



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**BIOLOGY**

**0610/33**

Paper 3 Theory (Core)

**October/November 2016**

**MARK SCHEME**

Maximum Mark: 80

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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This document consists of **11** printed pages.

|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 2</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

**Abbreviations used in the Mark Scheme:**

- ; separates marking points
- / alternatives
- I ignore
- R reject
- A accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording
- AVP any valid point
- ecf credit a correct statement / calculation that follows a previous wrong response
- ora or reverse argument
- ( ) the word / phrase in brackets is not required, but sets the context
- underline actual words given must be used by the candidate (or grammatical variants of them)

|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 3</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| Question | Answer  | Mark            | Further guidance  |
|----------|---|-----------------|---|
| 1(a)     | all have a backbone ;   | 1               |   |
| 1(b)(i)  | birds / Aves;   | 1               |   |
| 1(b)(ii) | <i>any 2 from</i><br>feathers;<br>(pair of) wings;<br>beaks;<br>(lay) <u>hard-shelled</u> eggs; | 2               | <b>R</b> features shared with other vertebrates<br>e.g. warm-blooded / 'lay eggs' unqualified / claws |
|          |   | <b>Total: 4</b> |   |

| Question | Answer  | Mark            | Further Guidance                                     |
|----------|---|-----------------|--|
| 2(a)(i)  | xylem;  | 1               | <b>A</b> underline or circle the correct word        |
| 2(a)(ii) | (cell or cellulose) wall;   | 1               | <b>R</b> cell membrane<br><b>A</b> vessel / tracheid |
| 2(b)     | <i>transport:</i><br>it is hollow / has no contents / has no cytoplasm;<br><br><i>support:</i><br>thick / rigid / strong / lignified walls; | 2               |  |
| 2(c)     | nucleus / cytoplasm / cell membrane / vacuole;  | 1               |  |
|          |   | <b>Total: 5</b> |  |
| 3(a)     | 60 (beats per minute);;   | 2               | 15 × 4   |

|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 4</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| <b>Question</b> | <b>Answer</b>   | <b>Mark</b>     | <b>Further guidance</b> |
|-----------------|---|-----------------|-------------------------|
| 3(b)            | valves closing;   | <b>1</b>        |                         |
| 3(c)(i)         | heart rate, increases / faster;<br><br>more than doubled / 12 beats in 5 secs;  | <b>2</b>        | ! beats harder          |
| 3(c)(ii)        | (more) exercise / increased stress levels / fear / excitement / adrenaline / (named) stimulant;   | <b>1</b>        |                         |
| 3(d)            | <i>description:</i><br>blockage of the coronary artery;<br><br><i>risk factors any 1 from:</i><br>smoking / lack of exercise / stress / poor diet i.e. too much fat / genetic factors e.g. high cholesterol / obesity / age / gender; | <b>2</b>        |                         |
|                 |   | <b>Total: 8</b> |                         |

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|---------------|--|-----------------|--------------|
| <b>Page 5</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| <b>Question</b> | <b>Answer</b>   | <b>Mark</b>      | <b>Further guidance</b>   |
|-----------------|---|------------------|---------------------------|
| 4(a)            | the manufacture of carbohydrate / sugars;<br>using the energy from light;<br>start of (most) food chains /AW;   | <b>3</b>         |                           |
| 4(b)(i)         | chlorophyll;  | <b>1</b>         |                           |
| 4(b)(ii)        | carbon dioxide;   | <b>1</b>         |                           |
| 4(b)(iii)       | oxygen;   | <b>1</b>         |                           |
| 4(c)(i)         | 24 (bubbles per minute);  | <b>1</b>         |                           |
| 4(c)(ii)        | the rate of photosynthesis / number of bubbles, decreases as the distance increases ora;<br><br>the rate of photosynthesis / number of bubbles, increases as light intensity increases ora;     | <b>2</b>         |                           |
| 4(c)(iii)       | 3 (bubbles per minute);   | <b>1</b>         |                           |
| 4(d)            | <i>either:</i><br>idea that carbon dioxide;<br>is being used up / is in short supply;<br><i>or:</i><br>idea that the water is heated up;<br>(this) may damage enzymes / plant (starts to) die ; | <b>2</b>         | <b>A</b> enzymes denature |
|                 |   | <b>Total: 12</b> |                           |

|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 6</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| Question  | Answer   | Mark            | Further guidance |
|-----------|--|-----------------|------------------|
| 5(a)      |  | <b>3</b>        |                  |
| 5(b)(i)   | mechanical <b>and</b> chemical;  | <b>1</b>        |                  |
| 5(b)(ii)  | biological catalyst;<br>made of protein;   | <b>2</b>        |                  |
| 5(b)(iii) | amylase – starch;<br>protease / pepsin – protein;<br>lipase – fats;  | <b>1</b>        |                  |
| 5(b)(iv)  | (enzymes) are specific / have a complementary shape;<br><br>there are many different, foods / nutrients / substrates, to break down; | <b>2</b>        |                  |
|           |  | <b>Total: 9</b> |                  |

|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 7</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| <b>Question</b> | <b>Answer</b>   | <b>Mark</b>     | <b>Further guidance</b>   |
|-----------------|---|-----------------|---|
| 6(a)(i)         | <i>any two from:</i><br>automatic/involuntary (response) /AW;<br><br>fast/immediate/sudden (response);<br><br>same response;<br><br>integrates/co-ordinates, stimuli and responses; | <b>2</b>        | <b>A</b> unconsciously / without thinking                               |
| 6(a)(ii)        | <i>idea</i> that responses are protective / needed for survival / keep safe / avoid getting hurt / AW;  | <b>1</b>        |   |
| 6(b)            | receptors;<br>sensory neurone;<br>relay neurone;<br>motor neurone;<br>effectors;  | <b>4</b>        | All correct = 4<br>3 or 4 correct = 3<br>2 correct = 2<br>1 correct = 1 |
| 6(c)(i)         | synapse;  | <b>1</b>        |   |
| 6(c)(ii)        | spinal cord / CNS / brain;  | <b>1</b>        |   |
|                 |   | <b>Total: 9</b> |   |

|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 8</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| <b>Question</b> | <b>Answer</b>   | <b>Mark</b>     | <b>Further guidance</b> |
|-----------------|---|-----------------|-------------------------|
| 7(a)            | <i>any four from:</i><br>slow and easy to catch;<br>not enough left to reproduce;<br>not enough grow to breeding age AW;<br>hunting drove them out of their natural habitats;<br>difficult to find mates;<br>competition for food / not enough food;<br>introduction of disease;<br>destruction of habitat;<br>(goats) damaged their eggs / hatchlings; | <b>max 4</b>    |                         |
| 7(b)            | <i>any two from:</i><br>captive breeding program;<br>zoos / reserves / national parks;<br>ban hunting;<br>conserve / protect, habitat AW;<br>remove predators / competitors;<br>educate / awareness / research;<br>idea of ecotourism;  | <b>max 2</b>    |                         |
| 7(c)            | <i>any two from:</i><br>more, primary consumers / herbivores / prey;<br>fewer producers;<br>increase in the numbers of <u>other</u> secondary consumers;<br>fewer, tertiary consumers;  | <b>max 2</b>    |                         |
|                 |   | <b>Total: 8</b> |                         |



|               |  |                 |              |
|---------------|--|-----------------|--------------|
| <b>Page 9</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| <b>Question</b> | <b>Answer</b>  | <b>Mark</b>      | <b>Further guidance</b>                                     |
|-----------------|--|------------------|---|
| 8(a)(i)         | has two identical alleles of a particular gene;<br>pure breeding;  | <b>2</b>         |   |
| 8(b)(i)         | a version of a gene;   | <b>1</b>         |   |
| 8(b)(ii)        | few plants produced green beans / most plants produced purple beans;<br><br>allele for green beans was masked by the allele for purple beans AW;<br><br>need, two recessive / no dominant, alleles to get green beans; | <b>2</b>         |   |
| 8(c)            | <i>genotype</i> is the organisms, genetic make-up / alleles / genes;<br><br><i>phenotype</i> is the organisms, observable features / outward appearance / how the genes are expressed ;                                | <b>2</b>         |   |
| 8(d)            | selective breeding;  | <b>1</b>         | <b>A</b> artificial selection                               |
| 8(e)            | feature of a genetically engineered crop that increases production;<br>e.g. pesticide / herbicide / drought / frost, resistance<br><br>descript of how this increases production;                                      | <b>2</b>         | <b>I</b> examples of genetically engineered micro-organisms |
|                 |  | <b>Total: 10</b> |   |

|                |  |                 |              |
|----------------|--|-----------------|--------------|
| <b>Page 10</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|                | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| Question | Answer   | Mark             | Further guidance             |
|----------|--|------------------|------------------------------|
| 9(a)     | <pre> graph LR     movement[movement] --- absorption[absorption]     passing[passing] --- assimilation[assimilation]     taking[taking] --- egestion[egestion]     ingestion[ingestion]     ingestion ... dots[...] </pre> | <b>3</b>         | 1 mark for each correct line |
| 9(b)(i)  | <b>X</b> on an incisor;<br>incisor;  | <b>2</b>         |                              |
| 9(b)(ii) | <b>Y</b> on a molar;<br>molar/premolar;  | <b>2</b>         |                              |
| 9(c)     | bacteria feed on sugars;<br>bacteria respire;<br>(this)produces acid;<br>acid dissolves, enamel/ A/ dentine/ B;<br>cavities are formed;  | <b>3</b>         |                              |
|          |  | <b>Total: 10</b> |                              |

|                |  |                 |              |
|----------------|--|-----------------|--------------|
| <b>Page 11</b> | <b>Mark Scheme</b>                             | <b>Syllabus</b> | <b>Paper</b> |
|                | <b>Cambridge IGCSE – October/November 2016</b> | <b>0610</b>     | <b>33</b>    |

| <b>Question</b> | <b>Answer</b>  | <b>Mark</b>     | <b>Further guidance</b>  |
|-----------------|--|-----------------|--|
| 10(a)           | 17.5 (%);;   | <b>2</b>        | $(35/200) \times 100$  |
| 10(b)(i)        | 65(J);;  | <b>2</b>        | $200 - (100 + 35)$   |
| 10(b)(ii)       | <i>any 1 from:</i><br>(named) movement;<br>excretion;<br>repair;<br>growth;<br>digestion;<br>active transport; | <b>1</b>        | <b>A</b> any energy consuming life process except reproduction and respiration |
|                 |  | <b>Total: 5</b> |  |