Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

8948273964

BIOLOGY **0610/31**

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.

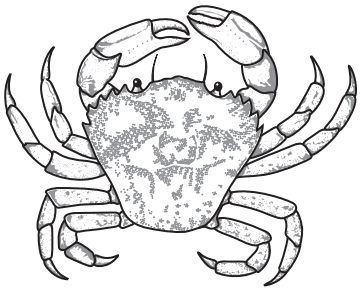
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.

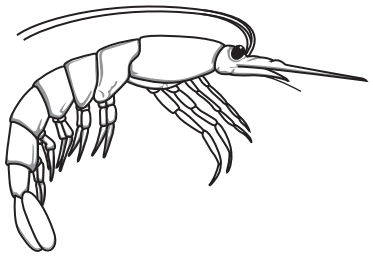
© UCLES 2016

1 Fig. 1.1 shows three crustaceans which live in the same rock pool.

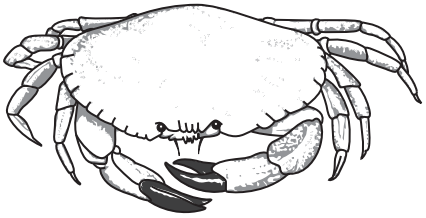
The rock pool also contains seaweed and seawater.



Carcinus maenas



Crangon crangon



Cancer pagurus

not drawn to scale

Fig. 1.1

(a) Complete the sentences. Use words from the list.

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

arthropods carnivore consumer endoskeleton

exoskeleton five four habitat herbivore

population producer three vertebrates

Crustaceans all belong to the same group as insects, called ..... .

All crustaceans have at least ..... pairs of legs.

They also have a hard outer covering called an ..... .

Seven individuals of one species, *Cancer pagurus,* were found in the same pool. These individuals make up a ..... .

Cancer pagurus is a ..... because it eats fish and other animals.

Seaweed makes its own food so it is a ..... .

[6]

© UCLES 2016

(b) The drawing of *Cancer pagurus* in Fig. 1.1 is not the same size as the actual animal.

State what would be needed to calculate its actual size **and** explain how you would do this calculation.

.....

.....

.....

.....

..... [3]

(c) All the crustaceans were found living under rocks or seaweed.

Suggest **two** reasons why they were living there.

1 .....

.....

2 .....

.....
[2]

(d) Two other crustaceans, *Porcellana platycheles* and *Porcellana longicornis*, were found in the same rock pool. They are closely related to each other.

(i) Describe how their scientific names show that they are closely related.

.....

..... [1]

(ii) Although they are closely related, they cannot successfully interbreed.

Describe how their scientific names show that they cannot successfully interbreed.

.....

.....

..... [1]

[Total: 13]

© UCLES 2016

[Turn over

2 **(a)** **(i)** The eye is a sense organ.

Define the term *sense organ*.

.....

.....

.....

..... [2]

(ii) Explain why the eye is described as an organ and not a tissue.

.....

.....

.....

..... [2]

(b) Fig. 2.1 shows a section through the eye.

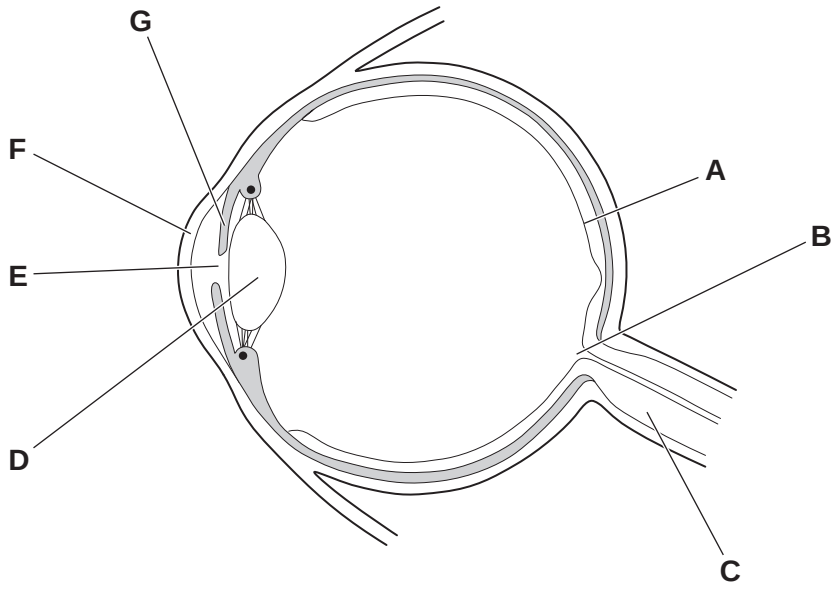


Fig. 2.1

(i) Select letters from Fig. 2.1 to match the part with its function.

Write your answers in Table 2.1.

Table 2.1

function	letter
carries impulses to the brain	
contains light receptors to detect light	
controls how much light enters the eye	
refracts light	

[4]

(ii) Write down the letter from Fig. 2.1 which shows the position of the blind spot.

.....

[1]

[Total: 9]

3 A student carried out an investigation into transpiration from leaves.

She chose leaves of a similar size from the same plant.

She weighed them and then placed them in different conditions.

As the leaves transpired they lost mass.

Table 3.1 shows the results.

Table 3.1

leaf	conditions	mass at start / g	mass at end / g	change in mass / g	% change in mass
H	hot and dry	6.3	2.1	4.2	66.7
J	cool and dry	6.4	4.6	1.8	
K	hot and humid	6.2	3.7		40.3
L	cool and humid	5.1	4.7	0.4	7.8

(a) Complete the table by calculating:

(i) the change in mass for leaf **K** ..... [1]

(ii) the percentage change in mass for leaf **J**.

Show your working. Write your answer to one decimal place.

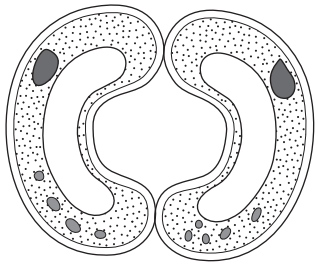
..... [2]

(b) State which conditions caused the most transpiration in the leaves.

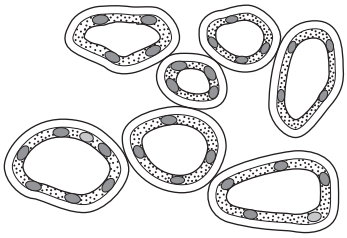
..... [1]

© UCLES 2016

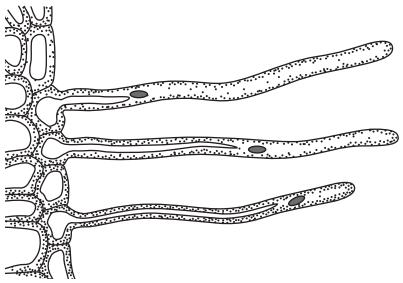
(c) Fig. 3.1 shows four types of plant tissue involved in the transport of water through a plant.



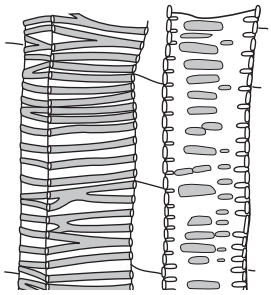
M



N



O



P

Fig. 3.1

(i) Describe how tissue **O** is adapted for its function.

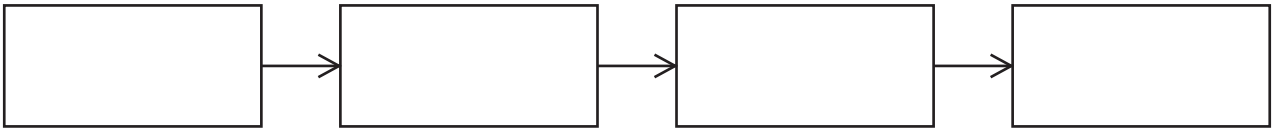
.....

.....

..... [1]

(ii) Complete the flow chart by placing the letters of the cells **M**, **N**, **O** and **P** in the correct order, starting with the absorption of water.

absorption of water → **transpiration from the leaf**



[3]

(d) State the name of:

(i) the type of tissue in which water is carried up the stem

..... [1]

(ii) another substance which is carried in the same tissue.

..... [1]

[Total: 10]

4 The body has defences against pathogens.

(a) (i) Define the term *pathogen*.

.....

.....

..... [1]

(ii) State **two** ways a pathogen can be transmitted.

1 .....

.....

2 .....

.....

[2]

(iii) The body can defend itself against pathogens.

Complete Table 4.1 by stating examples of the body's defences.

Table 4.1

defence	example
mechanical barrier	
chemical barrier	

[2]

(b) (i) Blood cells can also defend the body against pathogens.

Outline how they do this.

.....

.....

.....

.....

..... [3]

(ii) State **one** way in which modern medicine can help the body defend itself against pathogens.

.....

..... [1]

[Total: 9]

© UCLES 2016

5 Fish called trout and other fish used to be caught commercially in the Great Lakes of Canada.

However, canals built between the lakes before 1900 allowed a predator fish, the lamprey, to enter the lakes.

The lamprey feeds on trout. It caused the fishing industry to collapse.

Fig. 5.1 shows fish catches over 65 years.

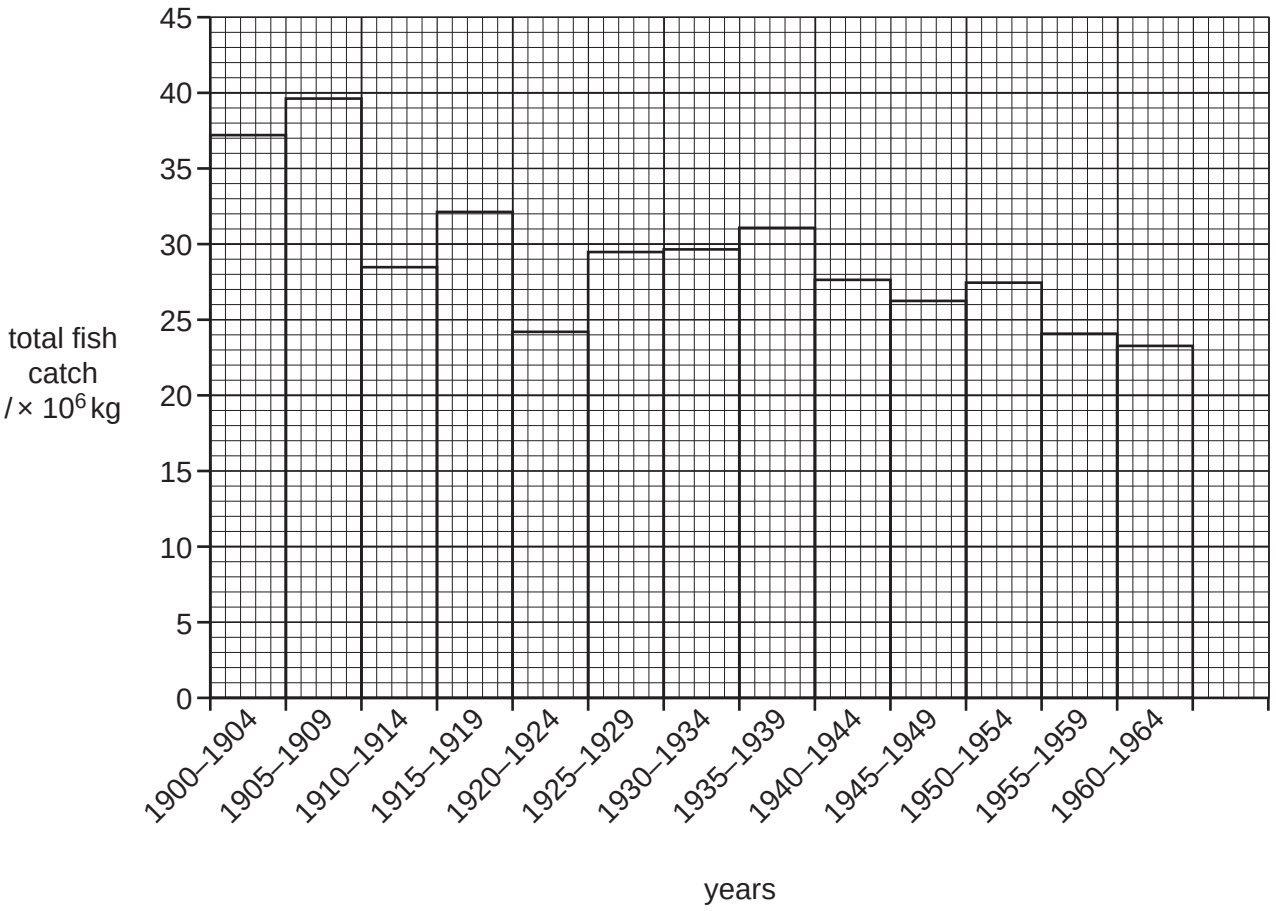


Fig. 5.1

(a) State in which five year period:

(i) the greatest mass of fish was caught ..... [1]

(ii) the smallest mass of fish was caught ..... [1]

(iii) Between 1900 and 1904, 37.4×10^6 kg of fish were caught.

Between 1960 and 1964, 23.4×10^6 kg of fish were caught.

Calculate the reduction in fish catches between 1900 and 1964.

Show your working.

..... [2]

(b) In 1944 barriers were placed in the canals to stop lampreys entering the lakes.

Suggest whether the barriers were effective.

Explain your answer.

.....

.....

..... [1]

(c) Studies have shown that human activities can affect trout numbers.

Suggest **three** human activities that could cause the trout numbers to drop.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(d) Describe **two** methods of conserving endangered species.

1 .....

.....

2 .....

.....

[2]

[Total: 10]

© UCLES 2016

6 **(a)** Complete Table 6.1 about diffusion and active transport.

Place a tick (✓) in each box which is correct.

Table 6.1

process	involves the movement of particles down a concentration gradient	involves the movement of particles up a concentration gradient	energy from respiration is required to move the particles
diffusion			
active transport			

[2]

(b) Complete Table 6.2 by naming the organ where each of these examples of diffusion takes place.

Table 6.2

example of diffusion	organ
oxygen passes into the blood of a human	
carbon dioxide passes into a plant	
glucose is absorbed into the blood of a human	

[3]

(c) Water moves into plant cells by osmosis.

Explain how plants benefit from the build-up of water in their cells.

.....

.....

..... [1]

[Total: 6]

7 **(a)** Teeth are involved in mechanical digestion.

What is meant by the term *mechanical digestion*?

.....

..... [2]

(b) Fig. 7.1 shows a section through a molar tooth.

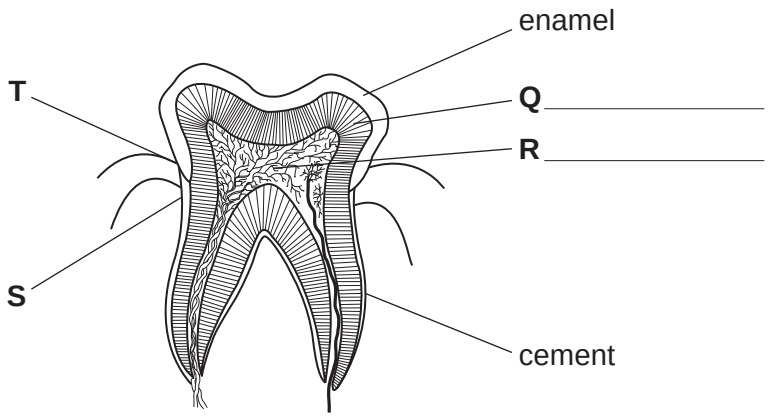


Fig. 7.1

(i) On Fig. 7.1, label parts **Q** and **R**. [2]

(ii) State **two** reasons why this tooth **cannot** be a canine tooth.

1 .....

.....

2 .....

.....
[2]

(iii) Gum disease causes the gums to shrink from position **T** to position **S**, as shown on Fig. 7.1.

Suggest why the tooth is more likely to decay when the gums are at position **S**.

.....

.....

..... [2]

(iv) State **two** ways of maintaining healthy teeth.

1 .....

.....

2 .....

.....
[2]

[Total: 10]

© UCLES 2016

8 Fig. 8.1 shows the apparatus used for investigating the contents of cigarette smoke.

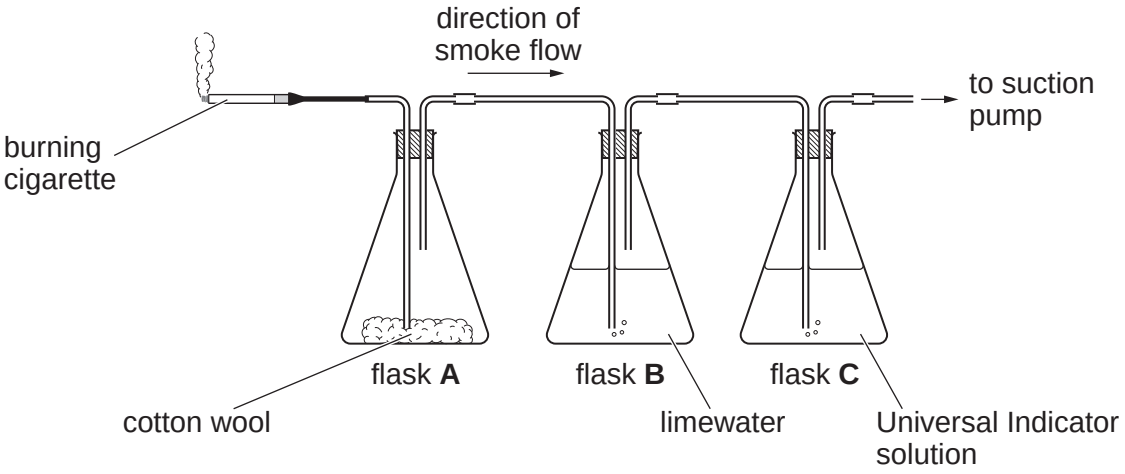


Fig. 8.1

The smoke from the burning cigarette is sucked through the apparatus.

Table 8.1 shows the results.

Table 8.1

flask	contents of flask	observations
A	cotton wool	stained yellow-brown with a sticky liquid
B	limewater	turned from colourless to milky
C	Universal Indicator solution	turned from green to orange-red

(a) (i) The chemical from the smoke that stained the cotton wool was tar.

State **two** effects tar has on the body.

1 .....

.....

2 .....

.....

[2]

(ii) State **one** conclusion that can be made from the limewater results.

.....

.....

..... [1]

(iii) State what the Universal Indicator results show about cigarette smoke.

.....

..... [1]

(iv) Name **one** component of cigarette smoke, other than tar and carbon monoxide, **not** found in this investigation.

..... [1]

(b) The cigarette had a filter to collect harmful substances, but it did not work very well.

Suggest how the results in Table 8.1 show that the filter did not work very well.

..... [1]

(c) Explain why cigarette smoke makes the transport of oxygen by the blood less effective.

.....

.....

.....

.....

..... [2]

[Total: 8]

© UCLES 2016

9 Fig. 9.1 shows a genetic cross between a purple flower and a white flower. Components of the cross are labelled with the letters **U**–**Z**.

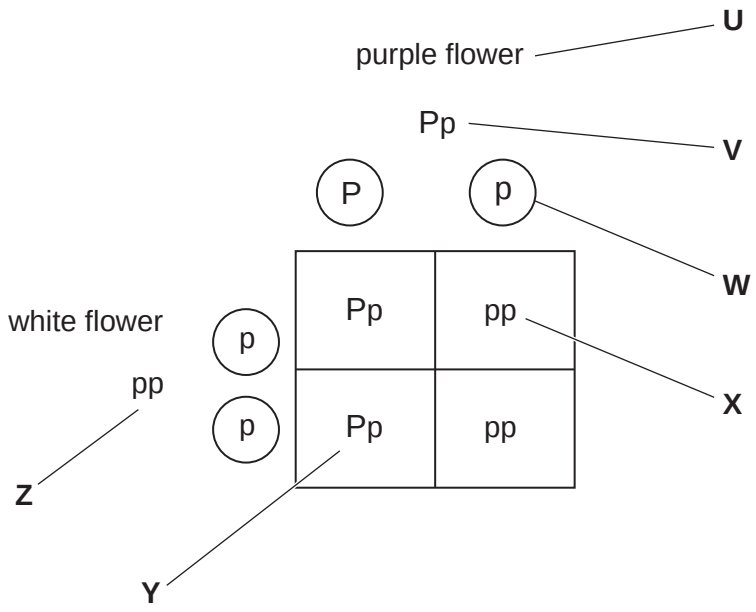


Fig. 9.1

(a) Use the letters **U**, **V**, **W**, **X**, **Y**, or **Z** from Fig. 9.1 to answer the questions.

You may use any letter once, more than once, or not at all.

State which letter represents:

(i) the genotype of a heterozygous parent ..... [1]

(ii) a gamete ..... [1]

(iii) the phenotype of an individual ..... [1]

(iv) a pure-breeding offspring. ..... [1]

(b) State the ratio of purple flowers to white flowers produced in this cross.

..... [1]

[Total: 5]

© UCLES 2016

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.