



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
January 2013

Centre Number

71

Candidate Number

Biology

Assessment Unit AS 1

assessing

Molecules and Cells

[AB111]



WEDNESDAY 9 JANUARY, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

There is an extra lined page at the end of the paper if required.

Answer **all eight** questions.

You are provided with **Photograph 1.4** for use with Question 4 in this paper.

Do not write your answers on this photograph.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Section A carries 60 marks. Section B carries 15 marks.

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.

You should spend approximately **20 minutes** on Section B.

You are expected to answer Section B in continuous prose.

Quality of written communication will be assessed in **Section B**, and awarded a maximum of 2 marks.

For Examiner's
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total
Marks

- Protein synthesis

- Formation of secretory vesicles

- Destruction of worn out organelles

- Direct movement of substances between adjacent plant cells

- Formation of ribosomes

[5]

Examiner Only	
Marks	Remark

1. _____

2. _____

1. _____

[4]

- Starch _____

Glucose _____ [1]

Examiner Only	
Marks	Remark



[1]

(ii) Identify the specific stage in the cell cycle when DNA replicates to form the two chromatids.

[1]

(b) (i) The diagram below shows a cell at a stage of mitosis.

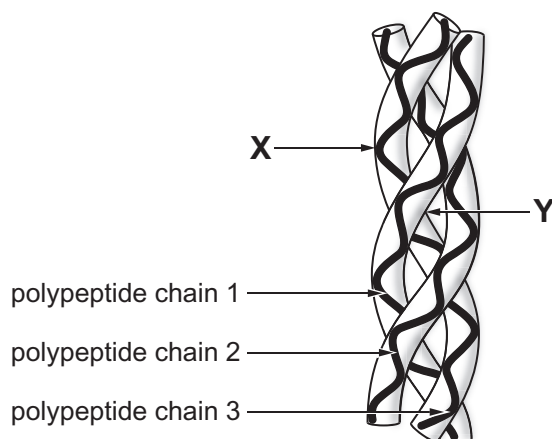


[1]

4

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(Questions continue overleaf)

The diagram below represents the structure of collagen.



-

[2]

-
-
- [1]

Examiner Only	
Marks	Remark

- Two test tubes, one containing 10 cm³ of milk suspension and one containing 10 cm³ of protease enzyme solution were placed in a water bath at 20°C.
- After 10 minutes, the contents were mixed and the time taken for the mixture to clear was recorded.
- The experiment was repeated at a series of temperatures up to 80°C. The rate of reaction (min⁻¹) was then calculated.
- The results are shown in the table below.

Temperature/°C	Rate of reaction/min ⁻¹
20	0.95
30	2.00
40	4.00
50	7.50
60	8.00
70	6.00
80	1.00

- (a)** Using the most appropriate graphical technique, plot the above data.
(Use the graph paper opposite.) [4]

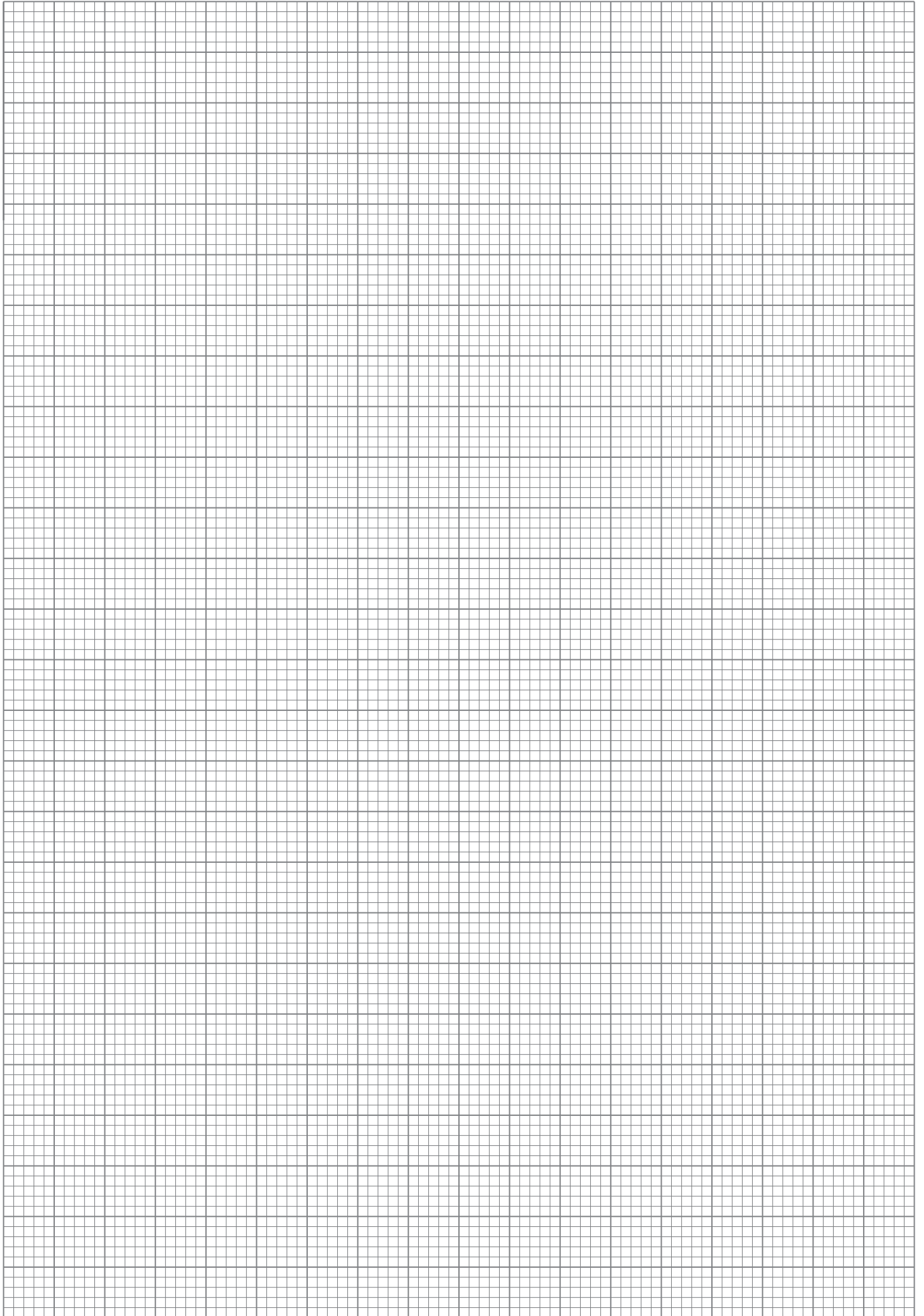
- (b) (i)** Using the graph, estimate the optimum temperature for this enzyme.

 [1]

- (ii) Describe how the experiment could be extended to obtain a more precise value for the optimum temperature.

[1]

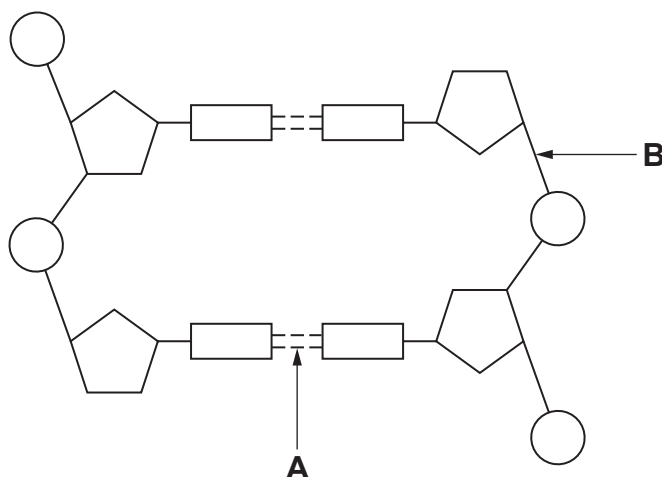
Examiner Only	
Marks	Remark



[2]

12

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- A**

B _____

[2]

-
-
-
-
- [2]

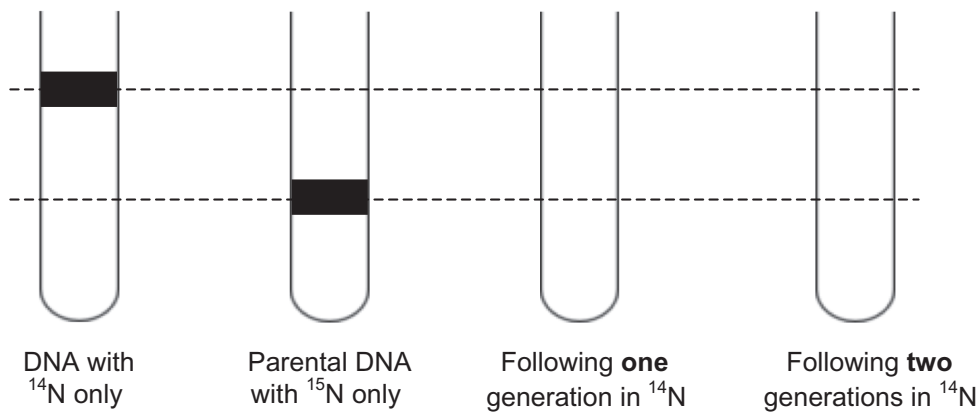
- (i) Which part of the DNA molecule would be expected to incorporate the nitrogen?

[1]

Examiner Only	
Marks	Remark

As shown in the diagram below, the parental DNA was 'heavy' (with ^{15}N only). The position of the 'light' DNA (with ^{14}N only) is shown for comparison.

- (ii) Complete the diagram to show the position(s) which the bacterial DNA would occupy after successive generations in nutrient medium containing 'light' nitrogen (^{14}N).



[2]

- (iii) Explain the result obtained following **one** generation in ^{14}N .

_____ [1]

- (d) DNA replication takes place naturally prior to cell division. An artificial technique for replicating DNA has also been developed by scientists.

- (i) Name this technique.

_____ [1]

- (ii) Describe an important property of the DNA polymerase enzyme involved in this technique which distinguishes it from most other DNA polymerases.

_____ [1]

- (iii) The technique amplifies small samples of DNA. Give **two** examples of how this technique can be used.

1. _____

2. _____ [2]

8 Viruses such as bacteriophages infect bacterial cells like *Escherichia coli*, while human immunodeficiency virus (HIV) infects a particular type of animal cell.

- (a) Describe the similarities and differences in the structure of a bacteriophage virus and the human immunodeficiency virus (HIV). [5]
- (b) Describe the similarities and differences in the structure of a bacterial cell and an animal cell. [8]

Quality of written communication [2]

- (a)** Describe the similarities and differences in the structure of a bacteriophage virus and the human immunodeficiency virus (HIV).

[illegible]

Examiner Only	
Marks	Remark

[illegible]

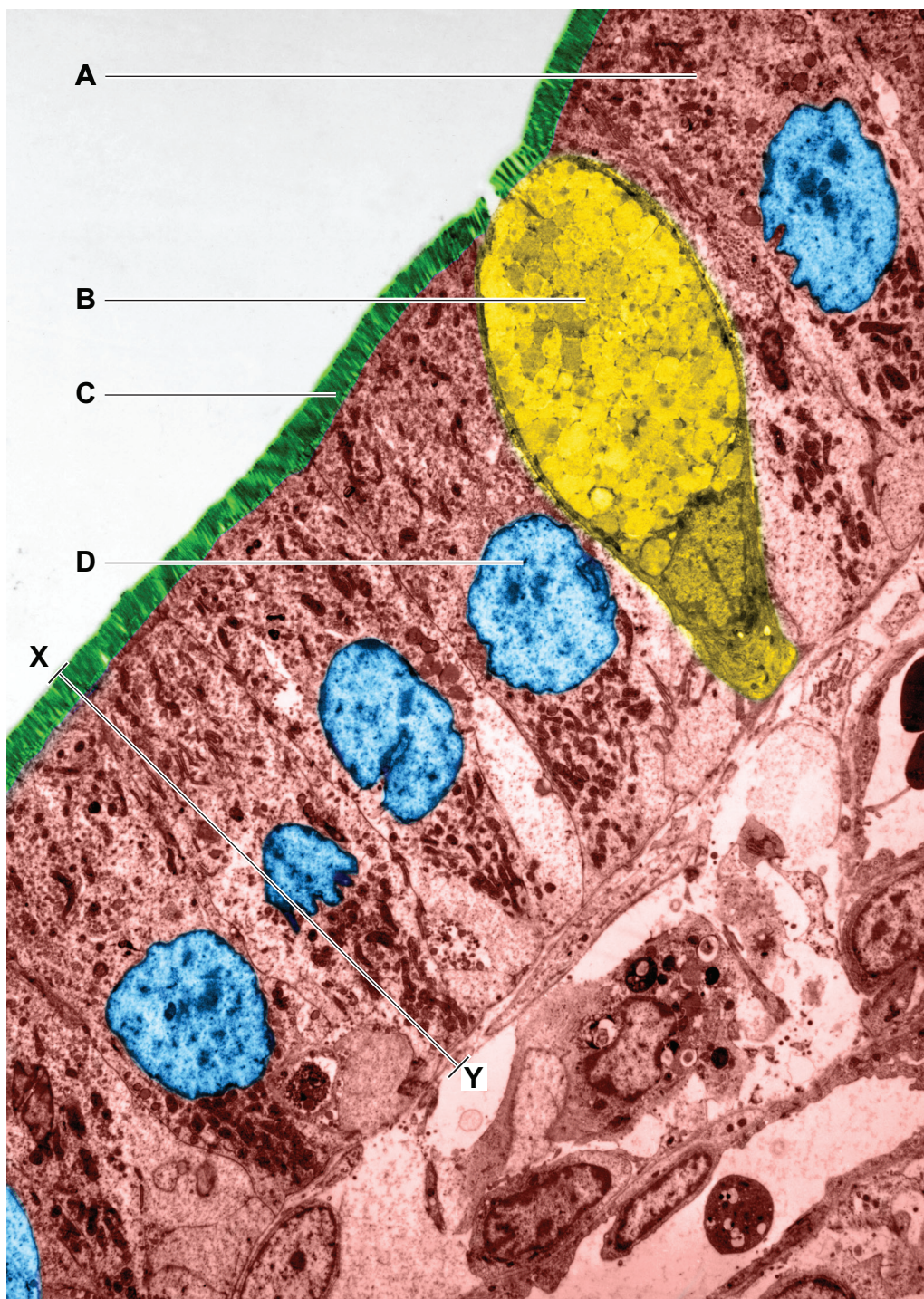
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Marks	Remark

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GCE Biology Advanced Subsidiary (AS)
Assessment Unit AS 1: Molecules and Cells
January 2013

Photograph 1.4
(For use with Question 4)



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