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Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/32**

Paper 3 Theory (Core) **May/June 2024**

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

..... [2]

(ii) State the name of the green pigment that is needed for photosynthesis.

..... [1]

(b) A student investigated the rate of photosynthesis at different temperatures in potato plants.

Fig. 1.1 shows the results of the investigation.

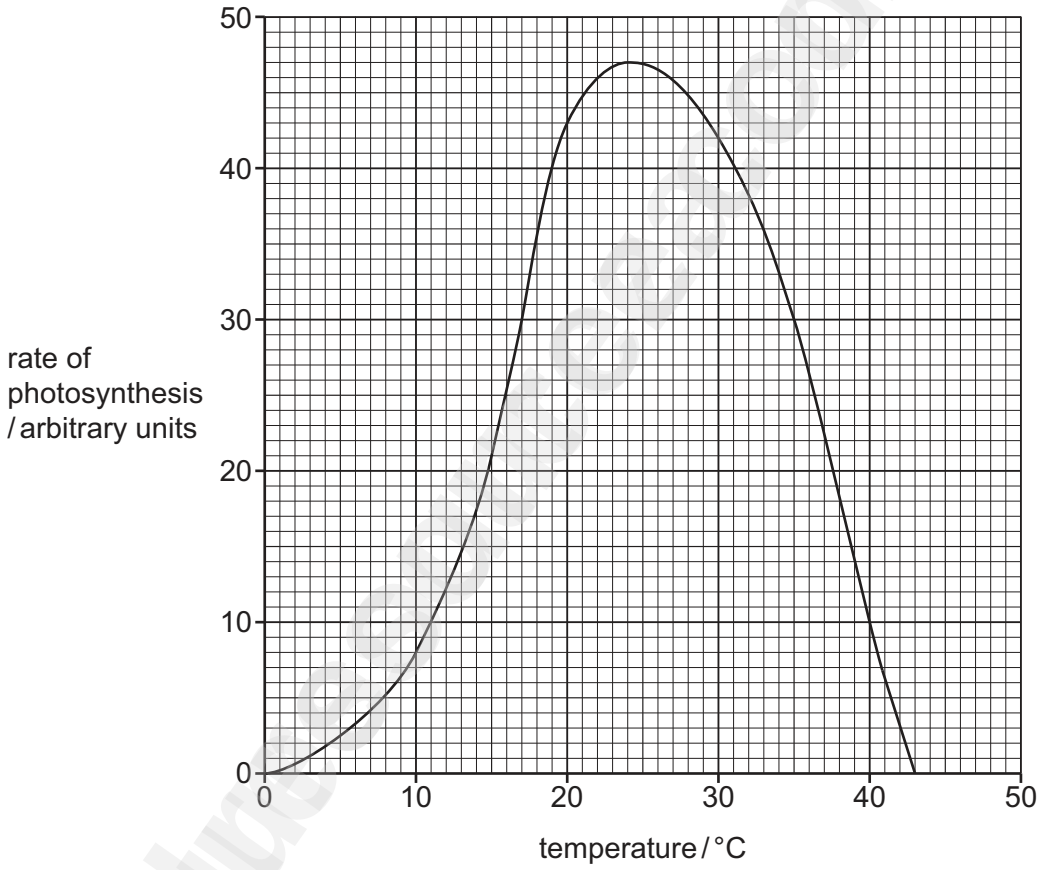

Fig. 1.1

Using the information in Fig. 1.1:

(i) State a temperature when the rate of photosynthesis is 30 arbitrary units.

..... °C [1]

(ii) State the rate of photosynthesis when the temperature is 15 °C.

..... arbitrary units [1]

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(iii) Describe the effect of increasing temperature on the rate of photosynthesis in potato plants.

.....

.....

.....

.....

..... [2]

(c) **(i)** Potato cells contain starch.

State **one** use of starch in potato cells.

..... [1]

(ii) Starch is a large molecule made from many glucose molecules.

State the name of **one** other carbohydrate that is found in plants and is made from glucose molecules.

..... [1]

(iii) Glucose can be combined with ions to make amino acids in plants.

State the name of the ions needed to make amino acids.

..... [1]

(d) Photosynthesis is one process of the carbon cycle.

State **two** other processes of the carbon cycle.

1 .....

2 .....

[2]

[Total: 12]

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2 **(a)** **(i)** Physical digestion by teeth breaks down food into smaller pieces.

Explain the importance of food being physically broken down into smaller pieces.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State the name of **one other** part of the digestive system where physical digestion occurs in humans.

..... [1]

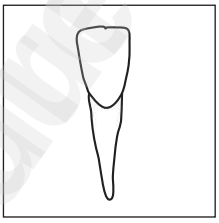
(b) **(i)** There are different types of human teeth.

The boxes on the left contain diagrams of different types of human teeth.

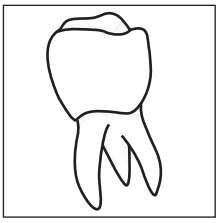
The boxes on the right contain the names of the types of human teeth.

Draw **one** straight line from each box on the left to a box on the right to match each tooth to its name.

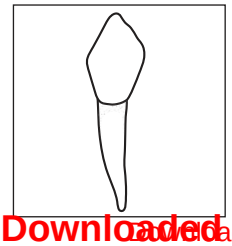
Draw **three** lines.



canine



incisor



molar

[2]

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(ii) Describe the function of molar teeth.

.....

.....

..... [1]

(c) Fig. 2.1 is a diagram of a human tooth.

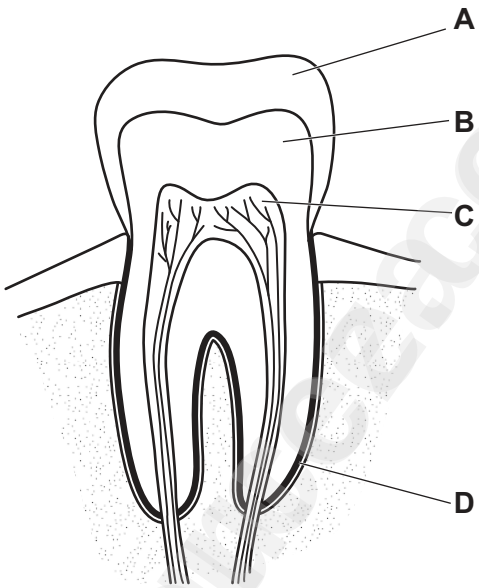

Fig. 2.1

State the names of the parts labelled **A**, **B**, **C** and **D** in Fig. 2.1.

A .....

B .....

C .....

D .....

[4]

[Total: 11]

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3 Fig. 3.1 is a photomicrograph of a section through the stem of a plant.

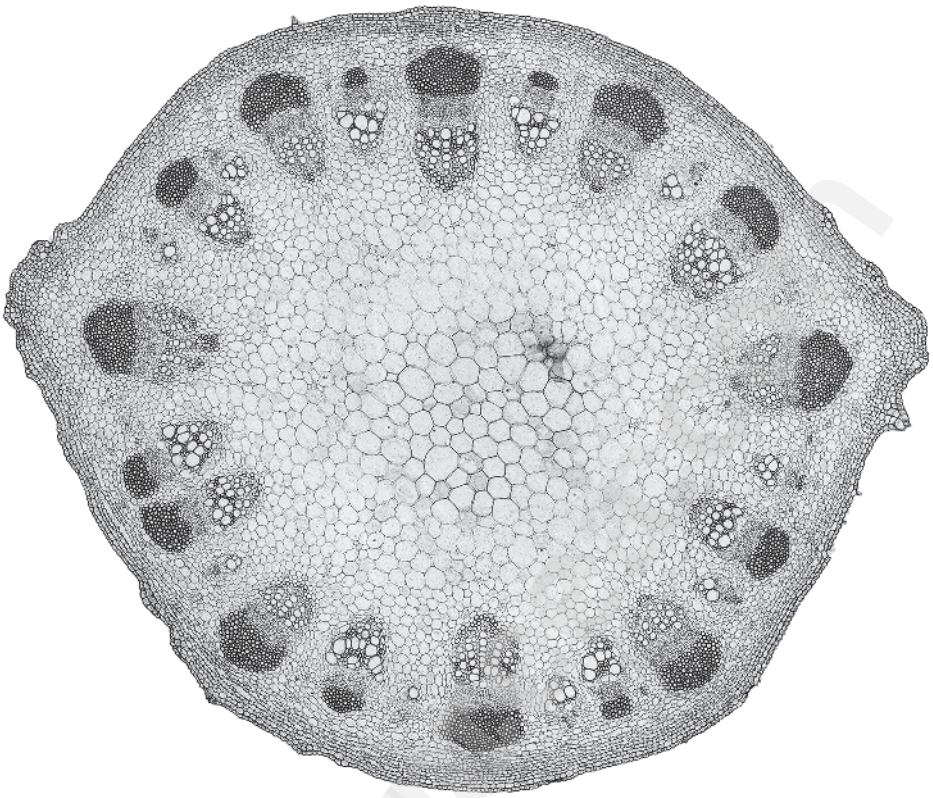

Fig. 3.1

(a) Use a label line and label to identify **and** name a structure that transports sucrose in Fig. 3.1. [2]

(b) Complete the sentences about water uptake in a plant using words or phrases from the list.

You may use the words or phrases once, more than once or not at all.

active transport **cuticle** **mesophyll** **osmosis**

photosynthesis **respiration** **root cortex** **root hair**

stomata **transpiration**

Plants absorb water molecules from the soil through ..... cells by the process of .....

Water molecules then move into ..... cells and then into the xylem.

From the xylem, the water molecules move into ..... cells in the leaf.

Water vapour diffuses out of the leaves through the ..... The loss of water vapour from leaves is called .....

[6]

[Total: 8]

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4 **(a)** Complete the description of the human circulatory system.

The circulatory system is a system of blood vessels with a ..... and ..... to ensure one-way flow of blood.

[2]

(b) A student investigated the resting heart rate in people of different ages.

The student recorded the heart rate as the number of beats per minute (bpm).

(i) The student wore a watch that could monitor their heart rate.

State **two other** methods that can be used to monitor heart rate.

1 .....

2 .....

[2]

(ii) Table 4.1 shows the results of the investigation.

Table 4.1

age of participant / years	resting heart rate / bpm
1	140
5	110
10	85
40	70
70	90

Tick (✓) **two** correct conclusions that can be drawn from the data shown in Table 4.1.

As age increases, the resting heart rate decreases.	
As age increases, the resting heart rate decreases until age 40 and then increases.	
From age 5 to 10, the resting heart rate decreases by 25 bpm.	
The difference between the maximum and minimum resting heart rates was 50 bpm.	
The highest resting heart rate was at 5 years old.	

[2]

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(c) A 38-year-old person had a resting heart rate of 72 bpm.

The person exercised for 10 minutes.

At the end of exercise their heart rate was 170 bpm.

Calculate the percentage change in heart rate from the beginning to the end of exercise for the 38-year-old.

Give your answer to the nearest whole number.

Space for working.

.....%
[2]

(d) A lack of physical activity is one factor that can increase the risk of coronary heart disease.

Diet also has a role in the risk of coronary heart disease.

Discuss the role of diet in reducing the risk of coronary heart disease.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

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5 **(a)** The melanin gene in humans codes for a pigment produced in the skin, hair and eyes.

(i) Describe what is meant by the term gene.

.....

.....

..... [2]

(ii) State the name of a cell structure in humans that contains genes.

..... [1]

(b) Albinism is a genetic condition where there is a mutation in the gene that produces melanin.

People with albinism have very pale skin, hair and eyes.

In a population, 1 in 18 000 are people with albinism.

Calculate how many people with albinism would be expected in a population of 270 000 people.

..... people [1]

(c) The allele for normal melanin production is dominant and is represented by the letter **A**.

The allele for albinism is recessive and is represented by the letter **a**.

Fig. 5.1 is a pedigree diagram showing the inheritance of albinism in one family.

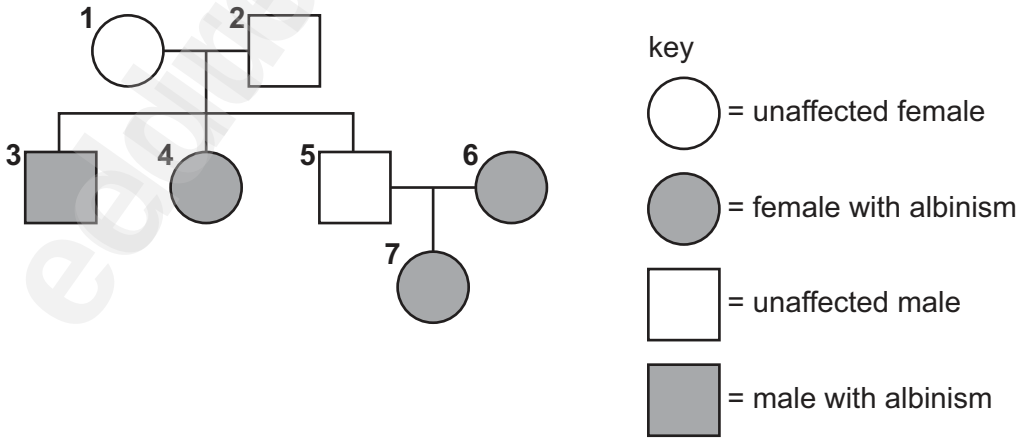

Fig. 5.1

(i) State the sex chromosomes for person **1** in Fig. 5.1.

..... [1]

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(ii) State how many people in Fig. 5.1 have albinism.

..... [1]

(iii) Circle the correct description of the genotype of person **3** in Fig. 5.1.

heterozygous **homozygous dominant** **homozygous recessive**

[1]

(d) An unaffected person has a child with a person with albinism.

Complete the genetic diagram to show the possible genotypes and phenotypes of this child.

parental phenotype unaffected person X person with albinism

parental genotypes Aa X aa

parental gametes ....

offspring genotypes				
offspring phenotypes				

ratio of unaffected people : people with albinism .....

[4]

[Total: 11]

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6 **(a)** **(i)** Fig. 6.1 is a diagram of a bacterial cell.

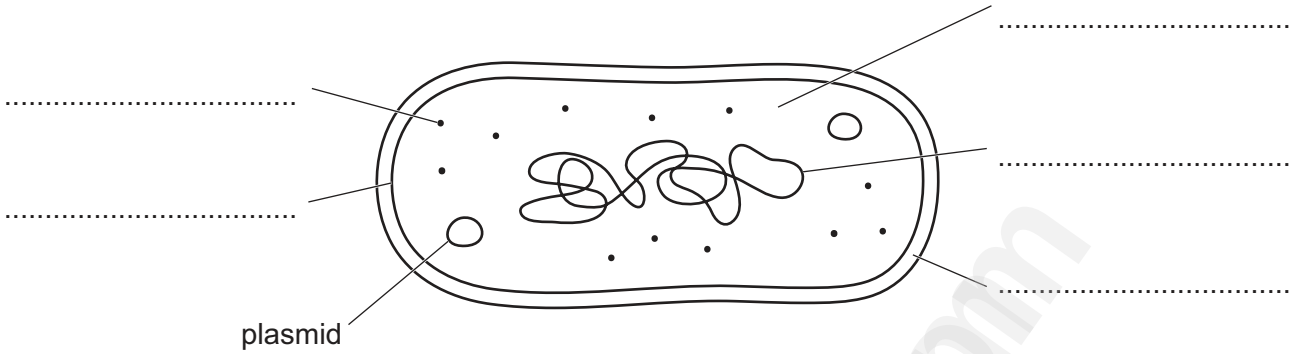

Fig. 6.1

Complete Fig. 6.1 by using the words in the list to label these structures on the answer lines provided.

- cell membrane
- cell wall
- circular DNA
- cytoplasm
- ribosome

[4]

(ii) State the names of **two** structures in the cell in Fig. 6.1 that are **not** found in animal cells.

1 .....

2 .....

[2]

(iii) Describe the function of plasmids in bacterial cells.

.....

.....

..... [1]

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(b) Many sewage treatment plants use bacteria in the process of cleaning sewage.

Some of these bacteria release methane as a waste product.

This methane can be burned as a source of energy for the sewage treatment plant.

Explain why the production and use of methane in this way is described as sustainable.

.....

.....

.....

.....

..... [2]

(c) Sometimes untreated sewage enters water ecosystems.

Describe the effects of untreated sewage on river ecosystems.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 12]

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7 **(a)** The human body must maintain a constant internal environment.

(i) State the term used to describe the maintenance of a constant internal environment.

..... [1]

(ii) Secretion of hormones by endocrine glands is one way that a constant internal environment is maintained.

Fig. 7.1 shows the locations of some endocrine glands and some organs in the human body.

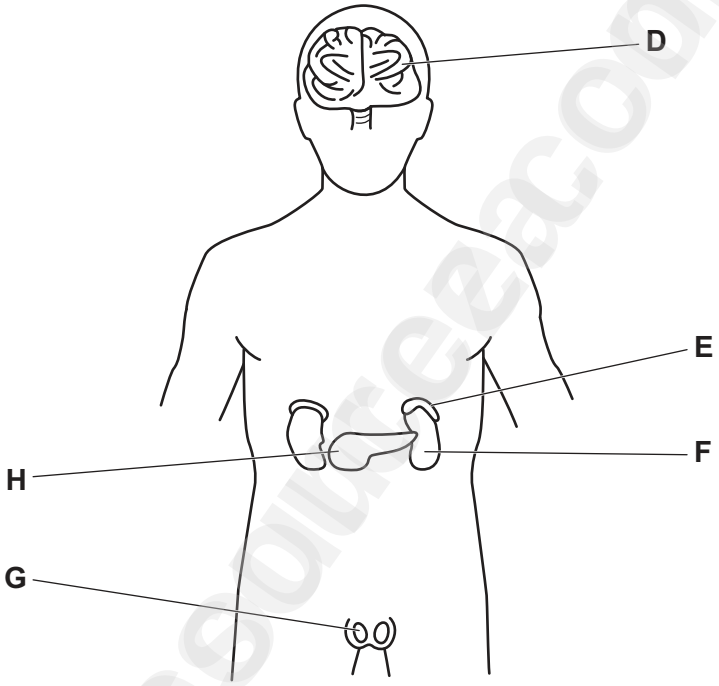

Fig. 7.1

Table 7.1 shows some of the names of the endocrine glands, the hormones they secrete, their functions and their letters from Fig. 7.1.

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Complete Table 7.1.

Table 7.1

name of endocrine gland	letter from Fig. 7.1	hormone secreted by gland	**one** function of hormone
testes			development of secondary sexual characteristics during puberty
pancreas		insulin	
	E	adrenaline	

[6]

(b) State how hormones secreted by an endocrine gland reach their target organ.

..... [1]

(c) **(i)** The nervous system also helps the body to maintain a constant internal environment.

Complete Table 7.2 to compare nervous and hormonal control.

Table 7.2

type of control	speed of action	duration of effect
nervous		
hormonal		

[2]

(ii) State **one** type of neurone found in a reflex arc.

..... [1]

[Total: 11]

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8 A student carefully took a fuchsia flower apart.

Fig. 8.1 is a photograph of the parts of the flower.

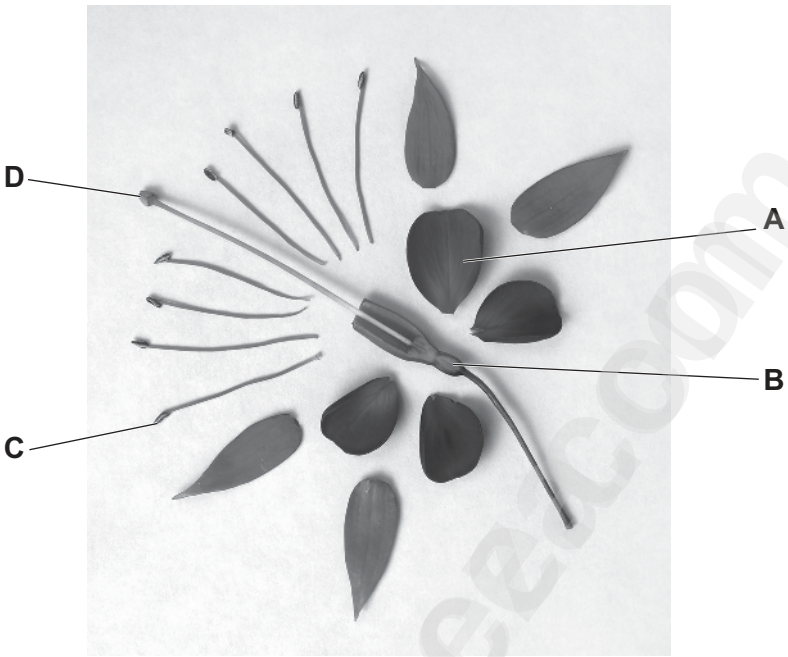

Fig. 8.1

State the function of each of the parts labelled **A** to **D** in Fig. 8.1.

A .....

.....

B .....

.....

C .....

.....

D .....

.....

[4]

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