Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2024

Centre Number

Candidate Number

Biology

Assessment Unit AS 3
assessing
Practical Skills in AS Biology

[SBY31]

SBY31

WEDNESDAY 29 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 six** 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.

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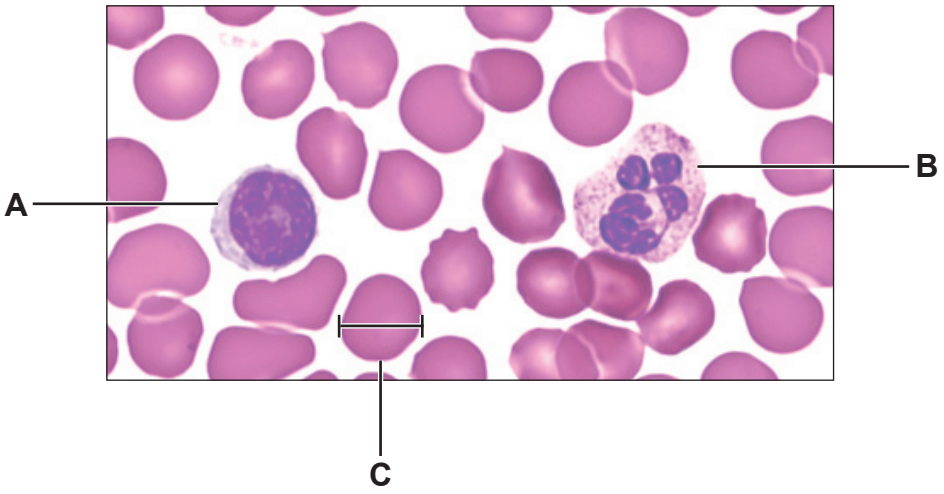
1 A human blood smear is shown in the photomicrograph below.



(a) Identify the white blood cells labelled **A** and **B**.

A _____

B _____ [2]

(b) The blood cell labelled **C** is 7 μm in diameter.

Use the lines on cell **C** to calculate the magnification of this image.

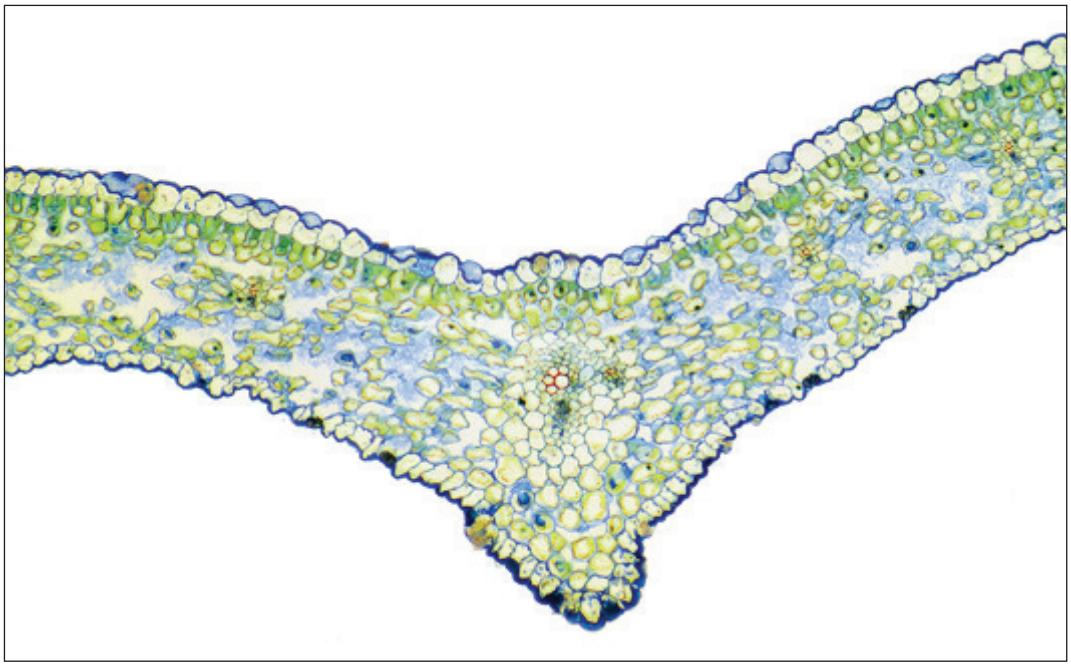
Give your answer to the nearest whole number.

(Show your working.)

_____ [2]

[Turn over

2 The photomicrograph below shows a transverse section through a leaf.



(a) Draw a block diagram of this section in the box below.

Label **three** tissue layers in your drawing.

[5]

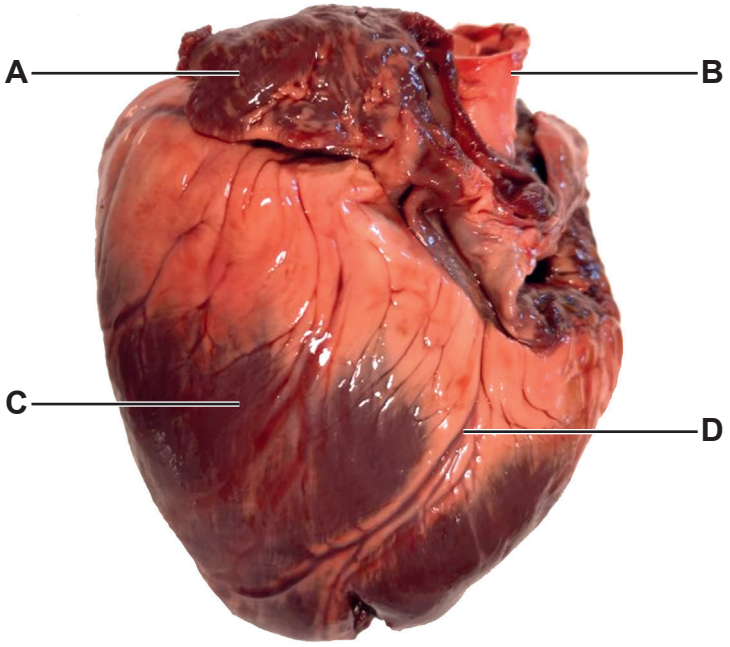
(b) Using the photomicrograph, give **one** piece of evidence which suggests that this leaf is **not** xerophytic.

_____

_____

_____ [1]

3 **(a)** The photograph below shows a lamb's heart before dissection.



Source: Principal Examiner

(i) Identify the parts of the heart labelled **A** to **C**.

A _____

B _____

C _____ [3]

(ii) An atheroma in blood vessel **D** is found in people with heart disease.

Name blood vessel **D**.

D _____ [1]

(b) (i) During dissection, a vertical cut was made through part **C**.

Name **two** internal structures which would now be visible and state their function in the circulation of blood through the heart.

1 _____

Function _____

_____

_____

2 _____

Function _____

_____

_____ [4]

(ii) Describe **one** safety precaution necessary when carrying out a dissection.

_____

_____

_____ [1]

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4 Chromatography can be used to identify amino acids.

(a) After amino acid solutions have been applied to chromatography paper, the next stages are 'running' and 'developing' the chromatogram.

Describe each of these stages.

Running _____

_____

_____

_____

_____

_____

Developing _____

_____

_____

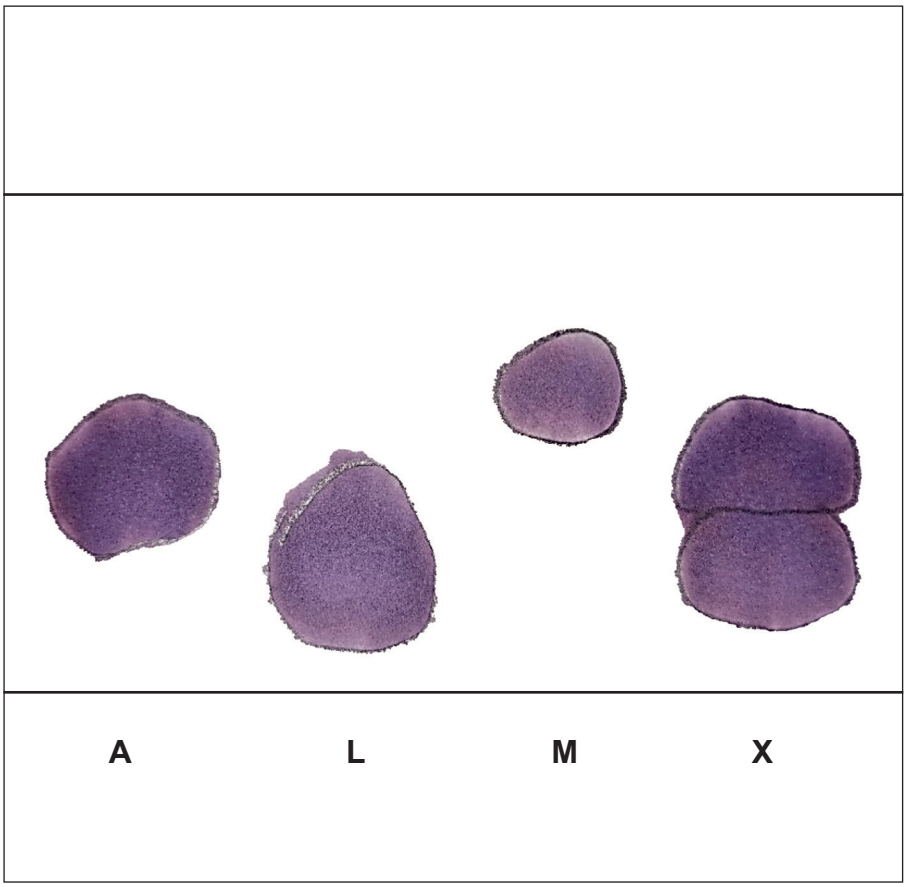
_____

_____

_____ [4]

(b) Paper chromatography was carried out with three known amino acids – alanine (**A**), lysine (**L**), and methionine (**M**). In addition, a mixture of amino acids (**X**) was analysed.

The developed chromatogram is shown below.



Source: Principal Examiner

(i) Use the letter **S** to label the solvent front on this chromatogram. [1]

(ii) Using the chromatogram, state the number and identity of amino acids in mixture **X**.

Number _____

Identity of amino acids _____

_____ [2]

(iii) The accepted R_f value for alanine is 0.38.

The R_f value for alanine calculated using this chromatogram was 0.42.

Suggest a reason why the R_f value obtained here would have differed from the accepted value.

_____

_____

_____ [1]

5 An interrupted belt transect was used to sample five species of seaweed on a rocky shore.

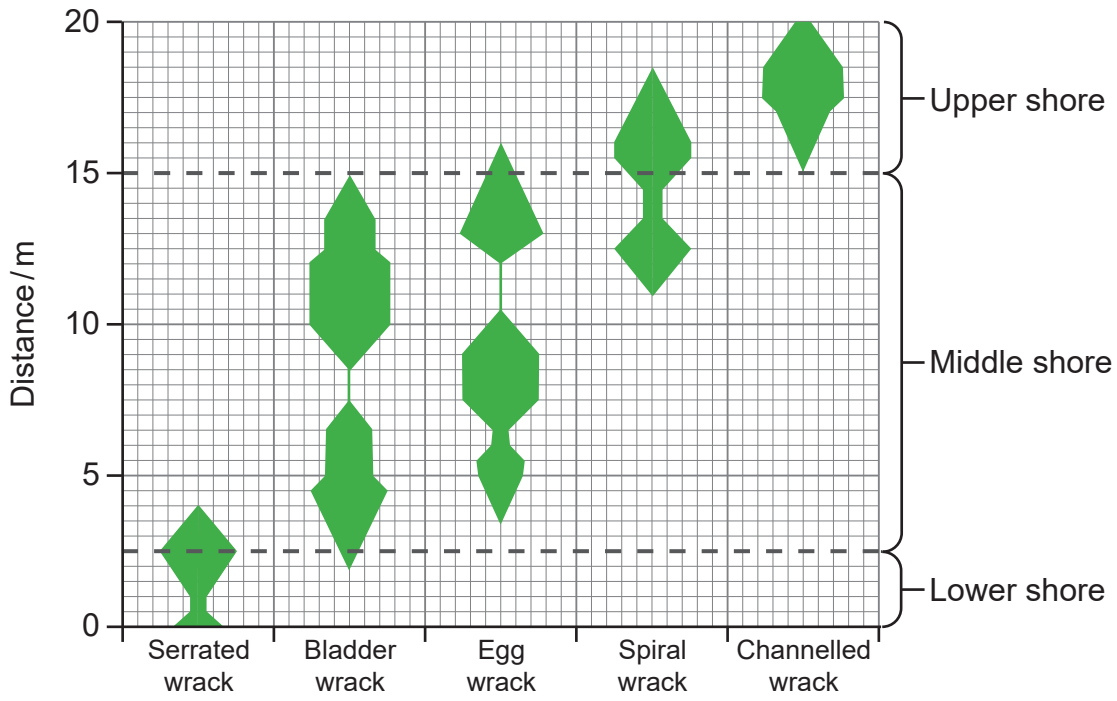
A 20 m transect was placed from the lower shore to the upper shore and quadrats were placed at 2 m intervals.

(a) Explain why this was the most appropriate method of sampling this habitat.

_____

_____ [1]

(b) The results of the transect are shown in the kite diagram below.
The shaded areas represent the abundance of each species at a particular distance on the shore (the larger the area, the greater the abundance).



(i) Using the results shown, describe the distribution of seaweed species on this rocky shore.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

(ii) Name **one** biotic factor that would influence the distribution of the seaweed species along this shore.

_____ [1]

(iii) None of the five species of seaweed were found beyond 20 m.

Suggest **one** abiotic factor that would account for this and explain how this factor prevents seaweed growth beyond 20 m.

_____

_____

_____

_____ [2]

[Turn over

(c) Sea snails are small invertebrates which were also sampled along this belt transect.

Name the most suitable apparatus for sampling sea snails.

Explain your answer.

Apparatus _____

Explanation _____

_____

_____ [2]

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(Questions continue overleaf)

6 Enzymes can be extracted from plant tissue. Plants store glucose as starch and an enzyme is involved in the conversion of glucose to starch in cells. An extract containing the enzyme, as well as other cell components, can be produced by crushing raw potato tissue with water and filtering this mixture.

To use this extract in investigations, any starch in the mixture should be removed. This is achieved using centrifugation, where the enzyme remains in the liquid component at the top of the centrifuge tube after spinning and the starch is found in the 'pellet' at the bottom.

(a) **(i)** From the information provided, state your conclusion regarding the **size** of starch molecules relative to the enzyme molecules.

_____

_____ [1]

(ii) Describe how iodine can be used to show that no starch remains in the enzyme extract.

_____

_____

_____ [1]

(b) Although not a pure enzyme extract, the solution obtained can be used in enzyme investigations. In such investigations, the production of starch is used as a measure of enzyme activity. This is done using iodine and a colorimeter.

(i) Suggest and explain which colour of filter is most appropriate for this investigation.

Colour _____

Explanation _____

_____

_____ [2]

(ii) Describe fully the steps involved when using a colorimeter to determine accurately the % transmission of light through a single sample from this investigation.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(c) The table below shows results for an investigation using this enzyme extract. Samples were removed and tested at 5-minute intervals.

Time / minutes	% transmission of light
0	45
5	36
10	29
15	22
20	17
25	15
30	13
35	11
40	10

(i) Using the information provided, describe and explain what causes the change in the percentage transmission of light through the solution between 0 and 15 minutes.

_____

_____

_____

_____

_____

_____

_____

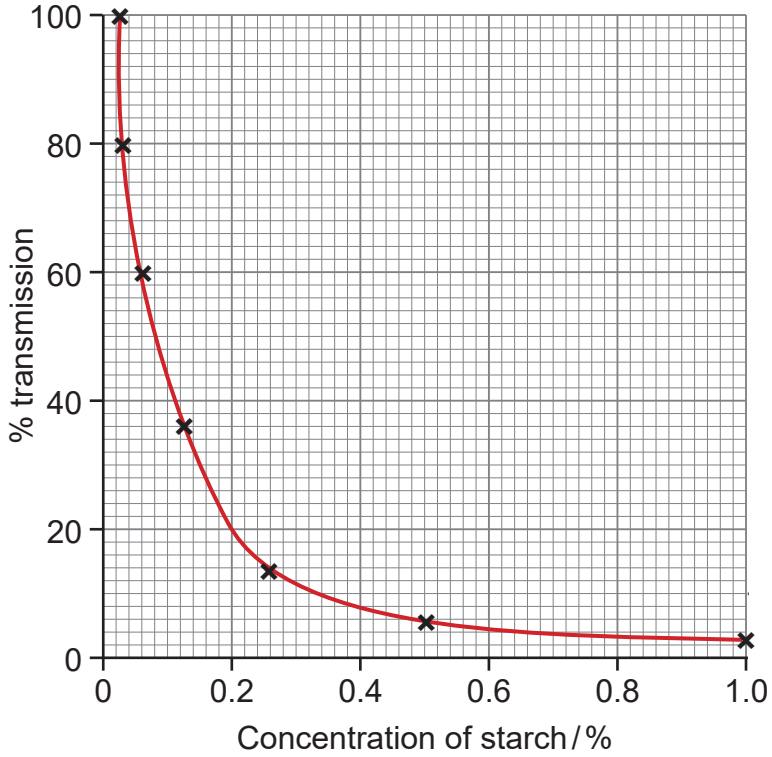
_____

_____

_____ [3]

(ii) Use the table opposite and the calibration graph below to determine the concentration of starch at 40 minutes.

_____% [1]



(iii) Suggest how the concentration of starch after 40 minutes would have differed if a diluted preparation of the enzyme extract had been used.

Explain your answer.

_____

_____

_____

_____

_____ [2]

Sources: .

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Q5b and Q6c(ii)....."© CCEA AS/A2 Unit 3: Biology Student Guide: Practical Skills in Biology by John Campton (2018) ISBN: 9781510419155. Published by Hodder and Stoughton Educational Limited
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THIS IS THE END OF THE QUESTION PAPER

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Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

Examiner Number

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