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

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3751526322

BIOLOGY **9700/32**

Advanced Practical Skills 2 **May/June 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.
Do **not** use red ink, staples, paperclips, highlighters, glue or correction fluid.
You may use a pencil for any diagrams, graphs or rough working.
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.

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 Yeast cells use enzymes as part of their metabolic reactions. Some of these reactions release oxygen from hydrogen peroxide solution.

You are required to investigate the effect of temperature (independent variable) on the release of oxygen from hydrogen peroxide solution.

You are provided with:

labelled	**contents**	**hazard**	**volume / cm^3**
Y	yeast cell suspension	none	20
H	hydrogen peroxide solution	irritant harmful	20

Proceed as follows:

You are required to change the temperature of **Y** during the investigation.

1. Put the beaker containing **Y** into a large beaker (**W**) which will be the water-bath as shown in Fig. 1.1.

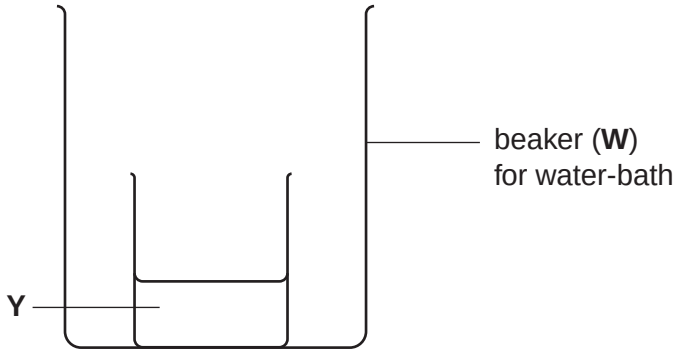

Fig. 1.1

(a) (i) Decide what level of water you will start with in **W**.

Show on Fig. 1.1 the level of water in **W**. [1]

2. Put hot water from the beaker provided into **W** to **below** the level you decided.

Add hot water and cold water as needed to obtain a water-bath of between 40 °C and 45 °C. Adjust the volume of water to the level you decided in **(a)(i)**. *The beaker may float but should not spill its contents.*

3. Keep **Y** (in **W**) at a temperature between 40 °C to 45 °C.

Fig. 1.2 shows the apparatus set up to measure the release of oxygen from hydrogen peroxide solution. The oxygen released into **B** can be measured (dependent variable) by counting the number of bubbles.

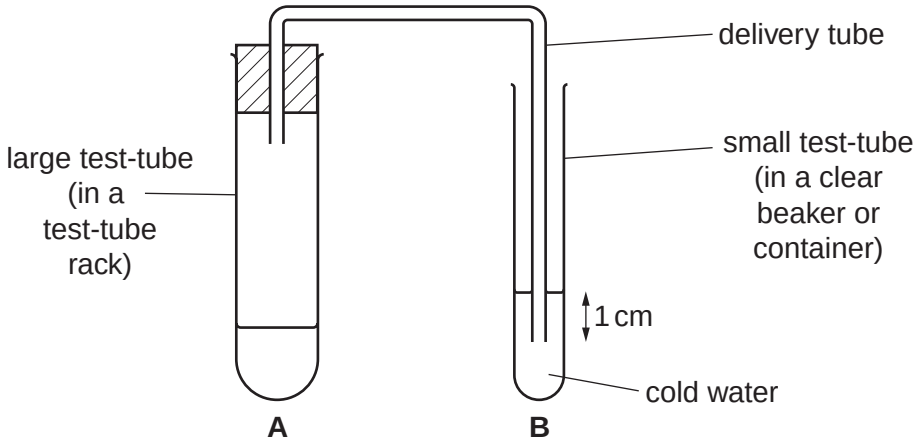

Fig. 1.2

The end of the delivery tube should be 1 cm below the level of the water in test-tube **B** as shown in Fig. 1.2.

(ii) Decide how you will standardise the position of the delivery tube in test-tube **B** as shown in Fig. 1.2.

Describe how you standardised the position of the tube.

..... [1]

4. Put water from the beaker or container, labelled **cold**, into test-tube **B** as shown in Fig. 1.2.

5. Remove the small beaker or container containing **Y** from **W**.

6. Record the temperature of **Y**. .....

[Turn over

7. Stir **Y** and put 1 cm^3 into the large test-tube **A**. Put the beaker containing **Y** back into **W**.

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The reaction will start as soon as you add **H** (in step 8).
You are required to count the number of bubbles released into **B** by making a small mark on Grid 1.1 for each bubble as it is released for the intervals shown below.

If the number of bubbles is too many to record for any one time, record 'too many' for that interval.

Example

1st 30 s
IIII II II IIIIIII
15

Grid 1.1 – for recording higher temperature

1st 30 s	2nd 30 s	3rd 30 s	4th 30 s	5th 30 s	6th 30 s	7th 30 s	8th 30 s

8. Put 4 cm^3 of **H** into the large test-tube **A**, immediately put in the bung and start timing and recording.

9. After 4 minutes, remove the bung from test-tube **A**.
You are provided with a container labelled '**for waste**' and a container labelled '**for washing**' so you can re-use the large test-tube **A**.

10. Decide on a lower temperature for your next investigation.

    Adjust the temperature of **W** and put the beaker containing **Y** into **W** for **5 minutes**.

    After this 5 minutes, record the temperature of **Y** .....

11. Repeat steps 7 to 9.
Use Grid 1.2 to record your readings.

Grid 1.2 – for recording lower temperature

1st 30 s	2nd 30 s	3rd 30 s	4th 30 s	5th 30 s	6th 30 s	7th 30 s	8th 30 s

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

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[6]

(iv) Identify **two** significant sources of error in your investigation.

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..... [2]

(v) Describe **three** modifications to this investigation which would improve the confidence in your results.

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..... [3]

In a similar investigation, some scientists investigated the effect of the concentration of hydrogen peroxide on the release of oxygen from hydrogen peroxide solution, using yeast as a source of enzymes. The breakdown of hydrogen peroxide solution was measured by the time taken to collect 20 cm^3 of oxygen.

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The results are shown in Table 1.1.

Table 1.1

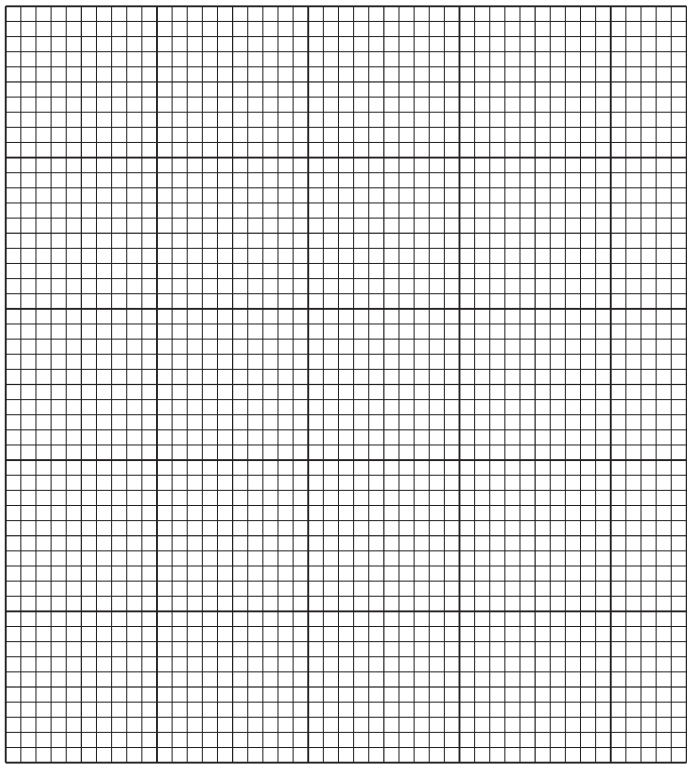
percentage concentration of hydrogen peroxide	time taken to collect 20 cm^3 of oxygen / s					
	trial 1	trial 2	trial 3	trial 4	trial 5	mean
4	46	48	48	47	45	47
6	28	28	20	27	26	27
8	21	17	18	17	21	19
12	12	13	14	9	14	
16	11	9	10	9	11	10
20	8	9	9	8	10	9

(b) (i) **Two** of the values in Table 1.1 are anomalous.

Draw a circle around each of these values. [1]

(ii) Complete Table 1.1 by calculating the missing value. [1]

(iii) Plot a graph of the data shown in Table 1.1. [4]



(iv) Using the data in Table 1.1 and your graph, explain the results for the investigation.

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..... [2]

[Total: 21]

Question 2 starts on page 10

2 **M1** is a slide of a stained transverse section through a plant stem.
This plant species is a native of the Mediterranean region.

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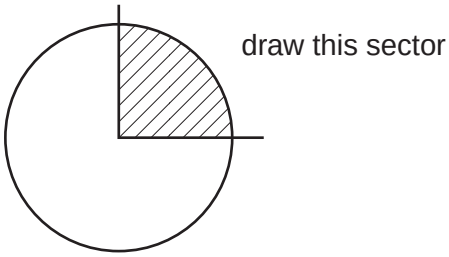

Fig. 2.1

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

On your diagram, use a ruled label line to show the pith.

[5]

(ii) The cells in each corner of the stem are different from the cells in the centre of the stem.

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Make a large drawing of one group of **three** whole, adjacent (touching) cells

- from the tissue in one corner, as observed on the specimen on **M1**.

Make a large drawing of one group of **three** whole, adjacent (touching) cells

- from the tissue in the centre of the stem, as observed on the specimen on **M1**.

On your drawing, use a ruled label line and label to show **one** cell wall.

cells from the tissue in one corner

cells from the tissue in the centre of the stem

[5]

[Turn over

(iii) Use the eyepiece graticule scale to find the **mean width** of the:

- cells in the centre of the stem
- cells in a corner of the stem.

State the **ratio** of the mean width of the cells in the centre of the stem to the mean width of the cells in a corner.

Note: You are **not** required to calibrate the eyepiece graticule scale with a stage micrometer.

You will lose marks if you do not show all the steps in finding the ratio.

[3]

(iv) The cells in the corner of the stem on **M1** carry out the function of support.

Suggest **one** observable feature which supports this conclusion.

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..... [1]

Fig. 2.2 is a photomicrograph of a stained transverse section through a stem of a different plant species.

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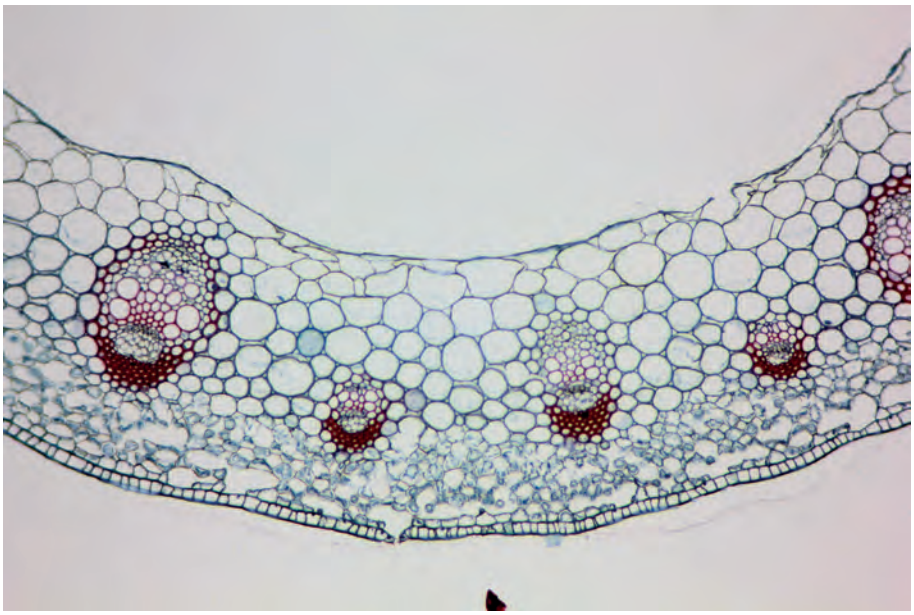

Fig. 2.2

(b) Prepare the space below so that it is suitable for you to record observable differences between the specimens on slide **M1** and in Fig. 2.2 to include:

- the vascular tissue
- at least two other tissues.

[5]

[Total: 19]

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