Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
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BIOLOGY **0610/33**

Paper 3 Theory (Core) **October/November 2019**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **18** printed pages and **2** blank pages.

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1 An adaptive feature is an inherited feature that helps an organism to survive and reproduce in its environment.

View solution

(a) (i) Egg cells have adaptive features linked to their structure.

Draw **two** lines from the phrase 'An egg cell' to two boxes on the right to complete **two** correct sentences.

	has a jelly coating.
	has chloroplasts.
An egg cell	has cilia.
	has energy stores.
	is very thin.

[2]

View solution

(ii) Fig. 1.1 is an incomplete drawing of a sperm cell.

Complete the drawing and label the main features of the sperm cell.

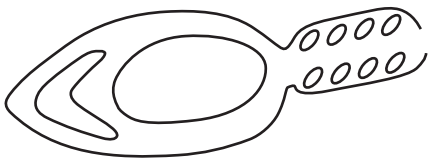

Fig. 1.1

[3]

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(b) (i) Egg cells and sperm cells each contain these structures:

View solution

chromosome **gene** **nucleus**

List the **three** structures in order of size starting with the largest.

..... largest

.....

..... smallest

[1]

(ii) Egg cells and sperm cells contain genetic material.

View solution

State the name of the molecule that genetic material is made from.

..... [1]

(c) Egg cells and sperm cells are specialised cells.

View solution

State the name of the specialised cell that is responsible for each of these functions:

conduction and support in plants .....

movement of mucus in the trachea .....

photosynthesis .....

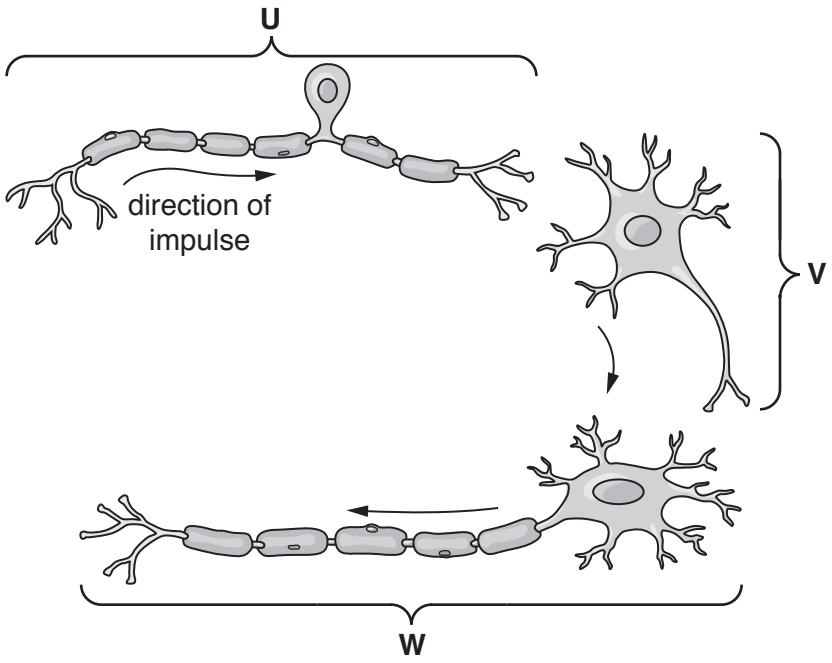
transport of oxygen in mammals .....

[4]

[Total: 11]

2 Nervous coordination uses specialised cells called neurones.

Fig. 2.1 is a diagram showing three neurones.



not to scale

Fig. 2.1

(a) State the name of the type of neurone labelled **U**.

View solution

..... [1]

(b) The list of words and phrases can be used to describe nervous control.

View solution

chemical signal **effector** **electrical signal**

receptor **reflex** **stimulus** **synapse**

(i) State the word or phrase from the list that describes a junction between two neurones.

..... [1]

(ii) State the word or phrase from the list that describes a nerve impulse.

..... [1]

View solution

(c) Place ticks (✓) in the boxes that describe the human nervous system.

View solution

includes the brain and spinal cord	
is made up of the brain, heart and spinal cord	
consists of the central nervous system only	
consists of the central and peripheral nervous system	
coordinated by hormones	
coordinates and regulates body functions	

[3]

(d) Some neurones are wrapped in a layer of fat and protein.

View solution

List **four** chemical elements that are found in all proteins.

1 .....

2 .....

3 .....

4 .....

[2]

(e) Proteins are large molecules.

View solution

The boxes on the left show the names of some large molecules.

The boxes on the right show the smaller molecules they are made from.

Draw **four** lines to match the large molecule with the smaller molecule it is made from.

large molecule	**smaller molecule**
cellulose	amino acids
fat	fatty acids and glycerol
glycogen and starch	glucose
protein	

[4]

[Total: 12]

3 **(a)** Plant and animal cells contain many cell structures with important functions.

View solution

Complete the sentences using the words or phrases from the list.

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

chloroplast **cytoplasm** **membrane** **microscope**

nucleus **protein synthesis** **photosynthesis**

respiration **test-tube** **vacuole** **wall**

Cells are very small. To magnify cells a piece of laboratory equipment called a ..... is used.

All cells have a cell ..... that controls what goes into and out of the cell. The structure that contains the genetic information and controls all of a cell's activities is called the ..... .

In a plant cell, the cell ..... maintains the cell shape and the ..... is full of a solution of sugars, called cell sap.

Plant cells carry out the process of ..... to release energy.

[6]

(b) Mitosis and meiosis are types of nuclear division.

View solution

(i) Table 3.1 shows some features of mitosis **and** meiosis.

Place ticks (✓) in the boxes to show which features occur in which type of nuclear division.

Table 3.1

feature	mitosis	meiosis
produces gametes		
produces genetically different cells		
produces genetically identical cells		
produces new cells during growth and repair to damaged tissues		
replaces cells		
used in asexual reproduction		

[4]

View solution

(ii) A human body cell has 46 chromosomes including a pair of sex chromosomes.

There are two types of sex chromosome, **X** and **Y**, as shown in Fig. 3.1.

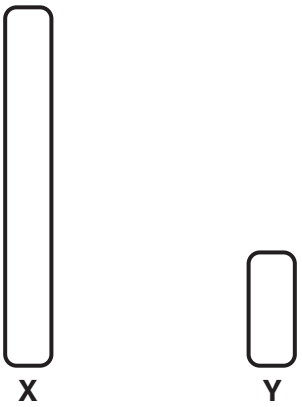


Fig. 3.1

Complete Table 3.2 to show the correct letters of the sex chromosomes in a female and a male.

Table 3.2

sex	chromosomes
female	
male	

[2]

[Total: 12]

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4 **(a)** Define the term *variation*.

View solution

.....

.....

..... [2]

(b) Hand span is the maximum distance between the tip of the thumb and the tip of the fifth finger as shown in Fig. 4.1.

Scientists investigated variation in the hand spans of adults.

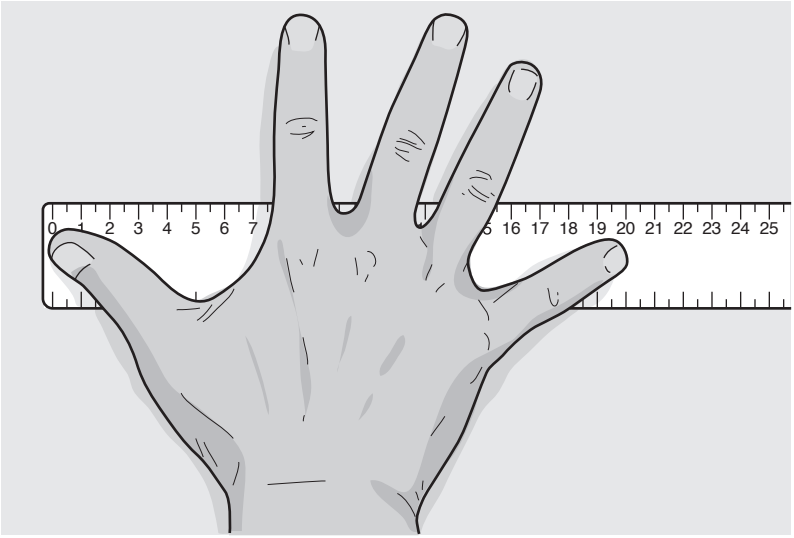

Fig. 4.1

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The results are shown in Fig. 4.2.

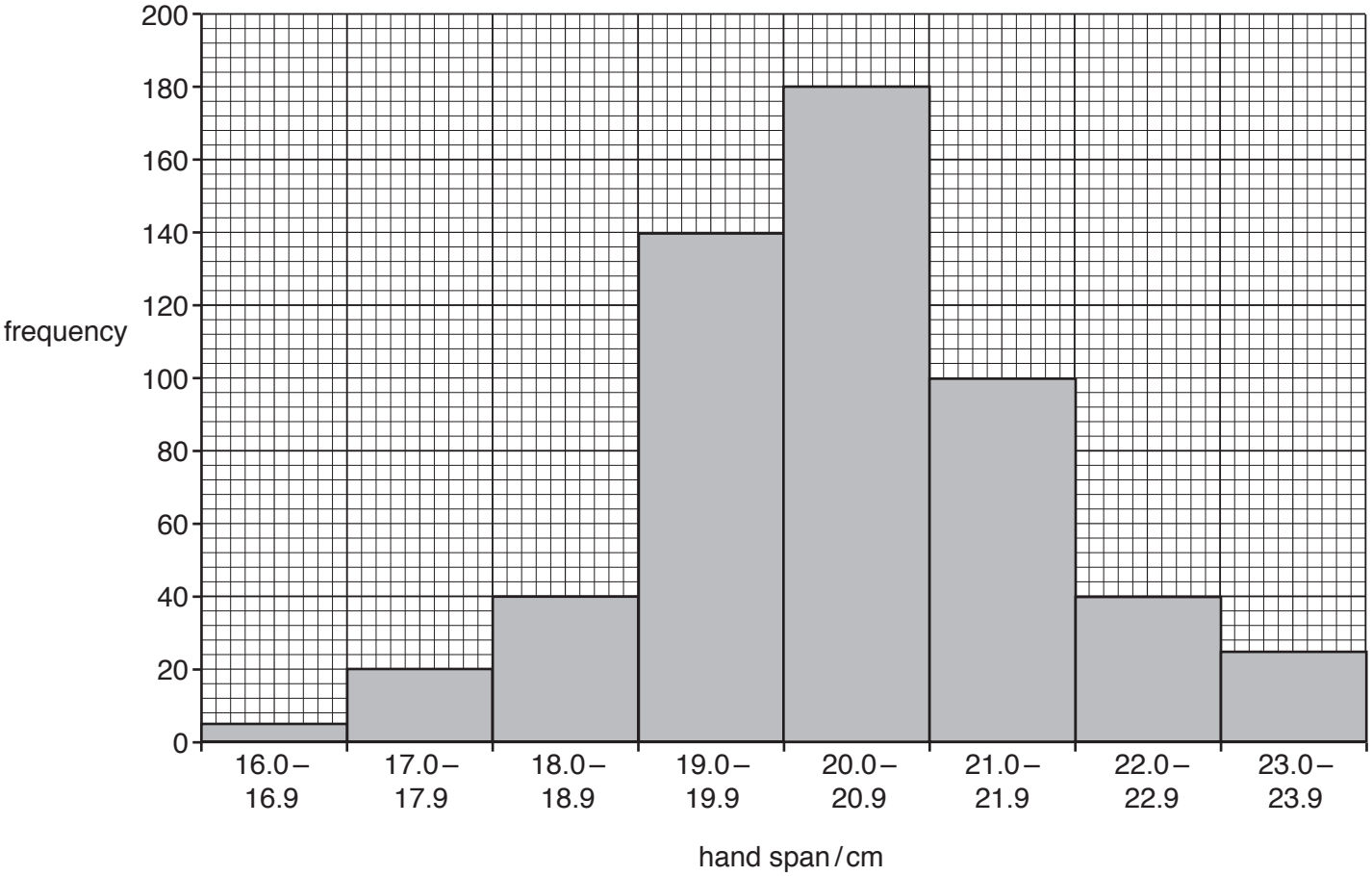

Fig. 4.2

(i) State the frequency of adults with a hand span of 19.0–19.9 cm in Fig. 4.2. View solution

..... [1]

(ii) State which hand span range is the most frequent. View solution

..... cm [1]

(c) There are different types of variation. View solution

State the type of variation shown in Fig. 4.2 **and** describe the evidence for your choice.

type of variation .....

evidence .....

.....

.....

[2]

[Total: 6]

5 **(a)** Puberty leads to the development of secondary sexual characteristics.

View solution

It is controlled by hormones released from endocrine glands.

Fig. 5.1 is a diagram of part of the human endocrine system.

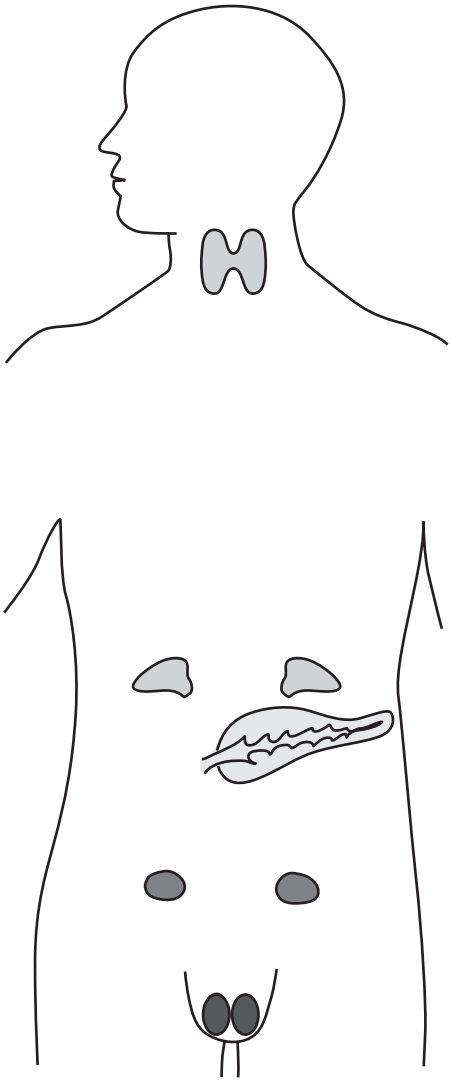

Fig. 5.1

(i) One of the structures shown on Fig. 5.1 produces a hormone that controls puberty in boys.

Label this structure with a label line. Include the name of the structure in your label. [2]

(ii) State the name of the hormone that leads to the development of secondary sexual characteristics in girls.

..... [1]

View solution

(iii) The list shows some secondary sexual characteristics that develop in puberty in humans.

View solution

breasts grow **growth of pubic hair**

growth of underarm hair **menstruation begins**

pelvis widens

Complete Table 5.1 to show which characteristics develop in girls only and which develop in both boys and girls.

Table 5.1

girls only	both boys and girls

[3]

(b) State **two** effects on the body of the hormone adrenaline.

View solution

1 .....

2 .....

[2]

[Total: 8]

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6 Muscle cells can carry out both aerobic and anaerobic respiration.

View solution

(a) (i) Define the term *anaerobic respiration*.

.....

.....

..... [2]

(ii) State the product of anaerobic respiration in a human muscle cell during vigorous exercise.

..... [1]

(iii) State **two** ways that anaerobic respiration in a yeast cell differs from that of a muscle cell.

1 .....

2 .....
[2]

(b) Fig. 6.1 shows an athlete taking part in a long distance race.



Fig. 6.1

Table 6.1 shows the energy released in muscle cells from 180 g of glucose.

Table 6.1

type of respiration	energy released / kJ
aerobic	2900
anaerobic	120

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(i) Calculate the ratio of energy released using the information in Table 6.1:

View solution

$$\text{ratio of energy released} = \frac{\text{energy released in aerobic respiration}}{\text{energy released in anaerobic respiration}}$$

Give your answer to the nearest whole number.

ratio ..... : 1
[2]

(ii) Suggest why it is beneficial for the long distance athlete to respire aerobically, rather than anaerobically.

.....

.....

.....

.....

..... [2]

(c) A student went for a short run to investigate the effect of physical activity on his pulse rate.

The resting pulse rate for the student was 60 beats per minute and during exercise his pulse rate increased to 144 beats per minute.

View solution

Calculate the percentage increase in pulse rate.

.....%
[2]

(d) A student wrote a sentence about the circulatory system:

View solution

"The circulatory system is a system of alveoli with a pump and valves to ensure two-way flow of blood."

Identify **two** incorrect words or phrases in the sentence.

1 .....

2 .....
[2]

[Total: 13]

7 A gardener investigated plant growth.

She used a tray of tomato seedlings. The tomato seedlings were all approximately 3 cm tall.

She placed the tray in a box with a source of light at the side.

Fig. 7.1 shows the apparatus.

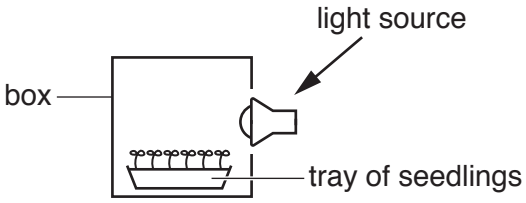

Fig. 7.1

(a) After 48 hours the gardener observed that the tomato seedlings had curved stems.

She rotated the tray so that the curved tomato seedlings were facing away from the source of light as shown in Fig. 7.2.

View solution

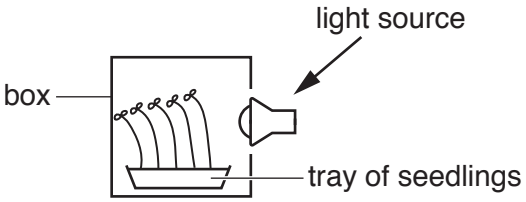

Fig. 7.2

(i) Predict what will happen to the tomato seedlings in Fig. 7.2.

.....

.....

..... [1]

(ii) State the name of the response to light shown by the tomato seedlings.

..... [1]

View solution

(iii) Explain why the tomato seedlings need light.

View solution

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iv) Describe how the **roots** of the tomato seedlings would respond to light.

View solution

.....

..... [1]

(b) The gardener grew the tomato seedlings from tomato seeds.

View solution

State **three** conditions that are required for the germination of seeds.

1 .....

2 .....

3 .....

[3]

(c) The cells of tomato seedlings that are regularly watered remain firm and well-supported.

View solution

State how water supports plant cells.

.....

.....

.....

.....

..... [2]

[Total: 12]

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8 **(a)** The eye is a sense organ that contains receptor cells that respond to light.

View solution

Fig. 8.1 is a diagram of the human eye.

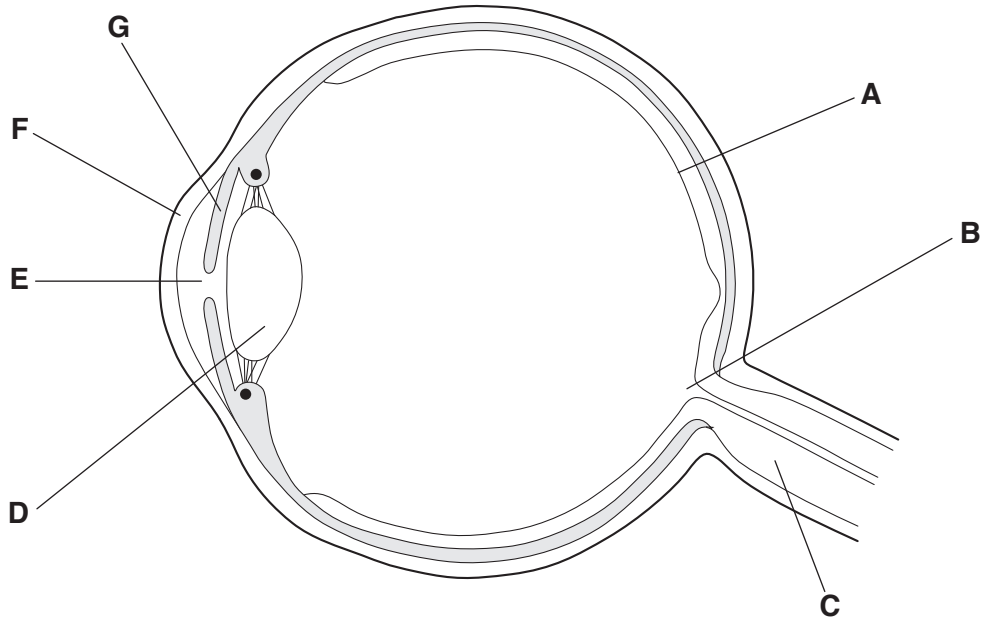

Fig. 8.1

Complete Table 8.1 using the information in Fig. 8.1.

Table 8.1

name	letter from Fig. 8.1	function
cornea		refracts light
iris	**G**	controls how much light enters the pupil
retina		contains light receptors
	D	focuses light on the retina
optic nerve		

[4]

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(b) Fig. 8.2 is a photograph of a human eye.

View solution

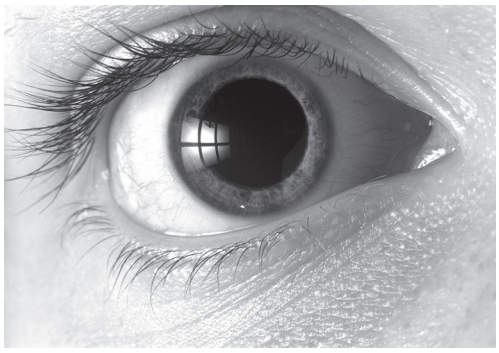

Fig. 8.2

The person has been in a dark room.

Explain the response of the pupil if the light is now switched on.

.....

.....

.....

.....

..... [2]

[Total: 6]

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