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AQA EXAMINATIONS

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# INTERNATIONAL AS BIOLOGY (9610)

## BL01

Unit 1 The Diversity of Living Organisms

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Mark scheme

June 2023

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Version: 1.0 Final



2 3 6 X B L 0 1 / M S

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| Question | Marking guidance                                                            | Mark | Comments |
|----------|-----------------------------------------------------------------------------|------|----------|
| 01.1     | <b>A</b> Phospholipid/lipid;<br><b>B</b> Peptidoglycan/murein/glycoprotein; | 2    |          |

| Question | Marking guidance                                                                                                                                                                                                                    | Mark | Comments                   |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------|
| 01.2     | <b>Capsule</b><br>1. protects from drying out / protects from phagocytosis / attachment to surfaces or other cells;<br><br><b>Pilus</b><br>2.movement / attachment to surfaces or other cells / exchange of plasmids / conjugation; | 2    | INGORE sexual reproduction |

| Question | Marking guidance | Mark | Comments                                                                                         |
|----------|------------------|------|--------------------------------------------------------------------------------------------------|
| 01.3     | 37(nm);;         | 2    | Allow <b>one mark</b> for<br>(25 mm÷670 000) or (25 000µm÷670 000) or<br>(2.5cm÷670 000) or 37.3 |

| Question | Marking guidance     | Mark | Comments                            |
|----------|----------------------|------|-------------------------------------|
| 01.4     | $3.6 \times 10^6$ ;; | 2    | Allow <b>one mark</b> for 3 600 000 |

| Question | Marking guidance                                                                                                                                                                                                                                                                                                                                      | Mark | Comments |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| 01.5     | <p>Any <b>one</b> from</p> <ul style="list-style-type: none"><li>• Not a representative sample;</li><li>• Not mixed evenly / cells overlapping;</li><li>• Not all cells stained so not all visible;</li><li>• A difference of one (a few) cells is multiplied each time the sample is diluted;</li><li>• The stain dilutes the sample more;</li></ul> | 1    |          |

| Question | Marking guidance                              |                                                         | Mark  | Comments                                                                                                                                                                                                                                                                                            |
|----------|-----------------------------------------------|---------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01.6     |                                               |                                                         | 2 max | Allow <b>two marks</b> for 3 differences<br>Allow <b>one mark</b> for 1 or 2 differences<br>The <u>difference</u> must be clear<br><br><b>ALLOW</b> description of no nucleus e.g. DNA in cytoplasm<br><br><b>IGNORE</b> proteins unqualified<br><br><b>ALLOW</b> one named example of an organelle |
|          | <b>Eukaryote</b>                              | <b>Prokaryote</b>                                       |       |                                                                                                                                                                                                                                                                                                     |
|          | nucleus/nucleolus                             | no nucleus/no nucleolus;                                |       |                                                                                                                                                                                                                                                                                                     |
|          | larger ribosomes (80s)                        | smaller ribosomes (70s);                                |       |                                                                                                                                                                                                                                                                                                     |
|          | Linear DNA/chromosomes/has histones           | circular DNA/single chromosome /does not have histones; |       |                                                                                                                                                                                                                                                                                                     |
|          | no plasmids                                   | plasmids;                                               |       |                                                                                                                                                                                                                                                                                                     |
|          | no mesosomes                                  | mesosomes;                                              |       |                                                                                                                                                                                                                                                                                                     |
|          | eukaryotic cells are <u>larger</u>            | prokaryotic cells are smaller;                          |       |                                                                                                                                                                                                                                                                                                     |
|          | (named) membrane bound cytoplasmic organelles | no (named) membrane bound cytoplasmic organelles;       |       |                                                                                                                                                                                                                                                                                                     |
|          | no flagellum/pili                             | (some have) flagellum/pili;                             |       |                                                                                                                                                                                                                                                                                                     |

| Question    | Marking guidance                                                                                                                                                                                                                                               | Mark  | Comments                                                                                                                           |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>02.1</b> | <p>1. (concentration of salt) Does not decrease yield by the same amount;</p> <p>2. Different species have different tolerance points / allow data ranges for any 2 of the 3 species;</p> <p>3. Species with lower tolerance points decrease yield faster;</p> | 2 max | <p><b>ALLOW</b> e.g. potato has the largest decrease in yield</p> <p><b>ALLOW</b> e.g. onions have the highest tolerance point</p> |

| Question    | Marking guidance                              | Mark | Comments |
|-------------|-----------------------------------------------|------|----------|
| <b>02.2</b> | Similar salt tolerance / genetically similar; | 1    |          |

| Question    | Marking guidance                                                                                                                                                                                                                                                                             | Mark  | Comments                                                                                                                                                                                                            |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>02.3</b> | <p>1. Volume of (salt/distilled) water;</p> <p>2. Light intensity / distance of light source / duration of light;</p> <p>3. Ion/mineral <u>concentration</u>/pH of the <u>soil</u>;</p> <p>4. Seeds from the same plant/berry;</p> <p>5. Distance between the seeds;</p> <p>6. Humidity;</p> | 2 max | <p><b>2. ACCEPT</b> light / amount of light</p> <p><b>3. ACCEPT</b> correctly named ion/mineral concentration/amount</p> <p><b>3. IGNORE</b> nutrients unqualified</p> <p><b>4. IGNORE</b> variety/type/species</p> |

| Question    | Marking guidance                                                                                                                                                                                                   | Mark  | Comments                                                                                                          |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------|
| <b>02.4</b> | 1. (idea that) Not all the seeds will germinate;<br><br>2. Want them to be the same height/size / they have the same starting point;<br><br>3. It allows a comparison to be made;<br><br>4. To reduce competition; | 2 max | <b>ACCEPT</b> not all seeds will grow / some seeds may die / some may be diseased / not all seeds will be healthy |

| Question    | Marking guidance                                                                                                                          | Mark | Comments                                               |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------|
| <b>02.5</b> | 1. (salt solution) Decreases the (mean) mass;<br><br>2. (salt solution) Has very little/no effect on the (mean) dry mass of strawberries; | 2    | <b>ACCEPT</b> idea that it is <u>only</u> 1g different |

| Question    | Marking guidance                                                                                                                               | Mark | Comments |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| <b>02.6</b> | 1. T-test / standard error and 95% confidence limits<br><br><b>and</b><br><br>2. Allows a significant difference between two means to be seen; | 1    |          |

| Question | Marking guidance                                                                                                                                                                                                                        | Mark | Comments |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| 02.7     | (these cells shrink because);<br>1. Water leaves the cell;<br>2. by osmosis/diffusion;<br>3. Water moves down a water potential gradient / from a <u>higher</u> to <u>lower</u> water potential/water potential is higher in the cells; | 3    |          |

| Question | Marking guidance                                                                                                                                                                                                                       | Mark  | Comments                                            |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------|
| 03.1     | <p>Any <b>three</b> from:</p> <ul style="list-style-type: none"> <li>• Use a quadrat;</li> <li>• Key to identify the species;</li> <li>• (Tape measure to) set out a grid/co-ordinates;</li> <li>• Random number generator;</li> </ul> | 3 max | <b>ACCEPT</b> idea of separating field into squares |

| Question | Marking guidance                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Mark  | Comments |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 03.2     | <p><b>A large number of samples:</b></p> <p>To minimize the effect of an anomalous result</p> <p><b>OR</b></p> <p>So that an accurate/valid/reliable <u>mean</u> can be calculated</p> <p><b>OR</b></p> <p>So that stats tests can be carried out e.g. SD or t-test or standard error 95% confidence limit;</p> <p><b>Random samples:</b></p> <p>Random to avoid bias;</p> <p><b>Accept once only for either large or random</b></p> <p>To obtain representative data/samples;</p> | 2 max |          |

| Question | Marking guidance | Mark | Comments                                                                                                                                                                                                                                                                                                                                                             |
|----------|------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 03.3     | 6.4;,,;          | 3    | <p>If the answer is incorrect:</p> <p>Allow <b>one mark</b> for 3422 or (59x58) and</p> <p>Allow <b>one mark</b> for 538</p> <p>Allow <b>two marks</b> for 6.36...</p> <p>If the data for the treated field has been used allow <b>two marks</b> for 4.6</p> <p><b>ALLOW ECF</b> for <b>two marks</b> if graph has been mis-read but all other steps are correct</p> |

| Question | Marking guidance                                                                                                                                                                                                                      | Mark | Comments |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| 03.4     | <p><b>Species richness</b></p> <p>1. Is the total number of different species;</p> <p><b>Index of diversity</b></p> <p>2. Is the total number of different species <b>and</b> includes the number of individuals in each species;</p> | 2    |          |

| Question    | Marking guidance                                                      | Mark | Comments |
|-------------|-----------------------------------------------------------------------|------|----------|
| <b>03.5</b> | Accept answers in either order<br>1. mRNA;<br>2. Protein/polypeptide; | 2    |          |

| Question    | Marking guidance                                                                                                                                                                                | Mark  | Comments                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------|
| <b>03.6</b> | Allow any <b>two</b> from: <ul style="list-style-type: none"><li>• Greater variety of food;</li><li>• Greater number of habitats/niches;</li><li>• Herbicide may be toxic to animals;</li></ul> | 2 max | <b>DO NOT ACCEPT</b> more food |

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| Question | Marking guidance | Mark | Comments |
|----------|------------------|------|----------|
| 04.1     | Active site;     | 1    |          |

| Question | Marking guidance        | Mark | Comments |
|----------|-------------------------|------|----------|
| 04.2     | Water/H <sub>2</sub> O; | 1    |          |

| Question | Marking guidance                     | Mark | Comments |
|----------|--------------------------------------|------|----------|
| 04.3     | Enzyme-substrate complex/ES complex; | 1    |          |

| Question | Marking guidance                                                                                                                                          | Mark | Comments |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| 04.4     | 1. Provides <u>specific</u> shape for the <u>active site</u> ;<br>2. (so that) substrate fits/is complementary to/binds into/attaches to the active site; | 2    |          |

| Question    | Marking guidance                                                                                                                                                                                                        | Mark | Comments |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|
| <b>04.5</b> | 1. Induced fit;<br>2. (idea that) the <u>active site</u> changes shape to become complementary/fits/binds<br><b>OR</b><br><u>Active site</u> can't fit/bind/be complementary to the exact shape for just one substrate; | 2    |          |

| Question | Marking guidance                                                                                                                                                                                                                     | Mark | Comments                                                                                                                                    |                        |                          |  |   |   |         |  |   |         |  |  |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|--|---|---|---------|--|---|---------|--|--|
| 05.1     | A tick in the box representing haploid and 2 cell divisions;                                                                                                                                                                         | 1    | <b>ALLOW</b> a cross if the correct box is the only box marked<br><b>ALLOW</b> answers with crosses if only the correct box contains a tick |                        |                          |  |   |   |         |  |   |         |  |  |
|          | <table><tr><th rowspan="2">Type of cells produced</th><th colspan="2">Number of cell divisions</th></tr><tr><th>1</th><th>2</th></tr><tr><td>Haploid</td><td></td><td>✓</td></tr><tr><td>Diploid</td><td></td><td></td></tr></table> |      |                                                                                                                                             | Type of cells produced | Number of cell divisions |  | 1 | 2 | Haploid |  | ✓ | Diploid |  |  |
|          | Type of cells produced                                                                                                                                                                                                               |      |                                                                                                                                             |                        | Number of cell divisions |  |   |   |         |  |   |         |  |  |
|          |                                                                                                                                                                                                                                      |      |                                                                                                                                             | 1                      | 2                        |  |   |   |         |  |   |         |  |  |
|          | Haploid                                                                                                                                                                                                                              |      |                                                                                                                                             |                        | ✓                        |  |   |   |         |  |   |         |  |  |
| Diploid  |                                                                                                                                                                                                                                      |      |                                                                                                                                             |                        |                          |  |   |   |         |  |   |         |  |  |
|          |                                                                                                                                                                                                                                      |      |                                                                                                                                             |                        |                          |  |   |   |         |  |   |         |  |  |
|          |                                                                                                                                                                                                                                      |      |                                                                                                                                             |                        |                          |  |   |   |         |  |   |         |  |  |
|          |                                                                                                                                                                                                                                      |      |                                                                                                                                             |                        |                          |  |   |   |         |  |   |         |  |  |

| Question    | Marking guidance                                                                                                                                                                                                                                                                                                                                                                       | Mark | Comments                                                                                                  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------|
| <b>05.2</b> | <p><b>Crossing over</b></p> <p>1. (Chromatids are produced with) different/new combinations of alleles;</p> <p>2. Correct example e.g. Ef/eF;</p> <p><b>Independent segregation</b></p> <p>3. Different combinations of chromosomes (1 and 2)/maternal and paternal chromosomes are produced;</p> <p>4. Correct example e.g. the alleles EF could be in the same gamete as D or d;</p> | 4    | <p>1. <b>REJECT</b> new alleles are produced</p> <p>4. <b>ALLOW</b> other correct allele combinations</p> |

| Question           | Marking guidance                                                                                                                                                                                                                                                                                                                                | Mark         | Comments                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>05.3</b></p> | <p>(In meiosis 1)</p> <p>1. Homologous chromosomes/pairs are separated from one another;</p> <p>(In meiosis 2)</p> <p>2. (Sister) chromatids are then separated/split from one another;</p> <p>3. The idea of each chromatid carrying one allele;</p> <p>4. Spindle (fibres) pull the chromosomes/chromatids to opposite poles of the cell;</p> | <p>3 max</p> | <p><b>IGNORE</b> crossing over/independent assortment/reference to stages of meiosis</p> <p><b>ALLOW</b> chromosomes for chromatid if the context is correct</p> |

| Question | Marking guidance                                     | Mark | Comments                                              |
|----------|------------------------------------------------------|------|-------------------------------------------------------|
| 06.1     | Molecule contains more than one polypeptide (chain); | 1    | <b>REJECT</b> has a non-protein/prosthetic group/haem |

| Question | Marking guidance                                                                                                                                                                                                                                                                      | Mark | Comments                                                                                                                                                                                                                         |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06.2     | <p>1. At low <u>partial pressure</u> of oxygen / <u>partial pressure</u> between 0-2, little increase (in saturation of oxygen);</p> <p>2. At higher <u>partial pressure</u> of oxygen / <u>partial pressure</u> between 2-12, larger/steeper increase (in saturation of oxygen);</p> | 2    | <p><b>ALLOW</b> values between 0-2</p> <p><b>ALLOW</b> oxygen concentration/amount for partial pressure/kPA</p> <p><b>ALLOW</b> values between 2-12</p> <p><b>ALLOW</b> oxygen concentration/amount for partial pressure/kPa</p> |

| Question | Marking guidance                                                                     | Mark | Comments                                                                                           |
|----------|--------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------|
| 06.3     | (ensures/results in) greater uptake of oxygen (by Hb) in the lungs/exchange surface; | 1    | <b>ALLOW</b> more transport of oxygen to the tissues only if in context of greater overall uptake; |

| Question | Marking guidance                                                                                                     | Mark | Comments |
|----------|----------------------------------------------------------------------------------------------------------------------|------|----------|
| 06.4     | <p>1. <b>X</b> is hepatic artery;</p> <p>2. <b>Y</b> is hepatic portal vein;</p> <p>3. <b>Z</b> is hepatic vein;</p> | 3    |          |

| Question | Marking guidance | Mark | Comments                                                                                                                                                    |
|----------|------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06.5     | 2/2.1/1.9;;      | 2    | <b>ALLOW</b> 1 mark if answer is correct but incorrect values have been used e.g. $6.2 - 4.2 = 2.0$<br><b>ALLOW</b> 6.5/6.4 and 4.5/4.4 for <b>one mark</b> |

| Question | Marking guidance                                                                                   | Mark | Comments |
|----------|----------------------------------------------------------------------------------------------------|------|----------|
| 06.6     | (oxygen lower in diseased rats) because cancer cells are more metabolically active/respiring more; | 1    |          |

| Question | Marking guidance                                                                                                                                                                                                                                                                                     | Mark  | Comments                                                                     |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------|
| 06.7     | Any two from <ul style="list-style-type: none"> <li>• Species;</li> <li>• Sex;</li> <li>• Size;</li> <li>• Age;</li> </ul> Any two from <ul style="list-style-type: none"> <li>• Diet;</li> <li>• Same environment;</li> <li>• Same activity level;</li> <li>• No other diseases present;</li> </ul> | 3 max | <b>ALLOW</b> named example e.g. same concentration oxygen in air/temperature |

| Question | Marking guidance | Mark | Comments                                       |
|----------|------------------|------|------------------------------------------------|
| 07.1     | 2857;            | 1    | <b>DO NOT ALLOW</b> 2,857.1 or any other value |

| Question | Marking guidance                                                                            | Mark | Comments |
|----------|---------------------------------------------------------------------------------------------|------|----------|
| 07.2     | Differences in environmental factors/a combination of the effects of genes and environment; | 1    |          |

| Question | Marking guidance                                                                  | Mark | Comments                                |
|----------|-----------------------------------------------------------------------------------|------|-----------------------------------------|
| 07.3     | 1. <i>C. coli</i> and <i>C. jejuni</i> ;<br>2. They share the same <u>genus</u> ; | 2    | <b>IGNORE</b> Campylobacter unqualified |

| Question | Marking guidance | Mark | Comments                                                                           |
|----------|------------------|------|------------------------------------------------------------------------------------|
| 07.4     | Kingdom;         | 1    | <b>ALLOW</b> name of kingdom e.g. Eubacteria/Monera<br><b>IGNORE</b> domain/phylum |

| Question | Marking guidance                                                                                                                                                                                                                                   | Mark  | Comments |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 07.5     | 1. Asexual reproduction/can't reproduce together and make fertile offspring/can't sexually reproduce;<br>2. Horizontal transmission/conjugation;<br>3. Difficult to observe/identify physical characteristics;<br>4. Issues accessing the bacteria | 1 max |          |

| Question    | Marking guidance                                | Mark | Comments |
|-------------|-------------------------------------------------|------|----------|
| <b>07.6</b> | Less gut inflammation / improved mental health; | 1    |          |

| Question    | Marking guidance                                                                                                                                                               | Mark  | Comments                                                                                                                                                                                   |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>07.7</b> | 1. Diet e.g., sugar/salt/fat/alcohol/meat/dairy/probiotics levels;<br>2. Microorganism exposure/competition with pathogens;<br>3. Lifestyle<br><br>4. Exposure to antibiotics; | 2 max | <b>ALLOW</b> relevant examples e.g., Salmonella<br><b>ALLOW</b> relevant examples e.g., sleeping patterns/exercise levels/fitness level/smoking;<br><br><b>IGNORE</b> age/gender/body mass |