

Pearson Edexcel

# Mark Scheme (Results)

## Summer 2025

Pearson Edexcel International Advanced Level In Biology (WBI16)
Paper 01 Practical Skills in Biology II

**Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

**Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2025
Question paper log number P78741A
Publications Code WBI16_01_2506_MS
All the material in this publication is copyright
© Pearson Education Ltd 2025

**General Marking Guidance**

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**Using the Mark Scheme**

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer. ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

**Quality of Written Communication**
Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear · select and use a form and style of writing appropriate to purpose and to complex subject matter · organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **1(a)** | TTC/methylene blue /DCPIP (1) | | **(1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **1(b)** | A description that includes six of the following points:<br>• **dependent variable** identified is time for indicator to change colour (1)<br>• use 5 temperatures in the range 0ºC to 60ºC /five stated temperatures in the range (1)<br>• allow to equilibrate to (stated) temperature(s) (1)<br>• use of same strain/species/variety/age/mass of yeast/ volume of culture (1)<br>• add glucose/sucrose/sugar/respiratory substate (1)<br>• same volume/mass of indicator (1)<br>• Use a **{**stopwatch/timer**}** to measure the time for colour change (1) | Ignore any stated colour change<br>Ignore concentration<br>Ignore nutrients<br>Ignore amount/number of drops<br>accept start the stopwatch and stop it when the colour has changed | **(6)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **1(c)** | A description that includes three of the following points:<br>• (the co-enzyme is) NAD (1)<br>• Electrons are transferred to co enzyme (1)<br>• (Inorganic) phosphate added to ADP to form ATP (1)<br>• by substrate level phosphorylation (1) | **Not Co-enzyme A / FAD**<br>Accept $NAD^+ + H^+ + 2e^- \rightarrow NADH$<br>accept ADP +Pi ---> ATP<br>not oxidative phosphorylation | **3** |

**(Total for question 1 = 10 marks)**

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **2(a)** | Magnification in the range 0.37 to 0.5 (1) | | **(1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **2(b)(i)** | • creation of a grid (of the area) (1)<br><br>• select sample **{locations/ co-ordinates/points}** using **random** number generator (1) | Ignore select 5 sample sites at random<br><br>accept any valid method of selecting at random sample e.g. numbers out of a bag | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **2bii** | • a correct calculation (1)<br><br>• 2.2/ 2.20 / 2.202 / 2.2017 (1) | only accept 10.24/19.39/4.8/4.85/4.8475 (in table or in working)<br><br>correct answer with no working gains two marks | **(2)** |

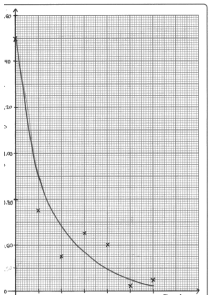
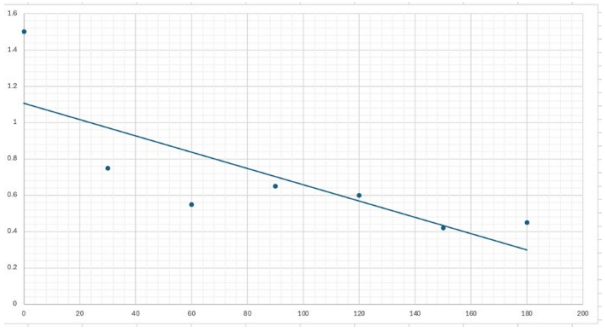
| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **2(b)(iii)** | • comparing the means to show the difference in populations (1)<br><br>• Use SD's (and means) to show if the difference (between means) is significant {by t test or inspecting for overlap} | Ignore comment on anomalies/validity/reliability/accuracy/precision<br><br>Accept error bars for SD's | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **2(c)(i)** | Any two of the following:<br>• pH (of water/soil)<br>• water/soil moisture<br>• soil minerals<br>• light intensity<br>• time of year/season | Mark the first answer per line<br>Accept PH/ph<br>Ignore nutrients/humidity<br>accept organic matter/humus | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **2(c)(ii)** | • description of an appropriate method to control the selection of sample **sites with similar values** (1) | not pH and buffer<br><br>allow appropriate temperature method | **(1)** |

**(Total for question 2 = 10 marks)**

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **3(a)** | • there is no **correlation** between the percentage oil remaining and the (length of) time (the tray was stored) (1) | Accept the correlation coefficient for the percentage oil remaining and storage time will be 0<br><br>Candidates will express this in different ways | **(1)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **3(b)** | • line graph with linear scale and axes labelled, with units (1)<br><br>• data plotted correctly (1)<br><br>• suitable line of best fit (1) | X axis (number of) days Y axis mean percentage of oil left (%)<br><br>Accept a curve or straight line similar to the examples below (ignore extrapolation)<br><br><br><br><br><br><br>top range 1.05 to 1.15 bottom range 0.25 to 0.35 | **(3)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **3(c)(i)** | • correct calculation of $d^2$ values (1)<br><br>• **-**0.857 (1) | e.g. 36 16 0 1 1 25 25 or total 104 (in table or working)<br><br>accept -0.86/-0.9 must have - sign | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **3(c)(ii)** | An answer that includes two of the following points:<br><br>• the calculated value of r (0.857) is more than the critical value **0.786** (1)<br><br>• therefore, reject the null hypothesis, so there is a correlation between the percentage oil left and the time (1) | lgnore – sign on any calculated value<br>reject other critical values<br><br>Accept any calculated value less than 0.786 so accept the null hypothesis therefore no correlation | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **3(d)** | An answer that includes six of the following points:<br><br>• serially dilute culture / dilute several times (1)<br>• to reduce the number of bacteria in the samples/because too many bacteria to count individual colonies (1)<br><br>• make a bacterial lawn on agar (1)<br>• to separate individual bacteria (1)<br><br>• keep for {fixed time/ temperature} (1)<br>• to able to {see/count} **colonies** (1)<br><br>• use aseptic technique (1)<br>• to avoid contamination/competition/errors in counting (1) | Accept a description<br>Ignore streaking/swab/inoculate<br><br>Accept spread known volume of bacteria<br><br>20- 35ºC /time 1-4 days<br><br>accept a technique described<br>Ignore infection | **(6)** |

**(Total for question 3 = 14 marks)**

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **4(a)** | A description that includes two of the following points:<br><br>• ethical concern needs to get (informed) consent of volunteer (1)<br><br>• safety prevent infection of mouthpiece (1) | Accept students cannot be forced to participate<br><br>Accept check students do not have health problem/are able to do the exercise<br><br>Accept change the carbon dioxide absorber regularly | **(2)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **4(b)** | An answer that includes nine of the following points:<br>• one group with and one without a fitness programme (1)<br>• clear statement of the **dependent** variable e.g. the time for the trace to return to the resting rate/ tidal volume (1)<br>• detail of method/use of apparatus (1)<br>• use of soda lime (in canister) (1)<br>• {sterilize/replace} mouthpiece for each student (1)<br>• find the resting breathing rate/tidal volume/ (1)<br>• use of standardised/same exercise (1)<br>• measure the time to return to the resting rate/normal breathing rate/recovery time (1)<br>• **two** variables that need to be controlled (1)<br>• and **method** of control of **one** variable (1)<br>• repeats to give mean values **AND** SD's (1) | Ignore amount<br>Accept groups with different fitness programmes and no programme<br>accept resting tidal volume or resting breathing rate<br>not recovery time<br>e.g. use of nose clip/calibrating/reading the trace/get volunteers used to the apparatus/change soda lime<br>ignore volume/mass of soda lime<br>e.g. exercise for one minute<br>accept resting tidal volume or resting breathing rate<br>accept description of finding resting rate<br>accept BM1/sex/height/mass/age/room temperature/humidity/smokers/non smokers<br>e.g. temperature and AC<br>accept mean to do t test/to measure variability of data | **(9)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **4(c)** | An answer that includes the following points:<br>• table for raw data with headings and unit for time, with means calculated from repeats (1)<br>**AND**<br>• bar graph format with labelled axes (1)<br><br>• use of a t test(for difference) (with a bar graph showing only two different fitness levels)<br><br>**OR**<br>• {line / scatter} graph format with labelled axes (1)<br><br>use of a correlation test (with a line graph showing more than two different fitness levels) | **Do not** accept a calculated rate/recovery rate heading in table (not raw data)<br>But allow breathing rate<br>accept description of mean calculated in text or mean on one graph label<br><br>accept inspect SD's/ **for overlap**<br>ignore error bars<br><br>Accept any named correlation test | **(3)** |

| Question Number | Answer | Additional Guidance | Mark |
|---|---|---|---|
| **4(d)** | An answer that includes two of the following points:<br><br>• difficult to control all other aspects of volunteers' life before the experiment (1)<br><br>• a stated difficulty with the apparatus (1) | e.g. genetic difference/ stress/ diet/respiratory disease/problem/previous level of fitness/health<br><br>e.g. leaking air/soda lime stops working/difficult to read the trace/abnormal breathing with spirometer<br>ignore temperature of the lab | **(2)** |

**(Total for question 4 = 16 marks)**

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom