Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018

Centre Number

Candidate Number

Biology

Assessment Unit AS 3
assessing
Practical Skills in AS Biology

[SBY31]

SBY31

WEDNESDAY 2 MAY, MORNING

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 eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You are reminded of the need for good English and clear presentation in your answers.
Use accurate scientific terminology in all answers.

11074.05 **R**

1 Chromatography is a technique that can be used to separate different solutes.

(a) When **preparing** a chromatogram, state **two** precautions necessary to ensure a valid result.

1. ____

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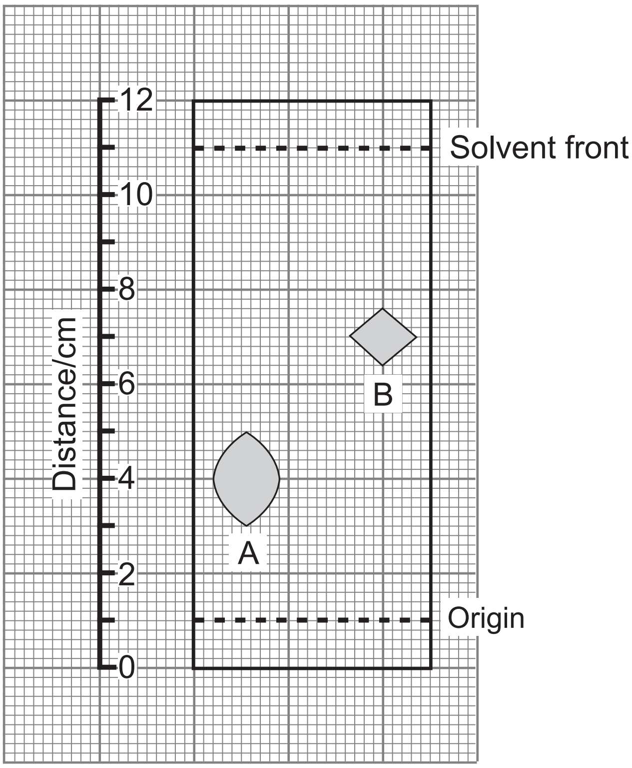
2. ____

____ [2]

(b) The diagram below represents a chromatogram showing two amino acids, **A** and **B**.



(i) On the diagram, use the letter **X** to show the position where the spot for amino acid **A** would have been placed. [1]

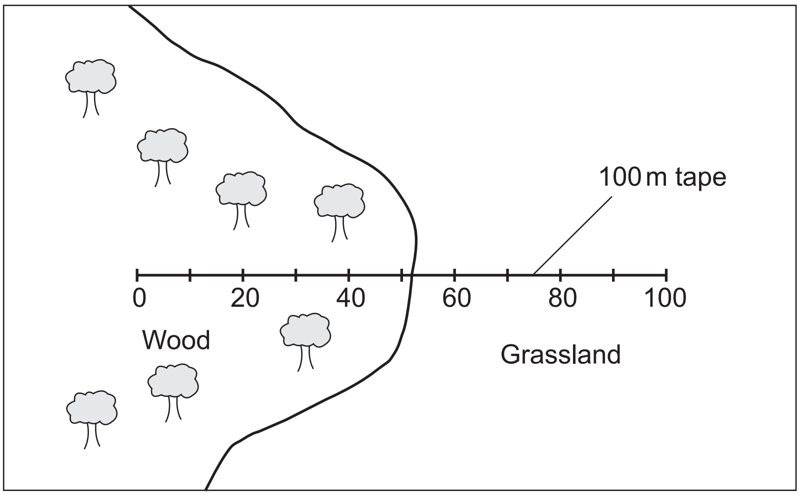
(ii) Calculate the R_f value for amino acid **B**. Give your answer to two decimal places.

(Show your working.)

_____________ [2]

2 In ecological sampling, species abundance can be measured in a variety of ways.

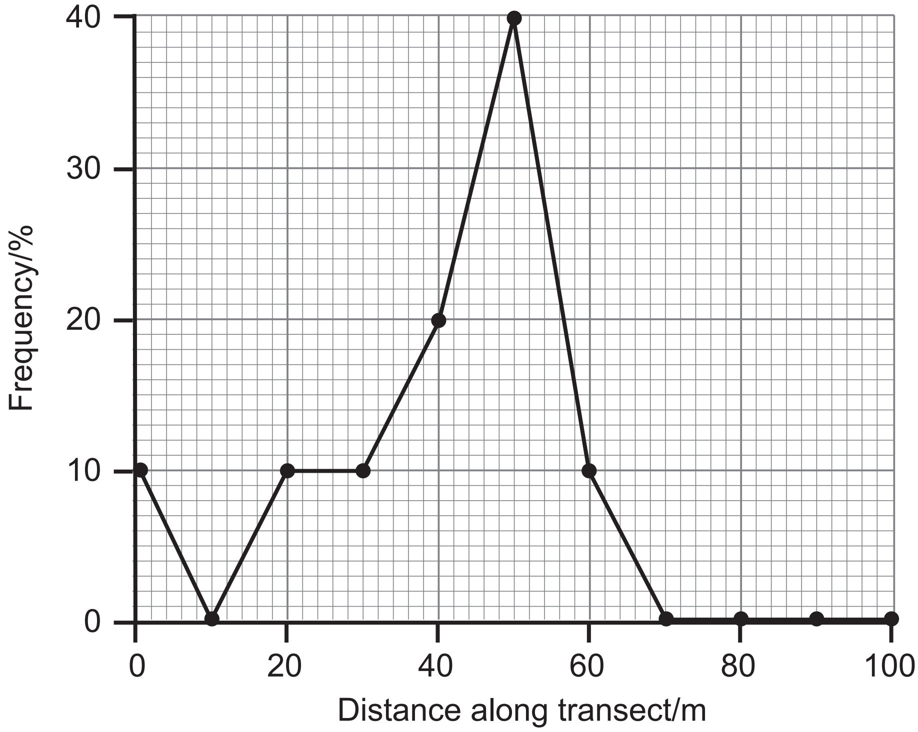
In one investigation, a 100 m line tape was laid out, extending from the centre of a small wood into an area of grassland, as shown in the diagram below.



The frequency of lesser celandine (*Ranunculus ficaria*), a small ground layer plant, was sampled at 10 m intervals along the transect using a pin frame.

A pin frame can be used to measure the frequency of plant species along a transect. At each sampling point, the ten pins in the frame were lowered, and the number of pins which touched lesser celandine was recorded. This data was used to estimate percentage frequency.

The results are shown in the graph opposite.



(a) With reference to habitat, describe the distribution shown by the lesser celandine along the transect.

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____ [3]

(b) The distribution of lesser celandine is affected by light intensity and competition from other ground layer plants (e.g. grasses). Taking account of this, explain the frequency of lesser celandine at a distance of 50 m along the transect.

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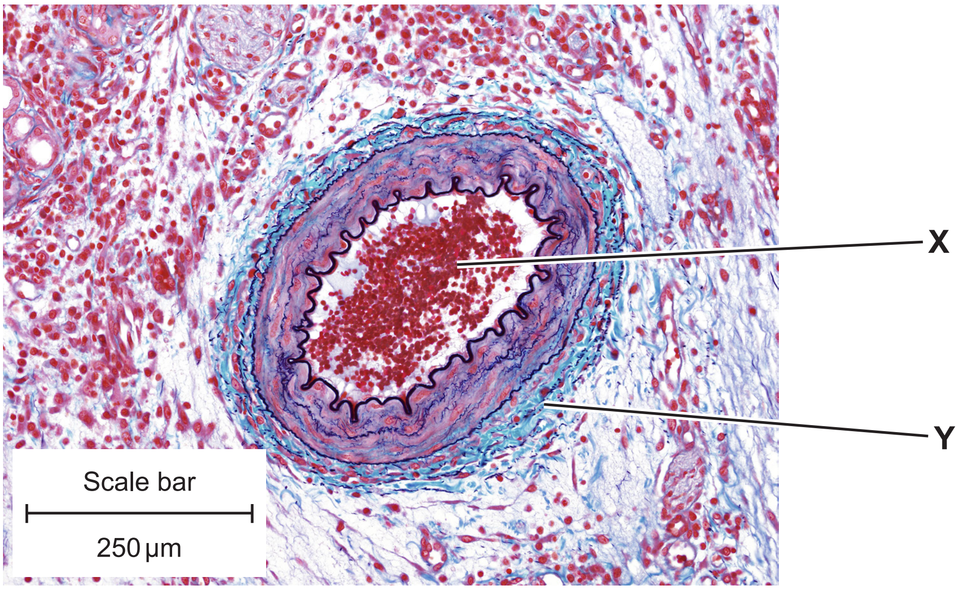
____ [1]

3 The photomicrograph below shows a section through an artery.



© Microscape / Science Photo Library

(a) Identify the tissues labelled **X** and **Y**.

X ____________________________

Y ____________________________ [2]

(b) Identify **one** piece of evidence from the photomicrograph which shows that the structure is an artery rather than a vein.

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____

____ [1]

(c) Using the scale bar, calculate the magnification of the photomicrograph.

(Show your working.)

______________ [3]

[Turn over

4 Beetroot cells contain the pigment betalain which gives beetroot its dark red-purple colour. Damage to membranes in beetroot cells can cause some of the pigment to leak out of the cells.

A colorimeter can be used to investigate the effect of temperature on membrane permeability in beetroot.

A typical procedure is as follows:

1. Cut several small sections of beetroot
2. Rinse the sections of beetroot in running water
3. Add one section of beetroot to a boiling tube half filled with water
4. Place the boiling tube in a water bath set at 20°C
5. After 10 minutes in the water bath, remove a small amount of the water surrounding the beetroot in the boiling tube and measure percentage transmission using a colorimeter
6. Repeat at temperatures of 30, 40, 50 and 60°C.

(a) **(i)** Suggest what was used to calibrate the colorimeter to 100% transmission.

______________________________ [1]

(ii) In this investigation, a blue-green filter is typically used in the colorimeter.

State the benefit of using a filter in investigations using a colorimeter.

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______________________________ [1]

At 20°C, 97% transmission was obtained, 95% was obtained at 30°C and 87% at 40°C. Percentage transmission at 50°C was 72% and 40% at 60°C.

(iii) Using the information provided, complete the table below of the results. Your table does **not** require a caption.

[3]

(iv) Explain the results of this investigation.

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____ [2]

(b) Rather than using different sections of beetroot, a student carried out this investigation using only one section of beetroot, which was immersed at each temperature in turn.

Suggest and explain how the results would be different from those shown in **(a)(iii)**.

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____ [2]

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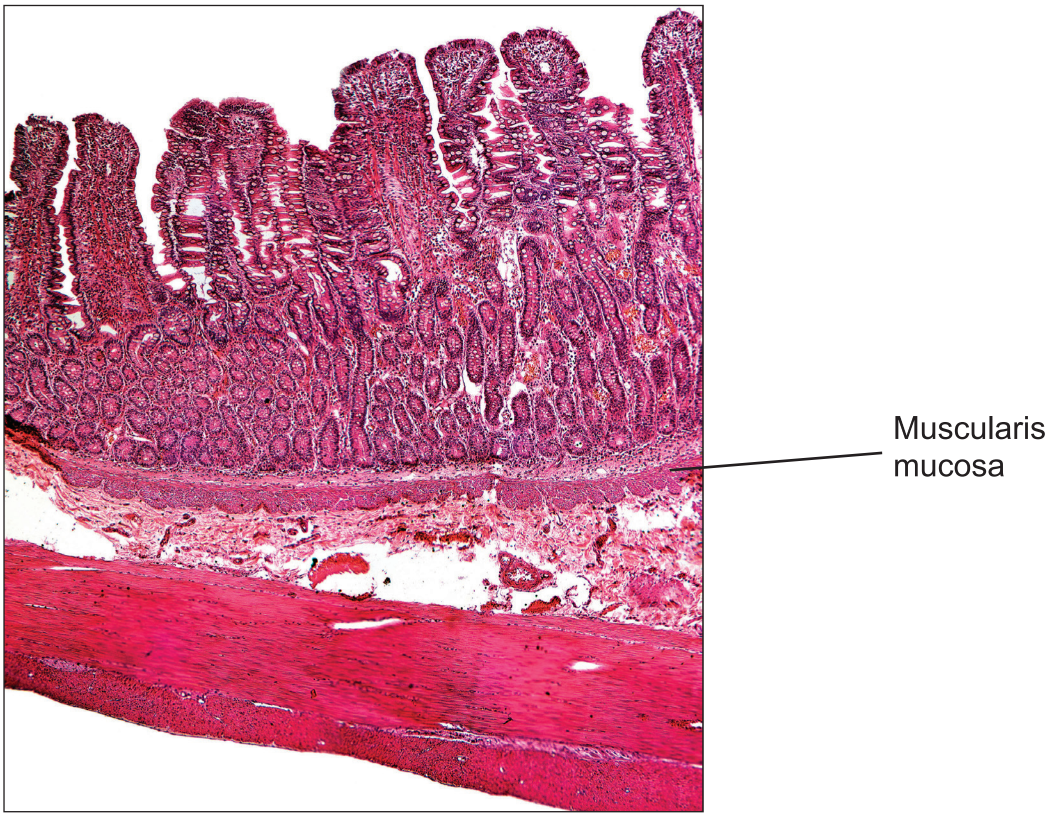
(Questions continue overleaf)

5 The photomicrograph below shows a section through the ileum. The muscularis mucosa is labelled.



© Dr Keith Wheeler / Science Photo library

Draw a block diagram of this section in the box below. Your diagram should only show the following layers:

- muscularis externa
- mucosa
- muscularis mucosa
- submucosa.

(Note: the serosa is not clearly visible in this section and should **not** be included.)

Label the submucosa and the muscularis externa.

[5]

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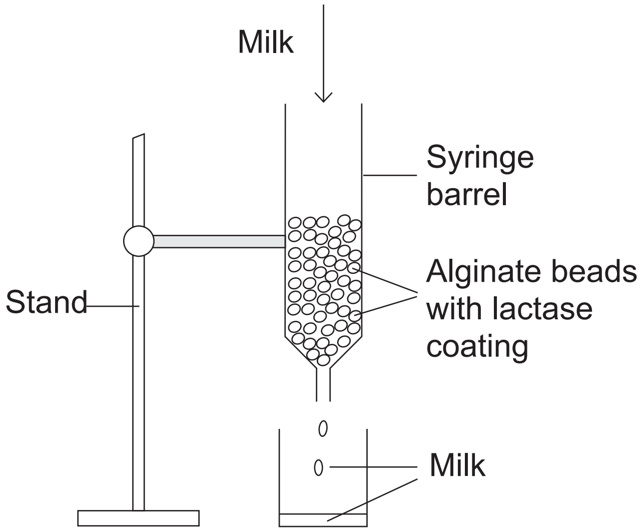
6 Describe how you would carry out an investigation in order to measure the average water potential of cells in potato tissue using the weighing method.

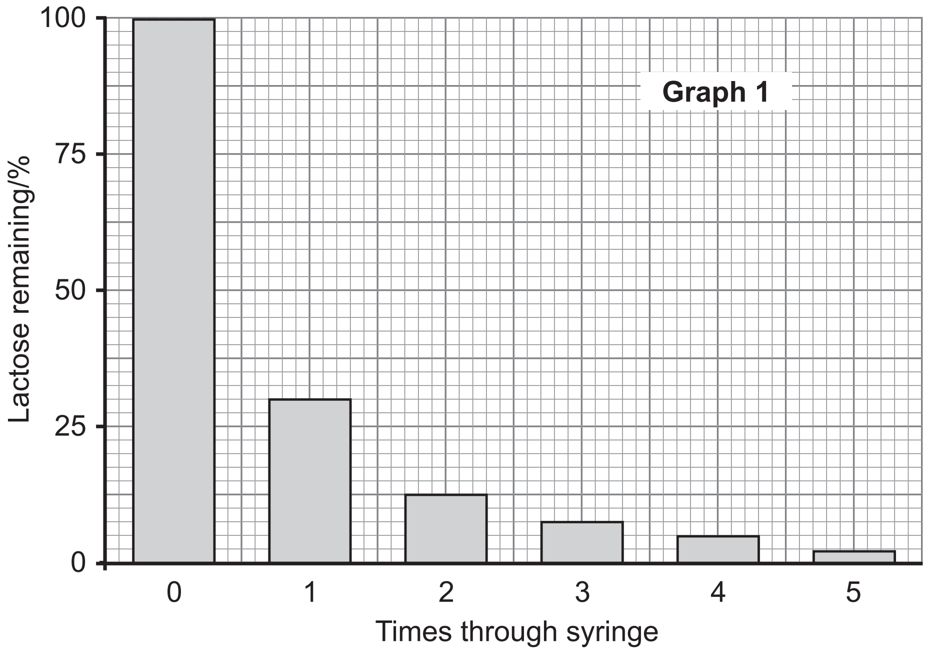
[5]

7 Milk contains the sugar lactose, a disaccharide which can be broken down to its constituent monosaccharides (glucose and galactose) by the enzyme lactase.

Alginate beads were coated with lactase and placed into the barrel of a large syringe. 50 cm^3 of milk was then poured through the syringe containing the beads, as shown in the diagram below.



The percentage of lactose remaining after all the milk had passed through once was analysed. This milk was then passed through the syringe a second time and the percentage of lactose in the milk again analysed. This process was repeated a further three times. The results are shown in **Graph 1**.



(a) Describe and explain the results shown.

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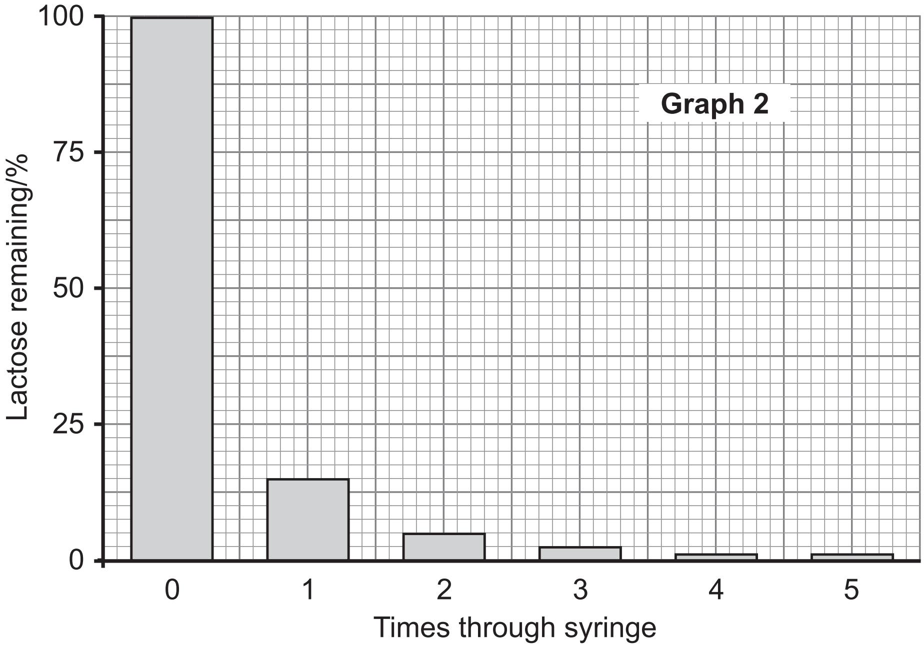
____ [4]

The investigation was repeated using smaller alginate beads coated with lactase. The results for this are shown in **Graph 2**.



(b) Describe and suggest an explanation for the difference between the results in **Graph 2** and **Graph 1**.

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____ [3]

(c) State **two** variables that should have been controlled in this investigation.

1. ____

2. ____ [2]

(d) Describe how you could show that the milk collected at the end of the investigation contained glucose.

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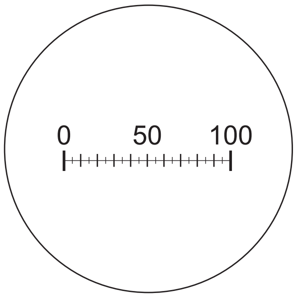
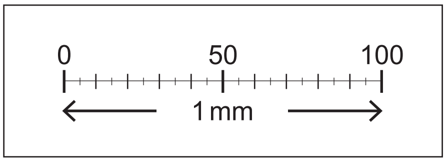
____ [1]

8 When viewing plant cells with a light microscope, their length can be calculated using an eyepiece graticule and a stage micrometer.

A typical eyepiece graticule and a stage micrometer are represented in the diagrams below.



Eyepiece graticule (on microscope eyepiece lens)



Stage micrometer (on glass slide)

(a) Using information in the diagram, describe the steps you would take to calibrate an eyepiece graticule.

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____ [4]

[Turn over

(b) A student measured the length of 10 epidermal plant cells on a microscope slide using an eyepiece graticule. The mean cell length was calculated as 125 μm.

The student then went for lunch for 1 hour and, when he returned, he measured the length of a further 10 cells on his slide. The mean length for these 10 cells was calculated as 105 μm.

Apart from random variation in cell length, suggest an explanation for the different means obtained.

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____ [2]

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For Examiner's use only	
Question Number	**Marks**
1	
2	
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Examiner Number