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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2010 question paper  
for the guidance of teachers**

**0610 BIOLOGY**

**0610/21**

Paper 2 (Core Theory), maximum raw mark 80

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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### General notes

Do not exceed the section sub-totals or question maxima.

Symbols used in mark scheme and guidance notes.

/ separates alternatives for a marking point

; separates points for the award of a mark

MP mark point – used in guidance notes when referring to numbered marking points

OWTTE or words to that effect

ORA or reverse argument / approach

A accept – as a correct response

R reject – this is marked with a cross and any following correct statements do not gain any marks

I ignore / irrelevant / inadequate – this response gains no mark, but any following correct answers can gain marks.

( ) the word / phrase in brackets is not required to gain marks but sets the context of the response for credit e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark is awarded.

mitosis underlined words – this word only

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| <p><b>1 (a)</b> 1 pinna / ear flap / visible part of external ear;<br/>2 hair / fur;<br/>3 vibrissae / whiskers;<br/>4 mammary glands / nipples / teats;<br/><br/>any two – 1 mark each [2]</p> <p><b>(b)</b> 1 (hard) exoskeleton / OWTTE;<br/>2 segmented body;<br/>3 jointed legs;<br/>4 three or more pairs of legs;<br/>any two – 1 mark each [2]</p> <p><b>[Total: 4]</b></p>                                                                                                                 | <p>A – external ear</p> <p>A – breasts / udders<br/>A – heterodont dentition / OWTTE</p>                                                                                                                                                             |
| <p><b>2 (a) (i)</b> (stationary phase) C;<br/>(lag phase) A; [2]</p> <p><b>(ii)</b> any two letters (from A, B, C, D);<br/>other two letters; [2]</p> <p><b>(b) (i)</b> 1 availability of food supply;<br/>2 number of predators;<br/>3 incidence of disease;<br/><br/>any two – 1 mark each [2]</p> <p><b>(ii)</b> 1 more food; – rate gets faster;<br/>2 more predators; – rate gets slower;<br/>3 more disease; – rate gets slower;<br/>any two – 2 marks each [4]</p> <p><b>[Total: 10]</b></p> | <p>A – “all of them” / A–D / OWTTE – 2 marks</p> <p>A – ref. to an additional competitor species</p> <p>A – other valid points such as rate of egg / offspring production / suitable ref. to poor weather</p> <p>A – ORA<br/>A – ORA<br/>A – ORA</p> |

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| 3 (a) (i) left ventricle;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [1] |                                                                                                                                         |
| (ii) (chambers) A and B;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | [1] | A – RA and RV, right atrium and right ventricle<br>Note – both needed for mark                                                          |
| (b) <u>pulmonary artery</u> <u>pulmonary vein</u><br>1      small lumen                      large lumen;<br>2      carries deoxygenated blood                      carries oxygenated blood;<br>3      away from heart /                      towards heart /<br>towards lungs                      away from lungs;<br>4      thicker / more muscular walls                      thinner / less muscular walls;<br>5      have a pulse                      no pulse;<br>6      high pressure                      low pressure;<br>any three – 1 mark each | [3] | both needed for mark<br>need comparison for each row of table<br><br>A – no valves versus valves<br>I – refs to elastic tissue / fibres |
| (c) (i) prevent backflow;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [1] | A – specific example in heart                                                                                                           |
| rise in pressure in (right) atrium;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | [1] | A – because of inflow of blood (from body / vena cava) /<br>because (atrial) wall / muscles contract / systole                          |
| (ii) pressure in atrium greater than in ventricle;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | [2] |                                                                                                                                         |
| prevents backflow / return to atrium;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | [2] |                                                                                                                                         |
| (iii) so blood is forced into arteries / to lungs / body;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [2] | A – pushed / enters                                                                                                                     |
| [Total: 10]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |                                                                                                                                         |

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| <p><b>4 (a)</b> stoma correctly labelled;<br/>cuticle correctly labelled;</p> <p>vascular bundle correctly labelled; [3]</p> <p><b>(b) (i)</b> allows light to penetrate / OWTTE (for photosynthesis); [1]</p> <p><b>(ii)</b> reduces water loss / transpiration from leaf; [1]</p> <p><b>(iii)</b> 1 bring water (to leaf cells);<br/>2 bring minerals / named mineral (to leaf cells);<br/>3 carry away glucose / amino acids / products of photosynthesis (from leaf cells);<br/>4 provide support / skeleton for leaf / OWTTE;<br/>any two – 1 mark each [2]</p> <p><b>(c) (i)</b> carbon dioxide;<br/>water; [2]</p> <p><b>(ii)</b> 1 for (release of) energy / respiration;<br/>2 to form starch (for storage);<br/>3 to form fats / oils (for storage);<br/>4 to form amino acids / proteins / enzymes;<br/>5 to form cellulose / cell walls;<br/>any three – 1 mark each [3]</p> <p><b>[Total: 12]</b></p> | <p>A – bracket label / label line to pore or guard cell<br/>A – label line to cuticle associated with either upper or lower epidermis<br/>A – bracket label / label line to xylem and / or phloem</p> <p>A – prevents water loss, protects against entry of pathogens / OWTTE<br/>I – ref. to xylem and phloem<br/>I – starch, carbohydrate. A – sucrose, sugar.</p> <p>I – refs to light or energy<br/>R – produce</p> |
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| <p><b>5 (a) (i)</b> (substrates) glucose + oxygen;<br/>(products) carbon dioxide + water; [2]</p> <p><b>(ii)</b></p> <table border="0"> <tr> <td><u>aerobic respiration</u></td> <td><u>anaerobic respiration</u></td> </tr> <tr> <td>1 oxygen used</td> <td>no oxygen used;</td> </tr> <tr> <td>2 lots of energy released</td> <td>little energy released;</td> </tr> <tr> <td>3 no lactic acid produced</td> <td>lactic acid produced;</td> </tr> <tr> <td>4 carbon dioxide formed</td> <td>no carbon dioxide formed;</td> </tr> <tr> <td colspan="2">any three – 1 mark each [3]</td> </tr> </table> <p><b>(b) (i)</b></p> <ol style="list-style-type: none"> <li>1 yeast respire glucose / sugar (in dough);</li> <li>2 produces carbon dioxide (bubbles);</li> <li>3 causes dough to rise;</li> <li>4 on baking bubbles expand;</li> <li>5 form air spaces in bread / make bread porous / light;</li> </ol> <p>any three – 1 mark each [3]</p> <p><b>(ii)</b></p> <ol style="list-style-type: none"> <li>1 in little / no oxygen conditions;</li> <li>2 yeast respire anaerobically;</li> <li>3 ethanol / alcohol produced;</li> <li>4 releases carbon dioxide / adds “gas” to product;</li> </ol> <p>any two – 1 mark each [2]</p> <p><b>[Total: 10]</b></p> | <u>aerobic respiration</u>             | <u>anaerobic respiration</u> | 1 oxygen used | no oxygen used; | 2 lots of energy released | little energy released; | 3 no lactic acid produced | lactic acid produced; | 4 carbon dioxide formed | no carbon dioxide formed; | any three – 1 mark each [3] |  | <p>I – refs to energy / ATP<br/>A – chemical formulae as long as a side of the equation is balanced</p> <p>A – refs to number of ATPs produced</p> <p>A – occurs all the time / only when short of oxygen</p> <p>A – breaks down / uses</p> <p>A – makes bread bigger</p> <p>A – fermentation</p> <p>A – makes drinks fizzy</p> |
| <u>aerobic respiration</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <u>anaerobic respiration</u>           |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |
| 1 oxygen used                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | no oxygen used;                        |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |
| 2 lots of energy released                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | little energy released;                |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |
| 3 no lactic acid produced                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | lactic acid produced;                  |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |
| 4 carbon dioxide formed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | no carbon dioxide formed;              |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |
| any three – 1 mark each [3]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                        |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |
| <p><b>6</b> gene;<br/>meiosis;<br/>diploid;<br/>phenotype;<br/>recessive;<br/>heterozygous; [6]</p> <p><b>[Total: 6]</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>Only these words and no others.</p> |                              |               |                 |                           |                         |                           |                       |                         |                           |                             |  |                                                                                                                                                                                                                                                                                                                                 |

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| <p>7 1 carbon monoxide;<br/>2 from (incomplete) combustion of fossil fuels / cigarettes / from vehicles;<br/>3 sulfur dioxide;<br/>4 burning fossil fuels / vehicle exhaust fumes;<br/>5 carbon dioxide;<br/>6 burning of fossil fuels / deforestation by burning / respiration by increasing world population / from vehicles;<br/>7 methane;<br/>8 from incomplete decay of organic matter;<br/>9 smoke (particles) / carbon / soot;<br/>10 from forest fires / factories;</p> <p>any three pairs – 2 marks each</p> <p>[6]</p> <p><b>[Total: 6]</b></p> | <p>A – fuel / named fossil fuels</p> <p>A – sulphur dioxide</p> <p>R – cigarette smoking</p> <p>A – other air pollutants with qualification<br/>e.g. (aerosol) gases / CFCs from aerosols / refrigerators<br/>e.g. oxides of nitrogen from vehicle exhaust<br/>e.g. dust particles from quarrying etc.</p> |
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| <p>8 (a) A – ovule;<br/>B – sepal; [2]</p> <p>(b) (i) transfer of pollen (grains);<br/>from male part of plant (anther of stamen) to female part of the<br/>plant (stigma); [2]</p> <p>(ii) 1 C / petals attract insects to flower;<br/>2 C / petals enclose E / anthers / D / stigma (to prevent wind<br/>pollination);<br/>3 insect picks up pollen (from E / anther);<br/>4 insect deposits pollen on D / stigma;<br/>5 D / stigma has sticky surface to retain pollen;<br/>any three – 1 mark each [3]</p> <p>(c) 1 smaller / less conspicuous flowers / OWTTE;<br/>2 petals do not enclose anthers / stigma;<br/>3 (anther on) longer filament / stamen longer;<br/>4 (stigma on) longer style;<br/>5 stigma feathery;<br/>6 no nectary / scent;<br/>any four – 1 mark each [4]</p> <p>(d) oxygen – for respiration / release of energy;<br/>suitable temperature – allows enzyme catalysed reactions to occur /<br/>speeds up reactions / metabolism / OWTTE;<br/>water – forms solutions of chemicals / reactions occur in solution /<br/>hydrolysis / expansion of cells; [3]</p> <p>[Total: 14]</p> | <p>I – ovary<br/>A – calyx</p> <p>A – flower for plant<br/>A – from anther / stamen to stigma</p> <p>A – stamens</p> <p>A – petals not brightly coloured<br/>A – anthers / stigma outside of flower / petals</p> <p>I – produce energy<br/>A – enzymes work better<br/>A – (too high) denatures enzymes<br/>A – activates enzymes</p> |
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| <p><b>9 (a)</b> skin;<br/>named component in sweat;<br/>lungs;<br/>named component in exhaled air;</p> <p><b>(b)</b> 1 ref. to filtration;<br/>2 (renal vein contains) substances reabsorbed (from filtrate);<br/>3 some substances not reabsorbed;<br/>4 (some) glucose used for respiration (in kidney);<br/>5 (some) oxygen used for respiration (in kidney);<br/>6 (most of) urea not reabsorbed;<br/>7 water (largely) reabsorbed;<br/>8 sodium / sodium salts (largely) reabsorbed;<br/>any four – 1 mark each</p> | <p>[4]</p> <p>A – sweat gland<br/>A – water / salts</p> <p>A – carbon dioxide / water (vapour)<br/>A – liver and bile pigments for 2 marks</p> <p>If “removed” instead of “reabsorbed” is used do not accept its first use but do accept for later uses<br/>A – “selective reabsorption happens” = MP2 and MP3</p> <p>[4]</p> <p><b>[Total: 8]</b></p> |
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