molecules move down a concentration gradient.

..... [1]

[Total: 8]

6 **(a)** Scientists surveyed a group of adults. Some of the adults had chronic bronchitis, which is a lung disease. The adults were asked their age and whether they smoked tobacco.

The results of the study are shown in Fig. 6.1.

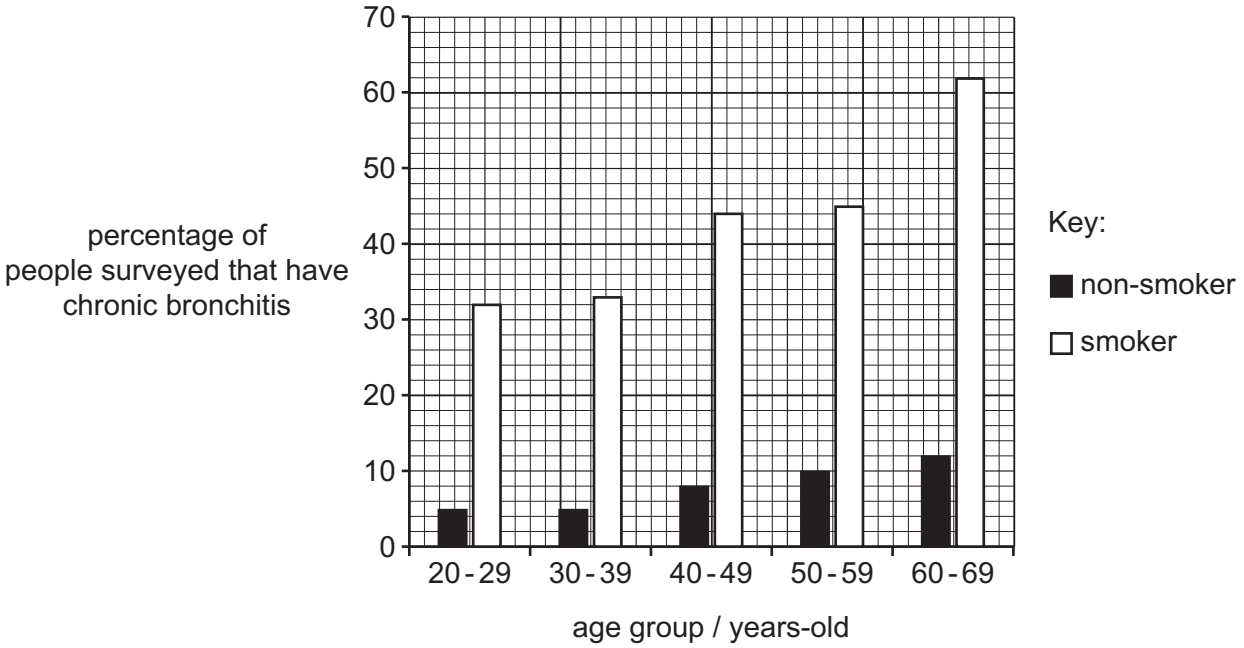


Fig. 6.1

Describe the data shown in Fig. 6.1.

.....

.....

.....

.....

.....

.....

..... [3]

(b) **(i)** State **two** diseases other than chronic bronchitis that tobacco smoking can cause.

1 .....

2 .....

[2]

(ii) List **three** major toxic components of tobacco smoke.

1 .....

2 .....

3 .....

[3]

[Total: 8]

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7 One type of nuclear division produces genetically identical cells.

(a) State the name and **one** role of the type of nuclear division that produces genetically identical cells.

name .....

role .....

.....
[2]

(b) Fig. 7.1 shows the mass of DNA in a cell undergoing this type of cell division. Two cell divisions complete in this time.

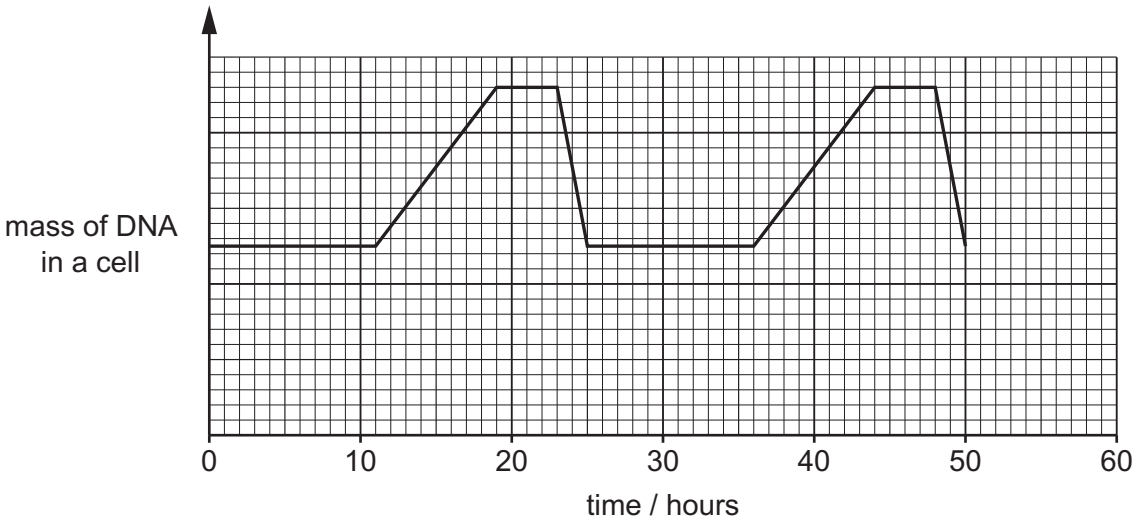


Fig. 7.1

Using the information in Fig. 7.1, calculate how long it takes for the DNA to double in mass.

..... hours [1]

(c) Gametes are involved in sexual reproduction.

Fig. 7.2 is a diagram of human gametes.

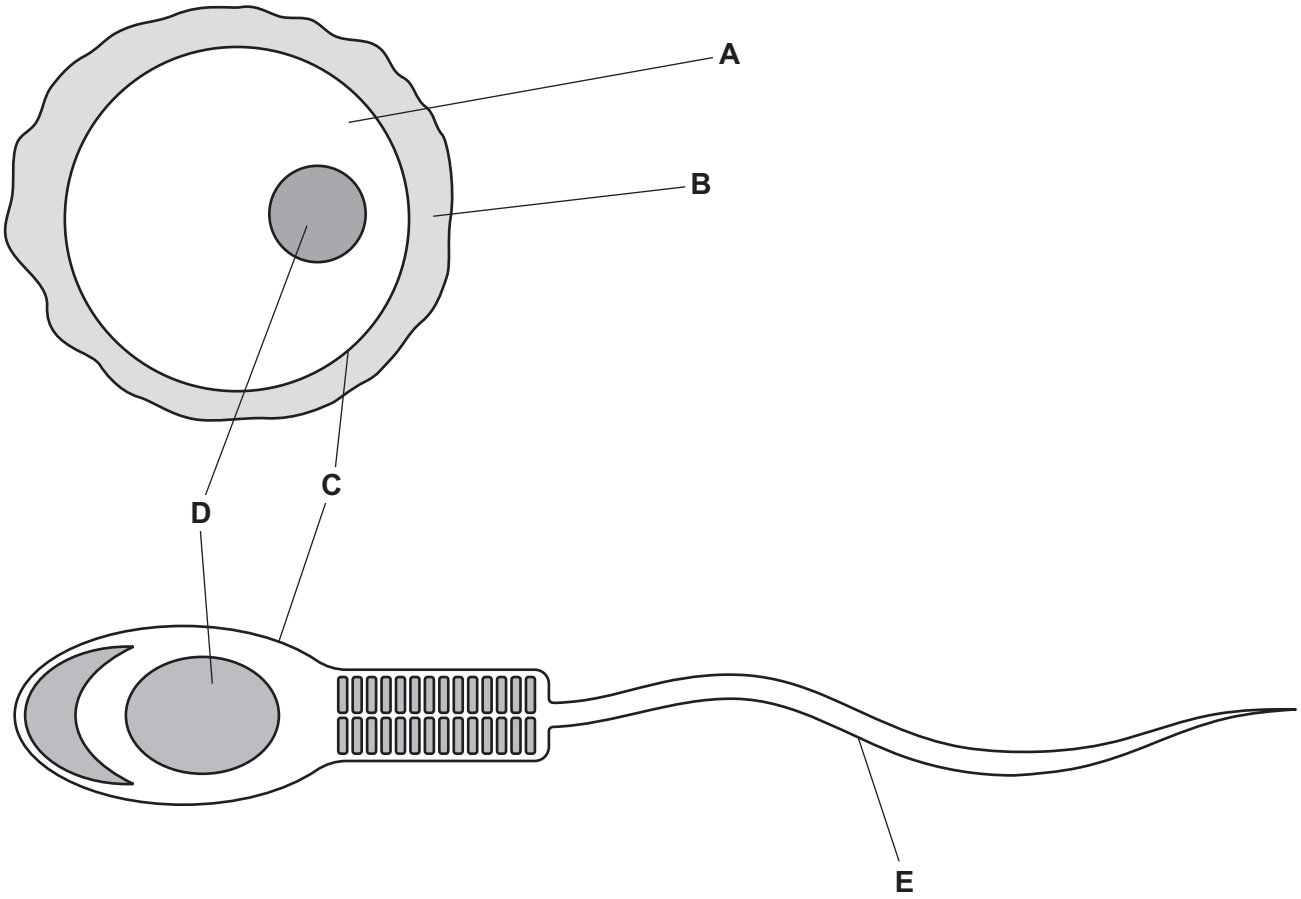


Fig. 7.2

(i) State the names of structures **A**, **B**, **C**, **D** and **E** shown in Fig. 7.2.

A .....

B .....

C .....

D .....

E .....

[5]

(ii) Suggest a type of biological molecule that could be used as an energy store in an egg cell.

..... [1]

[Total: 9]

8 **(a)** Complete the description of the immune system, using the words from the list.

Each word may be used once, more than once or not at all.

antibodies **antigens** **biological** **block**

chemical **engulf** **hairs** **mechanical**

nails **vaccines**

The body has defences to protect against infectious diseases.

Skin and ..... in the nose are ..... barriers.

Some types of blood cell are involved in defending the body against infectious diseases.

Some blood cells can produce ..... which can kill the pathogen.

Other cells can ..... the pathogen in a process called phagocytosis. [4]

(b) Describe actions that can be taken by individuals in their homes to reduce the spread of disease.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 7]

9 **(a)** Define the term sense organ.

.....

.....

.....

.....

..... [2]

(b) Fig. 9.1 is a diagram of a section of a human eye.

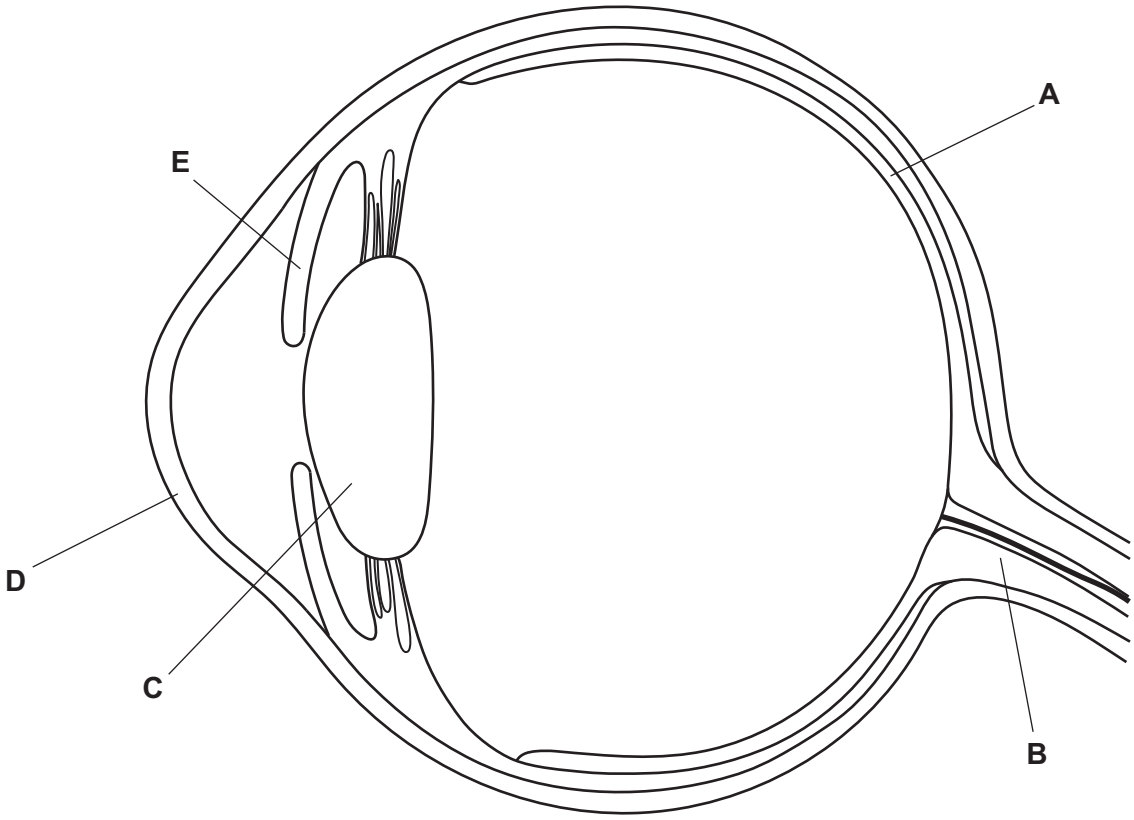


Fig. 9.1

State the letter of the structure shown on Fig. 9.1 that:

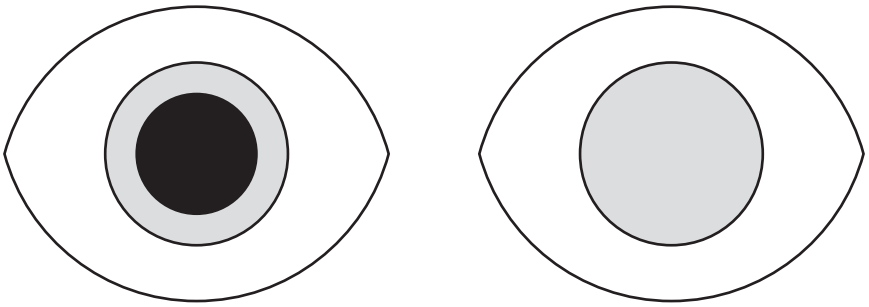
- focuses light on the light receptors .....
- refracts light .....
- controls how much light enters the pupil .....
- carries impulses to the brain .....

[4]

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(c) Fig. 9.2 is a diagram of an eye in a dark room and in a light room.

Draw the expected size of the pupil on the eye in the **light room** in Fig. 9.2.



dark room light room

Fig. 9.2

[1]

[Total: 7]

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