Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

3870282862

BIOLOGY **9700/35**

Advanced Practical Skills 1 **May/June 2014**

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, 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 **11** printed pages and **1** blank page.

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Before you proceed, read carefully through **the whole** of Question 1 and Question 2.

Plan the use of the two hours to make sure that you finish all the work that you would like to do.

If you have enough time, consider how you can improve the accuracy of your results, for example by obtaining and recording one or more additional measurements.

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

1 During the summer, certain plants translocate sucrose from the leaves to the roots to be stored as starch.
In the spring, this starch is hydrolysed to produce glucose which will provide energy for new growth.

You are provided with three samples, **S1**, **S2** and **S3** from plant root extracts, removed at different times of the year:

- the middle of winter, when there was no plant growth
- the beginning of spring, when plant growth begins
- the middle of spring, during active growth.

(a) (i) These extracts were tested for starch. Predict the colour that was observed and complete the table.

time of year extract was taken	predicted colour
middle of winter	
beginning of spring	
middle of spring	

[1]

You are required to:

- compare the concentrations of starch in the samples **S1**, **S2** and **S3**
- identify the time of year when each extract was taken.

You are provided with:

labelled	hazard	volume / cm^3
S1	none	20
S2	none	20
S3	none	20

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(ii) State the reagent you will use to compare the concentrations of starch **and** describe how you will standardise the starch test for each sample.

reagent .....

description .....

.....

.....[2]

Proceed as follows:

- Carry out the starch test as described in **(a)(ii)**.

(iii) Prepare the space below and record your observations.

[3]

(iv) Complete the table to match the samples **S1**, **S2** and **S3** with the time of year that each extract was taken from the root.

time of year extract was taken	sample
middle of winter	
beginning of spring	
middle of spring	

[1]

You are required to estimate the concentration of glucose in **S3** using **G1** and **G2**.

You are provided with:

labelled	hazard	percentage concentration of glucose	volume / cm^3
G1	none	0.1	20
G2	none	1.0	20

Proceed as follows:

1. Carry out tests to compare the **concentration** of glucose in **S3**, **G1** and **G2** using the apparatus and reagents provided.

   You will need to record the **time taken** for the first appearance of a colour change at the **top** of the mixture of the sample with the selected reagent(s).
   If no colour change occurs after 5 minutes, stop the experiment and record 'more than 300'.

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

[3]

(vi) Use the results you obtained to estimate the concentration of glucose found in **S3**.

.....

.....[1]

(vii) Suggest how you would modify this investigation to obtain a more accurate estimate of the glucose concentration in **S3**.

.....

.....

.....

.....

.....

.....

.....[3]

(viii) A systematic error occurs when apparatus with scales are used, since the scales may be slightly different.
For example, when measuring the same line, two rulers may give different lengths. However, as long as the same ruler is used for all the measurements, the trend is **not** affected because the error is consistent.

State **one** piece of apparatus used in this investigation that may have a systematic error. Suggest whether this affected your results and give a reason for your answer.

apparatus .....

effect and reason .....

.....[1]

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[Turn over

(b) Certain plants translocate sucrose from the leaves to the roots to be stored as sucrose rather than as starch. These roots can be harvested and kept in storage until they are sold. However, water loss during storage reduces their value.

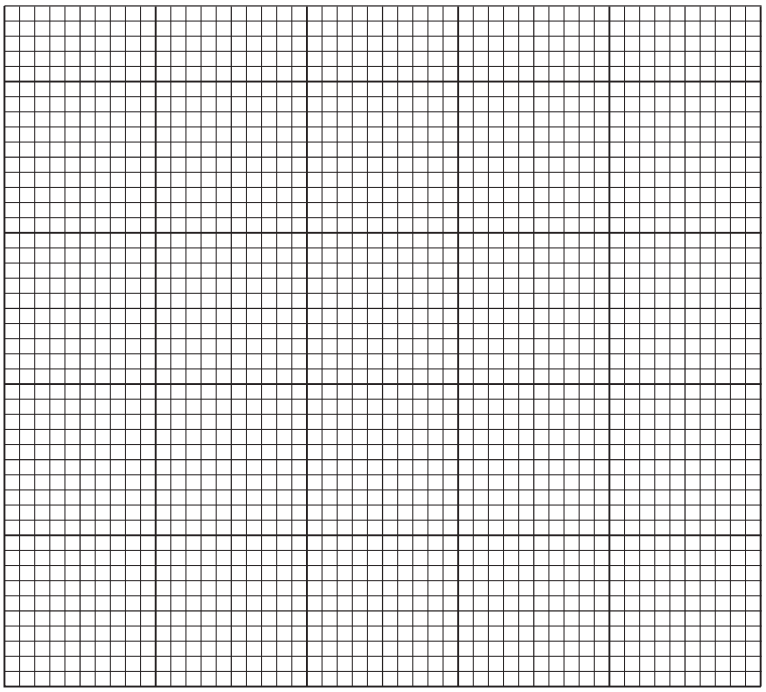
A scientist investigated how water loss from these roots was affected by the time in storage. Constant temperature and humidity were maintained during storage.
Ten roots were weighed at five day intervals. The mean percentage change in water content was calculated. It was found that all the roots had lost water.

The results are shown in Table 1.1.

Table 1.1

time in storage / days	mean percentage change in water content
5	–6.25
10	–11.00
15	–15.50
20	–17.25
25	–17.50

(i) Plot a graph of the data in Table 1.1.



[4]

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(ii) Ten roots were stored for 5 days, and another ten roots were stored for 20 days. Pieces of root from the sample at 5 days and from the sample at 20 days were removed, weighed and soaked in dilute sucrose solution for 24 hours. The pieces were then reweighed.

State which sample would have the highest percentage gain in mass after soaking in the dilute sucrose solution.

Explain your answer using your knowledge of water potential.

sample .....

explanation .....

.....

.....

.....[2]

[Total: 21]

2 The eyepiece graticule scale in your microscope may be used to measure the actual length of the layers of tissue or cells, if the scale has been calibrated against a stage micrometer.

However, to help draw the correct shape and proportion of tissues, as in **(a)**, it is **not** necessary to calibrate the eyepiece graticule scale.

K1 and **K2** are slides showing stained transverse sections through blood vessels.

(a) Draw large plan diagrams of **two** different **types** of blood vessel shown in **K1** and **K2**.

On your diagram, use ruled label lines and labels to describe (annotate) **one** observable difference in the layer lining the inside of each vessel.

[5]

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Fig. 2.1 is a photomicrograph of blood cells taken from a person suffering from cancer affecting the white blood cells.

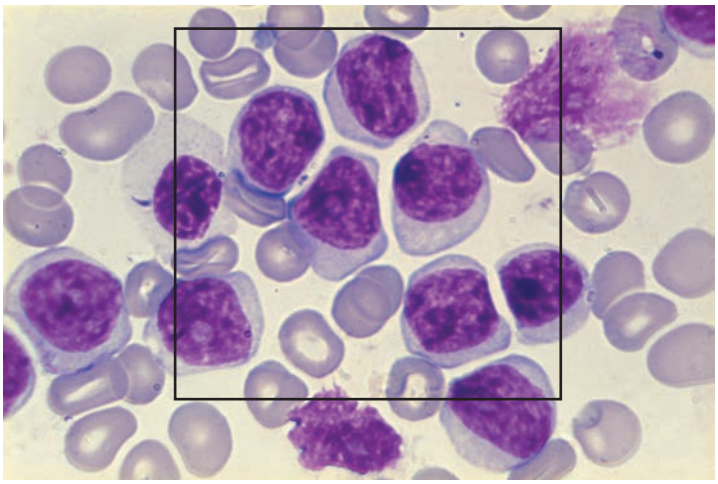


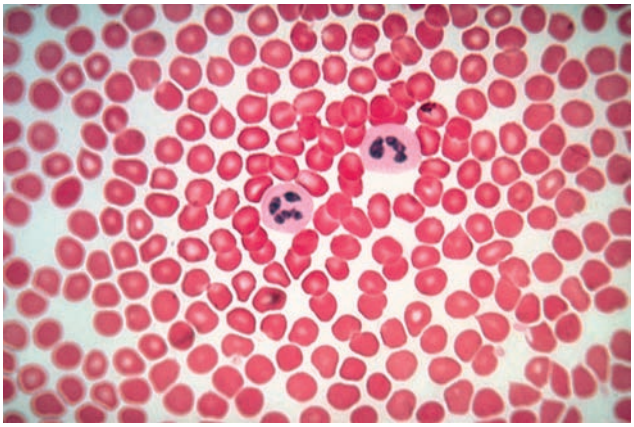
Fig. 2.1

(b) Make a large drawing of **five** whole white blood cells in the area shown on Fig. 2.1.

Use ruled label lines and labels to **one** cell you have drawn to identify **three** cell structures that can also be found in plant cells.

[5]

(c) Fig. 2.2 is a photomicrograph showing blood cells from a healthy person.



magnification x500

Fig. 2.2

(i) To diagnose cancer of the white blood cells a sample of blood is taken and a total blood cell count is carried out on the sample.

State **one** difference, **other than size**, between the blood shown in Fig. 2.1 and that in Fig. 2.2 that indicates that the person is suffering from cancer which affects the white blood cells.

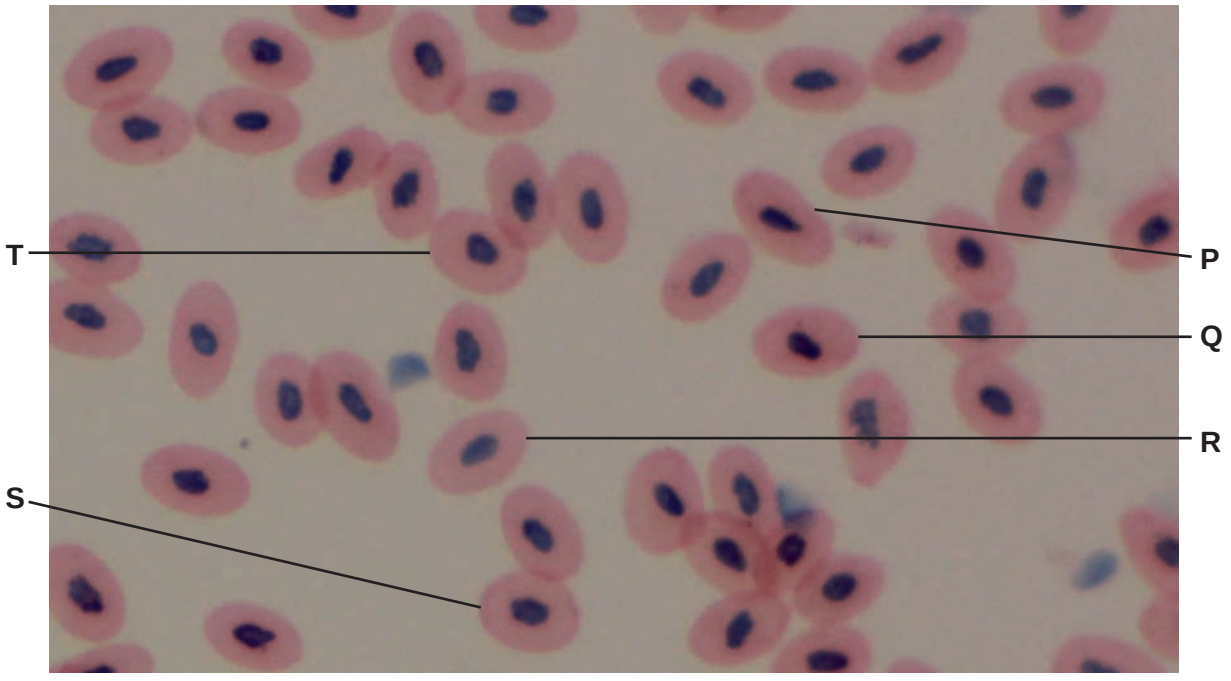
Explain the reason for this difference.

difference .....

explanation .....

.....[2]

Fig. 2.3 is a photomicrograph of blood cells from a different species of animal.



magnification x500

Fig. 2.3

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(ii) A student measured the **longest** length of five red blood cells **P**, **Q**, **R**, **S** and **T** shown in Fig. 2.3 and found the mean actual length of the red blood cells.

Use the magnification to calculate the mean actual length, in μm, of the red blood cells using the five **labelled** red blood cells in Fig. 2.3.

You may lose marks if you do not show your working or if you do not use appropriate units.

mean actual length .....μm [4]

(d) Prepare the space below so that it is suitable for you to record the observable differences between the red blood cells in Fig. 2.2 and Fig. 2.3.

Record your observations in the space you have prepared.

[3]

[Total: 19]

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Fig. 2.2 © ERIC GRAVE/SCIENCE PHOTO LIBRARY.

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