Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/33**

Paper 3 Theory (Core) **October/November 2023**

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 **20** pages. Any blank pages are indicated.

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1 **(a)** Arteries are a type of blood vessel.

State **two** structural features of arteries.

1 .....

2 .....

[2]

(b) Capillaries are another type of blood vessel.

State **one** function of capillaries.

.....

..... [1]

(c) State the name of the structures in veins that ensure the one-way flow of blood.

..... [1]

(d) Fig. 1.1 is a diagram of part of the human circulatory system.

The arrows show the direction of blood flow.

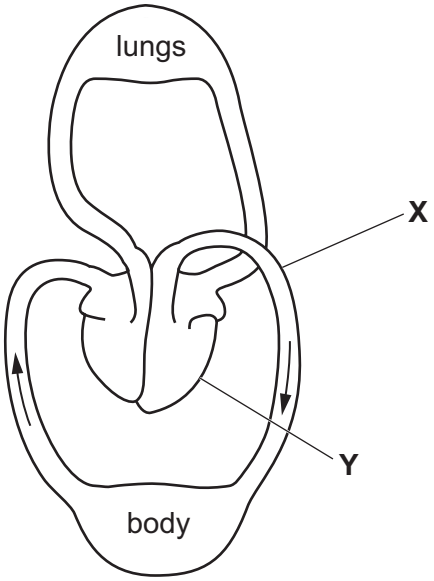

Fig. 1.1

(i) **On Fig. 1.1**, draw arrows to show the direction of blood flow to and from the lungs. [1]

(ii) State the names of blood vessel **X** and organ **Y** in Fig. 1.1.

blood vessel **X** .....

organ **Y** .....

[2]

(e) State the name of the blood vessel that transports oxygenated blood to the kidney.

..... [1]

[Total: 8]

View solution

2 Water moves into and out of cells by osmosis.

(a) State **two** plant cell structures that water moves through to reach the cytoplasm.

View solution

1 .....

2 .....

[2]

(b) Potato plant tissue was used to investigate osmosis.

View solution

Potato cylinders were placed into different sucrose solutions for 30 minutes.

The masses of the potato cylinders were measured before and after being placed into the solutions.

The difference in mass was calculated for each potato cylinder.

Table 2.1 shows the results of the investigation.

Table 2.1

concentration of sucrose solution / mol per dm^3	starting mass of potato cylinder / g	final mass of potato cylinder / g	difference in mass / g	percentage change in mass
0.0	2.31	2.53	0.22	9.52
0.2	2.35	2.49	0.14	5.96
0.4	2.28	2.34	0.06	2.63
0.6	2.30	2.21	–0.09	
0.8	2.34	2.19	–0.15	–6.41

(i) Using the information in Table 2.1, calculate the **percentage change in mass** for the potato cylinder in the 0.6 mol per dm^3 sucrose solution.

Give your answer to **two** decimal places.

Space for working.

..... %

[3]

(ii) Describe the expected appearance of the potato cylinder that was placed in the 0.8 mol per dm^3 sucrose solution for 30 minutes.

.....

.....

..... [1]

(iii) Using the results in Table 2.1, describe how the concentration of sucrose solution affects the percentage change in mass of the potato cylinders.

.....

.....

.....

.....

.....

..... [2]

[Total: 8]

3 **(a)** Fig. 3.1 is a drawing of a leaf from an oak tree.

View solution

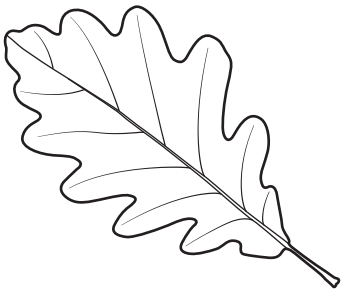

Fig. 3.1

The oak leaf has a large surface area.

Explain why having a large surface area is an adaptation for photosynthesis.

.....

.....

..... [1]

(b) State the word equation for photosynthesis.

..... [2]

View solution

(c) Fig. 3.2 is a diagram of a section of a leaf from a dicotyledonous plant.

View solution

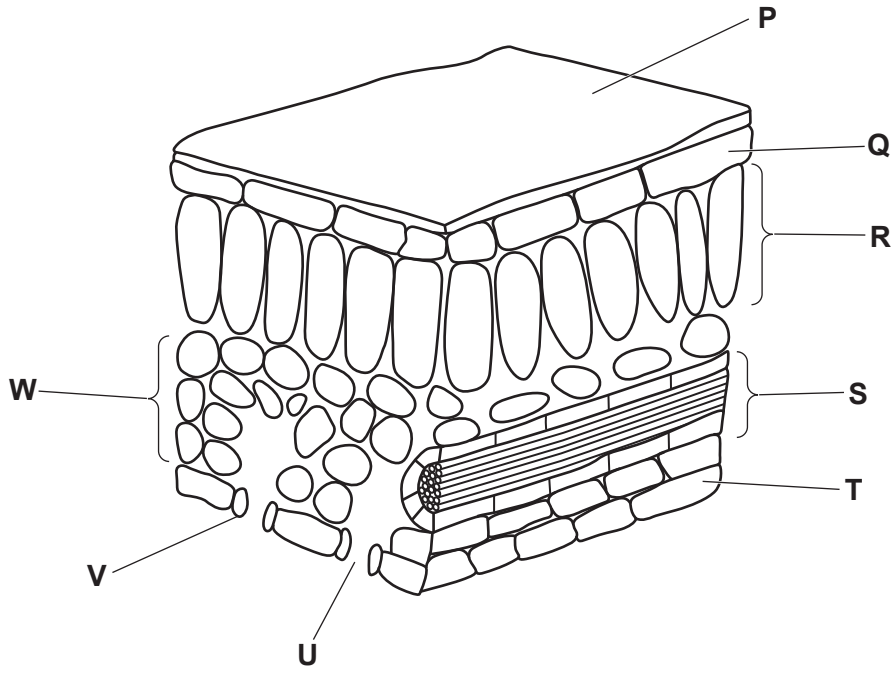

Fig. 3.2

(i) State the letter in Fig. 3.2 which identifies the tissue that contains the highest density of chloroplasts.

..... [1]

(ii) In Fig. 3.2, the letter **S** labels a vascular bundle.

View solution

State the names of **two** tissues found in the vascular bundle.

1 .....

2 .....

[2]

(iii) State the letter in Fig. 3.2 which identifies the cells that control gas exchange in the leaf **and** state their name.

View solution

letter .....

name .....

[2]

(iv) State the name **and one** function of the layer labelled **P** in Fig. 3.2.

View solution

name .....

function .....

.....

[2]

[Total: 10]

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4 **(a)** During inspiration air is taken into the lungs.

View solution

Table 4.1 shows the structures that air passes through during inspiration.

The structures are **not** in the correct order.

Table 4.1

A	alveoli
B	bronchi
C	bronchioles
D	larynx
E	nose
F	trachea

Identify the order of structures that air travels through during inspiration.

Write the letters from Table 4.1 in the boxes provided to show the correct order.

One has been done for you.

		F			

[3]

(b) The composition of inspired air is different from the composition of expired air.

View solution

Describe the differences in composition between inspired and expired air.

.....

.....

.....

.....

.....

.....

..... [4]

(c) A student investigated the composition of inspired and expired air.

View solution

Fig. 4.1 shows the apparatus that was used.

The student breathed in and out, through the mouthpiece, for 15 seconds.

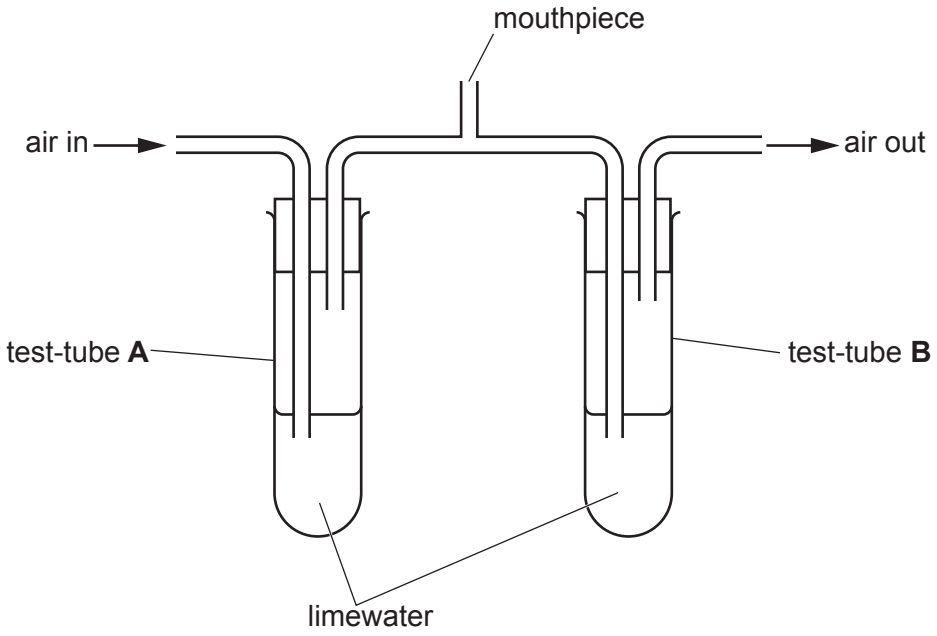

Fig. 4.1

(i) State the name of the gas that can be identified using limewater.

..... [1]

(ii) Using the information in Fig. 4.1, predict what happened to the limewater in test-tube **A** and in test-tube **B**.

test-tube **A** .....

test-tube **B** .....

[2]

(d) The student exercised for five minutes.

View solution

Describe the effects of vigorous exercise on breathing.

.....

.....

.....

.....

..... [2]

[Total: 12]

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5 Bluebells are plants that can reproduce sexually and asexually.

(a) (i) Define the term asexual reproduction.

View solution

.....

.....

..... [2]

(ii) State **one** example of a structure that is involved in asexual reproduction in a plant.

..... [1]

(b) Fig. 5.1 is a drawing of a bluebell plant.

View solution

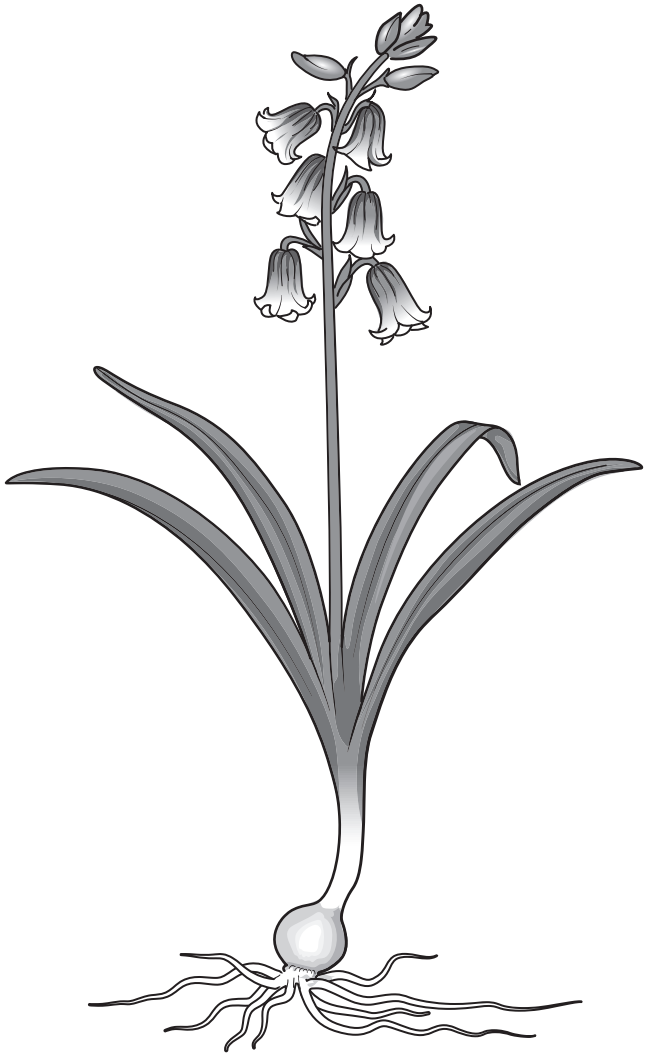

Fig. 5.1

On Fig. 5.1, label the structure that carries out sexual reproduction with a label line and the letter **S**. [1]

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(c) Bluebells grow in ancient woodlands.

Fig. 5.2 is a graph showing the percentage of land that was covered with woodland in one country from the years 1100 to 2000.

View solution

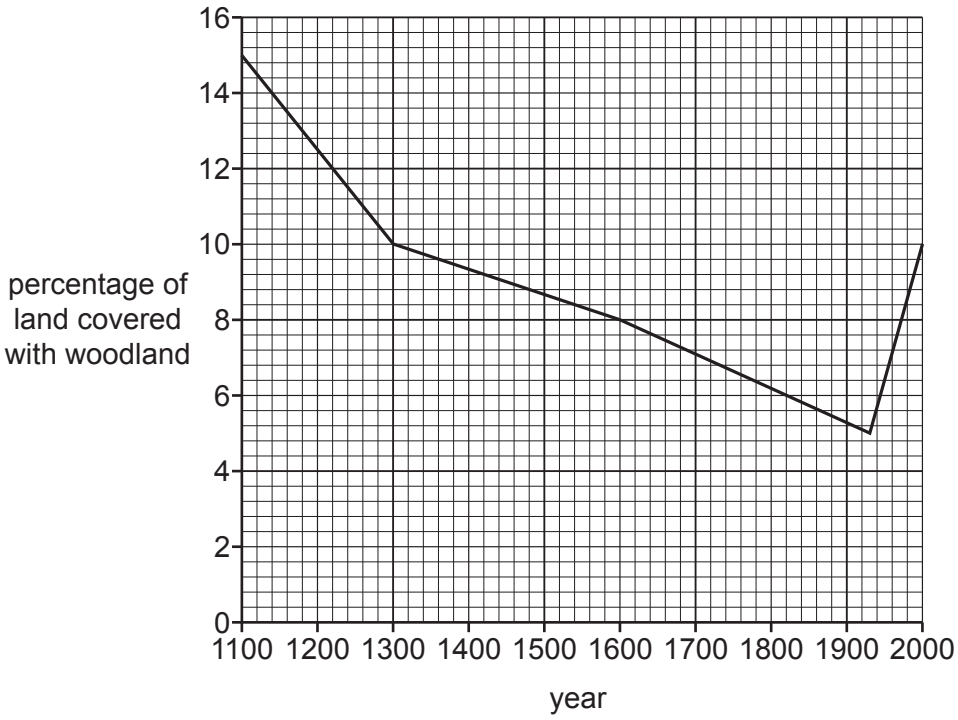

Fig. 5.2

(i) State the years when the percentage of land covered with woodland was 10% in Fig. 5.2.

..... and ..... [2]

(ii) State the percentage of land covered with woodland in 1600 in Fig. 5.2.

..... % [1]

View solution

(d) (i) In many countries the percentage of land covered with woodland has decreased because of deforestation.

View solution

Suggest **two** reasons why deforestation occurs.

1 .....

.....

2 .....

.....

[2]

(ii) Explain the undesirable effects of deforestation.

View solution

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 12]

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6 **(a)** A student investigated variation in flower colour in pea plants.

The student counted the number of pea plants that had purple flowers and the number of pea plants that had white flowers.

View solution

Fig. 6.1 shows the results.

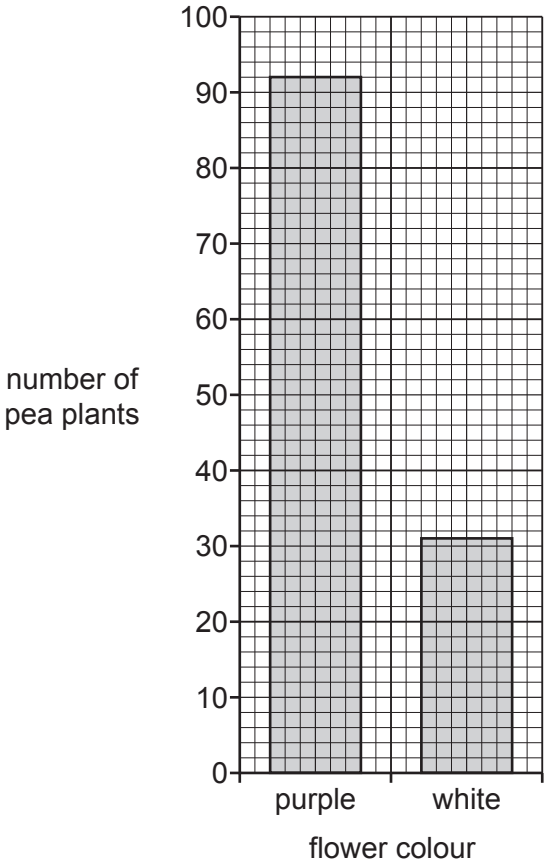

Fig. 6.1

Use the information in Fig. 6.1 and your own knowledge to complete the sentences about variation.

Variation is the ..... between individuals of the same species.

Flower colour in pea plants is an example of discontinuous variation. The other type of variation is known as ..... variation.

Discontinuous variation results in a limited number of phenotypes with no ..... .

Discontinuous variation is usually caused by ..... only.

The difference between the number of pea plants that had purple flowers and the number of pea plants that had white flowers is ..... .

The ratio of purple to white flowers in Fig. 6.1 is ..... .

[6]

(b) Some features of organisms show discontinuous variation.

View solution

The term discontinuous variation is in the box on the left.

The boxes on the right show some features of organisms.

Draw **two** lines from 'discontinuous variation' to **two** features that show discontinuous variation.

	blood group in humans
	body length in reptiles
discontinuous variation	height in humans
	mass of pea seeds
	pea seed shape

[2]

(c) New alleles for flower colour can arise as a result of genetic change.

View solution

(i) State the term used to describe genetic change.

..... [1]

(ii) State **one** factor that can increase the rate at which genetic change occurs.

..... [1]

View solution

(d) Scientists have experimented with genetically modifying pea plants to make them resistant to pea weevils.

View solution

Pea weevils are an insect pest.

(i) Suggest why pea plants might be genetically modified to make them resistant to pests.

.....

.....

..... [1]

(ii) State **two** other examples of genetic modification in **crop plants**.

View solution

1 .....

2 .....

[2]

[Total: 13]

7 Fig. 7.1 is a photograph of a lionfish (*Pterois volitans*).

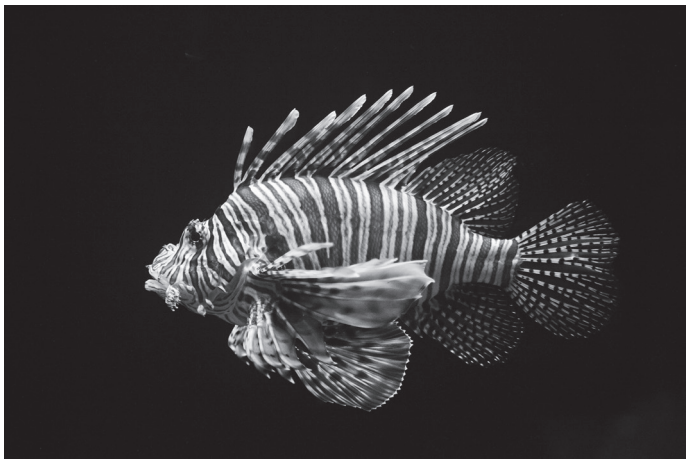

Fig. 7.1

(a) State the genus of the lionfish.

View solution

..... [1]

(b) Lionfish are classified as fish.

View solution

Table 7.1 shows features of organisms.

Place ticks (✓) in the boxes to show the correct features of birds, fish and insects.

Table 7.1

features	birds	fish	insects
compound eyes			
feathers			
internal skeleton			

[3]

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(c) Lionfish are an example of a foreign species that has been accidentally introduced to many marine habitats.

Describe the harmful consequences of introducing a foreign species to a habitat.

View solution

.....

.....

.....

.....

.....

.....

..... [3]

(d) Removing introduced species from habitats is one method of conserving endangered species.

Describe other methods of conserving endangered species.

View solution

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

8 Fig. 8.1 is a diagram showing part of the carbon cycle.

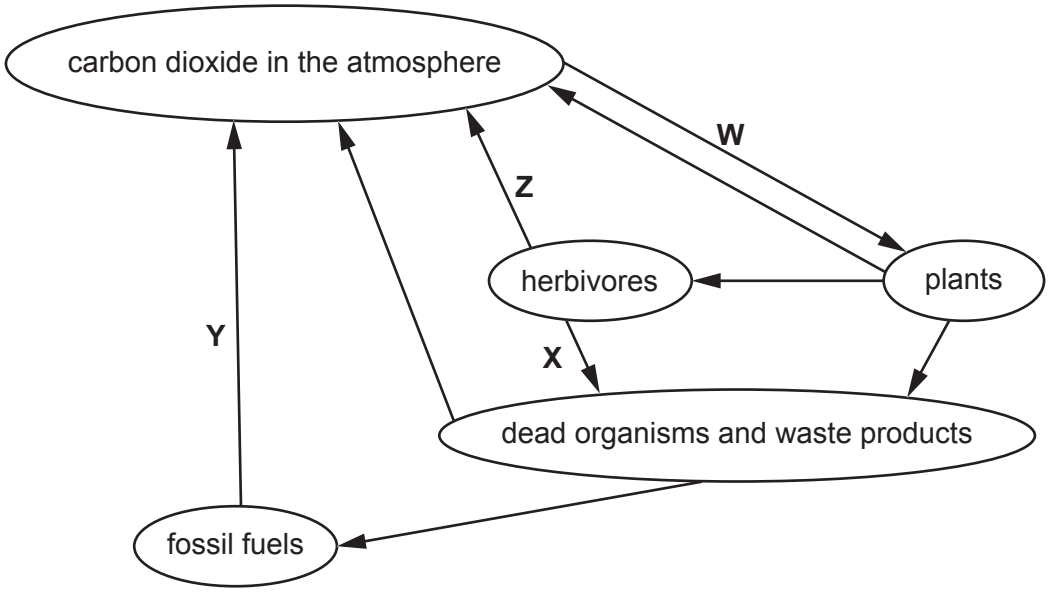

Fig. 8.1

(a) Identify the processes labelled **W**, **X**, **Y** and **Z** in Fig. 8.1.

View solution

W .....

X .....

Y .....

Z .....

[4]

(b) State the names of **two** biological molecules found in plants that contain carbon.

View solution

1 .....

2 .....

[2]

(c) An increase in the concentration of carbon dioxide in the atmosphere is causing the enhanced greenhouse effect.

State the name of **one** other greenhouse gas.

View solution

..... [1]

[Total: 7]

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