



# Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE  
In Biology (1BI0)  
Paper 1H

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## **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.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

| Assessment Objective |           | Command Word                                                                                                                    |                                                                                                                                         |
|----------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Strand               | Element   | Describe                                                                                                                        | Explain                                                                                                                                 |
| AO1*                 |           | An answer that combines the marking points to provide a logical description                                                     | An explanation that links identification of a point with reasoning/justification(s) as required                                         |
| AO2                  |           | An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding | An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding) |
| AO3                  | 1a and 1b | An answer that combines points of interpretation/evaluation to provide a logical description                                    |                                                                                                                                         |
| AO3                  | 2a and 2b |                                                                                                                                 | An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning                            |
| AO3                  | 3a        | An answer that combines the marking points to provide a logical description of the plan/method/experiment                       |                                                                                                                                         |
| AO3                  | 3b        |                                                                                                                                 | An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning             |

\*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

**Biology 1BIO\_1H**

| <b>Question number</b> | <b>Answer</b>                                                                                                                                                             | <b>Mark</b>                           |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>1(a)(i)</b>         | <p>B 120 cm</p> <p><b>The only correct answer is B</b></p> <p>A, C and D are not correct because they are not on the 10<sup>th</sup> percentile for an 8-year-old boy</p> | <p><b>(1)</b></p> <p><b>AO2 2</b></p> |

| <b>Question number</b> | <b>Answer</b>                                                                                                                                                                     | <b>Additional guidance</b>                                                                                         | <b>Mark</b>                                             |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>1(a)(ii)</b>        | <p>An answer linking:</p> <ul style="list-style-type: none"><li>• he is growing as expected (1)</li><li>• because the boy is still on the 5<sup>th</sup> percentile (1)</li></ul> | <p>accept healthy growth</p> <p>accept he is on the 5<sup>th</sup> percentile (at age 6) / the same percentile</p> | <p><b>(2)</b></p> <p><b>AO3</b></p> <p><b>2a+2b</b></p> |

| Question number | Answer                                                                                                                                                                                                                                                                     | Additional guidance                   | Mark                                  |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------------|
| <b>1(b)(i)</b>  | <p>An answer including:</p> <ul style="list-style-type: none"> <li>• add ethanol and water (1)</li> <li>• a white emulsion is present (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• rub food on paper (1)</li> <li>• leaves grease spot (1)</li> </ul> | accept cloudy<br>accept emulsion test | <p><b>(2)</b></p> <p><b>AO1 2</b></p> |

| Question number | Answer                                                                                                                                                 | Mark                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>1(b)(ii)</b> | <p>B fatty acids</p> <p><b>The only correct answer is B</b></p> <p>A, C and D are not correct because they are not produced when fats are digested</p> | <p><b>(1)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                       | Additional Guidance         | Mark         |
|-----------------|------------------------------|-----------------------------|--------------|
| <b>1 (c)</b>    | the energy (content of food) | accept calories / joules    | <b>(1)</b>   |
|                 |                              | ignore temperature (change) | <b>AO1 1</b> |

**Total for question 1 = 7 marks**

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                            | Additional guidance                                                                                                         | Mark                                  |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>2 (a)</b>    | <p>Any two from:</p> <ul style="list-style-type: none"> <li>• take antibiotics (1)</li> <li>• vaccination / immunisation (1)</li> <li>• covering mouth when sneezing or coughing / wear a (face) mask (1)</li> <li>• isolation of (infected individuals) / avoid contact with infected people (1)</li> <li>• washing hands / disinfecting surfaces (1)</li> </ul> | <p>ignore take medicine / drugs</p> <p>ignore PPE</p> <p>accept avoid mixing in groups / more ventilation / air filters</p> | <p><b>(2)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                                                                                      | Additional guidance                                                                               | Mark                                  |
|-----------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>2(b)(i)</b>  | <p>(because) it cannot be passed from person to person / it is not caused by a pathogen</p> | <p>ignore it cannot be spread unqualified</p> <p>accept it is caused by consuming alcohol (1)</p> | <p><b>(1)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                                             | Additional guidance                                                                                               | Mark                           |
|-----------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>2(b)(ii)</b> | calculation<br>$(80 \div 90) = 0.8888$ (1)<br>0.89 | award full marks for the correct answer with no working<br><br>accept 0.88 / 0.8 / 0.9 / 0.90 / 1.13 for one mark | <b>(2)</b><br><br><b>AO2 1</b> |

| Question number  | Answer                                                                                                                                                                          | Additional guidance                                                                | Mark                              |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------|
| <b>2(b)(iii)</b> | An explanation linking: <ul style="list-style-type: none"> <li>the risk to health is low (1)</li> <li>(because excess mass) is not around the {waist / vital organs}</li> </ul> | ignore no risk<br><br>accept because the {WHR / 0.75} is <b>less</b> than 0.80 (1) | <b>(2)</b><br><br><b>A03 2a2b</b> |

| Question number | Answer                                                                                                                                                                                                                           | Additional guidance                                                                                                         | Mark                           |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>2(c)</b>     | An answer including two from: <ul style="list-style-type: none"> <li>two (cells produced) (1)</li> <li>diploid / two sets of <b>chromosomes</b> (1)</li> <li><b>genetically</b> identical (1)</li> <li>body cells (1)</li> </ul> | ignore they double / duplicate<br><br>accept a full set of <b>chromosomes</b><br>reject haploid<br><br>accept somatic cells | <b>(2)</b><br><br><b>AO1 1</b> |

**Total for Question 2 = 9 marks**

| Question number | Answer                                                                                                                                                                                                                                                                                                                            | Additional guidance                                                                                                                                                                                                                                                                                           | Mark                                  |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>3(a)</b>     | <p>An explanation including three from:</p> <p>(the mass) will increase (1)</p> <p>because <b>water</b> will move <b>into</b> the potato (cells) (1)</p> <p>water moves across a {partially / semi} permeable membrane (1)</p> <p>by <u>osmosis</u> (1)</p> <p>from a high water concentration to low water concentration (1)</p> | <p>accept weight for mass</p> <p>accept potato absorbs <b>water</b></p> <p>accept references to down a water concentration gradient / water potential / low to high {<b>solute</b> / <b>named solute</b>} concentrations</p> <p>maximum two marks if mass change or direction of water movement incorrect</p> | <p><b>(3)</b></p> <p><b>AO2 1</b></p> |

| Question number | Answer                                                                       | Additional guidance                                                                                 | Mark                                  |
|-----------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>3(b)(i)</b>  | <p><math>3 \times 3 \times 3 / 3^3</math> (1)</p> <p>27 (cm<sup>3</sup>)</p> | <p>award full marks for the correct answer with no working</p> <p>accept <math>54 \div 2</math></p> | <p><b>(2)</b></p> <p><b>AO2 1</b></p> |

| Question number | Answer                                                                                                                                                                                                                                                                                                   | Additional guidance                                                                                                       | Mark                                                   |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| 3(b)(ii)        | <p>An explanation linking two from:</p> <ul style="list-style-type: none"> <li>• cube A takes less time (1)</li> <li>• because cube A {is smaller / has a smaller volume} / surface area to volume ratio of cube A is greater (1)</li> <li>• as A has a shorter <b>diffusion</b> distance (1)</li> </ul> | <p>accept reverse argument for B against all three marking points</p> <p>ignore the surface area of cube A is smaller</p> | <p><b>(2)</b></p> <p><b>A03</b></p> <p><b>1a1b</b></p> |

**Total for Question 3 = 7 marks**

| Question number | Answer                                                                                                                                    | Mark                                  |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 4(a)(i)         | <p>C genes</p> <p><b>The only correct answer is C</b></p> <p><b>A, B and D</b> are not correct because they are units of inheritance.</p> | <p><b>(1)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                                                                          | Mark                                  |
|-----------------|---------------------------------------------------------------------------------|---------------------------------------|
| 4 (a)(ii)       | wrinkled characteristic is recessive / wrinkled characteristic is not passed on | <p><b>(1)</b></p> <p><b>AO2 1</b></p> |

| Question number | Answer                           |    |    | Additional guidance                   | Mark                     |
|-----------------|----------------------------------|----|----|---------------------------------------|--------------------------|
| 4(b)(i)         |                                  | R  | r  | accept rR                             | (3)<br><br>AO3 1a and 1b |
|                 | R                                | RR | Rr | accept other letters                  |                          |
|                 | r                                | Rr | rr |                                       |                          |
|                 | correct parental gametes (1)     |    |    |                                       |                          |
|                 | correct offspring genotypes (1)  |    |    | ecf from incorrect parental genotypes |                          |
|                 | percentage probability = 25% (1) |    |    | ecf from incorrect Punnett square     |                          |

| Question number | Answer                                                                                                                                                                                                                                                                                                             | Additional guidance                                                                                                                                                                                                                                                                                      | Mark                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>4(b)(ii)</b> | <p>Any two from:</p> <ul style="list-style-type: none"> <li>grow in a greenhouse (1)</li> <li>(same) soil (conditions) (1)</li> <li>(same) temperature / use a heater (1)</li> <li>(same) light / use a lamp (1)</li> <li>(same) watering / rain (1)</li> <li>eliminate (micro) organisms / insects (1)</li> </ul> | <p>accept enclosed area / (same) carbon dioxide (concentration)</p> <p>accept named soil condition e.g. pH</p> <p>accept optimum temperature</p> <p>accept same humidity</p> <p>accept pathogens / named pathogens</p> <p>accept use pesticides</p> <p>accept control {abiotic / biotic} factors (1)</p> | <p><b>(2)</b></p> <p><b>AO2 2</b></p> |

| Question number | Answer                                     |                                         |                      | Additional guidance | Mark                                                           |                         |
|-----------------|--------------------------------------------|-----------------------------------------|----------------------|---------------------|----------------------------------------------------------------|-------------------------|
| 4(c)(i)         |                                            | feature                                 | asexual reproduction | sexual reproduction | accept Y / ✓ / true for Yes<br><br>accept N / X / false for No | (3)<br><br><b>AO1 1</b> |
|                 |                                            | produce genetically identical offspring | yes                  | no                  |                                                                |                         |
|                 |                                            | requires male and female gametes        | no                   | yes                 |                                                                |                         |
|                 |                                            | rapid reproductive cycle                | yes                  | no                  |                                                                |                         |
|                 | one mark for each correct row of the table |                                         |                      |                     |                                                                |                         |

| Question number | Answer                                                            | Additional Guidance                                                                                                                                                                           | Mark                                  |
|-----------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 4 (c)(ii)       | {two copies / pairs} of each chromosome / full set of chromosomes | <p>accept 46 chromosomes / a chromosome from the male and a chromosome from the female</p> <p>ignore double the number of chromosomes / all of the chromosomes / all the genetic material</p> | <p><b>(1)</b></p> <p><b>AO1 1</b></p> |

**Total for Question 4 = 11 marks**

| Question number | Answer                                                                                                                        | Mark                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>5(a)(i)</b>  | 900 000 / 0.9 million / 900 thousand / 9 hundred thousand / nine hundred thousand / $9 \times 10^5$ (years)<br><br>ignore 0.9 | <b>(1)</b><br><br><b>AO2 1</b> |

| Question number | Answer                                                                                                                                                                                                                                                                                           | Additional guidance                                                                                                                                                      | Mark                           |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>5(a)(ii)</b> | Any one from: <ul style="list-style-type: none"> <li>• hunting (1)</li> <li>• skinning (1)</li> <li>• making other tools (1)</li> <li>• preparing food / cooking (1)</li> <li>• fighting / weapons / defence (1)</li> <li>• building / making shelters (1)</li> <li>• making fire (1)</li> </ul> | accept any other reasonable use of tools<br><br><br><br><br><br>accept to break rocks<br><br><br>ignore protection unqualified<br><br><br><br>accept to date fossils (1) | <b>(1)</b><br><br><b>AO1 1</b> |

| Question number | Answer                                                                                                                                                                                                                         | Additional guidance                                                                                                                                                                                                                                              | Mark                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 5(a)(iii)       | <p>Any two from:</p> <ul style="list-style-type: none"> <li>Lucy was shorter (1)</li> <li>Lucy had a smaller skull (1)</li> <li>Lucy was <b>less</b> upright (1)</li> <li>Lucy had {longer arms / shorter legs} (1)</li> </ul> | <p>accept reverse arguments for <i>Homo habilis</i> for all mark points</p> <p>accept smaller brain / (changes to) skull shape or jaw / changes to teeth</p> <p>ignore bipedal / walked upright</p> <p>accept Lucy had a larger big toe / longer fingers (1)</p> | <p><b>(2)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                                                                                                                                                                                                                                       | Additional guidance                                                                                                                                                                                                                 | Mark                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 5(a)(iv)        | <p>An explanation linking:</p> <ul style="list-style-type: none"> <li>selection pressure / <b>change</b> in environment (1)</li> <li>no advantageous <b>adaptations</b> (1)</li> <li>unable to compete / they are outcompeted (1)</li> </ul> | <p>accept examples e.g. disease / predator / lack of food / natural disaster</p> <p>accept they cannot <b>adapt</b> (to the change)</p> <p>accept another species was better <b>adapted</b></p> <p>accept there was competition</p> | <p><b>(3)</b></p> <p><b>AO2</b></p> |



| Question number | Answer                                                                                                                                                                                                                        | Additional guidance                                                                              | Mark                                  |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>6(a)(i)</b>  | <p>An answer including:</p> <ul style="list-style-type: none"> <li>• (structure P) is for movement / swimming (1)</li> <li>• (structure Q) is for protection / maintain the structure / prevents cell bursting (1)</li> </ul> | <p>accept it controls what {enters / leaves} the cell</p> <p>accept to adhere to other cells</p> | <p><b>(2)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                                                                                                                                                                                   | Additional guidance                                                                                                                                                                    | Mark                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>6(a)(ii)</b> | <p>unit conversion</p> <p><math>12 \times 1000 / 12\ 000 / 2.0 \div 1000 / 0.002</math> (1)</p> <p>substitution</p> <p><math>(12\ 000 \div 2.0 / 12 \div 0.002)</math></p> <p>= 6000</p> | <p>award full marks for correct answer with no working</p> <p>ecf for incorrect unit conversion</p> <p>award one mark for the answer with a power of ten error</p> <p>ignore units</p> | <p><b>(2)</b></p> <p><b>AO2 1</b></p> |

| Question number  | Answer    | Additional guidance                                          | Mark                                  |
|------------------|-----------|--------------------------------------------------------------|---------------------------------------|
| <b>6(a)(iii)</b> | diarrhoea | <p>accept nausea / vomiting / dehydration / stomach pain</p> | <p><b>(1)</b></p> <p><b>AO1 1</b></p> |

| Question number | Answer                  | Additional guidance                                             | Mark                |
|-----------------|-------------------------|-----------------------------------------------------------------|---------------------|
| 6(a)(iv)        | by (contaminated) water | accept by (contaminated) food / oral-faecal route / water-borne | (1)<br><b>AO1 1</b> |

| Question number | Answer                                                                                                                                                                                                                        | Additional guidance                                                                                                             | Mark                |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 6(b)            | <p>An answer linking:</p> <ul style="list-style-type: none"> <li>• pathogens have antigens (1)</li> <li>• (trigger the production of) antibodies (1)</li> <li>• (by) lymphocytes / memory lymphocytes produced (1)</li> </ul> | <p>accept antitoxins</p> <p>accept memory cells</p> <p>accept <b>phagocytosis</b> / <b>phagocytes</b> destroy pathogens (1)</p> | (3)<br><b>AO1 1</b> |

**Total for Question 6 = 9 marks**

| Question number | Answer                                                                                                                                                                                                  | Additional guidance                                                                                | Mark                                  |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>7(a) (i)</b> | <p>An explanation linking:</p> <ul style="list-style-type: none"> <li>• X-rays (1)</li> <li>• <b>absorbed</b> by the tumour (1)</li> <li>• because tumours are {a mass of cells / dense} (1)</li> </ul> | <p>accept tumours <b>absorb</b> the radiation</p> <p>award two marks for tumours absorb X-rays</p> | <p><b>(2)</b></p> <p><b>AO2 1</b></p> |

| Question number  | Answer                                            | Additional guidance                                                                         | Mark                                  |
|------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------|
| <b>7(a) (ii)</b> | cerebrum / cerebral hemispheres / cerebral cortex | <p>accept hippocampus<br/>accept occipital lobe</p> <p>accept cerebellum / frontal lobe</p> | <p><b>(1)</b></p> <p><b>AO2 1</b></p> |

| Question number | Answer                                                                                                                                                                                                              | Additional guidance                                                                                                         | Mark                                  |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>7(b)</b>     | <p>An explanation linking:</p> <ul style="list-style-type: none"> <li>• the glucose goes to the <b>tumour</b> (1)</li> <li>• because they are (rapidly) dividing / (glucose is used) for respiration (1)</li> </ul> | <p>accept cancer cells for tumour</p> <p>accept tumours {have a higher metabolism / require energy / have rapid growth}</p> | <p><b>(2)</b></p> <p><b>AO2 1</b></p> |

| Question number | Indicative content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Mark                                  |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 7 *(c)          | <p style="text-align: center;"><b>AO1 6 marks</b></p> <p><b>Production</b></p> <ul style="list-style-type: none"> <li>• uses antigen present in a blood clot</li> <li>• antigen is injected into a small mammal</li> <li>• mammal has an immune response</li> <li>• lymphocyte producing the complementary antibody is isolated</li> <li>• fused with a myeloma / cancer cell / tumour cell</li> <li>• to form a hybridoma</li> <li>• which divides and produces the monoclonal antibody</li> <li>•</li> </ul> <p><b>Diagnosis</b></p> <ul style="list-style-type: none"> <li>• monoclonal antibody is attached to a radioisotope</li> <li>• injected into the blood stream of a person</li> <li>• monoclonal antibody attaches to the antigen in the blood clot</li> <li>• the location of the blood clot is identified</li> </ul> | <p><b>(6)</b></p> <p><b>AO1 1</b></p> |

| Level   | Mark | Descriptor                                                                                                                                                                                                                                                                                                                             |
|---------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | 0    | <ul style="list-style-type: none"> <li>• No rewardable material.</li> </ul>                                                                                                                                                                                                                                                            |
| Level 1 | 1-2  | <ul style="list-style-type: none"> <li>• Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail.</li> <li>• Presents an explanation with some structure and coherence.</li> </ul>                                                                              |
| Level 2 | 3-4  | <ul style="list-style-type: none"> <li>• Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and /or developed.</li> <li>• Presents an explanation that has a structure which is mostly clear, coherent and logical.</li> </ul> |
| Level 3 | 5-6  | <ul style="list-style-type: none"> <li>• Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed.</li> <li>• Presents an explanation that has a well-developed structure which is clear, coherent and logical.</li> </ul>                        |

### Additional Guidance

|         |     |                                                                                                                                                                                                                                                                                                                              |
|---------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Level 1 | 1–2 | <ul style="list-style-type: none"><li>• A brief description of the production OR the use in diagnosis</li><li>• The response includes more than one stage of production or diagnosis</li></ul>                                                                                                                               |
| Level 2 | 3–4 | <ul style="list-style-type: none"><li>• A brief description of the production <b>AND</b> the use in diagnosis <b>OR</b> a detailed explanation of the production <b>OR</b> a detailed explanation of the use in diagnosis</li><li>• The response makes a links between stages using key scientific terms correctly</li></ul> |
| Level 3 | 5–6 | <ul style="list-style-type: none"><li>• A detailed explanation of the production <b>AND</b> the use in diagnosis</li><li>• Response makes links between stages of production and diagnosis using key scientific terms correctly</li></ul>                                                                                    |

**Total for Question 7 = 11 marks**

| Question number | Answer                                                                                                                | Mark                       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------|
| <b>8 (a)(i)</b> | (put the results in order) determine the middle value / place the results in order and find the 3 <sup>rd</sup> value | <b>(1)</b><br><b>AO2 1</b> |

| Question number  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Additional Guidance | Mark                       |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------|
| <b>8 (a)(ii)</b> | <p>An explanation linking one from:</p> <ul style="list-style-type: none"> <li>• {height / start point} of the ruler (1)</li> <li>• where catching hand starts / catching hand starts at 0</li> <li>• distances the thumb and fingers are apart (1)</li> <li>• catching it with the same hand (1)</li> <li>• {food / drink / drug} intake / amount of sleep (1)</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• valid / comparable (1)</li> </ul> | accept tiredness    | <b>(2)</b><br><b>AO2 1</b> |



| Question number | Answer                                                                                                                                                                                                                                                                                                                                                 | Additional guidance                                                                                                                                                 | Mark                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>8(a)(iv)</b> | <p>An answering including three from:</p> <ul style="list-style-type: none"> <li>• two students each given a different caffeine drink (1)</li> <li>• test before and after drinking / use a control (1)</li> <li>• a variable that needs controlling (1)</li> <li>• repeat with multiple students (for each drink) / calculate the mean (1)</li> </ul> | <p>accept use of the same student with a time interval in between</p> <p>accept same volume of caffeine drink / same time interval between drinking and testing</p> | <p><b>(3)</b></p> <p><b>A03 2ab</b></p> |

| Question number | Answer    | Mark                                  |
|-----------------|-----------|---------------------------------------|
| <b>8 (b)(i)</b> | cell body | <p><b>(1)</b></p> <p><b>A01 1</b></p> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                           | Additional guidance                                                                                                                                                                                                            | Mark                                               |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>8(b)(ii)</b> | <p>An answering including three from:</p> <ul style="list-style-type: none"> <li>increasing diameter increases the speed (1)</li> <li>(after 0.5 <math>\mu\text{m}</math>) there is a greater increase in the speed of impulses in myelinated neurones (1)</li> <li>correct comparison of data from the graph for the effect of diameter on speed (1)</li> </ul> | <p>accept the speed is greater in myelinated neurones / impulses travel faster in myelinated neurones</p> <p>accept the increase in speed in myelinated neurones is linear / ORA<br/>ignore speeds quoted for one diameter</p> | <p><b>(3)</b></p> <p><b>AO3</b><br/><b>2ab</b></p> |

**Total for question 8 = 12 marks**

| Question number | Answer                                                                                                                                                                                                                                                                                               | Mark                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 9(a)(i)         | <p>C carrier      affected      carrier</p> <p><b>The only correct answer is C</b></p> <p><i>A is not correct because the father should be affected</i></p> <p><i>B is not correct because the son should be a carrier</i></p> <p><i>D is not correct because the mother should be a carrier</i></p> | <p><b>(1)</b></p> <p><b>AO2 1</b></p> |

| Question number | Answer                                                                                                                                                                                                                                                                                                           | Additional guidance                                                                                                    | Mark                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 9(a)(ii)        | <p>An answer including two from:</p> <ul style="list-style-type: none"> <li>• (cilia) can't move the mucus (1)</li> <li>• {bacteria / pathogens / dust} are trapped (1)</li> <li>• (increased chance of) infection (1)</li> <li>• reduced diameter of the airway / cough / breathing difficulties (1)</li> </ul> | <p>accept cannot move the pathogens / named pathogens</p> <p>accept blocks the airway<br/>accept less gas exchange</p> | <p><b>(2)</b></p> <p><b>AO2 1</b></p> |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Additional guidance | Mark |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|---|---|----|----|---|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|----|----|---|----|----|---------------------------------------|
| 9(b)            | <p>An answering including:</p> <table><tr><td></td><td>a</td><td>a</td></tr><tr><td>A</td><td>Aa</td><td>Aa</td></tr><tr><td>a</td><td>aa</td><td>aa</td></tr></table> <p>correct parental genotypes (1)</p> <p>correct offspring (1)</p> <p>50% (chance) of the offspring being unaffected / 50% (chance) of the offspring being affected (1)</p> <p>(Hh) is affected because they have <b>one dominant allele</b> / (hh) is unaffected because they have {<b>two recessive alleles</b> / no dominant <b>alleles</b>} (1)</p> |                     | a    | a | A | Aa | Aa | a | aa | aa | <p>accept any letter with gametes in either orientation</p> <table><tr><td></td><td>H</td><td>h</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr></table> <p>award from the Punnett square</p> <p>award from the Punnett square<br/>ecf from incorrect parental gametes</p> <p>accept 2/4, 1/2, 1 in 2, 1:1 for 50%</p> <p><b>reject</b> 50% are carriers</p> <p>accept heterozygous are affected <b>and</b> homozygous recessive are unaffected</p> |  | H | h | h | Hh | hh | h | Hh | hh | <p><b>(4)</b></p> <p><b>AO2 2</b></p> |
|                 | a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | a                   |      |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |
| A               | Aa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Aa                  |      |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |
| a               | aa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | aa                  |      |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |
|                 | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | h                   |      |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |
| h               | Hh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | hh                  |      |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |
| h               | Hh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | hh                  |      |   |   |    |    |   |    |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |   |   |   |    |    |   |    |    |                                       |

| Question number | Indicative content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Mark                                  |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| *9 (c)          | <p style="text-align: center;"><b>AO1 6 marks</b></p> <p><b>Extraction</b></p> <ul style="list-style-type: none"> <li>• strawberry is crushed</li> <li>• to increase the surface area</li> <li>• detergent is added</li> <li>• to break down membranes / cells</li> <li>• protease added</li> <li>• to break down proteins</li> <li>• heat in a water bath</li> <li>• to speed up reaction</li> <li>• salt added</li> <li>• to clump DNA</li> <li>• filtering</li> <li>• insoluble material is removed</li> <li>• ice cold ethanol is added</li> <li>• to precipitate the DNA / makes the DNA visible</li> </ul> <p><b>Structure</b></p> <ul style="list-style-type: none"> <li>• double helix</li> <li>• polymer of nucleotides</li> <li>• made of two strands</li> <li>• backbone consists of a sugar and phosphate</li> <li>• bases connect the two strands</li> <li>• four bases A pairs with T and C pairs with G</li> <li>• joined together by weak hydrogen bonds</li> </ul> | <p><b>(6)</b></p> <p><b>AO1 2</b></p> |

| Level   | Mark | Descriptor                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | 0    | <ul style="list-style-type: none"> <li>No rewardable material.</li> </ul>                                                                                                                                                                                                                                                                                                                                |
| Level 1 | 1-2  | <ul style="list-style-type: none"> <li>Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail.</li> <li>Presents a description which is not logically ordered or with significant gaps.</li> </ul>                                                                                                 |
| Level 2 | 3-4  | <ul style="list-style-type: none"> <li>Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific, enquiry, techniques and procedures is not fully detailed and/or developed.</li> <li>Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing.</li> </ul> |
| Level 3 | 5-6  | <ul style="list-style-type: none"> <li>Demonstrates accurate and relevant biological understanding throughout. Understanding of scientific, enquiry, techniques and procedures is detailed and fully developed.</li> <li>Presents a description that has a well-developed structure which is clear, coherent and logical.</li> </ul>                                                                     |

#### Additional Guidance

|         |     |                                                                                                                                                                                                                                                                                                                                                            |
|---------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Level 1 | 1–2 | <ul style="list-style-type: none"> <li>A brief description of the structure of DNA <b>OR</b> how it can be extracted from fruit cells</li> <li>The response links to a reason for the extraction stage <b>OR</b> two extraction stages <b>OR</b> two ideas on the structure of DNA</li> </ul>                                                              |
| Level 2 | 3–4 | <ul style="list-style-type: none"> <li>A brief description of the structure of DNA <b>AND</b> how it can be extracted from fruit cells <b>OR</b> a detailed description of the structure of DNA <b>OR</b> a detailed description of how it can be extracted from fruit cells</li> <li>Response gives reasons for at least two extraction stages</li> </ul> |
| Level 3 | 5–6 | <ul style="list-style-type: none"> <li>A detailed description of DNA molecule <b>AND</b> a detailed description of how it can be extracted from fruit cells</li> <li>Response gives reasons for at least three stages of the extraction process <b>AND</b> the complementary base pairs linked by hydrogen bonds for a DNA molecule.</li> </ul>            |

**Total for Question 9 = 13 marks**

| Question number | Answer   | Additional guidance | Mark              |
|-----------------|----------|---------------------|-------------------|
| 10(a)           | four / 4 |                     | (1)<br><br>A03 1a |

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Additional guidance                                                                                                                                                                                                                                             | Mark             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 10(b)(i)        | <p>An answer including:</p> <p><b>one advantage from</b></p> <ul style="list-style-type: none"> <li>increased crop yield (1)</li> <li>increased profit (1)</li> </ul> <p><b>one disadvantage from</b></p> <ul style="list-style-type: none"> <li>ingested by {herbivores/consumers} that feed on the plants (1)</li> <li>pollute rivers / runs off into water (1)</li> <li>fertilisers are expensive / can cost money (1)</li> <li>increases the growth of weeds (1)</li> </ul> | <p>accept {increased / faster} growth / provides mineral ions for <b>growth</b></p> <p>accept idea of bioaccumulation / enters the food chain / harmful to animals</p> <p>accept eutrophication / causes algal growth</p> <p>ignore damages the environment</p> | (2)<br><br>A02 1 |

| Question number | Answer                                                                                                                          | Mark             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------|------------------|
| 10(b)(ii)       | <p>C 20%</p> <p><b>The only correct answer is C</b></p> <p>A, B and D as they are not the correct result of the calculation</p> | (1)<br><br>A02 1 |

| Question number   | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Additional guidance                                                                                                                                                                                                                                                                                                                                                               | Mark                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>10(b)(iii)</b> | <p>An answering including two from:</p> <ul style="list-style-type: none"> <li>• use more concentrations of fertiliser between 1 % and 10 % (1)</li> <li>• use a control / do not apply fertiliser to one field (1)</li> <li>• repeat the test {<b>at each concentration</b> / at each percentage / on each field} (1)</li> <li>• controlling a variable e.g. all fields in the same location / crop density / crop variety / volume of fertiliser (1)</li> </ul> | <p>accept other ranges within 0-10%<br/>accept use smaller increments of fertiliser</p> <p>accept repeat the test over a <b>larger</b> area / more fields</p> <p>accept soil pH / watering / aspect of fields / idea of polytunnels</p> <p>accept idea of using the fertilisers in the same field</p> <p>ignore control the area / temperature / light intensity / greenhouse</p> | <p><b>(2)</b></p> <p><b>A03 3a</b></p> |

| Question number | Answer                                                                                                                                               | Mark                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>10(c)</b>    | <p>C biological control</p> <p><b>The only correct answer is C</b></p> <p>A, B and D are not correct because they are not the name of the method</p> | <p><b>(1)</b></p> <p><b>A01 1</b></p> |

| Question number | Answer                                                                                                                                                                                                                                                                                                   | Additional guidance                                                                                                                                                                                                                                                 | Mark                                  |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>10(d)</b>    | <p>An answer linking:</p> <ul style="list-style-type: none"> <li>• {sample / cells / tissue} taken from the (parent) <b>plant</b> (1)</li> <li>• aseptic techniques used (1)</li> <li>• placed on (sterile/nutrient) growth medium (1)</li> <li>• hormones applied (so plantlets develop) (1)</li> </ul> | <p>accept take leaf discs / cuttings / meristems / explants</p> <p>accept aseptic technique being described</p> <p>accept agar / Petri dish</p> <p>accept the cells {differentiate / specialise}<br/>accept {roots / shoots / leaves / plantlets / callus} form</p> | <p><b>(4)</b></p> <p><b>AO2 1</b></p> |

**Total for Question 10 = 11 marks**

