

**CAMBRIDGE INTERNATIONAL EXAMINATIONS****Cambridge International General Certificate of Secondary Education****MARK SCHEME for the March 2015 series****0610 BIOLOGY****0610/22**

Paper 2 (Core Theory), maximum raw mark 80

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### Abbreviations used in the Mark Scheme

- ; separates marking points
- / separates alternatives within a marking point
- **R** reject
- **ignore** mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- **AW** alternative wording (accept other ways of expressing the same idea)
- underline words underlined (or grammatical variants of them) must be present
- wiggly underline the idea conveyed by the word(s) underlined must be present in the answer
- **max** indicates the maximum number of marks that can be awarded
- **mark independently** the second mark may be given even if the first mark is wrong
- **ecf** credit a correct statement that follows a previous wrong response
- ( ) the word / phrase in brackets is not required, but sets the context
- **ora** or reverse argument
- **AVP** any valid point

|               |                                     |                 |              |
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| Question number | Mark Scheme                                                                                                                                                                                                                                                                                                           | Mark                                         | Guidance                                   |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|---|-------------|---|------------|---|-----------------|---|------------------|---|----------------|---|-----------------|---------------------------------|---------------------------------------------------------------------------------------|
| 1 (a)           | <table><tr><td>letter</td><td>type of cell</td></tr><tr><td>A</td><td>guard cell;</td></tr><tr><td>B</td><td>phagocyte;</td></tr><tr><td>C</td><td>red blood cell;</td></tr><tr><td>D</td><td>sensory neurone;</td></tr><tr><td>E</td><td>motor neurone;</td></tr><tr><td>F</td><td>(palisade cell)</td></tr></table> | letter                                       | type of cell                               | A | guard cell; | B | phagocyte; | C | red blood cell; | D | sensory neurone; | E | motor neurone; | F | (palisade cell) | <br><br><br><br><br><br>[max 4] | <br><br><br><br>4 or 5 correct = 4<br>3 correct = 3<br>2 correct = 2<br>1 correct = 1 |
| letter          | type of cell                                                                                                                                                                                                                                                                                                          |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| A               | guard cell;                                                                                                                                                                                                                                                                                                           |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| B               | phagocyte;                                                                                                                                                                                                                                                                                                            |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| C               | red blood cell;                                                                                                                                                                                                                                                                                                       |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| D               | sensory neurone;                                                                                                                                                                                                                                                                                                      |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| E               | motor neurone;                                                                                                                                                                                                                                                                                                        |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| F               | (palisade cell)                                                                                                                                                                                                                                                                                                       |                                              |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| (b) (i)         | photosynthesis / make carbohydrate / glucose / sugar;                                                                                                                                                                                                                                                                 | [1]                                          | <b>ignore</b> to make food                 |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| (ii)            | contains (many) chloroplasts;<br>to absorb energy / light;<br><br>long and thin / elongated;<br>so many can fit into a small area (of the leaf);<br><br>chloroplasts close to edge of cell / thin cytoplasmic layer;<br>so that more light / energy can be absorbed;                                                  | <br><br><br>[max 4]<br><br><b>[Total: 9]</b> | 1 mark for adaptation, 1 mark for function |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |
| 2 (a)           | (aerobic) respiration;                                                                                                                                                                                                                                                                                                | [1]                                          |                                            |   |             |   |            |   |                 |   |                  |   |                |   |                 |                                 |                                                                                       |

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|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |                                                 |
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| (b) (i) | <p>link of lower dry mass with less growth;</p> <p><b>B</b> (no nitrogen) plant cannot produce proteins / amino acids / enzymes;</p> <p><b>C</b> (no magnesium) plant cannot make chlorophyll; cannot photosynthesise / produce carbohydrate / sugar / glucose;</p> <p>reference to growth (more cells / larger cells) requiring synthesis of chemicals / AW;</p> <p>no carbohydrates / glucose / sugar made means limited energy supplies (for growth);</p> | [max 4]               |                                                 |
| (ii)    | (C plant's) leaves pale green / yellow / AW; growth stunted / AW;                                                                                                                                                                                                                                                                                                                                                                                            | [max 1]<br>[Total: 6] |                                                 |
| 3 (a)   | <p><b>P</b> trachea / windpipe;</p> <p><b>Q</b> bronchus / cartilage ring;</p> <p><b>R</b> air sac / alveolus;</p> <p><b>S</b> diaphragm;</p>                                                                                                                                                                                                                                                                                                                | [4]                   | <p><b>A</b> bronchi</p> <p><b>A</b> alveoli</p> |
| (b) (i) | x 130;                                                                                                                                                                                                                                                                                                                                                                                                                                                       | [1]                   |                                                 |
| (ii)    | nitrogen is not used up / produced by (the cells of) the body;                                                                                                                                                                                                                                                                                                                                                                                               | [1]                   | <b>A</b> nitrogen is not very reactive          |
| (iii)   | <p>air sacs / alveoli have a moist lining;</p> <p>water evaporates (from lining into air);</p> <p>water (in lining) replaced by osmosis from cells (of alveoli) / AW;</p>                                                                                                                                                                                                                                                                                    | [max 2]               |                                                 |

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|         |                                                                                                                                                                                                                           |                    |                                                                                                                                      |
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| (c) (i) | (oxygen uptake) increases;<br>reaches a maximum;<br>specific reference to figures in table;                                                                                                                               | [max 2]            |                                                                                                                                      |
| (ii)    | $(12 \times 9 =) 108$ (kJ);                                                                                                                                                                                               | [1]                |                                                                                                                                      |
| (iii)   | $30/60 \times 12 = 6$ ;<br>$6/18 = 0.33$ ;                                                                                                                                                                                | [2]<br>[Total: 13] |                                                                                                                                      |
| 4 (a)   | (selected for) greater volume/larger animal/higher yield of meat;<br>smaller/absent tusks;                                                                                                                                | [2]                |                                                                                                                                      |
| (b)     | wild pigs allowed to breed;<br>bigger pigs/pigs with small tusks selected (from offspring);<br>repeat above procedure;<br>for many generations;<br>'saddleback' type pigs interbreed/not allowed to breed with wild pigs; | [max 3]            |                                                                                                                                      |
| (c)     | parental genotype $Nn \times (nn)$ ;<br>gametes $N + n \times n + n$ ;<br><br>offspring genotype $Nn \quad nn \quad Nn \quad nn$ ;<br>offspring phenotype    white   brown   white   ( <i>brown</i> );                    | [4]<br>[Total: 9]  | <b>A</b> ecf if a mistake is made, but each line must correspond to the previous one<br><br><b>A</b> recessive given first e.g. $nN$ |

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|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                         |                                                                                                                      |
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| <b>5 (a)</b>   | <p>carbon dioxide;<br/>global warming / greenhouse effect;</p> <p>sulfur dioxide;<br/>acid rain / acidification / trees and plants die / aquatic organisms die / leaches minerals from soil;</p> <p>nitrogen oxides;<br/>global warming / acid rain / trees and plants die / aquatic organisms die / leaches minerals from soil;</p> <p>methane;<br/>global warming;</p> <p>ozone;<br/>decrease in level of photosynthesis / decrease in flower and fruit production;</p> <p>AVP;;</p> | [max 4]                                 | <p>1 mark for gas and 1 mark for effect (max 1 effect per gas)</p> <p><b>A</b> rocks / stone of buildings eroded</p> |
| <b>(b)</b>     | <p>extinction of species / loss of biodiversity / loss of habitat;<br/>disruption of food chains;<br/>increase in carbon dioxide resulting in global warming;<br/>loss of soil / soil erosion;<br/>flooding;<br/>loss of potential medicines / useful chemicals;<br/>changes to water cycle / weather patterns / desertification;<br/>AVP;</p>                                                                                                                                         | <p>[max 3]</p> <p><b>[Total: 7]</b></p> |                                                                                                                      |
| <b>6 (a)</b>   | from ovulation to start of menstruation;                                                                                                                                                                                                                                                                                                                                                                                                                                               | [1]                                     |                                                                                                                      |
| <b>(b) (i)</b> | 27 days;                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | [1]                                     |                                                                                                                      |

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|         |                                                                                                                                                                                                                                                                 |                               |                                                                                                     |
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| (ii)    | 14 <sup>th</sup> ;<br>(to) 17 <sup>th</sup> ;                                                                                                                                                                                                                   | [2]                           |                                                                                                     |
| (c)     | (loss of blood) means fewer red blood cells;<br>results in pale colour;<br>(loss of red blood cells) means less haemoglobin;<br>(so) less oxygen carried (by blood);<br>cells cannot carry out sufficient respiration;<br>causing lack of energy and tiredness; | [max 3]                       |                                                                                                     |
| (d)     | oxygen;<br>glucose;<br>amino acids;<br>glycerol;<br>fatty acids;<br>minerals / iron / calcium;<br>vitamins / vitamin C / vitamin D;<br>antibodies;<br>water;                                                                                                    | [max 3]                       | <b>A</b> any suitable named vitamin or mineral ion<br><b>ignore</b> nutrients / proteins / hormones |
| (e) (i) | colour;<br>taste / sweetness;<br>succulence / AW;<br>smell;                                                                                                                                                                                                     | [max 1]                       |                                                                                                     |
| (ii)    | prevents overcrowding / less competition;<br>for minerals / water;<br>for light;<br>new habitat / colonisation;<br>(existing) variations may be advantageous in new habitat;                                                                                    | [max 2]<br><b>[Total: 13]</b> |                                                                                                     |

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|         |                                                                                                                                                                                                                          |        |         |                |
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| 7 (a)   | function                                                                                                                                                                                                                 | letter | [4]     |                |
|         | ingestion of food                                                                                                                                                                                                        | A;     |         |                |
|         | bile storage                                                                                                                                                                                                             | C;     |         |                |
|         | fat digestion                                                                                                                                                                                                            | G;     |         |                |
|         | egestion                                                                                                                                                                                                                 | H;     |         |                |
| (b)     | peristalsis;                                                                                                                                                                                                             |        | [1]     |                |
| (c) (i) | fat digestion produces fatty acids (and glycerol);<br>fatty acids lower pH;                                                                                                                                              |        | [2]     |                |
| (ii)    | (B contains bile) which emulsifies fats;<br>increases surface area for enzyme/lipase action / AW;<br>(so) fatty acids are produced more quickly / more rapid fat digestion;<br>colour of indicator changes more quickly; |        | [max 3] |                |
| (d)     | hot water could denature the enzyme;<br>changes the shape of active site of enzyme/enzyme inactive;<br>tube C shows that boiled enzyme does not digest fats;                                                             |        | [max 2] | R kills enzyme |

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|           |                                                                                                                                                                                                     |                            |                                                                   |
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| (e)       | obesity;<br>(which) leads to joint damage;<br>blockage of blood vessels / heart disease / CHD /<br>atherosclerosis / cardiac arrest;<br>high blood pressure;<br>type 2 diabetes;<br>cancer;<br>AVP; | [max 1]<br><br>[Total: 13] |                                                                   |
| 8 (a) (i) | (oak) tree / primrose;                                                                                                                                                                              | [1]                        |                                                                   |
| (ii)      | (oak) tree → flies; → (spiders) →<br>blue tits → owl;                                                                                                                                               | [2]                        | 1 mark for first two organisms<br>1 mark for second two organisms |
| (b) (i)   | group of organisms of the same species;<br>living in the same area (at the same time);                                                                                                              | [2]                        |                                                                   |
| (ii)      | position of an organism in a food chain/food web;<br>example from food web in Fig. 8.1;                                                                                                             | [2]                        | e.g. flies ate at second trophic level                            |
| (c) (i)   | decomposer / bacteria / fungi;                                                                                                                                                                      | [1]                        |                                                                   |
| (ii)      | releases minerals from leaves;<br>minerals absorbed (into plant) from soil;<br>releases carbon dioxide;<br>carbon dioxide absorbed by leaves for photosynthesis;<br>AVP;                            | [max 2]<br><br>[Total: 10] |                                                                   |