Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

Friday 12 June 2026

Morning (Time: 1 hour 20 minutes)

Paper reference **WBI16/01**

Biology

International Advanced Level
UNIT 6: Practical Skills in Biology II

You must have:
Scientific calculator, ruler, HB pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **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

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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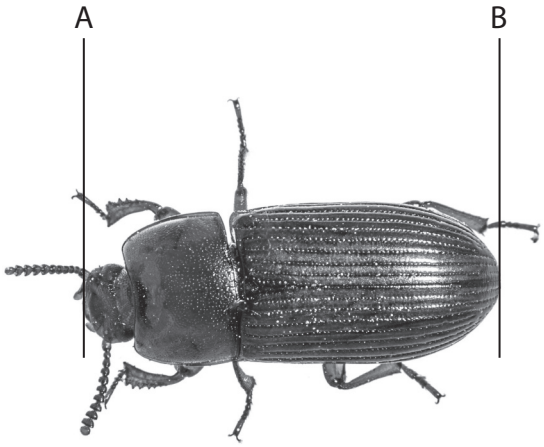
Answer ALL questions.

1 Red flour beetles originated from Indonesia and Australia.

Flour beetles feed on stored cereal grains that are used to make bread.

These beetles are now found in all parts of the world.

The photograph shows a red flour beetle.



(Source: © imageBROKER.com/Alamy)

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(a) Calculate the actual length of this beetle in millimetres, between points A and B.

(1)

Answer ..... mm

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(b) Flour beetles can complete their life cycle from egg to adult in 20 days at 40° C.

Describe an investigation to find the optimum temperature that produces the **largest number** of adult flour beetles after the eggs are laid.

(6)

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(c) Insecticides prevent flour beetles contaminating stored cereal grains.

Some populations of flour beetles are now resistant to insecticides.

Explain how a flour beetle population can become resistant to an insecticide.

(3)

(Total for Question 1 = 10 marks)

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2 The photograph shows part of a forest in Central Africa that has been cleared for farming.

(Source: © AfriPics.com/Alamy)

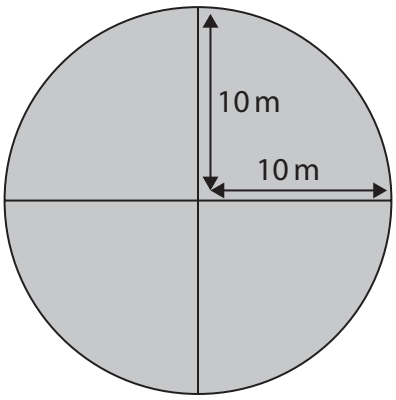
Crops are grown in the cleared area. After a few years, this area is abandoned.

This area can then be left for up to 20 years for the forest to regrow before it is cleared again for farming.

A scientist studied the biodiversity in areas that had been left to regrow for different lengths of time.

The biodiversity in each area was determined using circular quadrats.

The diagram shows a circular quadrat with a radius of 10 metres.



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(a) Identify **one** risk that the scientist might encounter when working in this area of regrown forest and describe how this risk could be reduced.

(2)

risk

reduction of risk

(b) (i) Describe **one** method that could be used to ensure that the quadrat locations are selected at random.

(2)

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(ii) The scientist selected an area that had been allowed to regrow for three years.

Five species of plant were identified in this area.

The number of individuals of each of these species was recorded.

The table shows the results.

Species	Number of individual plants (n)	n(n – 1)
P	12	132
Q	18	306
R	1	0
S	4	12
T	6	30

The scientist calculated an index of diversity (D) using the formula:

$$D = \frac{N(N-1)}{\sum n(n-1)}$$

Where:

N = the total number of individuals in this area

n = the number of individuals of one species

Calculate the index of diversity for this area to two decimal places.

(2)

D = ...

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(iii) This investigation was repeated in this area after the forest had regrown for 10 years and 20 years.

This investigation also studied forest that has not been cleared for farming.

The table shows the results.

Index of diversity (D)		
Forest allowed to regrow for 10 years	Forest allowed to regrow for 20 years	Forest that has not been cleared for farming
3.58	5.15	5.15

The changes in the index of diversity showed that growing crops on cleared forest land can be a sustainable activity.

Describe how these results support this conclusion.

(2)

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(c) Some variables in this investigation cannot be controlled but they were measured.

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

(1)

first variable

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second variable

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(ii) Give **one** reason why variables that cannot be controlled are measured.

(1)

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(Total for Question 2 = 10 marks)

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3 Training programmes are used to improve performance in many sports.

The resting oxygen consumption of volunteers who had trained for 14 days (group A) was compared with that of volunteers who had not trained (group B).

The results:

Group A

resting oxygen consumption dm^3 per minute

0.24 0.25 0.21 0.18 0.18

Group B

resting oxygen consumption dm^3 per minute

0.22 0.20 0.19 0.22 0.18

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

(1)

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

(3)

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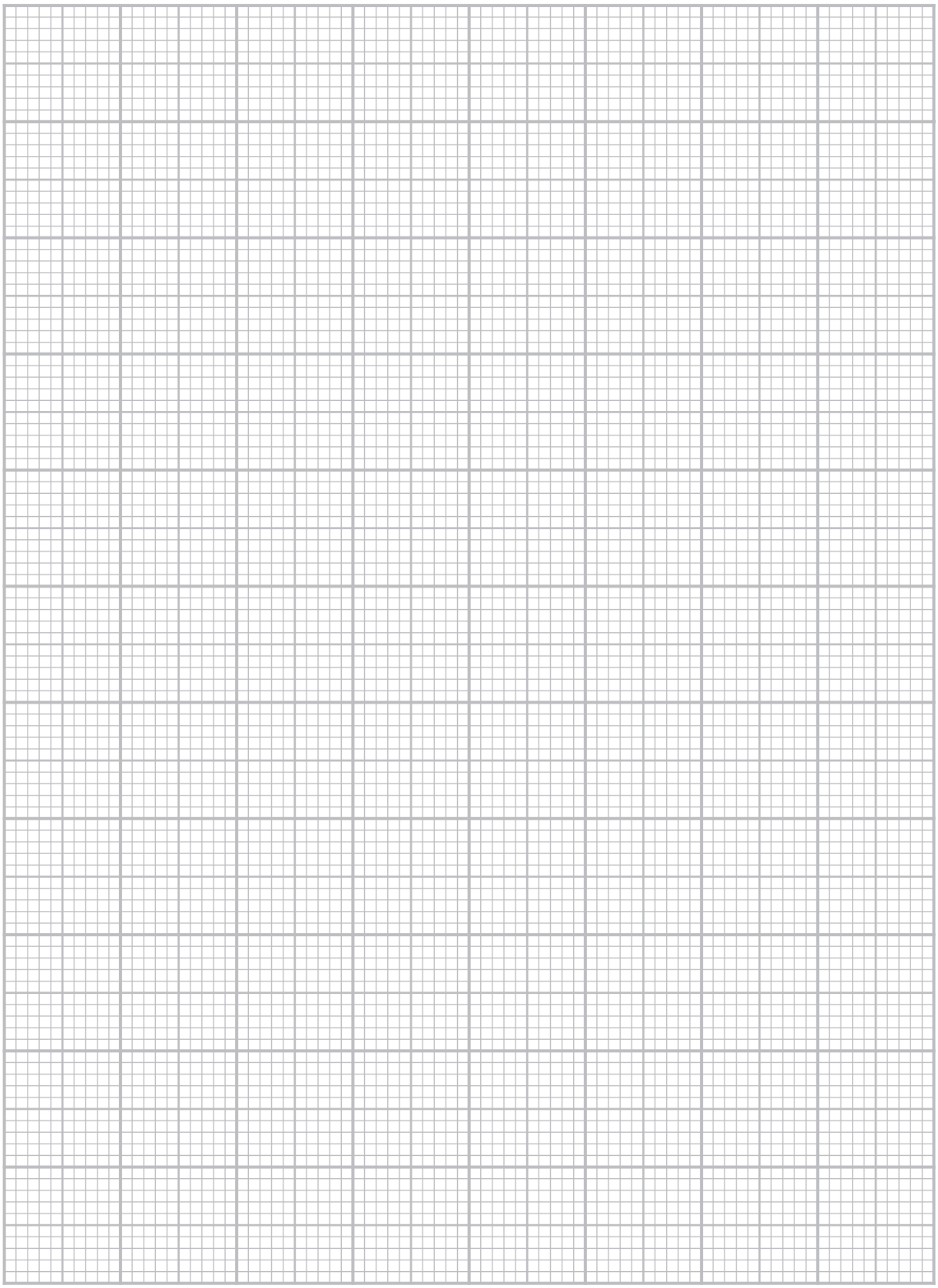
(c) Draw a suitable graph to show the mean oxygen consumption for trained and untrained volunteers.

Include an indication of the variability of the data.

(3)



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(d) A student analysed the data using a Student's *t*-test, with the formula:

$$t = \frac{(x_1 - x_2)}{\sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}}$$

Where:

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

n is the number of samples for each site

$(S_A)^2 = 0.00107$ and $(S_B)^2 = 0.00032$

(i) Calculate the value of *t*.

(2)

Answer .....

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

The number of degrees of freedom = $(n_A - 1) + (n_B - 1)$

degrees of freedom	p = 0.05	p = 0.01
5	2.02	3.65
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

Describe the conclusion that can be drawn from the results of this investigation.

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

(3)

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(e) During prolonged exercise, muscle tissue respires anaerobically producing lactate.

Describe what happens to lactate after a period of anaerobic respiration in animals.

(2)

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(Total for Question 3 = 14 marks)

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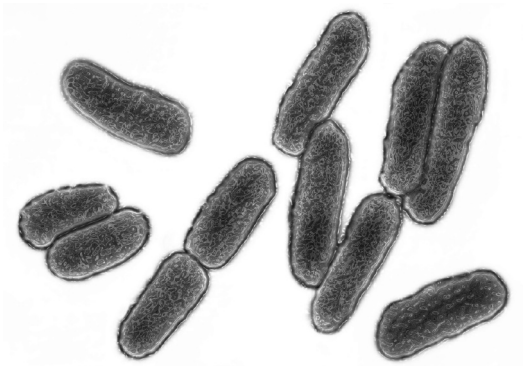
4 The photograph shows *E. coli* bacteria as seen using an electron microscope.



(Source: © JAMES CAVALLINI / SCIENCE PHOTO LIBRARY)

magnification × 10 000

These bacteria can multiply rapidly in optimum conditions.

Some strains of *E. coli* can be a serious risk to human health.

Ampicillin and erythromycin are two types of antibiotic used to treat bacterial infections.

(a) State the difference between a bactericidal antibiotic and a bacteriostatic antibiotic.

(1)

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(b) A student formed the following hypothesis:

Ampicillin can decrease the growth of
E. coli bacteria faster than erythromycin.

Plan an investigation to produce quantitative evidence to support or reject this hypothesis.

Your answer should give details under the following headings.

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

(9)

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

(3)

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(iii) Explain **two** limitations of your proposed method.

(3)

(Total for Question 4 = 16 marks)

TOTAL FOR PAPER = 50 MARKS

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