Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3056931141

BIOLOGY **9700/34**

Advanced Practical Skills 2 **October/November 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 pen.
You may use an HB pencil for any diagrams, graphs or rough working.
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 **13** printed pages and **3** blank pages.

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

Plan the use of your **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.

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.

1 Blood plasma contains the protein albumin. The concentration of albumin in a person's blood may be measured to identify health problems.

You are required to estimate, as accurately as possible, the concentration of albumin in a sample of blood plasma, **U**, by:

- carrying out a trial using the concentrations of albumin solutions **P1** and **P2**
- using the results of the trial prepare further concentrations of albumin solution
- obtaining more readings, so that you can estimate more accurately the concentration of albumin solution in **U**.

The albumin concentration can be measured by using potassium hydroxide solution and copper sulfate solution.

Fig. 1.1 shows the result of adding potassium hydroxide solution and copper sulfate solution to a sample containing albumin.

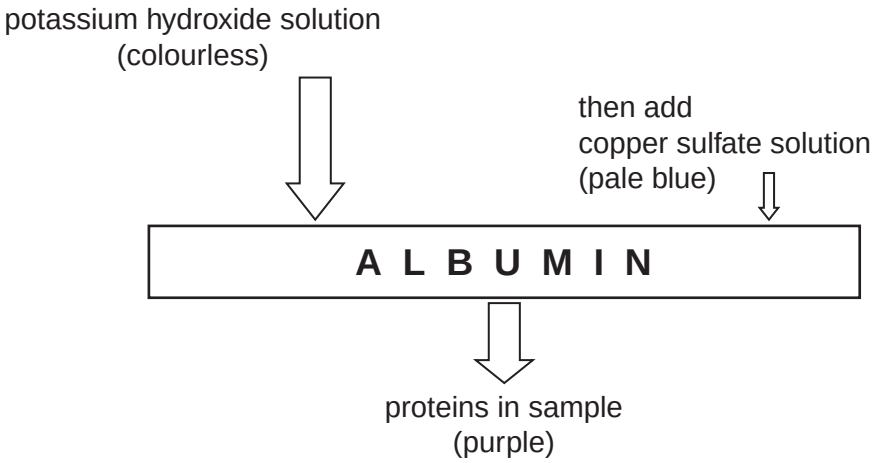


Fig. 1.1

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You are provided with:

labelled	contents	hazard	volume / cm^3
K	potassium hydroxide solution	harmful irritant corrosive	20
C	copper sulfate solution	harmful	20
P1	0.8% albumin solution	none	40
P2	1.6% albumin solution	none	40
U	blood albumin sample	none	20
W	distilled water	none	120

You are advised to wear safety glasses or goggles, especially when using the potassium hydroxide, **K**. If potassium hydroxide, **K**, comes into contact with your skin, wash it off with plenty of cold water.

Question 1 continues on page 4

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Read step 1 to step 6 before proceeding.

Proceed as follows:

You are required to estimate the concentration of **U** using **P1**, **P2** and **W**.

1. Put 1 cm^3 of the sample to be tested (for example, **P1**) into a test-tube.
2. Put 1 cm^3 of **K** into the same test-tube. Shake gently to mix.
3. Put 1 cm^3 of **C** into the same test-tube. Shake gently to mix.
4. Repeat steps 1 to 3 to test **P2**, **U** and **W**.
5. Record your **colour** observations.
6. In a test-tube rack put the test-tubes in an order which will enable you to record each colour as a **number** using the scale shown in Fig. 1.2. Use Fig. 1.3 to help you with the colours.

0 1 2 3 4 5 6 7 8 9 10

no purple — darkest purple

Fig. 1.2

Fig. 1.3 shows an example of no purple (0) and an example of darkest purple (10).

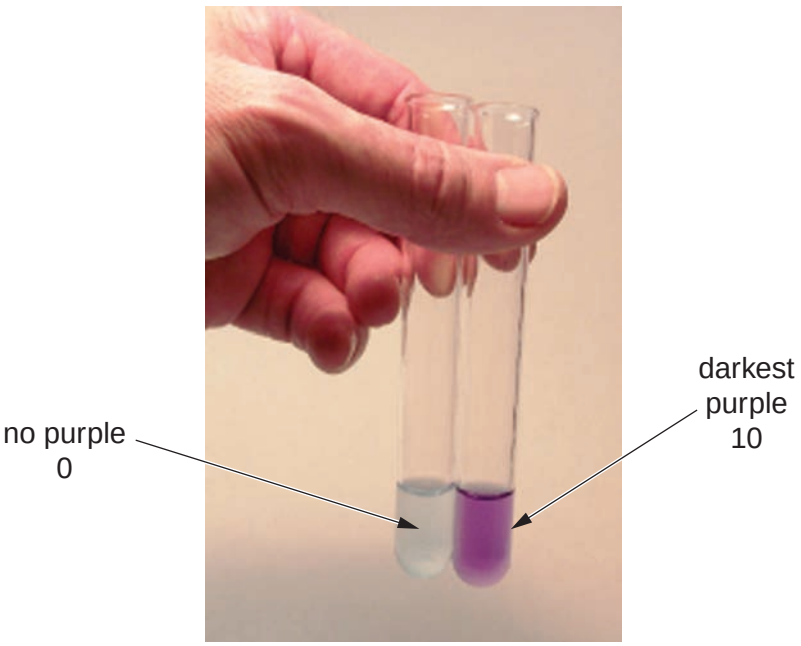


Fig. 1.3

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(a) (i) Prepare the space below to record your colour observations **and** the number using the scale shown in Fig. 1.2.

[4]

(ii) Complete the following by using one of the words '**more**' or '**less**'.

You may use each word once or more than once.

U is ..... concentrated than 0.8% (**P1**).

U is ..... concentrated than 1.6% (**P2**).

Use your results to estimate the concentration of albumin in **U**.

.....[1]

(iii) State which solution **P1** or **P2** you will dilute to prepare further concentrations.

Explain the reason for your decision.

.....

.....[2]

(iv) Complete Fig. 1.4 on page 6 to show how you will dilute the solution you decided on in **(iii)** to prepare a **serial** dilution.

You should use the two beakers shown in Fig. 1.4 and add as many extra beakers as you need to prepare a **serial** dilution.

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

For **each beaker**, complete Fig. 1.4 to show how you will dilute the solution you decided on in **(iii)** by:

- showing under each beaker the **concentration** and **volume** of the solution prepared in this beaker
- using one arrow, with a label above the beaker, to show the **concentration** and **volume** of albumin solution added
- using another arrow, with a label above the beaker, to show the **volume** of water added.

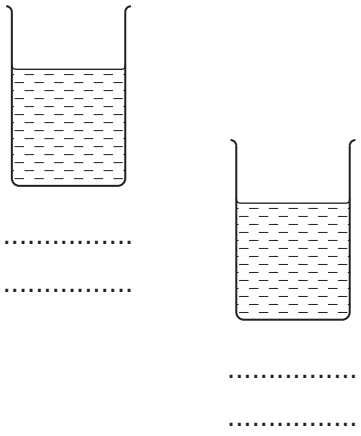


Fig. 1.4

[3]

7. Prepare **all** the concentrations of albumin solution, as shown in Fig. 1.4, in the containers provided.

8. Repeat steps 1 to 3 (page 4) with each of the solutions.

9. Repeat steps 5 and 6 (page 4).

(v) Prepare the space below to record your colour observations **and** the number using the scale shown in Fig. 1.2 (page 4).

[2]

(vi) Using these additional results from **(v)** state a more accurate estimate of the concentration of albumin in **U**.

.....[1]

(vii) Replicating the investigation would increase the confidence in the accuracy of your estimate.

Describe **one other** modification which would increase the confidence in your estimate.

.....

.....[1]

You are required to use a sharp pencil for charts.

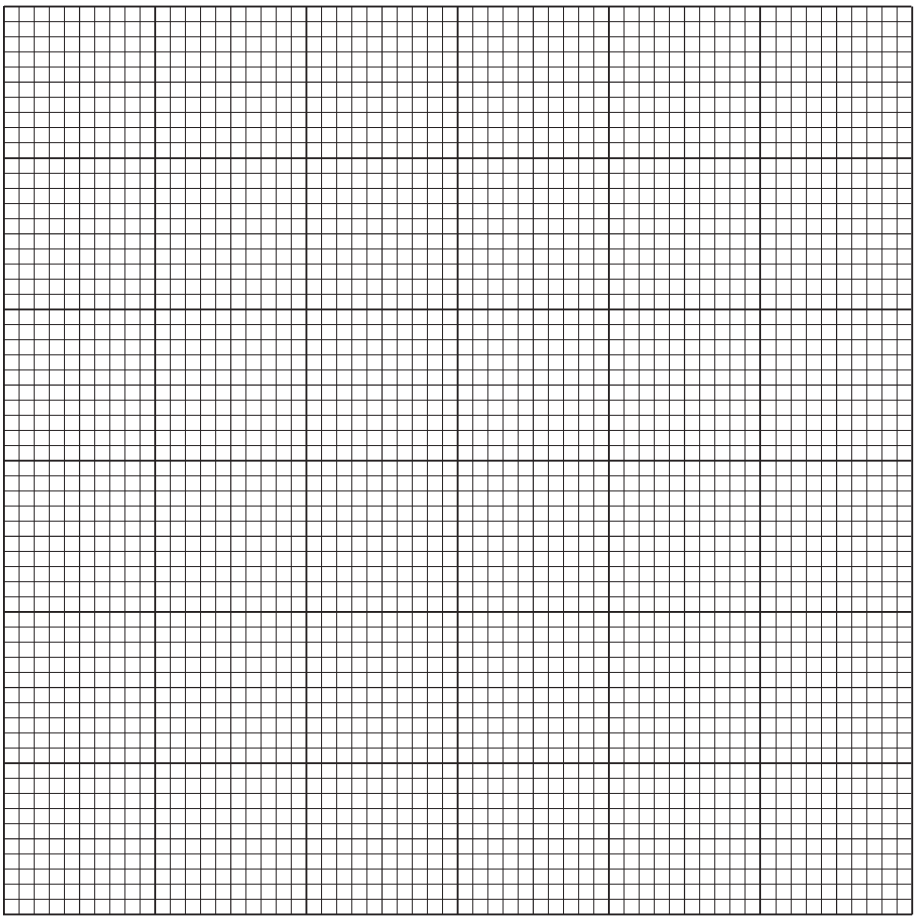
(b) Scientists have investigated the albumin concentration in the blood plasma of 166 people.

The results are shown in Table 1.1.

Table 1.1

albumin concentration in blood plasma / g per 100 cm^3	frequency / number of people
3.1 – 3.5	3
3.6 – 4.0	21
4.1 – 4.5	42
4.6 – 5.0	60
5.1 – 5.5	39
5.6 – 6.0	1

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



[4]

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(ii) Suggest **one** reason for the pattern of the results shown in the chart.

.....

..... [1]

(iii) The concentration of albumin in a person's blood may be measured to identify health problems. One of the reasons for a health problem is that blood albumin has a low solubility in water.

Suggest **one** health problem which may be caused by an albumin concentration of 5.6–6.0 g per 100 cm^3.

.....

.....

..... [1]

[Total: 20]

You are required to use a sharp pencil for drawings.

2 **L1** is a slide of a stained transverse section through a leaf.
This plant species grows widely including Europe, Africa and Asia.

You are not expected to be familiar with this specimen.

To help draw a plan diagram with the correct shape and proportions of the tissues, an eyepiece graticule can be used to measure the layers of tissues, without the need to calibrate the eyepiece graticule scale.

(a) **(i)** Draw a large plan diagram of the part of the specimen on **L1** indicated by the shaded sector in Fig. 2.1.

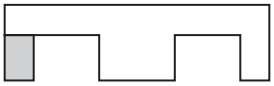


Fig. 2.1

On your diagram:

- ignore the trichomes (either attached or loose)
- use **one** ruled label line and label to show the palisade layer.

[5]

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(ii) Select one whole trichome:

- made up of at least three cells
- attached to at least one epidermal cell.

Make a large drawing of this trichome attached to at least one epidermal cell.

Use **one** ruled label line and label to show **one** nucleus.

[4]

(b) Fig. 2.2 is a photomicrograph of a stained transverse section through another species of leaf.

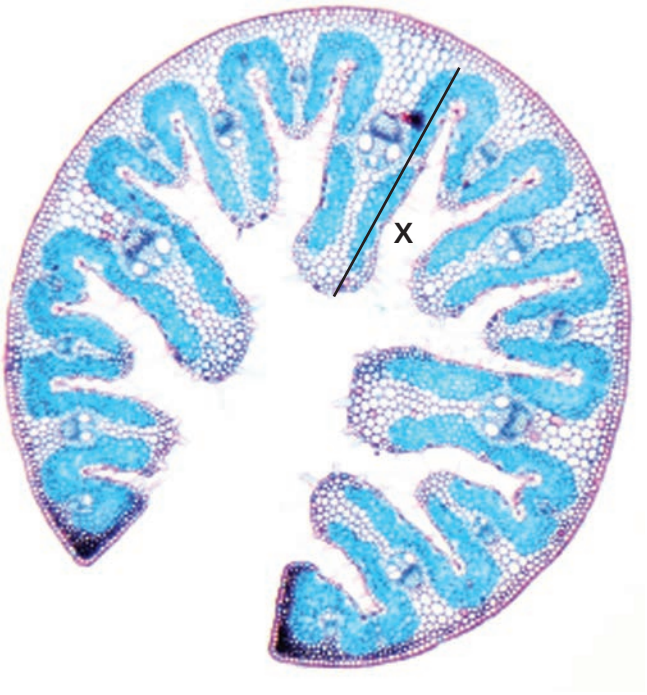


Fig. 2.2

(i) Prepare the space below so that it is suitable for you to show the observable differences between the specimens shown on **L1** and Fig. 2.2.

Record your observations in the space you have prepared.

[4]

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(ii) Calculate the actual length of the fold shown by line **X**, using the scale bar.

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

actual length .....[4]

(iii) Describe how you would obtain the **mean** maximum actual length of the folds in the specimen shown in Fig. 2.2.

.....

.....

.....

.....

.....[2]

(iv) Suggest **one** observable feature, other than trichomes, shown by **both** the specimen on **L1** and the specimen in Fig. 2.2 which supports the conclusion that these plants grow in dry conditions.

Explain how **this** feature may help the plants grow in dry conditions by preventing water loss.

feature .....

explanation .....

.....[1]

[Total: 20]

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