UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

BIOLOGY **9700/34**

Advanced Practical Skills 2 **October/November 2013**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

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 ink.
You may use a pencil for any diagrams, graphs or rough working.
Do **not** use red ink, staples, paper clips, highlighters, 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.

For Examiner's Use	
1	
2	
Total	

This document consists of **12** printed pages and **4** blank pages.

© UCLES 2013

BLANK PAGE

© UCLES 2013

You are reminded that you have **only one hour** for each question in the practical examination.

For Examiner's Use

You should:

- read carefully through **the whole** of Question 1 and Question 2
- then plan your use of **the time** to make sure that you finish all the work that you would like to do.

You will **gain marks** for recording your results according to the instructions.

1 You are provided with an extract from plant cells, which contains a mixture of biological molecules.
This extract may contain any of the biological molecules, for example lipids, proteins or types of carbohydrates.

Visking tubing, **V**, is selectively permeable, similar to a cell membrane, so that some biological molecules will diffuse through the wall of the tubing.

You are required to investigate the diffusion of biological molecule(s) into the water surrounding the Visking tubing.

(a) (i) State which biological molecule(s) might **diffuse** through the wall of the Visking tubing.

.....[1]

You are provided with:

labelled	contents	hazard	volume / cm^3
P	solution of plant extract	none	15
W	distilled water	none	100

labelled	details
V	15 cm length of Visking tubing in a beaker containing water

Fig. 1.1 shows the set-up of the apparatus.

For Examiner's Use

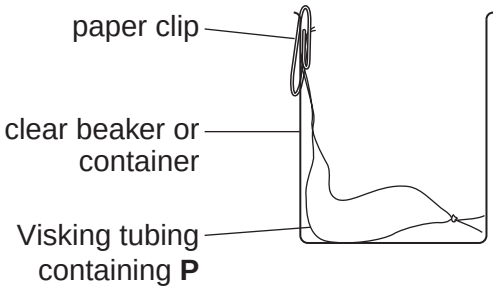


Fig. 1.1

You must now read up to the end of step 11 before proceeding.

Samples of the water surrounding the Visking tubing will be removed at 5 minute intervals for 15 minutes.

To compare the diffusion of any single biological molecule at each 5 minute interval the test for the biological molecule needs to be standardised.
For example, if you carried out the test for reducing sugars:

- one standardised variable is the volume of sample removed from water, e.g. 2 cm^3
- the dependent variable is measuring the time taken for the first colour change to appear.

(ii) State the **other** variables which would need to be standardised for the reducing sugars test, using only the reagents and apparatus provided.

Describe how you will standardise each variable.

.....

.....

.....

.....

.....

..... [3]

Samples of water surrounding the Visking tubing will be removed for testing at 5 minute intervals for 15 minutes. Therefore, you need to take this into account when you decide the volume of water to put into the container.

© UCLES 2013

Decide:

For Examiner's Use

- the test (or tests) you will carry out on the water
- the volume of the water you will need to sample for the test (or tests) at each time interval.

*You may find it helpful to calculate the **total** volume of water needed for all the tests.*

(iii) Draw **on Fig. 1.1** (on page 4) the level of the water:

- before you remove any samples (label this 'before')
- after the total volume of water needed to sample for all the tests has been removed (label this 'after'). [2]

Proceed as follows:

1. Tie a knot in the Visking tubing as close as possible to one end so that it seals the end.
2. To open the other end, wet the Visking tubing and rub the tubing gently between your fingers.
3. Put 5 cm^3 of **P** into the open end of the Visking tubing.
4. Rinse the outside of the Visking tubing by dipping it into the water in the container labelled **V**.
5. Put the Visking tubing into a small beaker or container as shown in Fig. 1.1.
6. Make sure the open end of the Visking tubing is held in place by a paperclip.

You will start timing as soon as you add **W**.

Read steps 7 to 11 before proceeding.

7. Put **W** into the small beaker to the level you decided in **(iii)**.
8. Immediately start timing and remove the first sample of water into a separate container to keep for the tests.
9. After 5 minutes, remove the next sample into a different container.
10. Repeat step 9 for two more samples.
11. Use the reagents and apparatus provided to identify the biological molecule(s) that you decided in **(a)(i)** may be present in the samples.

© UCLES 2013

(iv) Prepare the space below and record your results.

For Examiner's Use

[5]

(v) Use the results from **(iv)** to complete the hypothesis:

The Visking tubing allows …… to diffuse into the surrounding water. [1]

(vi) Explain how the results support your hypothesis.

.....

.....

.....[1]

(vii) Predict the trend in the results if the time was extended from 15 minutes to 30 minutes.

For Examiner's Use

.....

.....[1]

(viii) Suggest how you would modify this investigation to investigate the **concentration** of reducing sugars in **P**.

.....

.....

.....

.....

.....

.....

.....[3]

© UCLES 2013

[Turn over

Some scientists investigated the total sugar content of plant extracts from different types of fruit.

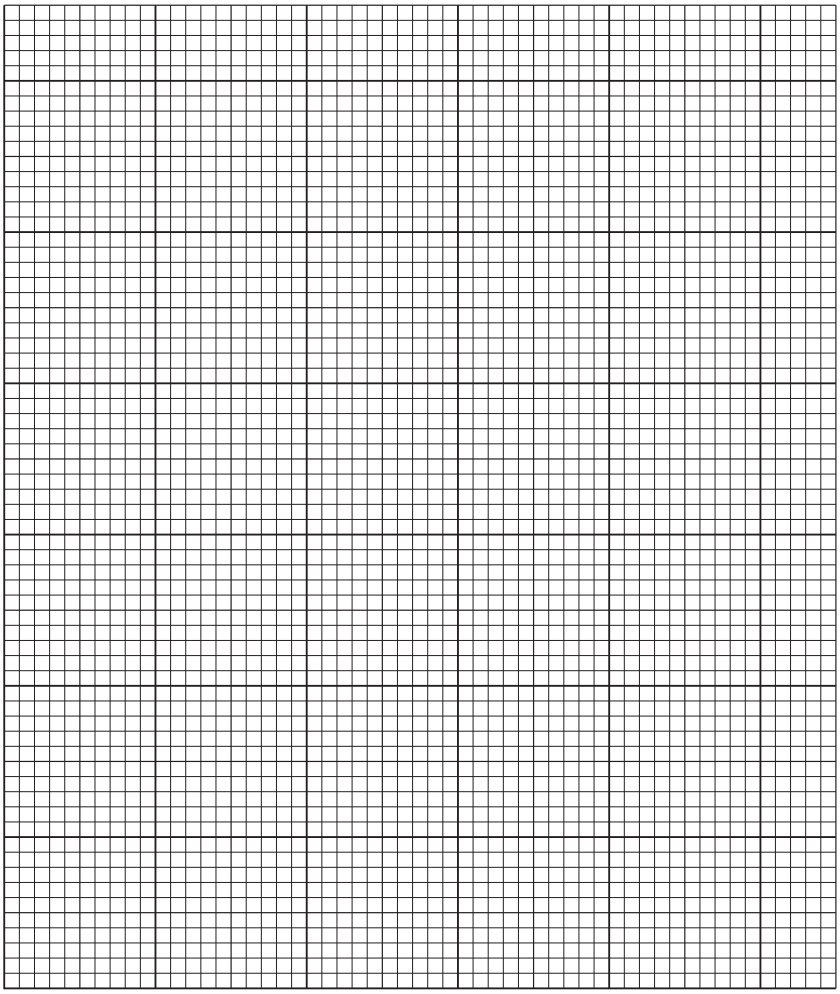
For Examiner's Use

The results are shown in Table 1.1.

Table 1.1

type of fruit	percentage of sugars
avocado (A)	0.6
banana (B)	12.2
kiwi (K)	8.0
lemon (L)	2.5
melon (M)	5.9

(b) Plot a chart of the data shown in Table 1.1. [4]



[Total: 21]

© UCLES 2013

2 The eyepiece graticule scale in your microscope may be used to help draw a plan diagram, as in **(a)**, with the correct shape and proportions of the tissues, without needing to calibrate the eyepiece graticule scale.

For Examiner's Use

M1 is a slide of a stained transverse section through part of a tubular organ from an animal.

(a) Select a part of the wall of the organ which shows the highest number of different layers of tissues.

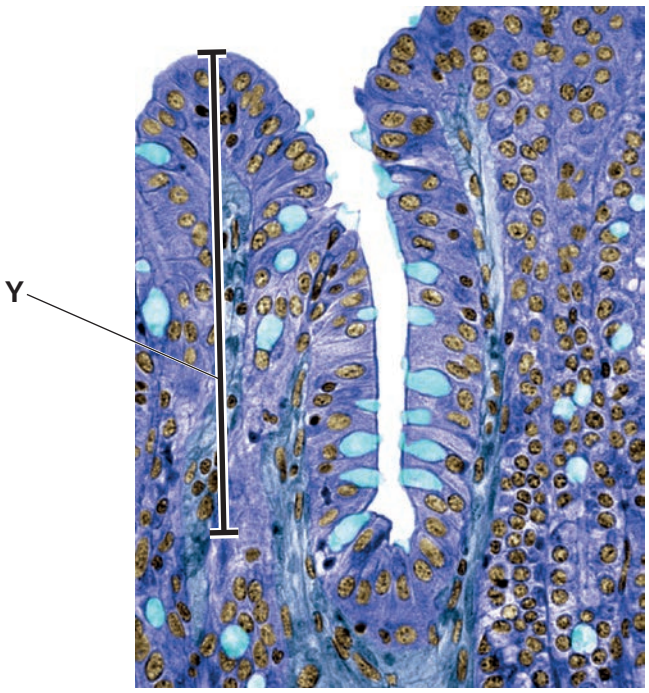
Draw a large plan diagram of this part of the wall to show the proportions of the different layers of tissues. The outermost layer is **smooth** and this should be drawn at the top of your diagram.

Annotate (make a note with a label line) your diagram to show one **other** difference between the layers making up the wall.

[4]

Fig. 2.1 is a photomicrograph of a stained transverse section through part of a different tubular organ from the same animal.

For Examiner's Use



magnification × 310

Fig. 2.1

(b) (i) Use the magnification to calculate the **actual length** of line **Y** in μm.

You will lose marks if you do not show all the steps in your calculation and do not use the appropriate units.

actual length .....μm [4]

(ii) State **one** observable feature in Fig. 2.1 which supports the conclusion that substances are absorbed by the tubular organ.

Explain how this feature would increase the rate of absorption.

.....

.....[1]

© UCLES 2013

(iii) Prepare the space below so that it is suitable for you to record the observable differences between the specimen on slide **M1** and that shown in Fig. 2.1.

Record your observations in the space you have prepared.

For Examiner's Use

[4]

Fig. 2.2 is a photomicrograph showing some cells from the lining of a different part of the same tubular organ shown in Fig. 2.1.

For Examiner's Use

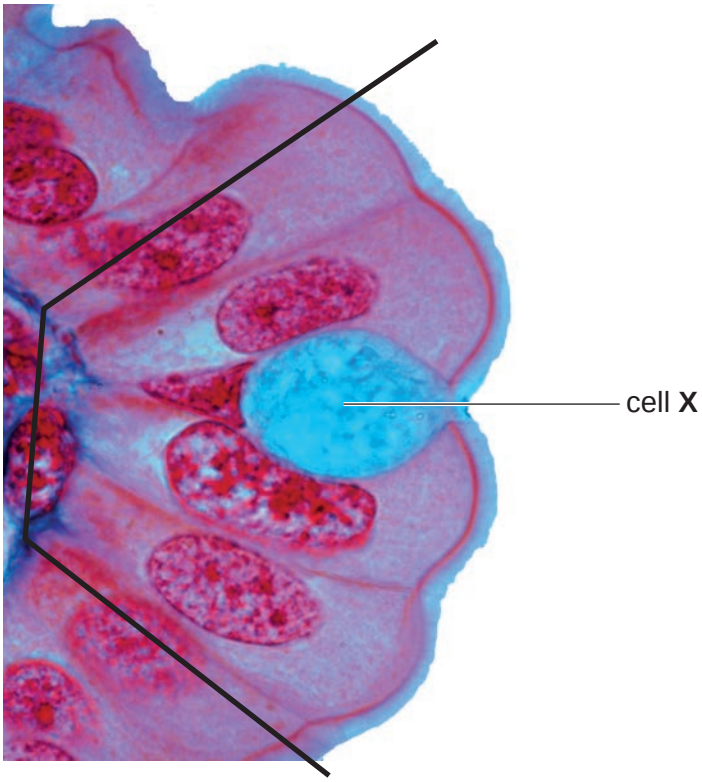


Fig. 2.2

(c) (i) Similar cells to cell **X** are found in Fig. 2.1 (on page 10).

On Fig. 2.1 (on page 10), use a label line and label to identify one cell which may be the same type as cell **X**. [1]

© UCLES 2013

(ii) Make a large drawing of the **whole** cells shown in the sector marked on Fig. 2.2 (on page 12).

On your drawing, use a label line and **label** to identify one observable feature of these cells which identify them as being **eukaryotic** cells.

For Examiner's Use

[5]

[Total: 19]

© UCLES 2013

BLANK PAGE

© UCLES 2013

BLANK PAGE

© UCLES 2013

BLANK PAGE

Copyright Acknowledgements:

Fig. 2.1 © STEVE GSCHMEISSNER/SCIENCE PHOTO LIBRARY.
Fig. 2.2 © MANFRED KAGE/SCIENCE PHOTO LIBRARY.

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.

University of 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.

© UCLES 2013