



# Mark Scheme (Results)

## Summer 2026

Pearson Edexcel International GCSE in Biology

4BI1/1B

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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.

| Question Number | Answer                                                                                                                                                                                                                                                  | Additional Guidance                                                                                                                                                                                        | Mark     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>1(a)</b>     | <p><b>calculation steps not marking points</b></p> <p>length of line = 61 (mm)</p> <p>= <math>61 \times 1000 = 61\,000\ (\mu\text{m})</math></p> <p>actual length = <math>61\,000 \div 15\,000</math></p> <p>= 4.1 allow 4.0-4.13 (3 recurring) (3)</p> | <p>allow one for</p> <p>either correct measurement 60-62<u>mm</u> 6.0-6.2<u>cm</u></p> <p>or <math>\times 1000</math> or 10000 =1 mark</p> <p><math>\div 15\,000 = 1</math> mark</p> <p>allow 4.0-4.13</p> | <b>3</b> |

| Question Number | Answer                                                                                                                                                                | Mark     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>1(b)(i)</b>  | <p>A (M)</p> <p><i>B is not correct as N is the cell wall</i></p> <p><i>C is not correct as Q is a flagellum</i></p> <p><i>D is not correct as R is ribosomes</i></p> | <b>1</b> |

| Question Number | Answer                                                                                                                                                                        | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>1(b)(ii)</b> | <p>A (N)</p> <p><i>B is not correct as O is the cell membrane</i></p> <p><i>C is not correct as P is the cytoplasm</i></p> <p><i>D is not correct as Q is a flagellum</i></p> | <b>1</b> |

| Question Number  | Answer                                                                                                                                                                          | Mark     |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>1(b)(iii)</b> | <p>D (S)</p> <p><i>A is not correct as N is the cell wall</i></p> <p><i>B is not correct as O is the cell membrane</i></p> <p><i>C is not correct as P is the cytoplasm</i></p> | <b>1</b> |

| Question Number | Answer                                                                                                       | Mark     |
|-----------------|--------------------------------------------------------------------------------------------------------------|----------|
| <b>1(b)(iv)</b> | <p>An answer that includes:</p> <ul style="list-style-type: none"> <li>to move / to swim / eq (1)</li> </ul> | <b>1</b> |

| Question Number | Answer                                                                                                                        | Additional Guidance                                                         | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------|
| <b>1(c)(i)</b>  | <p>An answer that includes:</p> <ul style="list-style-type: none"> <li>nucleus / mitochondria / organelles /eq (1)</li> </ul> | <p>allow Endoplasmic reticulum / Golgi / lysosomes</p> <p>not ribosomes</p> | <b>1</b> |

| Question Number | Answer                                                                                                                                  | Mark     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>1(c)(ii)</b> | <p>An answer that includes:</p> <ul style="list-style-type: none"> <li>cell wall / cell membrane / cytoplasm / ribosomes (1)</li> </ul> | <b>1</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Additional Guidance                                                                                            | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------|
| <b>1(d)</b>     | <p>An answer that includes two of</p> <ul style="list-style-type: none"> <li>• virus much smaller / eq (1)</li> <li>• bacteria have cell wall / eq (1)</li> <li>• virus has capsid / protein coat / eq (1)</li> <li>• viruses have DNA <b>or</b> RNA / eq (1)</li> <li>• bacteria have ribosomes / eq (1)</li> <li>• bacteria have nucleoid (1)</li> <li>• bacteria have cytoplasm (1)</li> <li>• bacteria have cell membrane (1)</li> <li>• bacteria have plasmids (1)</li> <li>• bacteria have flagella (1)</li> <li>• bacteria have a slime layer / capsule (1)</li> </ul> | <p><b>List rule mark first two statements</b></p> <p>allow converse</p> <p>reject bacteria have organelles</p> | <b>2</b> |

**Total 11 marks**

| Question Number | Answer                                                                                                   | Additional Guidance                                                                                     | Mark     |
|-----------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------|
| <b>2(a)</b>     | <p><b>calculation steps not marking points</b></p> $24 - 14 = 10$ $(10 \div 14) \times 100$ $= 71\% (2)$ | <p>allow one for</p> $24 - 14 \text{ or}$ $\div 14$ <p>allow 71.4 71.43 71.429 71.4286 71.42857 etc</p> | <b>2</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Additional Guidance                                                                                        | Mark     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------|
| <b>2(b)</b>     | <p>An answer that includes four of the following:</p> <ol style="list-style-type: none"> <li>1. energy increases as body mass increases / less in children due to smaller (body mass) / eq (1)</li> <li>2. energy less increase over 50 as (maybe) less active/ eq (1)</li> <li>3. protein increases with age for growth /eq (1)</li> <li>4. protein constant / levels off /no increase beyond 25-50 as less growth / no growth /eq (1)</li> <li>5. calcium increases with age / up to age 7-10 for bone / teeth / eq (1)</li> <li>6. Iron increases (from 10) as blood lost in menstruation /eq (1)</li> <li>7. Iron falls (after 50) due to menopause /eq (1)</li> </ol> | <p>each mp needs change and explanation</p> <p>allow converse</p> <p>ignore energy required for growth</p> | <b>4</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                   | Additional Guidance    | Mark     |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------|
| <b>2(c)</b>     | <p>An answer that includes three of the following:</p> <ol style="list-style-type: none"> <li>1. more energy required for foetus (and mother) / body mass increases /eq (1)</li> <li>2. protein more for growth of foetus / baby /eq (1)</li> <li>3. calcium the same / eq (1)</li> <li>4. Iron increases as more haemoglobin required for foetus (blood) / blood cells required to transport oxygen to foetus / baby /eq (1)</li> </ol> | allow for baby /embryo | <b>3</b> |

**Total = 9 marks**

| Question Number | Answer | Acceptable answers | Mark     |
|-----------------|--------|--------------------|----------|
| <b>Q03a</b>     | 6      | six                | <b>1</b> |

| Question Number | Answer                                                       | Additional Guidance                          | Mark     |
|-----------------|--------------------------------------------------------------|----------------------------------------------|----------|
| <b>3(b)</b>     | carbon dioxide + water $\longrightarrow$<br>glucose + oxygen | allow correct formulae<br>even if unbalanced | <b>1</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                        | Additional Guidance                                                                                                                | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>3(c)</b>     | An answer that refers to the following: <ul style="list-style-type: none"> <li>• scale linear on y (1)</li> <li>• and plot half grid on x and y (1)</li> <li>• bars correctly plotted within one small square (1)</li> <li>• colours or key (1)</li> <li>• Y axis labelled <u>mean</u> bubbles <u>per minute</u> / <u>mean</u> bubbles <u>min</u><sup>-1</sup> (1)</li> </ul> | allow truncated if correct<br><br>ignore plot for green<br><br>allow red blue etc<br><br>allow average<br><br>max 4 for line graph | <b>5</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                      | Additional Guidance | Mark     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|
| <b>3(d)</b>     | An answer that includes four of the following: <ol style="list-style-type: none"> <li>1. white most bubbles / highest rate (of photosynthesis) / most photosynthesis / eq (1)</li> <li>2. green fewest bubbles / lowest rate (of photosynthesis) / least photosynthesis / eq (1)</li> </ol> | yellow few bubbles  | <b>4</b> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                    |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--|
|  | <p>3. white lowest transmittance / most white light absorbed / least passes through / eq (1)</p> <p>4. green highest transmittance / least green light absorbed / most passes through / eq (1)</p> <p>5. no data for yellow / eq (1)</p> <p>6. correct relationship between rate of photosynthesis and absorption / transmittance / eq (1)</p> <p>7. no mention of temp control / CO<sub>2</sub> control / light intensity / eq (1)</p> | Eg high rate with low transmittance/ high absorption or vice versa |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--|

**Total = 11 marks**

| Question Number | Answer                                                                                                                                                                                                                                        | Additional Guidance                                                                                                                                                                    | Mark     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>4(a)</b>     | <p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• movement of particles / atoms/ molecules / gas / liquid / eq (1)</li> <li>• from a high concentration to a lower concentration / eq (1)</li> </ul> | <p>ignore substance</p> <p>not just movement alone</p> <p>allow water</p> <p>allow down a concentration gradient</p> <p>allow high pressure to low pressure</p> <p>ignore membrane</p> | <b>2</b> |

| Question Number | Answer                                                                          | Additional Guidance | Mark     |
|-----------------|---------------------------------------------------------------------------------|---------------------|----------|
| <b>4(b)(i)</b>  | <p>surface area of cube side 3 cm</p> <p>= <math>54 \text{ cm}^2</math> (1)</p> |                     | <b>1</b> |

| Question Number | Answer                                                               | Additional Guidance | Mark     |
|-----------------|----------------------------------------------------------------------|---------------------|----------|
| <b>4(b)(ii)</b> | <p>volume of cube 3 cm</p> <p>= <math>27 \text{ cm}^3</math> (1)</p> |                     | <b>1</b> |

| Question Number  | Answer                                                            | Additional Guidance                                                                                                       | Mark     |
|------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------|
| <b>4(b)(iii)</b> | <p>surface area to volume ratio of cube side 3.0 cm = 2:1 (2)</p> | <p>allow ECF for value from b(i) and b(ii) for 2 marks</p> <p>ECF one mark for correct ratio not give as X:1 eg 54:27</p> | <b>2</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Additional Guidance                                                                                                                                                                        | Mark     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>4(b)(iv)</b> | <p>An answer that includes four of the following:</p> <ol style="list-style-type: none"> <li>1. 1cm / smallest cube (most) similar to unicellular / eq (1)</li> <li>2. 1cm / smallest cube most penetrated / eq (1)</li> <li>3. 1cm/ small cube / small organism has high(est) SA : vol ratio / eq (1)</li> <li>4. small / unicellular organisms have short (diffusion) distance / substances can reach all of organism / eq (1)</li> <li>5. dye moves same distance / diffusion at same rate into each cube /eq (1)</li> <li>6. larger organisms need transport systems /circulation /eq (1)</li> </ol> | <p>allow converse for 1, 2, 3 and 6</p> <p>not quicker diffusion</p> <p>if state that small cubes <b>and</b> unicellular / small organisms have high SA/ Vol ratio scores mp1 and mp 3</p> | <b>4</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                          | Additional Guidance                                                                                                                                                      | Mark     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>4(b)(v)</b>  | <p>An answer that includes two of the following:</p> <ul style="list-style-type: none"> <li>• temperature (1)</li> <li>• increases / decreases (kinetic) energy / movement of molecules / eq (1)</li> <li>• concentration of dye / eq (1)</li> <li>• increases gradient / rate of diffusion / eq (1)</li> </ul> | <p>mark in pairs</p> <p>ignore amount</p> <p>density / concentration of agar (1)</p> <p>increased density / concentration slows movement of particles/ diffusion (1)</p> | <b>2</b> |

**Total = 12 marks**

| Question Number | Answer                                                                                                                                                                                                                                                                                                      | Additional Guidance | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|
| <b>5(a)(ii)</b> | <p>An explanation that includes two of the following:</p> <ul style="list-style-type: none"> <li>• fewer air sacs / alveoli (1)</li> <li>• larger air sac / space / eq (1)</li> <li>• less surface area / eq (1)</li> <li>• less diffusion / slower diffusion / less oxygen enters blood /eq (1)</li> </ul> | ignore gas exchange | <b>2</b> |

| Question Number | Answer                                                                                                                                                                                                                                      | Additional Guidance                                                               | Mark     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------|
| <b>5(b)</b>     | <p>An explanation that includes two of the following:</p> <ul style="list-style-type: none"> <li>inflamed /thicker walls / narrow / smaller lumen / air space /eq (1)</li> <li>cilia damaged / covered / cannot function /eq (1)</li> </ul> | <p>'mucus covers cilia'</p> <p>'cilia can't remove mucus' score mp 2 and mp 3</p> | <b>2</b> |

|  |                                                                                                                                                                                                                                                                           |  |  |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  | <ul style="list-style-type: none"> <li>• mucus accumulates / bacteria not removed / eq (1)</li> <li>• less air / oxygen enters lungs / eq (1)</li> <li>• shortage of breath / breathless / tired / harder to breathe / less energy / less respiration / eq (1)</li> </ul> |  |  |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Additional Guidance                                                                                                                                                                                    | Mark     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>5(c)</b>     | <p>An explanation that includes two of the following:</p> <ul style="list-style-type: none"> <li>• damage to arteries / blood vessel walls / high blood pressure / atherosclerosis / atheroma/ increase blood clotting /eq (1)</li> <li>• coronary heart disease / heart attacks / strokes / eq (1)</li> <li>• CO binds with haemoglobin / eq (1)</li> <li>• less oxygen transported around body / less respiration / eq (1)</li> <li>• contains carcinogens / tar / mutagens / eq (1)</li> <li>• causes (lung/ mouth /throat) cancer / eq (1)</li> </ul> | <p>mark one consequence and matched explanation</p> <p>explanation alone scores one eg coronary heart disease and lung cancer scores 1</p> <p>ignore ref to cilia bronchitis etc as covered in (b)</p> | <b>2</b> |

**Total = 10 marks**

| Question Number | Answer                                                                                                                                                                  | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>6(a)(i)</b>  | <p>D (X)</p> <p><i>A is not correct as T is the bladder</i></p> <p><i>B is not correct as U is the sperm duct</i></p> <p><i>C is not correct as V is the testis</i></p> | <b>1</b> |

| Question Number | Answer                                                                                                                                                               | Mark     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>6(a)(ii)</b> | <p>C (W)</p> <p><i>A is not correct as T is the bladder</i></p> <p><i>B is not correct as V is the testis</i></p> <p><i>D is not correct as X is the urethra</i></p> | <b>1</b> |

| Question Number  | Answer                                                                                                                                                                 | Mark     |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>6(a)(iii)</b> | <p>C (V)</p> <p><i>A is not correct as T is the bladder</i></p> <p><i>B is not correct as U is the sperm duct</i></p> <p><i>D is not correct as W is the penis</i></p> | <b>1</b> |

| Question Number | Answer                                                                                                                                                                 | Mark     |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>6(a)(iv)</b> | <p>C (V)</p> <p><i>A is not correct as T is the bladder</i></p> <p><i>B is not correct as U is the sperm duct</i></p> <p><i>D is not correct as W is the penis</i></p> | <b>1</b> |

| Question Number | Answer                                                                                                                                                                                                                                                            | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>6(a)(v)</b>  | <p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• sperm production / sperm development / eq (1)</li> <li>• secondary sexual characteristics / muscle development / body hair / beard/ voice breaking / eq (1)</li> </ul> | <b>2</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                      | Additional Guidance                                                                                                                                                                                              | Mark     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>6(b)</b>     | <p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• oestrogen (1)</li> <li>• repairs uterine lining / builds uterine lining / causes ovulation / release of egg / eq (1)</li> <li>• progesterone (1)</li> <li>• maintains uterine lining / prevents menstruation / eq (1)</li> </ul> | <p>no effect mark without correct named hormone</p> <p>ignore egg production</p> <p>allow increases LH / inhibits FSH(1)</p> <p>allow reduction in progesterone triggers menstruation /inhibits FSH / LH (1)</p> | <b>4</b> |

**Total = 10 marks**

| Question Number | Answer       | Additional Guidance | Mark     |
|-----------------|--------------|---------------------|----------|
| <b>7(a)</b>     | duodenum (1) | allow jejunum       | <b>1</b> |

| Question Number | Answer                                                                                                                                                                                                                   | Mark     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>7(b)(i)</b>  | <p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• increases / provides large surface area / eq (1)</li> <li>• for diffusion / absorption / active transport / eq (1)</li> </ul> | <b>2</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                          | Additional Guidance | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|
| <b>7(b)(ii)</b> | <p>An explanation that includes four of the following:</p> <ul style="list-style-type: none"> <li>• carbohydrates broken down / digested by enzymes / amylase / maltase / eq (1)</li> <li>• protein / broken down / digested by proteases / enzymes / eq (1)</li> <li>• diffuses into capillaries / eq (1)</li> <li>• glucose goes into / increases (in vein) / eq (1)</li> <li>• amino acids go into / increases (in vein) / eq (1)</li> </ul> | ignore sugar        | <b>4</b> |

| Question Number  | Answer                                                                                                                                                                                                                                                                                      | Mark     |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>7(b)(iii)</b> | <p>A description that includes two of the following:</p> <ul style="list-style-type: none"> <li>• lacteal to absorb / transport / eq (1)</li> <li>• digested lipid / digested fat / fatty acids / glycerol / eq (1)</li> <li>• into the lymphatic system / lymph vessel / eq (1)</li> </ul> | <b>2</b> |

**Total = 9 marks**

| Question Number | Answer                                                                                                                                                                                                                                                                                                               | Mark     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>8(a)</b>     | <p>A description that includes two of the following:</p> <ul style="list-style-type: none"> <li>• seed coat splits / testa splits / seed splits / sprouts / eq (1)</li> <li>• root grows / appears / radicle grows / appears / eq (1)</li> <li>• shoot grows / appears / plumule grows / appears / eq (1)</li> </ul> | <b>2</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                     | Additional Guidance                                                                                            | Mark     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------|
| <b>8(b)</b>     | <p>An explanation that includes the following:</p> <ul style="list-style-type: none"> <li>• B germinates , A C D not / eq (1)</li> <li>• water for hydrolysis / digestion / break down / enzyme activation / eq (1)</li> <li>• warm / optimum temperature for enzyme action / eq (1)</li> <li>• oxygen for respiration / eq (1)</li> </ul> | <p>only B</p> <p>germinates allow D<br/>germinates <u>slowly</u></p> <p>allow 4°C too cold<br/>for enzymes</p> | <b>4</b> |

**Total = 6 marks**

| Question Number | Answer                                                                                                                                                                                                                                                                                                             | Mark     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>9(a)</b>     | <p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• (select) breed / mate animals with desired characteristics / eq (1)</li> <li>• mate offspring / next generation with highest / most desired feature / eq (1)</li> <li>• repeat for many generations / eq (1)</li> </ul> | <b>3</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Mark     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>9(b)(i)</b>  | <p>A description that includes four of the following:</p> <ul style="list-style-type: none"> <li>• mean of all farms (generally) increases / eq (1)</li> <li>• farm X values fluctuate more / goes up and down / eq (1)</li> <li>• farm X falls 3 times / 2 drops (2004 to 2006) / all farms drop once (in 2009)/ eq (1)</li> <li>• farm X (only) higher % increase than all farms in 2004 / eq (1)</li> <li>• farm X go below 0 or negative value (in 2008) / eq (1)</li> <li>• farm X has wider / bigger range / eq (1)</li> </ul> | <b>4</b> |

| Question Number | Answer                                                                                                                                                         | Mark     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>9(b)(ii)</b> | <p>An answer that includes the following:</p> <ul style="list-style-type: none"> <li>• more wool / greater yield / more money / more profit /eq (1)</li> </ul> | <b>1</b> |

**Total = 8 marks**

| Question Number | Answer                                                                     | Mark     |
|-----------------|----------------------------------------------------------------------------|----------|
| <b>10(a)(i)</b> | <ul style="list-style-type: none"> <li>combustion / burning (1)</li> </ul> | <b>1</b> |

| Question Number  | Answer                                                  | Mark     |
|------------------|---------------------------------------------------------|----------|
| <b>10(a)(ii)</b> | <ul style="list-style-type: none"> <li>A (1)</li> </ul> | <b>1</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>10(b)</b>    | <p>A description that includes four of the following:</p> <ul style="list-style-type: none"> <li>as CO<sub>2</sub> is a greenhouse gas / increased greenhouse effect / eq (1)</li> <li>global warming / increase in atmosphere temperature / eq (1)</li> <li>flooding / sea levels rise / eq (1)</li> <li>habitat destruction / ice caps melting / extinction of species / migration / reduces biodiversity / change of ranges of species / pests move to new areas / eq (1)</li> <li>more extreme weather / more storms / eq (1)</li> <li>droughts / desertification/ forest fires / eq (1)</li> <li>ocean acidification / coral reef damage / coral bleaching / eq (1)</li> </ul> | <b>4</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                    | Additional Guidance | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|
| <b>10(c)</b>    | <p>An explanation that includes four of the following:</p> <ul style="list-style-type: none"> <li>more plant growth / eq (1)</li> <li>eutrophication / as more nitrates / phosphates / minerals / nutrients / eq (1)</li> <li>less photosynthesis / eq (1)</li> <li>as less light / eq (1)</li> <li>plants die / cannot respire / eq (1)</li> <li>as less / no oxygen / eq (1)</li> </ul> | ignore algal bloom  | <b>4</b> |

**Total = 10 marks**

| Question Number | Answer                                                                                                                                                  | Mark     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>11(a)(i)</b> | gene is a section of DNA / length of DNA that codes for a specific polypeptide / protein <b>and</b> an allele is an alternative form of a gene / eq (1) | <b>1</b> |

| Question Number  | Answer                                               | Mark     |
|------------------|------------------------------------------------------|----------|
| <b>11(a)(ii)</b> | GG and Gg / homozygous dominant and heterozygous (1) | <b>1</b> |

| Question Number | Answer                                                                                                                                                                                                                                                                                                | Additional Guidance                                                                                                                                                                                                                                                   | Mark     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>11(b)(i)</b> | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>parent genotypes Gg x gg (1)</li> <li>correct gametes for parents G or g and g (1)</li> <li>offspring genotypes Gg and gg (1)</li> <li>offspring phenotypes gold and cream shown (1)</li> </ul> | <p>allow other symbols not X and Y but allow GY x gg</p> <p>allow full marks from Punnet square</p> <p>gametes must be clearly shown separated or in circles or in Punnet square</p> <p>allow ecf for wrong parent genotypes gametes and offspring mark for 2 max</p> | <b>4</b> |

| Question Number  | Answer                                                                                                                                                                                                          | Additional Guidance                                                                                                                                           | Mark     |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>11(b)(ii)</b> | <p>An explanation that includes the following:</p> <ul style="list-style-type: none"> <li>• cross with cream / gg / eq (1)</li> <li>• if any cream in offspring gold is heterozygous / Gg / eq /( 1)</li> </ul> | <p>ignore Gg</p> <p>allow mp 2 if crossed with Gg</p> <p>if crossed with cream / gg allow all offspring are gold the hamster is GG as alternative to mp 2</p> | <b>2</b> |

**Total = 8 marks**

| Question Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Additional Guidance                                                                                                                 | Mark     |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>12</b>       | <p>An answer that makes reference to six of the following points</p> <ul style="list-style-type: none"> <li>• C with salt and without or different salt mass added / eq (1)</li> <li>• O use same yeast / species / type / strain / volume / mass / eq (1)</li> <li>• R repeat (for each salt mass) / eq (1)</li> <li>• M1 measure height / size / volume of rise / dough (bread) / eq (1)</li> <li>• M2 after stated time period (one minute plus) / eq (1)</li> <li>• S1 same temperature (1)</li> <li>• S2 same mass flour / mass starch / same dough / same mass of dough / volume of water / eq (1)</li> </ul> | <p>not amount</p> <p>not mass</p> <p>allow even if in oven</p> <p>allow even if in oven</p> <p>same flour / same batch of dough</p> | <b>6</b> |

**Total = 6 marks**