Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Biology

Unit 3 Practical Skills
Booklet B
Higher Tier

[GBL34]

GBL34

MONDAY 17 JUNE, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **2**.

12308

20GBL3401

1 Pupils investigated the energy content of plain digestive biscuits and chocolate digestive biscuits.

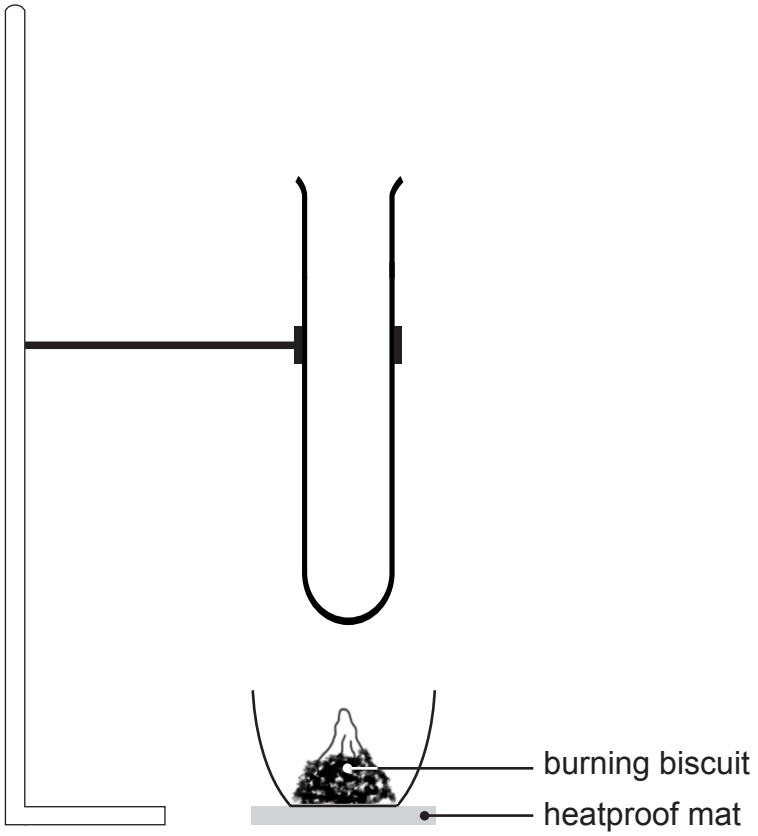
They placed 20 cm^3 of water in a boiling tube and recorded its temperature.

They then placed a sample of biscuit into a crucible.

They set the biscuit alight and placed the crucible under the boiling tube.

When the biscuit had completely burned, the pupils recorded the temperature of the water again.

The diagram shows some of the apparatus they used.



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(a) **Complete the diagram** to show the set-up of the boiling tube at the start of the investigation. [2]

The table shows the results the pupils obtained.

Type of biscuit	Mass of biscuit / g	Temperature of 20 cm^3 of water / °C		Rise in water temperature / °C
		Before burning	After burning	
plain digestive	2.7	18	37	
chocolate digestive	2.4	18	52	34

(b) Complete the table to show the rise in temperature of the water for the plain digestive biscuit. [1]

The equation below is used to calculate the energy content of a food sample.

Energy content = volume of water × rise in water temperature × 4.2
/ J / cm^3 / °C

(c) Use the equation to calculate the energy content of the **chocolate** digestive biscuit.

Show your working.

_____ J [2]

[Turn over

(d) The pupils then calculated the energy content per gram for each biscuit.

(i) Explain why this was necessary in this experiment.

_____

_____ [1]

The calculated energy content for the plain digestive biscuit was 591 J per gram.

The value given on the packet is 20710 J per gram.

(ii) Suggest **two** reasons why the result obtained by the pupils was lower than the value given on the packet.

1. _____

_____

2. _____

_____ [2]

(iii) The energy content per gram is higher for a chocolate digestive than a plain digestive biscuit.

Suggest why.

_____

_____ [1]

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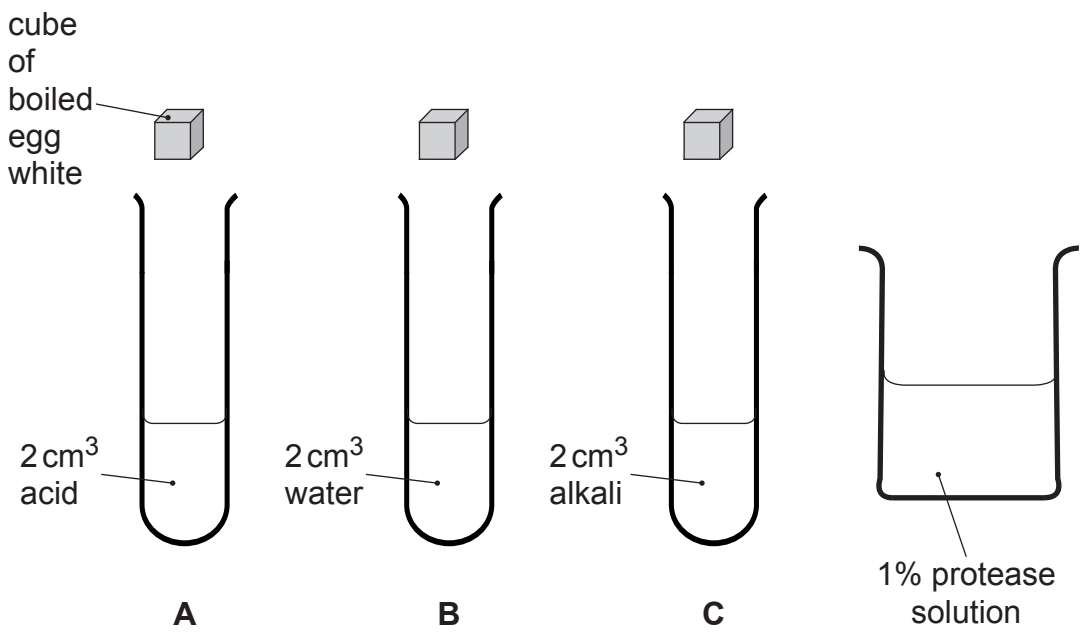
(Questions continue overleaf)

2 Pupils were asked to investigate the effect of pH on the action of the enzyme protease.

They were provided with cubes of boiled egg white, each weighing 3 g.

When added to a 1% concentration of protease solution, the protein in the boiled egg white is broken down and completely disappears over 10 minutes at optimum pH.

The diagram shows some of the apparatus and materials the pupils were given.



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Describe:

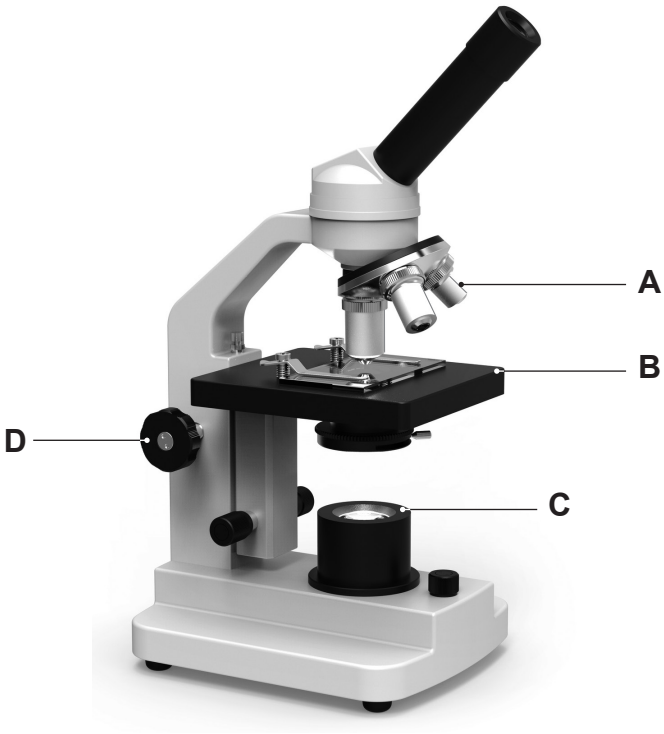
- how the pupils would set up the experiment to obtain results in **five** minutes.
- what they would measure as the result.
- the **other** variables they would control.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

[Turn over

3 The photograph shows a light microscope.



© Thomas-Soellner / iStock / Thinkstock

Look at the photograph.

(a) Name parts **A**, **B**, **C** and **D**.

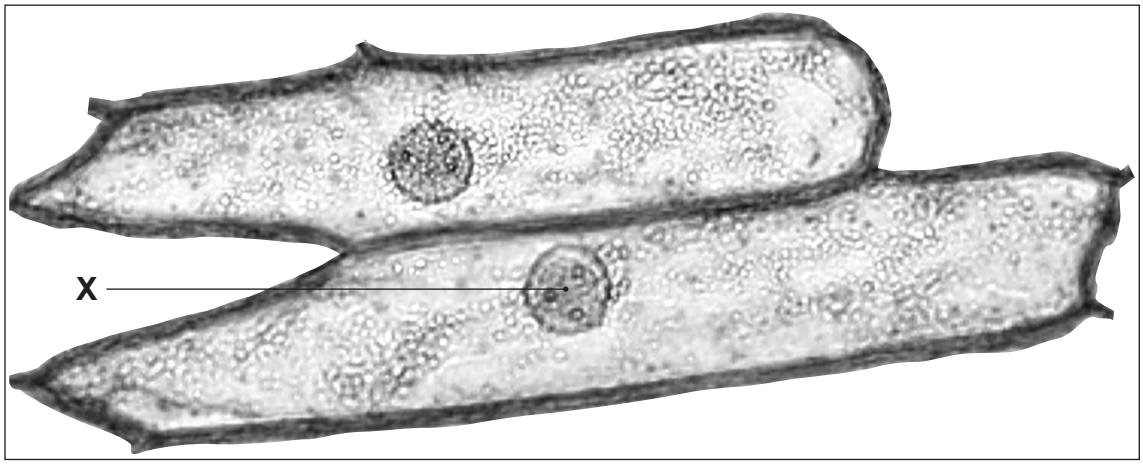
A _____ [1]

B _____ [1]

C _____ [1]

D _____ [1]

(b) The photograph shows onion cells on a slide viewed with a light microscope.



© Ted Kinman / Science Photo Library

(i) Name part **X**.

_____ [1]

(ii) Make a drawing of the cells in the box below.

Label the cell wall on your drawing.

[5]

(c) Describe how to prepare a slide of onion cells.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

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(Questions continue overleaf)

4 A teacher investigated the effect of exercising for different lengths of time on the pulse rate of two students.

Each student sprinted for 10 seconds, then 20 seconds, then 30 seconds and finally 40 seconds.

Between each sprint the students rested until their pulse rate returned to normal.

After each sprint they measured their pulse rate in beats per minute.

The results they obtained were:
Student **A** 63, 68, 75, 82 and
Student **B** 65, 73, 89, 96.

(a) Record the results in the table below.

- Use suitable column headings.
- Use appropriate units.

Length of time sprinting / s		

[4]

(b) **(i)** Describe the trend shown by **both** students.

_____

_____

_____ [1]

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Student **A** is fitter than student **B**.

(ii) Use data from the table to support this statement.

_____

_____

_____

_____ [2]

(c) Exercise also affects breathing.

(i) Give **two** ways breathing changes during exercise.

1. _____ [1]

2. _____ [1]

(ii) Suggest **one other** short-term and **one** long-term effect of exercise on the body.

Short-term _____

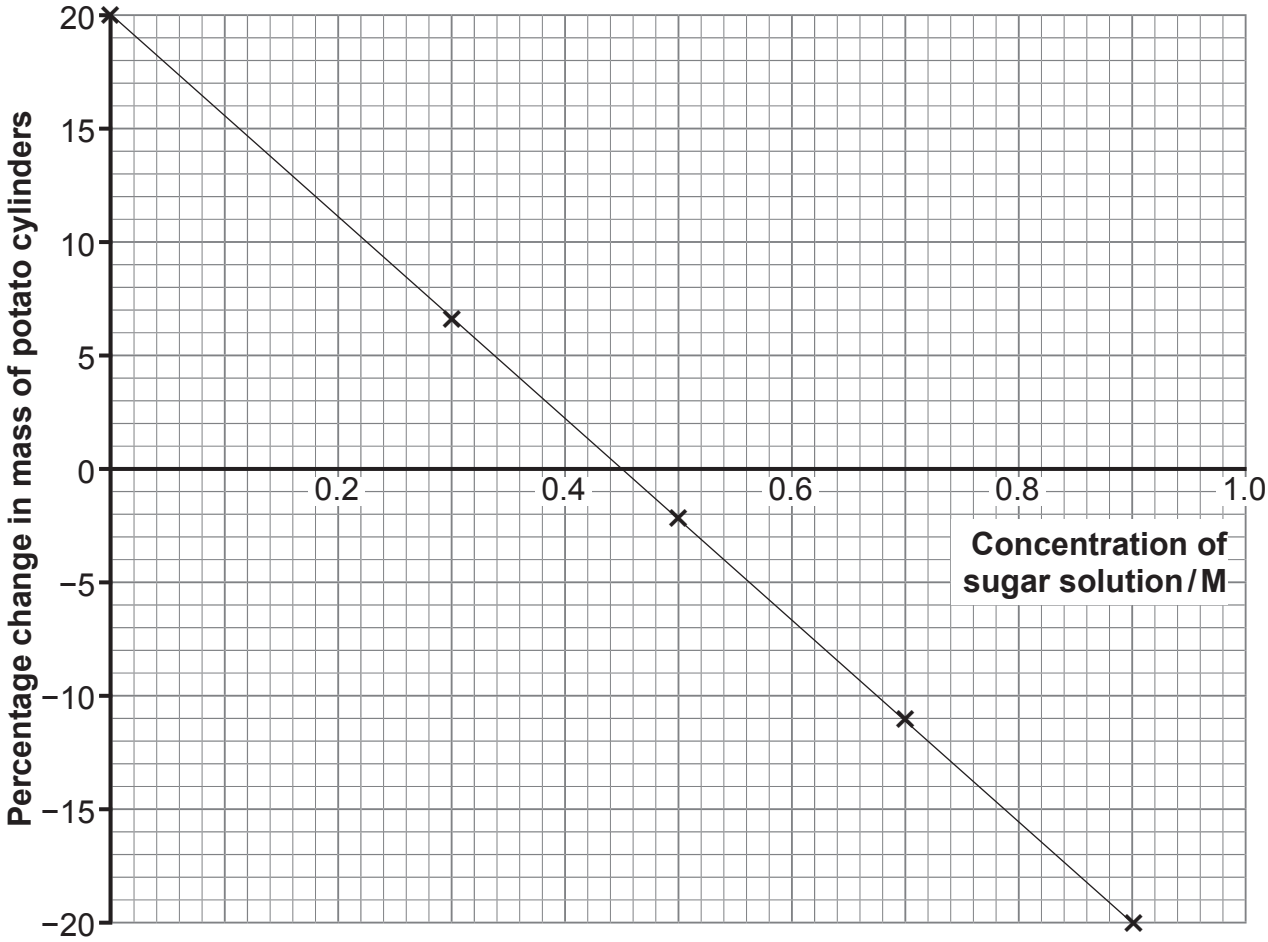
_____ [1]

Long-term _____

_____ [1]

5 **(a)** A group of students carried out an experiment to investigate the effect of placing potato cylinders into a range of sugar solutions for 24 hours.

The graph shows the results.



(i) Use the graph to estimate the concentration inside the cells of the potato cylinders.

Explain your answer.

Concentration _____ M [1]

Explanation _____

_____

_____

_____ [2]

(ii) Describe and explain what has happened to the potato cells placed in 0.9 M sugar solution.

_____

_____

_____

_____

_____

_____

_____ [3]

(iii) Give the term used to describe the potato cells after 24 hours in the 0 M sugar solution (water).

_____ [1]

(b) Red blood cells react differently when placed in 0 M sugar solution.

(i) Give the term used to describe the red blood cells after 24 hours in 0 M sugar solution.

_____ [1]

(ii) Explain why the 0 M sugar solution has a different effect on red blood cells compared to potato cells.

_____

_____

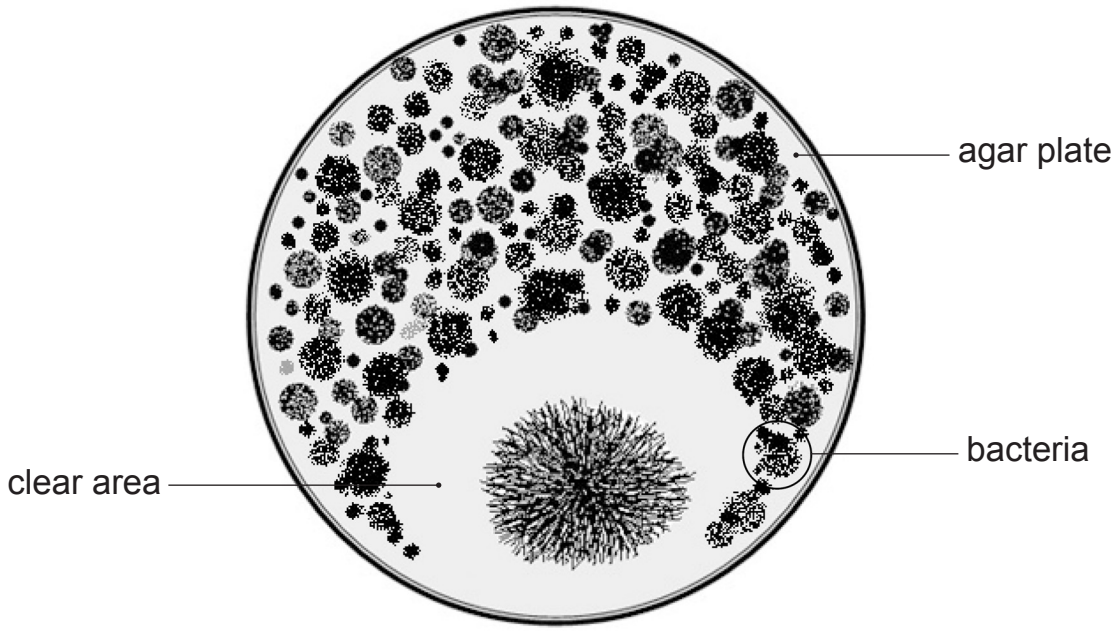
_____

_____

_____ [2]

[Turn over

6 The diagram shows the result of the experiment that led to Fleming's discovery of penicillin.



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(a) Explain why the clear area appeared on the agar plate.

_____

_____

_____

_____

_____

_____

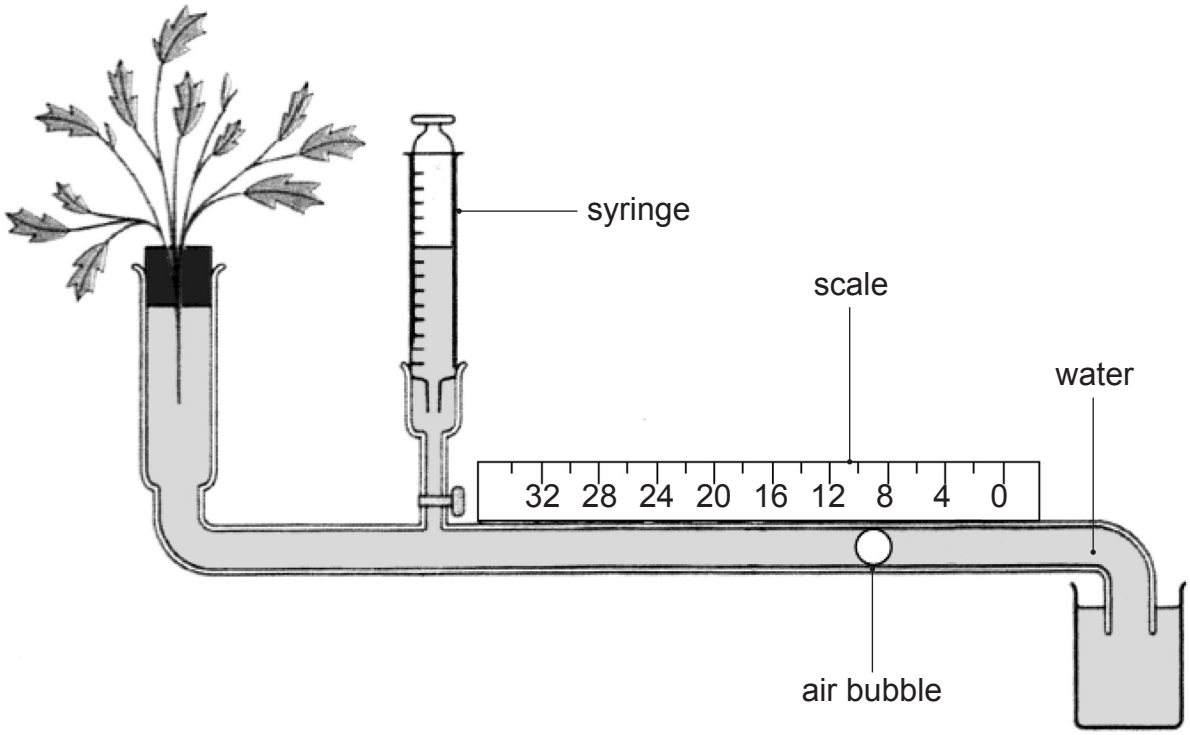
_____ [3]

(b) Name the **two** scientists who later developed the large-scale production of penicillin for medical use.

_____ and _____ [2]

7 A pupil set up a potometer to investigate the effect of three different factors on the rate of transpiration in a leafy shoot by measuring the rate of bubble movement.

The diagram shows the apparatus the pupil used.



© Barking Dog Art. Used with permission

(a) (i) Explain why the pupil set up the potometer under water.

_____

_____ [1]

(ii) It is important to seal the joints of the potometer with petroleum jelly.

Explain why.

_____

_____ [1]

[Turn over

(b) The pupil calculated the average rate of bubble movement for each environmental condition.

The table shows his results.

Environmental condition	Average rate of bubble movement / mm min^{-1}
control	10
humid	6
windy	50

(i) Suggest how the pupil created humid and windy conditions around the plant.

Humid _____

_____ [1]

Windy _____

_____ [1]

When a control experiment was set up, the average rate of bubble movement was 10 mm min^{-1}.

(ii) Suggest what conditions were used for the control experiment.

_____

_____ [1]

(iii) What measurements should the pupil have taken to calculate the **average** rate of bubble movement for the control experiment?

_____

_____

_____ [3]

(c) Windy conditions increase the rate of transpiration the most.

Explain why.

_____

_____

_____

_____

_____

_____ [3]

(d) The pupil removed some of the leaves from the shoot and repeated the experiment carried out in windy conditions.

(i) Predict how this will affect the rate of transpiration in the shoot.

_____

_____ [1]

(ii) Give the factor the pupil was investigating in this experiment.

_____ [1]

Not all of the water taken up by the leafy shoot was lost in transpiration.

(e) Give **two** other ways the leafy shoot may have used some of the water.

1. _____ [1]

2. _____ [1]

THIS IS THE END OF THE QUESTION PAPER

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

Examiner Number

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