

Surname	Centre Number	Candidate Number
First name(s)		2



GCE A LEVEL

1400U50-1A



TUESDAY, 10 MAY 2022

BIOLOGY – A2 unit 5

Practical Examination

Experimental Task

TEST 1

2 hours

For Teacher's use only Award a mark of 0 or 1 for	
Avoiding cross contamination of solutions	
For Examiner's use only	
Mark Awarded	
Total	

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ADDITIONAL MATERIALS

In addition to this examination paper, you will require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Pencil may be used to draw tables and graphs.
Write your name, centre number and candidate number in the spaces at the top of this page.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The total number of marks available for this task is 20.
Your teacher will directly assess your practical skills.
The number of marks is given in brackets at the end of each question or part question.
You are reminded of the necessity for orderly presentation in your answers.

1. Maltose is a disaccharide used in a number of industries, including brewing. This sugar can be obtained from germinating barley grains which produce the enzyme amylase that catalyses the following reaction:



To obtain the maximum yield of maltose from germinating grains, it is important to know how amylase activity changes during germination.

You are going to determine how amylase activity changes during the germination and initial growth of barley seedlings.

Follow these instructions carefully

You are provided with:

2 × dropping tiles
15 × dropping pipettes
1 × 1 cm³ syringe
1 × 10 cm³ syringe
15 × test tubes
2 × test tube racks
test tubes containing 5 cm³ each of extracts of barley grains after 1, 2, 5, 8 and 10 days of germination
150 cm³ of 1% starch solution
iodine/potassium iodide solution in a dropping bottle
stopclock
paper towels
marker pen
small beaker of water for washing syringes

Access to:

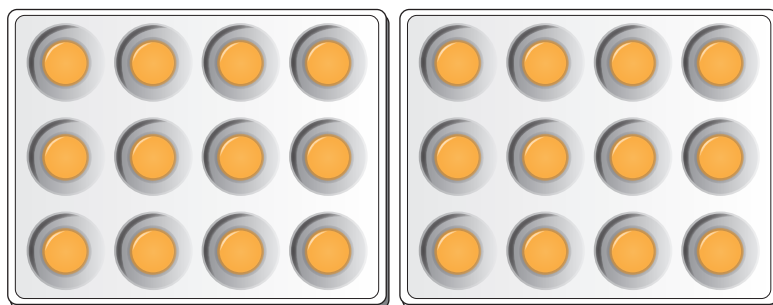
sink/container for washing dropping tiles

YOUR TEACHER WILL BE OBSERVING YOUR EXPERIMENTAL TECHNIQUE.

Method

1. Place one drop of iodine solution in each well of the dropping tiles as shown in **Image 1.1** below.

Image 1.1



2. Using the 10 cm³ syringe, measure 10 cm³ of starch solution and add to a test tube.
3. Using the 1 cm³ syringe, measure 1 cm³ of the extract labelled 1 day.
4. Add the extract to the starch solution and start the stopclock.
5. After 10 seconds, use a dropping pipette to take a sample of the starch and extract mixture and add 2 drops to the first well of one of the dropping tiles.
6. Every 10 seconds repeat step 5, using the same dropping pipette, until the iodine solution remains yellow-brown. There is no need to record the colour change for each well. **Record the time taken in seconds** (to the nearest 10 seconds) until the iodine solution **does not** change colour.

Do not stop the stopclock when you take each sample of the mixture.

7. Wash the syringes thoroughly and wash and dry the dropping tiles.
8. Repeat steps 1 to 7 to obtain **two** further readings for the extract labelled 1 day.
9. Repeat the experiment to obtain **three** readings for **each** of the 2, 5, 8 and 10 day extracts.

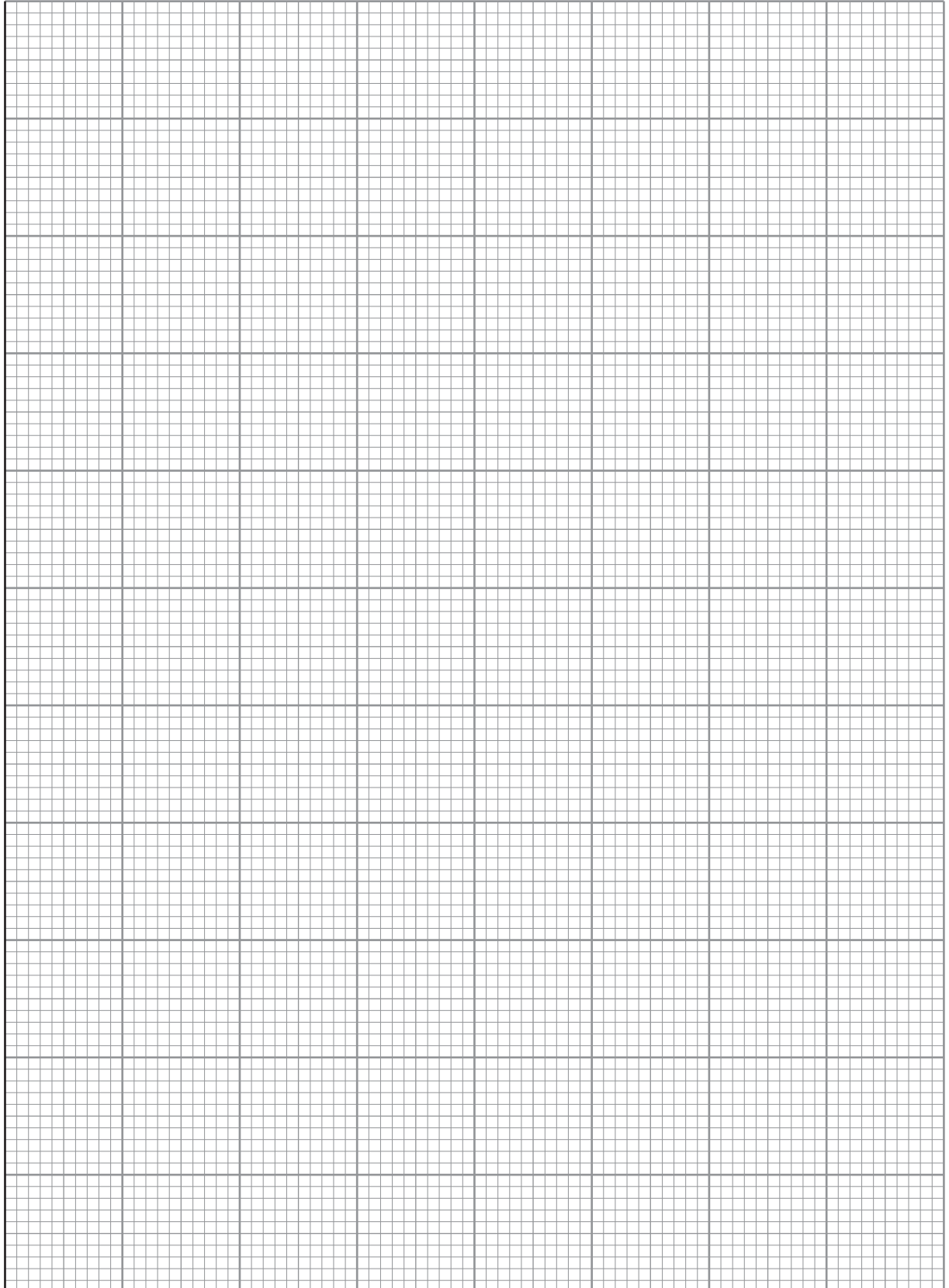
During this experiment make sure that you do not transfer any of the extract and starch mixtures to the iodine solution or vice versa.

Rough results:

Use the space below to record the time taken until the iodine solution did not change colour for each extract. Record the times taken **in seconds** (to the nearest 10 seconds).

- (a) Construct a suitable table to show the time taken until the iodine solution did not change colour for each extract. Record the times **in seconds** (to the nearest 10 seconds) and also the mean time for each extract. Show all repeats in your table. [4]

(b) Draw a graph to show the mean time taken until the iodine solution did not change colour against the number of days of germination. Range bars are **not** required. [7]



- (c) (i) From your results draw a conclusion that links the independent and dependent variables for this investigation. [1]

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- (ii) The enzyme extracts were prepared using the same mass of germinated seeds. Explain why this provides more accurate results than using the same number of seeds to prepare each extract. [3]

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- (iii) Identifying the end-point (i.e., when the iodine solution did not change colour) is said to be **subjective**. Explain what this means and how it could have affected the reproducibility of the experiment. [2]

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- (iv) Explain why the times you recorded cannot be used to calculate an accurate value for amylase activity in this investigation. [1]

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- (v) Using your knowledge of germination, explain why amylase activity decreases once seedlings produce leaves.

[1]

Examiner
only

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END OF PAPER