CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **9700/32**

Paper 32 Advanced Practical Skills **May/June 2009**

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 a pencil for any diagrams, graphs or rough working.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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.
You are advised to spend one hour on each question.

For Examiner's Use	
1	
2	
Total	

This document consists of **12** printed pages and **4** blank pages.

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International Examinations

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You are reminded that you have only one hour for each question in the practical examination. You should read carefully through the whole of each question and then plan your use of the time to make sure that you finish all the work that you would like to do.

You must record all your results and will not be penalised if these results are not as expected.

1 Yeast cells contain enzymes, which catalyse the breakdown of glucose to produce carbon dioxide.

You are required to investigate the effect of different concentrations of salt on the activity of yeast cells.

You are provided with:

- at least $50\,cm^3$ 10% salt solution, labelled **S**
- at least $100\,cm^3$ of an active yeast suspension in a glucose solution, labelled **Y**
- at least $100\,cm^3$ distilled water, labelled **W**
- $10\,cm^3$ syringe
- plastic pipette
- five beakers

You are going to change the independent variable, the salt concentration.

$10\,cm^3$ of each salt concentration is mixed with $10\,cm^3$ of yeast suspension so this will halve the concentration of the salt when mixed with the yeast.

Table 1.1 shows how to make up two of the salt concentrations you should use.

Table 1.1

volume of distilled water/cm^3	volume of 10% salt solution/cm^3	percentage concentration of salt	percentage concentration of salt when mixed with yeast
10	0	0	0.0
5	5	5	2.5

(a) (i) Using the information in Table 1.1, decide which other concentrations to make and complete Table 1.2 including the concentrations from Table 1.1.

Table 1.2

beaker	volume of distilled water/cm^3	volume of 10% salt solution/cm^3	percentage concentration of salt	percentage concentration of salt when mixed with yeast

[3]

1. Use the syringe to make up the salt concentrations in the beakers.

2. Stir the yeast suspension in **Y**.

3. Clean the syringe.

4. Use the syringe to slowly pull up 10 cm^3 of the yeast suspension **Y** from below the froth.

5. Add 10 cm^3 yeast suspension to a beaker.

6. Stir well.

7. Repeat steps 2 to 6 with the other beakers.

Leave for 5 minutes.

While you are waiting, continue with steps 8 to 10.

8. Clean the syringe.

9. Use the plastic pipette to make a nozzle to fit the syringe by measuring and cutting off 3.5 cm from the end of the pipette.
The syringe, with the nozzle attached, needs to hang into a tube as shown in Fig. 1.1.

syringe

plastic nozzle

large test-tube
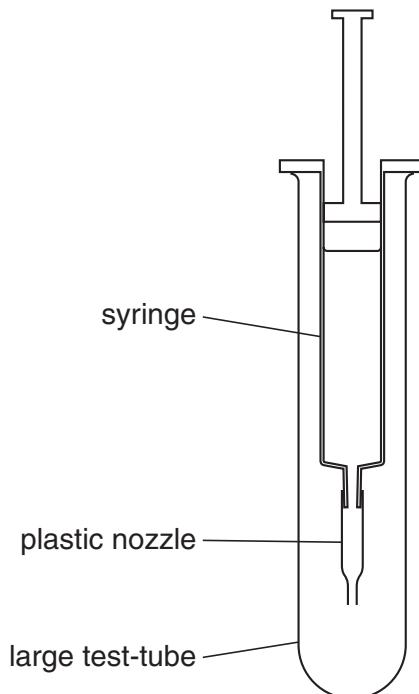
Fig. 1.1

10. Remove the nozzle.

11. Use the syringe to pull up 9 cm^3 of the mixture in the first beaker.

12. Remove the syringe from the mixture and pull the plunger up to the 10 cm^3 mark.

13. Attach the plastic nozzle firmly to the syringe and, pointing it downwards over the first beaker, push the plunger gently so that the liquid fills the nozzle.

14. Hang the syringe in the tube as shown in Fig. 1.1. Drops of yeast suspension should form at the end of the nozzle and drip into the tube.

15. Wait for two minutes.

16. After two minutes count the number of drops over a suitable time.

17. Clean the syringe.

18. Repeat steps 10 to 17 with the contents of the other beakers.

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

[4]

(iii) Identify two of the most significant errors in the experiment.

1. ....

....

2. ....

.... [2]

(iv) The nozzle was measured using a ruler.

State the smallest division on the ruler ……………

State the degree of uncertainty in using the ruler …………… [1]

(v) Suggest how you would make sure your results are

as accurate as possible,

....

....

....

....

as reliable as possible.

....

....

....

.... [3]

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(b) In a similar investigation, a student made up different masses of dried yeast into a suspension with 10% glucose solution and measured the percentage of light absorbed by the suspension (absorbance %).

The results of the student's investigation are shown in Table 1.3.

Table 1.3

mass of dried yeast /g 100 cm^{-3} glucose solution	mean percentage absorbance
1.00	9
1.50	17
2.00	39
2.25	53
3.00	94

(i) Plot a graph of the data in Table 1.3.
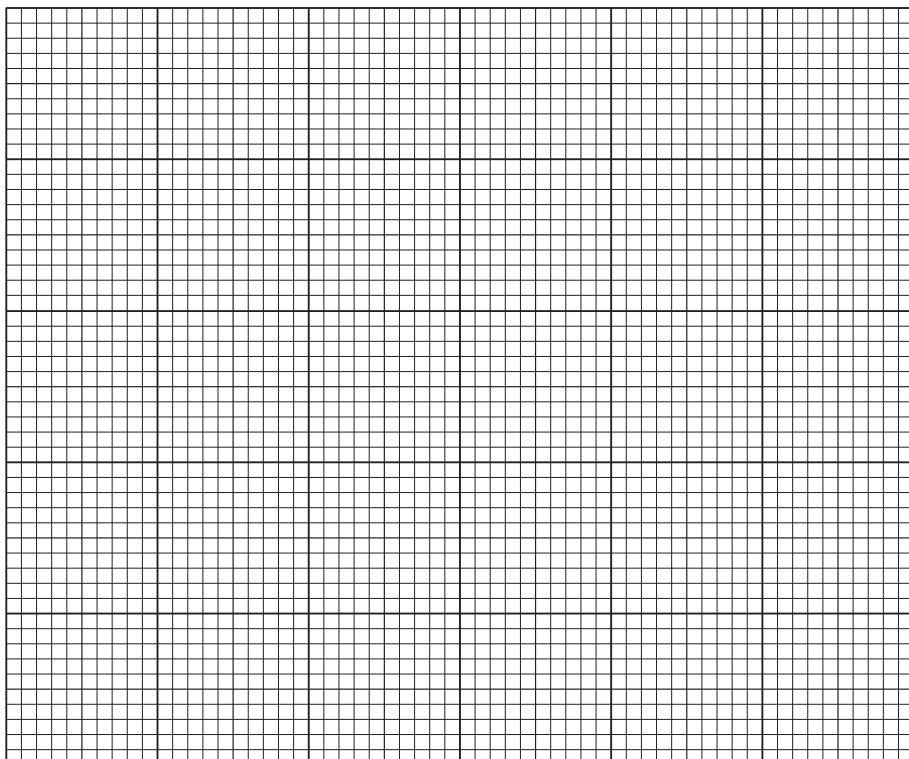
[4]

A student investigated the growth of yeast. The dry mass of 1.50 g of yeast in 100 cm^3 glucose solution has an absorbance of 17%, as shown in Table 1.3. The student measured the percentage absorbance after one day and after three days.

The first result is shown in Table 1.4.

Table 1.4

time/ days	mean percentage absorbance	mass of dried yeast / g 100 cm^{-3} glucose solution
0	17	1.50
1	60	
3	25	

(ii) Complete Table 1.4 using the graph. [1]

(iii) Show clearly **on the graph** how you obtained the mass of dried yeast after one day and after three days.

Put your answer on the graph that you plotted. [1]

(iv) In carrying out this investigation the student made the hypothesis that:

There will be a higher mass of dried yeast after two days.

State whether you think that this hypothesis is supported by the student's results.

Explain your answer.

....

....

....

.... [2]

[Total: 21]

2 **K1** is a slide of a stained transverse section of a plant organ.

  (a) (i) Draw a large, low power plan diagram of one end of the specimen on **K1** as shown in Fig. 2.1.

draw this
section

end

vascular
bundle
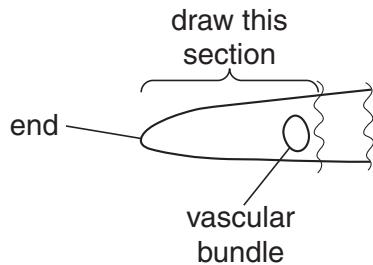
Fig. 2.1

Annotate your drawing to describe the visible appearance of **two** tissues.

[6]

(ii) Make a large, labelled, high-power drawing of two epidermal cells and the cells which form the layer inside touching these two cells.

You should draw the epidermal cells from the region shown in Fig. 2.2.

draw cells from
this region
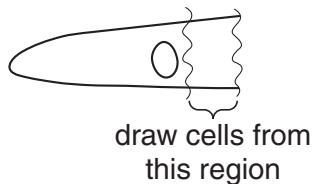
Fig. 2.2

[5]

(b) Fig. 2.3 shows a stage micrometer viewed through a microscope on a power of ×40 with an eyepiece graticule.

Each division on the stage micrometer is 100 µm (0.1 mm).
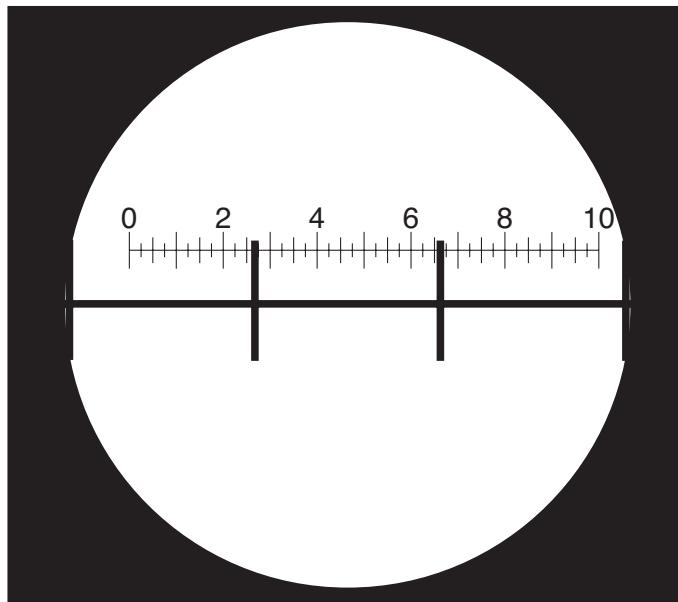
Fig. 2.3

Using the formula for the area of a circle πr^2 where $\pi = 3.14$ and r is the radius of the field of view, calculate the area of the field of view. Show your working.

area of field of view .... mm^2

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Fig. 2.4 is a photomicrograph of the lower surface of a leaf, with the same field of view as in Fig. 2.3.
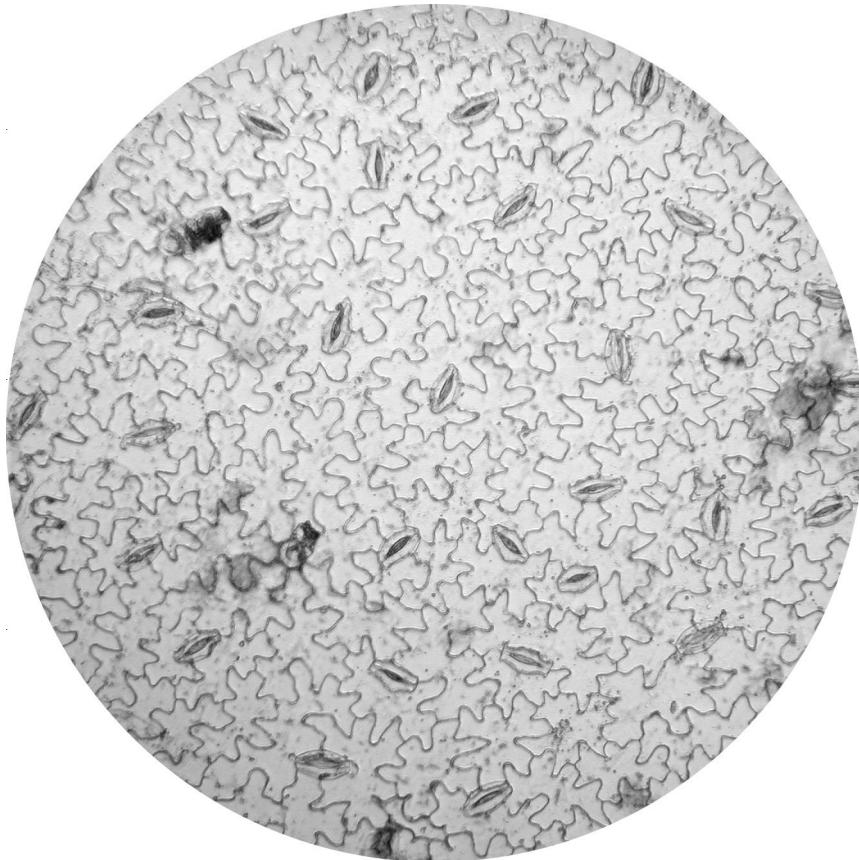
magnification ×100

Fig. 2.4

Count and record the number of stomata in the field of view.

Mark on Fig. 2.4 the stomata counted.

Calculate the number of stomata per mm^2.

.... mm^{-2} [5]

(c) Fig. 2.5 is a photomicrograph of the lower surface of a different leaf.

magnification ×100

Fig. 2.5

Prepare the space below so that it is suitable for you to show the difference between the surfaces of the leaves shown in Fig. 2.4 and Fig. 2.5.

Record your observations in the space which you have prepared.

[3]

[Total: 19]

[Paper total: 40]

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