Pearson Edexcel International Advanced Level

Wednesday 29 October 2025

Afternoon (Time: 1 hour 20 minutes) | Paper reference **WBI16/01A**

Biology

International Advanced Level

UNIT 6: Practical Skills in Biology II

Question Paper

You must have: Answer Book (sent separately)
Scientific calculator, ruler, HB pencil
Do not return this question paper with the answer book.

Turn over ▶

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Pearson

Answer ALL questions in the Answer Booklet.

1 There are nearly 2000 species of blowfly. They have a worldwide distribution.

Some blowfly species lay their eggs on the bodies of dead turkeys.

The eggs hatch into maggots that feed on this organic matter.

The maggots grow quickly and form pupae. A blowfly emerges from each pupa.

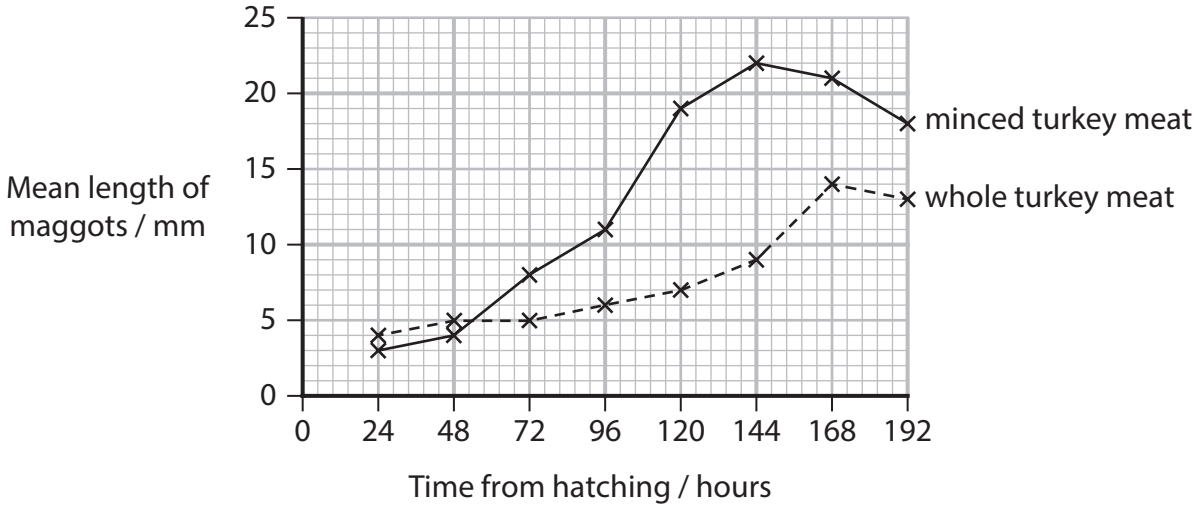
The photograph shows blowfly maggots.

(Source: © Dorling Kindersley ltd / Alamy Stock Photo)

Magnification $\times 1$

A student investigated the effect of growing these maggots on whole turkey meat and minced turkey meat for 8 days (192 hours).

The graph shows the results of this investigation.



(a) (i) The length of a maggot reduces when it stops feeding and forms a pupa.

State the time when the maggots, that feed on **whole** turkey meat, begin to develop into pupae.

(1)

(ii) Calculate the fastest growth rate of blowfly maggots in **minced** turkey meat.

Give your answer with appropriate units.

(2)

(b) Some variables were measured in this investigation.

(i) State **two abiotic** variables that could affect this investigation.

(2)

(ii) Choose **one** of the variables you have identified in (b)(i).

State how this variable can be controlled.

(1)

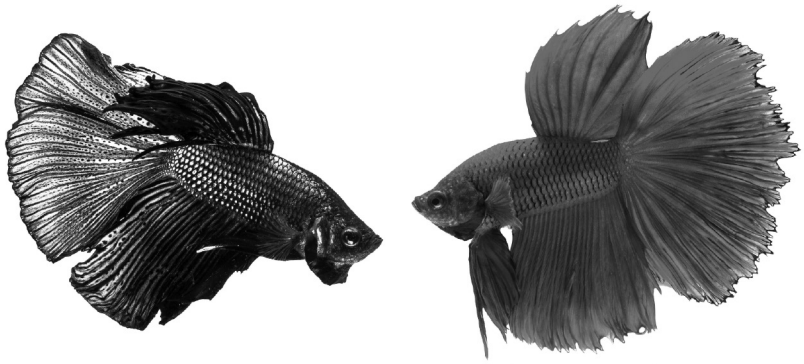
(c) Describe a method the student could use to collect the data shown in the graph.

(3)

(Total for Question 1 = 9 marks)

2 Siamese fighting fish live in rice paddy fields in Southeast Asia.

The photograph shows two male Siamese fighting fish.



(Source: © Suwat Sirivutcharungchit / Alamy Stock Photo)

Magnification $\times 1$

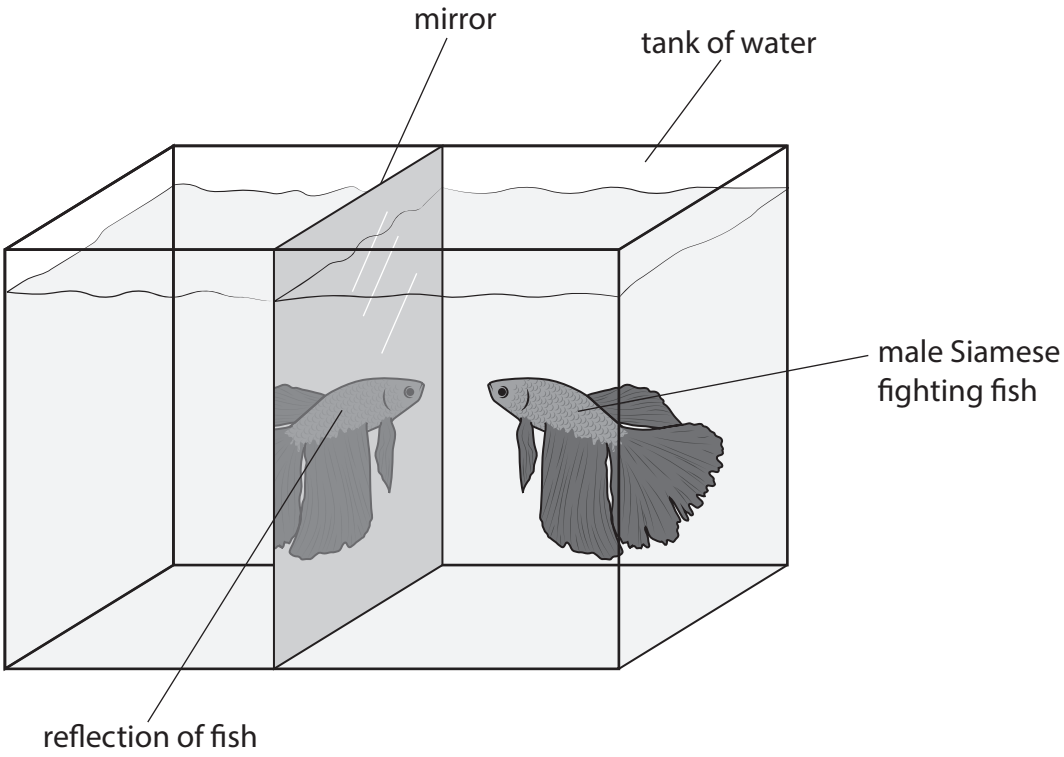
A male fish defends its territory when another male approaches.

The male fish spreads its fins as a threat behaviour, to scare away the other male fish.

A male fish will also display this threat behaviour when it sees its own image reflected in a mirror.

This threat behaviour was used to investigate habituation in these male fish.

The diagram shows the apparatus used in this investigation.



(a) Suggest why a reflection of the male fish was used instead of another male.

(1)

(b) Describe an experiment to investigate habituation of the male fish to its reflection in the mirror.

(6)

(c) Explain the advantage of the habituation of these male fish to the image of their reflection.

(3)

(Total for Question 2 = 10 marks)

3 The photograph shows some cows on grassland in central Asia.

(Source: © imageBROKER.com / Alamy Stock Photo)

A scientist investigated the effect of grazing on the plant biomass in three fields.

Three fields each 150 m × 300 m were used:

- Field A had 2 cows
- Field B had 4 cows
- Field C had no cows.

After 120 days, all the parts of the plants above the ground were collected from five 1 m^2 areas in each field.

The results of this investigation:

• Field A biomass / g m^{-2}	212	198	160	153	148
• Field B biomass / g m^{-2}	151	158	125	118	128
• Field C biomass / g m^{-2}	145	211	200	192	203

(a) State a suitable null hypothesis for this investigation.

(1)

(b) Draw a suitable table to display these **data** and your calculated **means**.

(3)

(c) Draw a suitable graph to show the mean biomass and the number of cows.

Include an indication of the variability of the data.

(3)

(d) (i) The scientist decided to analyse the data for field A and field B with a *t*-test using the formula

$$t = \frac{(\bar{x}_A - \bar{x}_B)}{\sqrt{\frac{(S_A)^2}{n_A} + \frac{(S_B)^2}{n_B}}}$$

where:

$\bar{x}$ is the mean value for each treatment

n is the number of samples for each treatment

$(S_A)^2 = 833.2$ and $(S_B)^2 = 304.5$

Calculate the value of *t*.

(2)

(ii) The table shows the critical values of *t* for different degrees of freedom.

The number of degrees of freedom = $(n_1 - 1) + (n_2 - 1)$.

degrees of freedom	p = 0.05	p = 0.01
6	2.45	3.70
7	2.37	3.50
8	2.31	3.36
9	2.26	3.25
10	2.23	3.17
11	2.20	3.11
12	2.18	3.06

Comment on the conclusion that can be drawn from this investigation.

Use the information in your graph and this table to support your answer.

(2)

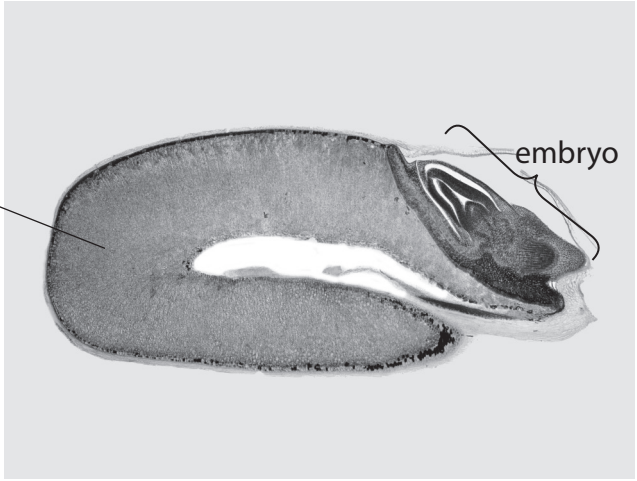
(e) Describe how the scientist could extend this investigation to collect more data to either support or reject the null hypothesis.

(2)

(Total for Question 3 = 13 marks)

4 There are many varieties of wheat grown worldwide.

The photograph shows a section through a wheat grain.



(Source: DR KEITH WHEELER / SCIENCE PHOTO LIBRARY)

Magnification $\times 5$

The endosperm is a store of starch.

During germination, the embryo stimulates the release of amylase from the cells surrounding the endosperm.

The starch is digested by the amylase to produce maltose. This allows the embryo to grow.

(a) Describe the structure of maltose.

(2)

(b) A student formed the following hypothesis:

Two varieties of wheat digest starch at different rates.

Plan an investigation to find evidence to support or reject this hypothesis.

(i) Describe preliminary practical work that you might undertake to ensure your proposed method would provide quantitative results.

(2)

(ii) Devise a detailed method, including how you would control and monitor important variables to provide quantitative results.

(9)

(iii) Describe how your results should be recorded, presented and analysed in order to draw conclusions from your investigation.

(3)

(iv) Suggest **two** limitations of your proposed method.

(2)

(Total for Question 4 = 18 marks)

TOTAL FOR PAPER = 50 MARKS

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

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You must have:
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Scientific calculator, ruler, HB pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Show all your working in calculations and include units where appropriate.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Answer ALL questions.

1

(a) (i)

(1)

.....

(ii)

(2)

Answer .....

(b)

(i)

(2)

First variable.....

Second variable.....

(ii)

(1)

Variable .....

Method of control

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(3)

(Total for Question 2 = 10 marks)

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(a)

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(b)

(3)

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(c)

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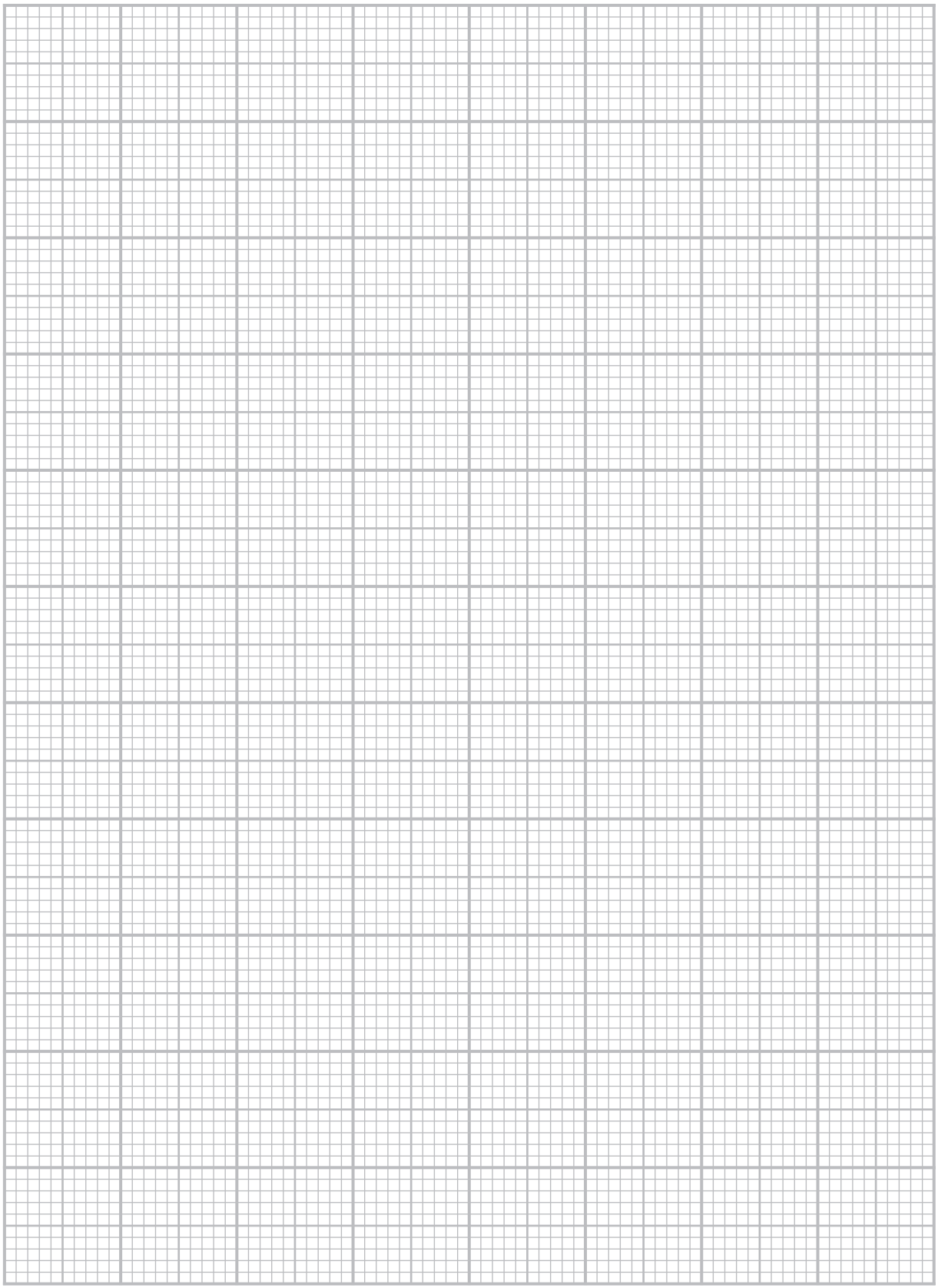

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(d) (i)

(2)

Answer .....

(ii)

(2)

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(e)

(2)

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(Total for Question 3 = 13 marks)

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(a)

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(i)

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(iv)

(2)

(Total for Question 4 = 18 marks)

TOTAL FOR PAPER = 50 MARKS

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