Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7274025430

BIOLOGY **9700/35**

Paper 3 Advanced Practical Skills 1 **May/June 2016**

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 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.

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 Glucose is an important substrate for cellular respiration. Glucose is absorbed into the blood from the small intestine and transported in the blood plasma to the body cells.

You are required to:

- prepare different concentrations of the glucose solution **G**
- carry out the Benedict's test on each of the concentrations of glucose solution you have prepared
- carry out the Benedict's test on the solution representing blood plasma **P**
- use the results of the Benedict's tests to estimate the concentration of glucose in **P**.

You are provided with:

labelled	contents	hazard	volume / cm^3
G	1% glucose solution	none	50
W	distilled water	none	70
P	unknown concentration of glucose	none	10
Benedict's	Benedict's solution	none	50

(a) You are required to make a **serial** dilution of the 1% glucose solution, **G**, which reduces the concentration **by half** between each successive dilution.

You will need to **prepare** 10 cm^3 of each concentration.

Fig. 1.1 shows the first two beakers you will use to make your serial dilution.

(i) Complete Fig. 1.1 by drawing the extra beakers you need for your serial dilution.

For each beaker:

- state, under the beaker, the **concentration** and **volume** of the glucose solution available for use in the investigation
- use one arrow, with a label above the beaker, to show the **concentration** and **volume** of glucose solution added to prepare the concentration
- use another arrow, with a label above the beaker, to show the **volume** of **W** added to prepare the concentration.

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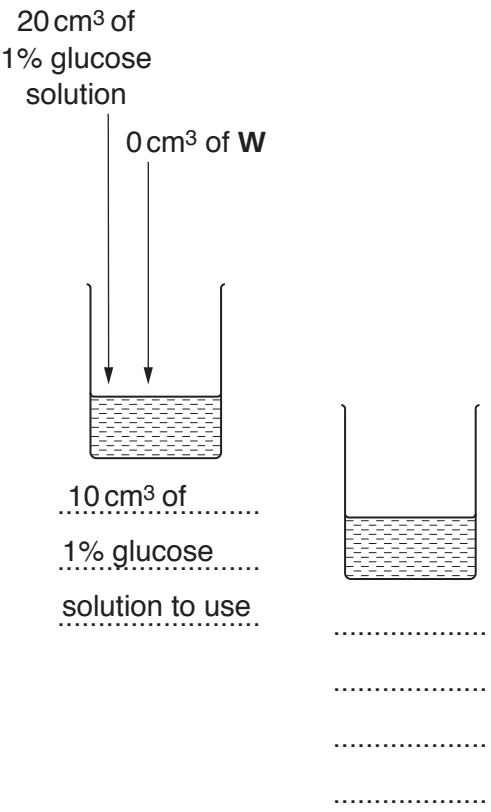

[3]

Fig. 1.1

Proceed as follows:

1. Set up a water-bath and heat to boiling ready for step 6.
2. Prepare the concentrations of glucose solution as shown in Fig. 1.1.
3. Put 2 cm^3 of 1% glucose solution into a test-tube.

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(ii) State the smallest division on the syringe you used in step 3.

.....

State the **actual** error when using this syringe.

.....[1]

Calculate the **percentage** error when using this syringe.

You may lose marks if you do not show your working.

percentage error .....[1]

4. Put 2 cm^3 of Benedict's solution into the same test-tube as step 3.

5. Shake the test-tube gently to mix the contents.

Read step 6 to step 9 before proceeding.

You are required to:

- observe the contents of the test-tube continuously while the test-tube is heated for 60 seconds
- record the time taken for the **first** appearance of a colour change, if a colour change occurs during this 60 seconds
- record the colour **after** heating for 60 seconds.

6. Put this test-tube into the water-bath you prepared in step 1 and start timing.

7. Record the **time taken** for the first appearance of a colour change in Table 1.1.
*Do **not** stop the clock and continue heating until 60 seconds.*

If there is no colour change after 60 seconds record the time as 'more than 60'.

8. At 60 seconds remove the test-tube from the water-bath, gently shake, and record the **colour** of the Benedict's solution in Table 1.1.

9. Repeat step 3 to step 8 for each of the glucose solutions you prepared in step 2.

You are not required to repeat this experiment.

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(iii) Complete the column headings and record your results in Table 1.1.

Table 1.1

	time taken for the first appearance of a colour change /	colour of Benedict's at 60 seconds

[4]

(iv) Describe how you will standardise the Benedict's test in order to enable you to estimate the concentration of glucose in **P**.

.....

.....

.....

.....[2]

10. Repeat step 3 to step 8 using solution **P**.

(v) Record your results for solution **P**.

time taken for the first appearance of a colour change .....

colour of Benedict's at 60 seconds .....[1]

(vi) Estimate the concentration of glucose in **P**, using the colour of Benedict's at 60 seconds recorded in Table 1.1 and **(a)(v)**.

.....[1]

(vii) Describe **one** improvement to allow a more accurate estimate of the concentration of glucose in **P** to be obtained using the **colour** of Benedict's at 60 seconds.

.....

.....

.....[1]

(viii) Describe how your results for the **time** taken for the first appearance of a colour change can be used to produce a more accurate estimate of the concentration of glucose in **P** than the one given in **(a)(vi)**.

.....

.....

.....

.....

.....[2]

(b) A scientist studied the change in the concentration of glucose in blood plasma after eating a meal containing carbohydrate. Samples of blood plasma were taken at regular intervals after eating the meal and the concentration of glucose in each sample was measured.

The results are shown in Table 1.2.

Table 1.2

time after eating the meal / minutes	**concentration of glucose in blood plasma / mmol dm^{-3}**
0	5.125
20	6.750
40	7.600
60	7.475
80	7.100

You are required to use a sharp pencil for graphs.

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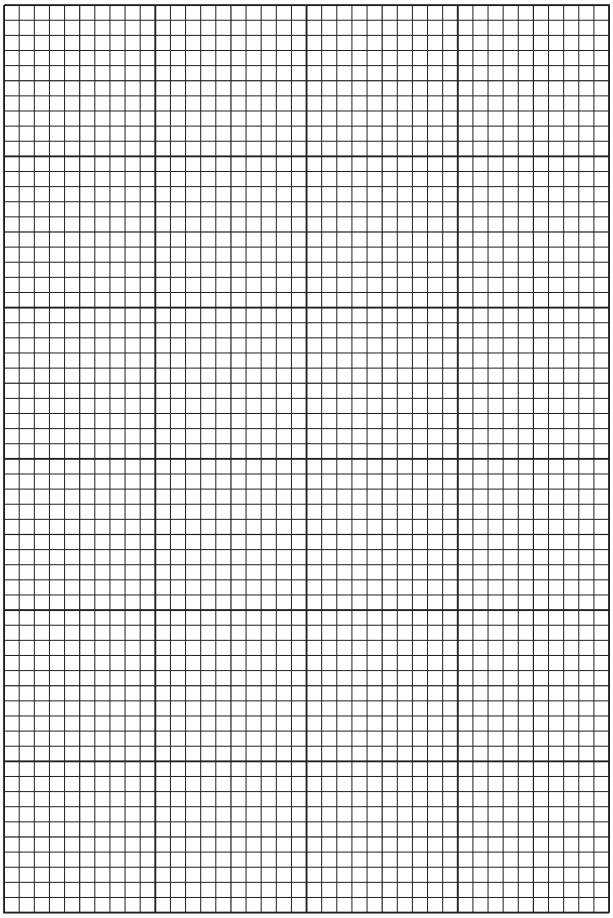
(i) Plot a graph of the data shown in Table 1.2.



[4]

(ii) Calculate the percentage increase in concentration of glucose in the blood plasma between 0 minutes and 20 minutes after eating the meal.
You may lose marks if you do not show all your working.

percentage increase .....[1]

(iii) Use **one** label line and the label **X** to show on the graph where the rate of diffusion of glucose into the blood is most rapid. [1]

(iv) Suggest **one** reason for the concentration of glucose in blood plasma decreasing between 60 minutes and 80 minutes after eating the meal.

.....

.....

.....[1]

[Total: 23]

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[Turn over

2 **L1** is a slide of a stained transverse section through a plant organ.

You are not expected to be familiar with this specimen.

(a) An eyepiece graticule scale can be used to measure the layers of tissues and to help draw a plan diagram with the correct shape and proportions of the tissues, without needing to calibrate the eyepiece graticule scale.

You are required to use a sharp pencil for drawings.

(i) Draw a large plan diagram of part of the organ as shown by the shaded area in Fig. 2.1.

Use **one** ruled label line and the letter **Z** to identify the position of the tissue which prevents the flow of water through the apoplast pathway.

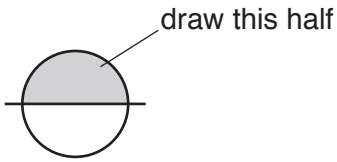

Fig. 2.1

[5]

(ii) Identify the organ on **L1**. Describe **one** observable feature that supports your identification.

name of organ .....

feature .....[1]

(iii) Observe the organ on **L1** in the region between the epidermis and the vascular tissue (the cortex).

Select **one** group of **four** adjacent (touching) cells from the cortex.
Each cell of this group must touch at least **two** of the other cells.

Make a large drawing of this group of **four** cells.

Use **one** ruled label line and label to identify the cytoplasm in **one** of the cells.

[5]

(b) Fig. 2.2 is a photomicrograph of a stained transverse section through the same plant organ as on **L1**, but from a different plant.

You are not expected to be familiar with this specimen.

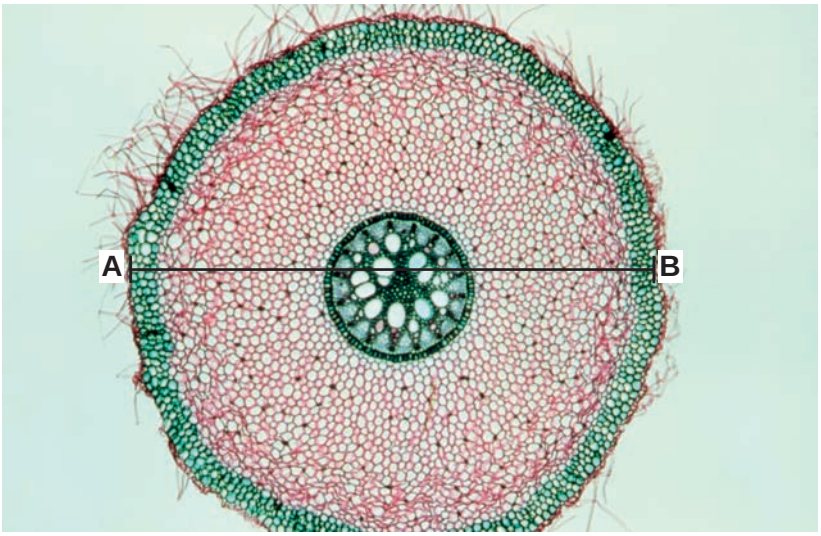

Fig. 2.2

The actual diameter of this organ along the line **A–B** is 3000 μm.

Calculate the magnification of the photomicrograph.
You may lose marks if you do not show your working or if you do not use appropriate units.

magnification .....[3]

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(c) Prepare the space below so that it is suitable for you to record the observable **similarities** between the plant organ on **L1** and that shown in Fig. 2.2.

Record your observations in the space you have prepared.

[3]

[Total: 17]

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