Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4023581544

BIOLOGY **0610/33**

Paper 3 Theory (Core) **October/November 2016**

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.

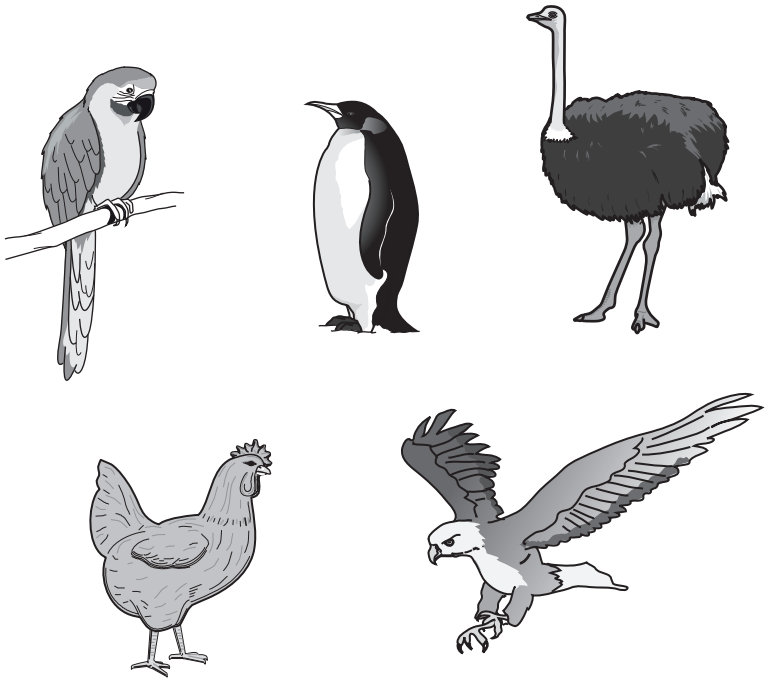
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This document consists of **20** printed pages and **4** blank pages.

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CAMBRIDGE International Examinations

1 Fig. 1.1 shows five different vertebrates.



not drawn to scale

Fig. 1.1

(a) State **one** feature that is shared by all vertebrates.

.....[1]

(b) The five animals in Fig. 1.1 all belong to the same group of vertebrates.

(i) State the name of this group of vertebrates.

.....[1]

(ii) State **two** features which place the five vertebrates in this group.

1 .....

2 .....

[2]

[Total: 4]

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2 Fig. 2.1 is a drawing of a piece of plant tissue.

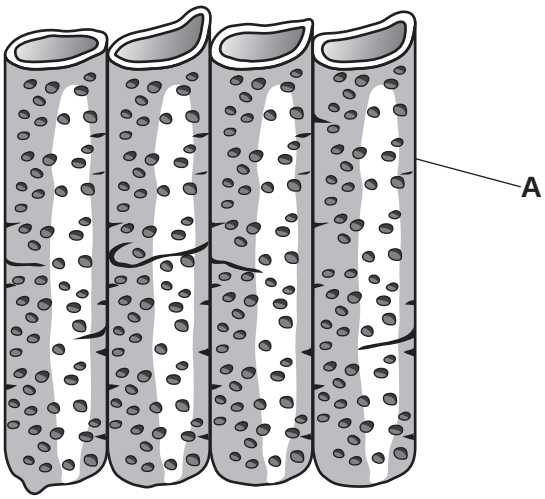


Fig. 2.1

(a) **(i)** What name is given to this type of tissue?
Choose your answer from the list.

palisade mesophyll **root hair** **xylem**

.....[1]

(ii) Name the part labelled **A** in Fig. 2.1.

.....[1]

(b) This tissue is important for both transport **and** support in the plant.

Explain how the structure of this tissue allows it to perform these functions:

transport .....

.....

support .....

.....
[2]

(c) The cells in this tissue do **not** contain some of the structures found in most plant cells.

State **one** structure that is missing from the tissue shown in Fig. 2.1.

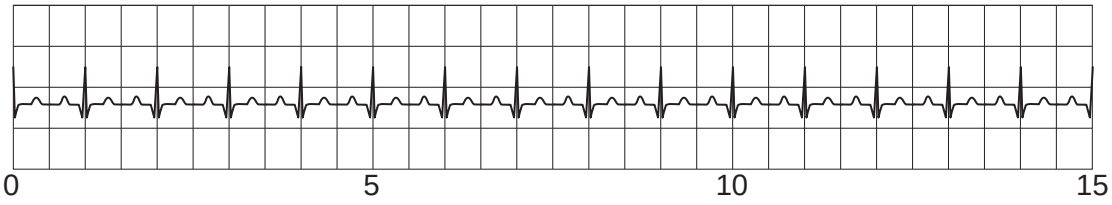
.....[1]

[Total: 5]

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3 Doctors can use an ECG machine to monitor a patient's heart rate.

Fig. 3.1 shows the ECG of a healthy man.



Key

= 1 heartbeat

Fig. 3.1

(a) Use Fig. 3.1 to calculate the man's heart rate.

Give your answer in beats per minute. Show your working.

..... beats per minute [2]

(b) The heart rate can also be measured by listening to the sounds that the heart makes.

State what causes the sounds made by the heart.

.....[1]

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(c) Several things can alter a person's resting heart rate.

Fig. 3.2 shows a normal resting ECG and the resting ECG of a person with a heart problem.

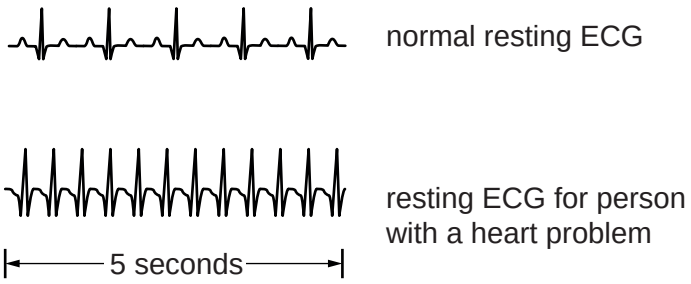


Fig. 3.2

(i) Describe how this heart problem affects the person's resting heart rate.
Use data from Fig. 3.2 to support your answer.

.....

.....[2]

(ii) State **one** factor which can alter the heart rate of a healthy person to produce the same effect as the heart problem shown in Fig. 3.2.

.....[1]

(d) Describe the meaning of the term *coronary heart disease* and state **one** factor that increases the risk of developing coronary heart disease.

description .....

.....

risk factor .....

.....
[2]

[Total: 8]

4 **(a)** Define the term *photosynthesis* and outline **one** reason why it is important to ecosystems.

.....

.....

.....

.....

.....[3]

(b) **(i)** Name the green substance that plants need for photosynthesis.

.....[1]

(ii) Name the gas that plants need for photosynthesis.

.....[1]

(iii) Name the gas that plants produce during photosynthesis.

.....[1]

(c) Fig. 4.1 shows the apparatus a student used to investigate how light intensity affects photosynthesis.

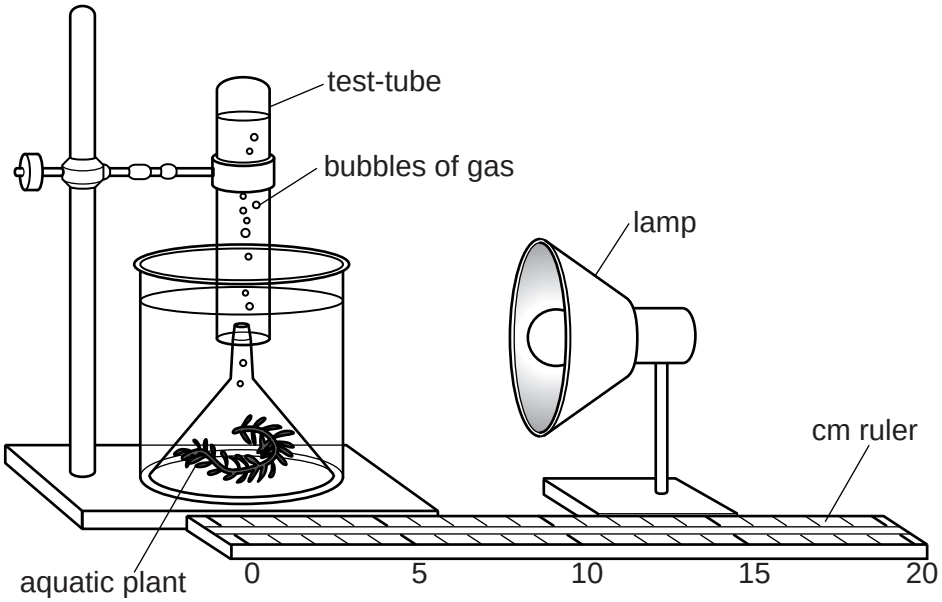


Fig. 4.1

The student placed an aquatic plant under a funnel in a beaker of water.

During the investigation she placed the lamp at different distances from the aquatic plant.

At each distance she counted how many bubbles the aquatic plant produced in one minute.

The bubbles of gas were then collected in the test-tube.

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Fig. 4.2 shows the results of her investigation.

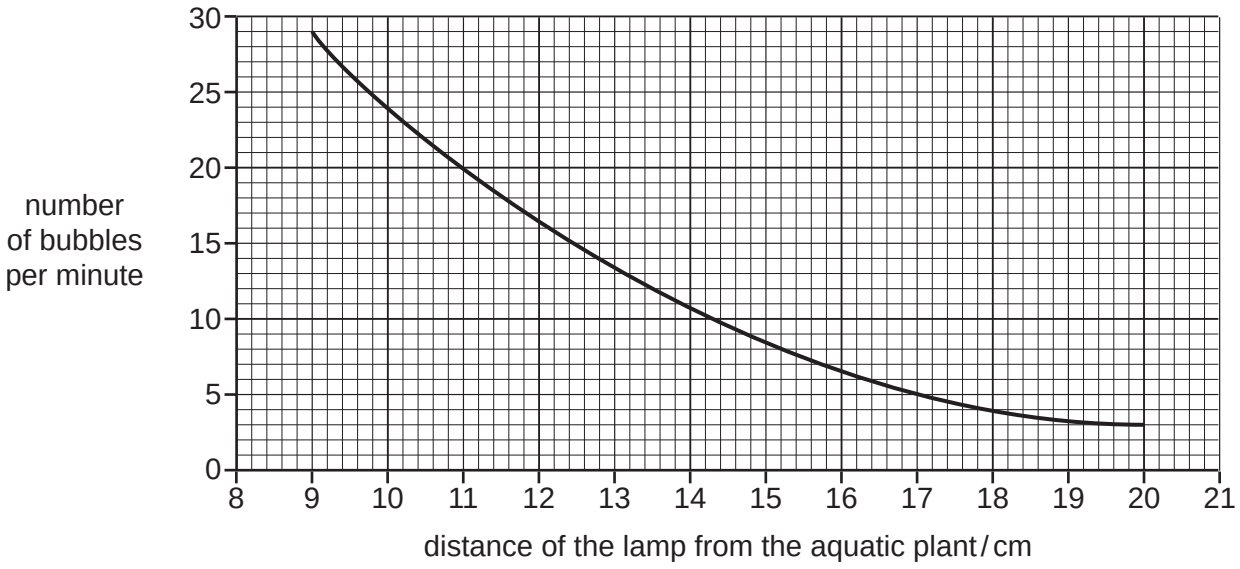


Fig. 4.2

(i) Use Fig. 4.2 to find the number of bubbles produced when the lamp was placed 10 cm from the aquatic plant.

..... bubbles per minute [1]

(ii) Describe how the rate of photosynthesis is affected by the distance of the lamp from the aquatic plant.

.....

.....

.....

.....

.....[2]

(iii) Predict the number of bubbles that would be produced if the lamp was placed 21 cm from the aquatic plant.

..... bubbles per minute [1]

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[Turn over

(d) Another student placed the lamp 15 cm from the aquatic plant and kept it there.

Although the light intensity stayed the same, the number of bubbles produced by the aquatic plant per minute decreased.

Suggest an explanation for this.

.....

.....

.....

.....

.....[2]

[Total: 12]

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5 This question is about the movement of substances into and out of cells.

(a) Draw one straight line from each box on the left to join it with the box containing the correct description on the right.

how substances pass into and out of cells	description
active transport	the movement of water through a partially permeable membrane
diffusion	the exchange of one kind of particle for another through a partially permeable membrane
osmosis	the net movement of particles from a region of their higher concentration to a region of their lower concentration down a concentration gradient
	the movement of particles through a cell membrane from a region of lower concentration to a region of higher concentration using energy

[3]

(b) (i) The contents of a meal must be digested before they can be absorbed.

State the two types of digestion.

1 .....

2 .....
[1]

(ii) The body uses enzymes to digest food.

Define the term *enzyme*.

.....

.....

.....

.....[2]

(iii) Give **one** example of a digestive enzyme and the substrate it acts on.

enzyme .....

substrate .....
[1]

(iv) Suggest why the human digestive system must make many different enzymes.

.....

.....

.....

.....[2]

[Total: 9]

6 Reflex actions play an important part in human behaviour.

(a) **(i)** What is meant by the term *reflex action*?

.....

.....

.....

.....

.....[2]

(ii) Suggest why reflex actions are important.

.....

.....[1]

(b) A reflex arc is made up of a number of different parts.

Complete the sentences that describe a reflex arc by writing the correct words in the spaces.

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

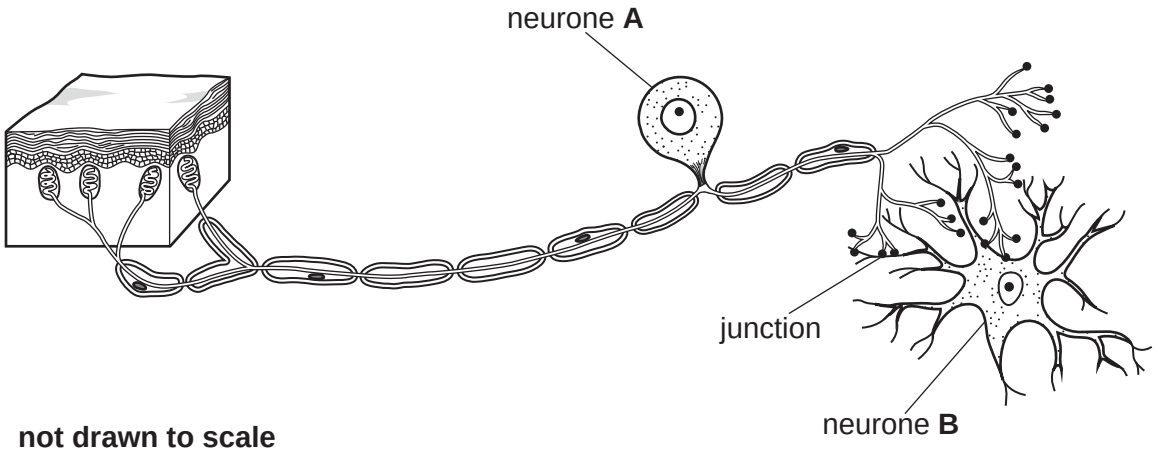
brain **effector** **motor neurone** **receptors**
relay neurone **sensory neurone**

Changes in the surroundings are detected by ..... which generate an impulse in a ..... . Nerve impulses travel from this cell to a ..... . The impulses then travel to a ..... . Finally the nerve impulse is passed to an ..... which results in the body responding to the changes. [4]

(c) Fig. 6.1 is a diagram of a reflex arc.

It shows two different neurones.

These are labelled neurone **A** and neurone **B**.



not drawn to scale

Fig. 6.1

(i) There are small gaps at the junctions between neurone **A** and neurone **B**.

State the name of these gaps.

.....[1]

(ii) State where in the body neurone **B** can be found.

.....[1]

[Total: 9]

7 Giant tortoises are an endangered species living on the Galapagos Islands, 600 miles from the coast of South America.

Fig. 7.1 shows a giant tortoise.



Fig. 7.1

(a) For over 300 years sailors hunted the slow-moving giant tortoises as a source of food.

They also left goats on the islands to provide food for sailors to eat in the future.

Giant tortoises and goats are both herbivores.

Use this information to suggest and explain **two** reasons why giant tortoises became an endangered species.

1 .....

.....

.....

2 .....

.....

.....

[4]

(b) Outline **two** ways that an endangered species can be conserved.

1 .....

.....

2 .....

.....

[2]

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(c) The loss of one species can affect other organisms living in the same environment.

Suggest how the loss of one species of secondary consumer from a food web might affect other organisms in the same food web.

.....

.....

.....

.....

.....[2]

[Total: 8]

8 **(a)** A farmer buys a packet of seeds that produce plants with purple beans.

The packet states that the seeds are homozygous for bean colour.

Define the term *homozygous*.

.....

.....

.....

.....

.....[2]

(b) The farmer plants the seeds and the bean plants grow.

When the beans are harvested the farmer notices that most of the beans are purple but a few beans are green.

He decides that some of the plants carried the allele for the green coloured bean and that this allele is recessive.

(i) Define the term *allele*.

.....

.....[1]

(ii) Suggest why the farmer decided that the allele for green coloured beans is recessive.

.....

.....

.....

.....

.....[2]

(c) Describe the difference between the *genotype* and the *phenotype* of an organism.

.....

.....

.....

.....

.....[2]

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(d) The farmer only wants **large** purple beans so he crosses the plants that produce the largest purple beans and does this for several generations.

He does not breed from any plant that produces small or green beans.

Eventually all his plants produce only large purple beans.

What is this process called?

.....[1]

(e) Genetic engineering has been used to provide more food for the increasing human population.

Give an example of genetic engineering in a crop plant and state how this will produce more food.

.....

.....

.....

.....

.....[2]

[Total: 10]

9 This question is about human nutrition.

The three boxes on the left contain definitions of processes involved in human nutrition.

The four boxes on the right contain the names of some of these processes.

(a) Draw **one** straight line from each definition to join it to the correct process.

definition	**process**
	absorption
the movement of digested food molecules into the cells of the body where they are used, becoming part of these cells	
	assimilation
the passing out of food that has not been digested or absorbed, as faeces, through the anus	
	egestion
the taking of substances, e.g. food and drink, into the body through the mouth	
	ingestion

[3]

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(b) Fig. 9.1 shows the teeth in the upper jaw of an adult human.

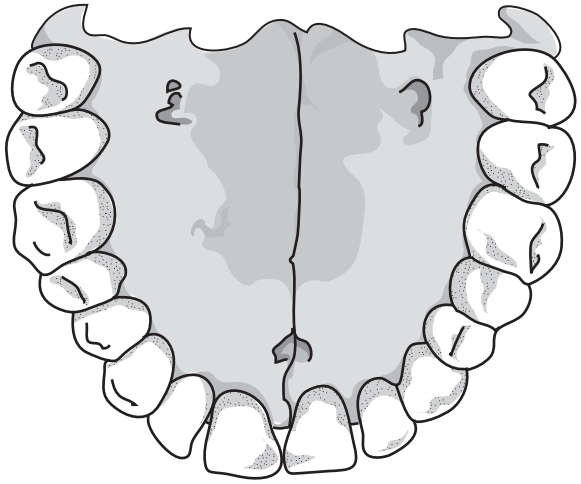


Fig. 9.1

(i) On Fig. 9.1 label with a letter **X** one tooth that is adapted for **cutting** food.

State the name of the type of tooth adapted for cutting.

.....

[2]

(ii) On Fig. 9.1 label with a letter **Y** one tooth adapted for **chewing** food.

State the name of the type of tooth adapted for chewing.

.....

[2]

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[Turn over

(c) Fig. 9.2 shows a section through a human tooth.

Two of the layers of the tooth are labelled **A** and **B**.

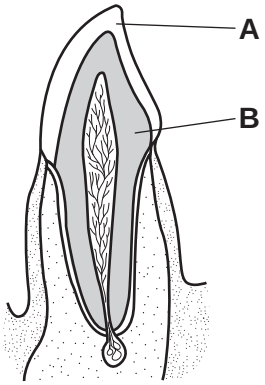


Fig. 9.2

Eating too much sugar can be the beginning of a process that ends in dental decay.

Explain how sugar is involved in decay **and** how decay affects parts **A** and **B**.

.....

.....

.....

.....[3]

[Total: 10]

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10 Fig. 10.1 shows the energy flow in a simple food chain.

For every 200 J of energy in the cabbage eaten by the caterpillar 35 J passes into the bird.

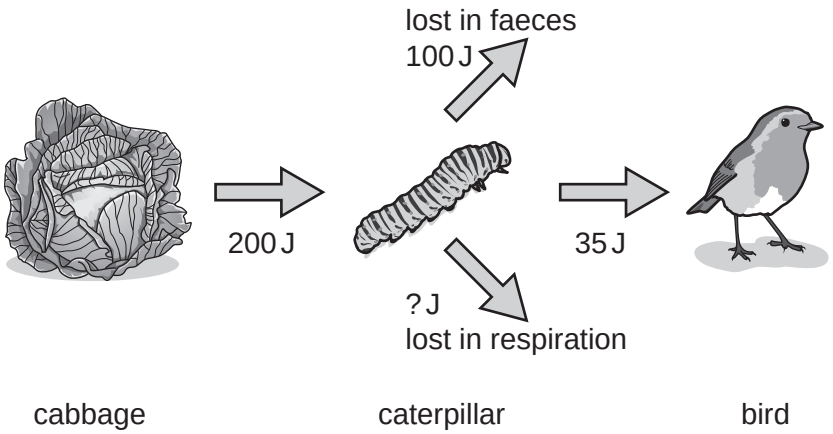


Fig. 10.1

(a) Calculate the percentage of energy that is transferred from the cabbage to the bird in this food chain.

Show your working.

.....% [2]

(b) **(i)** The caterpillar passes 35 J of energy from the cabbage to the bird.

The rest of the 200 J is lost in the form of respiration and faeces.

Use this information to find the energy the caterpillar loses in respiration.

Show your working.

..... J [2]

(ii) Suggest **one** other way the caterpillar uses the energy during its lifetime.

.....[1]

[Total: 5]

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