Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/36**

Paper 3 Advanced Practical Skills 2 **October/November 2018**

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 **12** printed pages.

CAMBRIDGE International Examinations

[Turn over

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, think about how you can improve the confidence in 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 The emulsion test is used to detect the presence of lipids in a sample.

To carry out the emulsion test, ethanol is added to the sample. If lipids are present they will dissolve in the ethanol. When water is then added, the lipids in the ethanol will form droplets in the water. The droplets in the water form an emulsion.

The emulsion appears as cloudiness in the layer towards the bottom of the test-tube, as shown in Fig. 1.1.

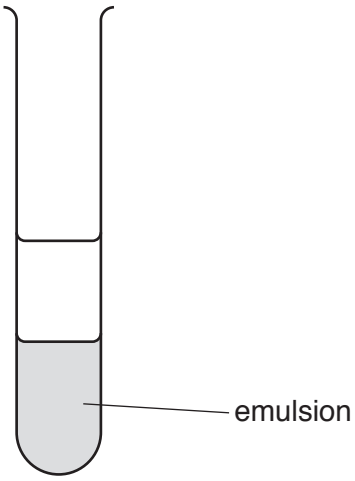

Fig. 1.1

(a) A student investigated the effect of the concentration of ethanol on the cloudiness of the emulsion during the emulsion test.

The student suggested the following hypothesis:

lowering the concentration of ethanol below 100% will have no effect on the cloudiness of the emulsion.

You will need to investigate this hypothesis by:

- diluting 100% ethanol, **A**, to provide further concentrations of ethanol
- carrying out the emulsion test using these concentrations of ethanol
- recording the cloudiness of the emulsion formed.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume /cm^3
A	100% ethanol	flammable	60
L	vegetable oil (lipid)	flammable	40
W	distilled water	none	60

If **A** comes into contact with your skin, wash off immediately under cold water.
It is recommended that you wear suitable eye protection.

You will need to use simple (proportional) dilution of the ethanol, **A**, to make further concentrations of ethanol between 100% and 75%, by reducing each successive dilution by 5%.

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

Table 1.2 shows how to prepare the highest concentration (100%) and the lowest concentration (75%).

(i) Complete Table 1.2 to show how you will prepare further concentrations of ethanol.

Table 1.2

volume of **A** /cm^3	volume of **W** /cm^3	percentage concentration of ethanol
10.0	0.0	100
7.5	2.5	75

[2]

[Turn over

Read step 1 to step 13 before carrying out this investigation.

1. Prepare the concentrations of ethanol as shown in Table 1.2, in the beakers provided.

2. Label **one** test-tube as a control.

3. Put 2 cm^3 of **L** into this test-tube.

4. Put 4 cm^3 of **W** into the same test-tube. Shake the test-tube gently for 20 seconds.

   The control test-tube will be needed for step 10.

5. Put 2 cm^3 of **L** into all the other test-tubes.

6. Put 2 cm^3 of 100% ethanol into **one** of the test-tubes containing **L**. Shake the test-tube gently for 20 seconds.

7. Put 2 cm^3 of **W** into the same test-tube. Shake the test-tube gently for 20 seconds.

8. Repeat step 6 to step 7 with each of the other concentrations of ethanol as prepared in step 1.

9. Leave all the test-tubes for approximately 1 minute so that the layers become visible.

10. Observe the cloudiness of the emulsion, as shown in Fig. 1.1, in each test-tube compared with the control.

    The control will **not** be cloudy.

    Use the key in Fig. 1.2 and record the results in **(a)(ii)**.

You may find it useful to observe the cloudiness of the emulsion with a piece of black card behind it.

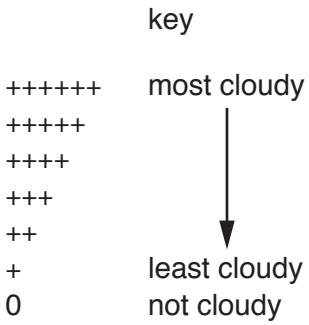

Fig. 1.2

11. Tip the contents of each test-tube, except the control, into the container labelled **For waste**.

12. Rinse these test-tubes **twice** using a syringe and the water in the container labelled **For washing**.

13. Repeat step 5 to step 10.

(ii) Record your results in an appropriate table, including the mean result for each concentration of ethanol.

[5]

(iii) State the independent variable in the investigation you have just carried out.

..... [1]

(iv) Identify **one** significant source of error when measuring the dependent variable **and** suggest **one** improvement to reduce this source of error.

source of error .....

.....

.....

improvement .....

.....

[2]

(v) The student's hypothesis stated that:

> lowering the concentration of ethanol below 100% will have no effect on the cloudiness of the emulsion.

State whether you **support** or **reject** this hypothesis.

Explain how your results provide evidence for this decision.

support or reject .....

explanation.....

.....

.....

.....
[3]

(vi) In the test-tubes the layer above the emulsion consists of undissolved lipids.

Suggest how the student could find the volume of ethanol required to dissolve **all** the lipid in **L**.

.....

.....

.....

.....

.....[2]

Question 1 continues on page 8

(b) Some foods contain two types of fat, unsaturated fat (**U**) and saturated fat (**S**). The proportions of these two types of fat vary according to the food.

A scientist carried out some tests to determine the mass of these two types of fat found in three food samples, **X**, **Y** and **Z**. The total mass of each food sample was 100 g.

The results are shown in Table 1.3.

Table 1.3

type of fat / food sample	mass of fat in 100 g of food / g	
	U	**S**
X	10.75	23.50
Y	1.50	1.25
Z	8.50	6.50

(i) Calculate the percentage of the total fat in food sample **X** that is unsaturated.

Show all the steps in your working and use appropriate units.

[3]

(ii) Draw a bar chart of the data shown in Table 1.3 on the grid in Fig. 1.3.

The bars should be separated for each food sample.

Use a sharp pencil for drawing bar charts.

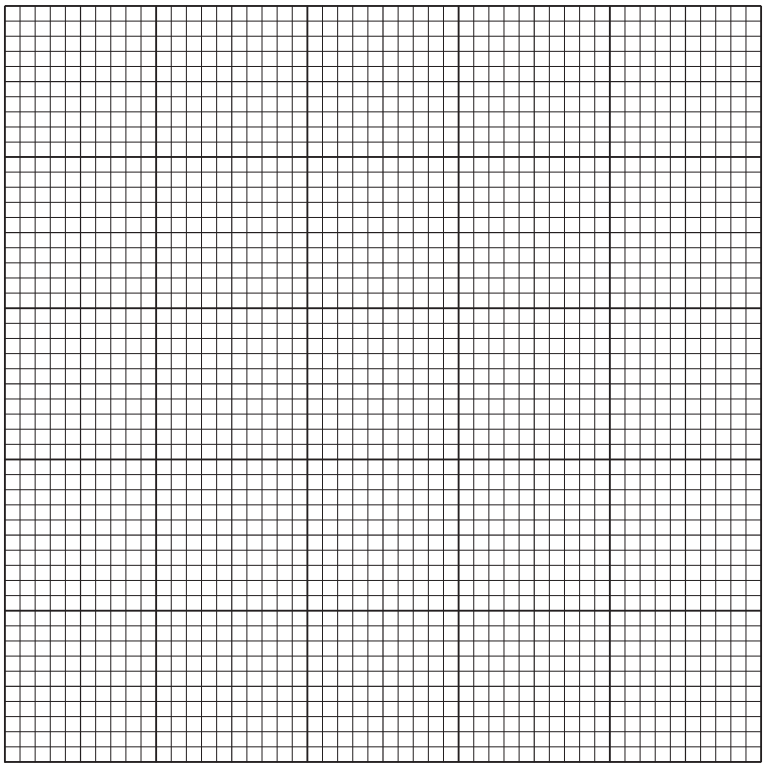

Fig. 1.3

[4]

[Total: 22]

2 **(a)** **N1** is a slide of a stained transverse section through a leaf-like structure.

You are not expected to be familiar with this specimen.

Use a sharp pencil for drawing.

(i) Select a field of view so that you can observe the different tissues shown by the shaded area in Fig. 2.1.

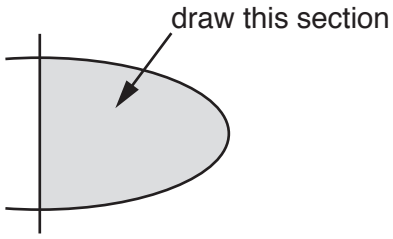

Fig. 2.1

Draw a large plan diagram from the selected field of view which has:

- part of the epidermis
- the outline of **two** vascular bundles
- any other observable tissues.

No details of the internal tissues of the vascular bundles are required.

Use **one** ruled label line and the label **C** to identify the tissue containing chloroplasts.

You are expected to draw the correct shape and proportions of the different tissues.

[5]

(ii) Observe the **largest** vascular bundle on **N1**.

Select **one** group of **four** adjacent, touching xylem vessel elements.
Each xylem vessel element must touch at least one of the other xylem vessel elements.

Make a large drawing of this group of **four** xylem vessel elements.

Use **one** ruled label line and label to identify the lumen of **one** xylem vessel element.

You are expected to draw the correct shape and proportions of the different cells.

[5]

(iii) On your drawing in **(a)(ii)**, use **one** ruled label line and the label **T** to identify an observable feature which enables water to be transported through the xylem vessel element.

Next to the letter **T** explain how this feature enables the xylem vessel element to carry out its function. [2]

(b) Fig. 2.2 is a photomicrograph of a stained transverse section through the trachea of a mammal.

Fig. 2.2

(i) On Fig. 2.2, use **one** ruled label line and the label **Q** to identify an observable feature which prevents the tube from collapsing. [1]

(ii) Determine the simplest whole number ratio of the length of **P3** (the air space) to the total length of **P1** and **P2**.

Show all the steps in your working and use appropriate units.

ratio .....[5]

[Total: 18]