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**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

**MARK SCHEME for the May/June 2013 series**

**0610 BIOLOGY**

**0610/53**

Paper 5 (Practical Test), maximum raw mark 40

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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**Mark schemes will use these abbreviations**

- ; separates marking points
- / alternatives
- R reject
- A accept (for answers correctly cued by the question)
- I ignore as irrelevant
- ecf error carried forward
- AW alternative wording (where responses vary more than usual)
- AVP alternative valid point
- ORA or reverse argument
- OWTTE or words to that effect
- underline actual word given must be used by candidate (grammatical variants excepted)
- ( ) the word / phrase in brackets is not required but sets the context
- D, L, T, Q quality of: drawing / labelling /
- table / detail as indicated
- max indicates the maximum number of marks

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|           | Answer                                                                                                                                                                                                                                                                                                                                                                   | Marks   | Guidance for Examiners                                                                                                                                                                                                                                           |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 (a) (i) | Yellow/orange to blue/black;                                                                                                                                                                                                                                                                                                                                             | [1]     | Check Supervisor's Report.                                                                                                                                                                                                                                       |
| (ii)      | Zone drawn around <b>P/Q</b> ;<br>Label clear zone;<br>Zone around <b>P</b> larger than <b>Q</b> ;<br>Measurement recorded;<br>No zone around <b>R</b> ;                                                                                                                                                                                                                 | [max 4] | Check Supervisor's Report.<br>If Report indicates otherwise – both equal accept.                                                                                                                                                                                 |
| (iii)     | <i>Explanation:</i> –<br><b>R</b> no clear zone but <b>P</b> and <b>Q</b> do;<br>Therefore enzyme must break down starch;<br><br><b>P</b> must have more (concentrated) enzyme (as wider clear area);<br><b>Q</b> has less enzyme in the water to breakdown starch;<br>to produce clear areas ;<br>no enzyme – no breakdown of starch/water does not contain enzyme /AW; | [max 3] | Accept 'iodine changed since starch not broken down'.<br>Ignore 'growth'.                                                                                                                                                                                        |
| (iv)      | amylase/carbohydase;                                                                                                                                                                                                                                                                                                                                                     | [1]     |                                                                                                                                                                                                                                                                  |
| (v)       | For comparison/control;                                                                                                                                                                                                                                                                                                                                                  | [1]     | Accept to see result without enzyme.                                                                                                                                                                                                                             |
| (b)       | 1. remove testa/germinate peas;<br>2. preparation of 'enzyme from seed';<br>3. leave for 15 mins and then add iodine solution;<br>4. look for colour <u>change</u> /black to clear;<br>5 repeat for reliability/or to calculate an average;<br>6 controlled variable;                                                                                                    | [max 4] | For example: place pea on plate/grind up with specified volume of water to extract enzyme and place in hole in starch agar jelly/cut the seed in half/ <b>AW</b> ;<br>Accept idea of set time period. 1h max.<br><br>Same size of pea/same species/same type/AW. |

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|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                    |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---|---|---|---|--|---|---|--|---|---|--|---|---|---------|-------------|---|------|---|----|---------|-------------|----|-----|---|----|-----|---|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (c)                                | <p><b>O</b> – outline;</p> <p><b>S</b> – size;</p> <p><b>D</b> – detail – show side root developing <b>and</b> split testa;<br/>one label from: testa/radicle/plumule/cotyledon;</p>                                                                                                                                                                                                                                                                                                                            | [4]                                | <p>Whole page allowed for drawing.<br/>Check Supervisor’s Report – living specimen provided.<br/>Larger than Fig 101 mm+</p> <p>Not seed/shoot/root.</p>                                                                                                                                                             |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| (d)(i)                             | <table><tr><td>number of pea seeds<br/>in each pod</td><td>tally</td><td>number of pods</td></tr><tr><td>4</td><td>/</td><td>1</td></tr><tr><td>5</td><td></td><td>0</td></tr><tr><td>6</td><td></td><td>0</td></tr><tr><td>7</td><td></td><td>0</td></tr><tr><td>8</td><td>already</td><td>completed 3</td></tr><tr><td>9</td><td>////</td><td>4</td></tr><tr><td>10</td><td>already</td><td>completed 7</td></tr><tr><td>11</td><td>###</td><td>5</td></tr><tr><td>12</td><td>///</td><td>3</td></tr></table> | number of pea seeds<br>in each pod | tally                                                                                                                                                                                                                                                                                                                | number of pods | 4 | / | 1 | 5 |  | 0 | 6 |  | 0 | 7 |  | 0 | 8 | already | completed 3 | 9 | //// | 4 | 10 | already | completed 7 | 11 | ### | 5 | 12 | /// | 3 | [2] | <p>Accept blank or 0 for 5 to 7 seeds in pod.<br/>One for correct tally and number of pods.<br/>All boxes correct – 2 marks.<br/>1 error in tally and ecf for number of pods – 1 mark.<br/>2 or more errors – no marks.<br/>Place ticks under the columns.</p> |
| number of pea seeds<br>in each pod | tally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | number of pods                     |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 4                                  | /                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 5                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 6                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 7                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 8                                  | already                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | completed 3                        |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 9                                  | ////                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 10                                 | already                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | completed 7                        |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 11                                 | ###                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| 12                                 | ///                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 3                                  |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| (ii)                               | <p><b>A</b>- axes – labelled and evenly scaled;</p> <p><b>S</b> – size to fill more than ½ of grid;<br/><b>P</b> – plotting accurate;<br/><b>C</b>- columns of equal width <b>and</b> touching</p>                                                                                                                                                                                                                                                                                                              | [4]                                | <p>x axis – number of seeds in pod and y axis number of pods. Label of number be central under column.<br/>If axes reversed max 3 for <b>S, P and C</b></p> <p><b>A</b> Within ± 1mm. ecf from tally table.<br/>If columns do not make contact.no <b>C</b><br/>If line graph Max 2 – <b>A</b> and <b>S</b> only.</p> |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| (iii)                              | <b>X</b> in bar for 4 peas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | [1]                                |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
| (iv)                               | variation (genetic or environmental);                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | [1]                                | <p><b>A</b> not all peas fertilised in pod/mutation/change in weather eg very dry/cold/less nutrients/AW.<br/><b>I</b> ‘not counting correctly’.</p>                                                                                                                                                                 |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |
|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | [Total: 26]                        |                                                                                                                                                                                                                                                                                                                      |                |   |   |   |   |  |   |   |  |   |   |  |   |   |         |             |   |      |   |    |         |             |    |     |   |    |     |   |     |                                                                                                                                                                                                                                                                |

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| 2              | (a)             | length of line 10 mm;<br>formula – ST length ÷ magnification 10/2.5 ;<br>actual length of leg – 4.0 mm;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | [3]                | <b>A</b> ± 1 mm.<br><b>A</b> word formula<br>3.6, 4.0, or 4.4 mm if line ST is 9, 10 or 11 mm.                                                                |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
|----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--|--|----------------|--------------|-------------------------------|-------|-----------------|------|-------|---|----------------|--------------|------|---------------|---|---------|---------|------|--------------------|---|-----|-----------------|------------|--------------------|---|-----|----------------------------------------------------------------------------------------------------------------------------------------------|
|                | (b)             | <i>Group</i> - arachnid/arachnida/spiders;<br><i>reasons</i> – eight/8 legs/4 pairs of leg;<br>two/2 parts to body/cephalothorax <u>and</u> abdomen;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | [3]                | If incorrect group – allow one feature for that group visible in Fig.<br>Ignore negative features/ref to teeth/2 <b>segments</b> .<br>Accept 2 parts to body. |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
|                |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>[Total: 6]</b>  |                                                                                                                                                               |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
| 3              | (a)             | label to root hair cell;<br>label to cortical cell;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [2]                | Line needed to indicate <b>cell</b> .                                                                                                                         |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
|                | (b)             | <table border="1"> <thead> <tr> <th rowspan="2">substance</th><th rowspan="2">reagent</th><th colspan="3">results</th></tr> <tr> <th>initial colour</th><th>final colour</th><th>positive or negative (✓ or x)</th></tr> </thead> <tbody> <tr> <td>water</td><td>cobalt chloride</td><td>blue</td><td>pink;</td><td>✓</td></tr> <tr> <td>reducing sugar</td><td>Benedict's ;</td><td>blue</td><td>orange / red;</td><td>✓</td></tr> <tr> <td>protein</td><td>biuret;</td><td>blue</td><td>blue /<b>AW</b>;</td><td>x</td></tr> <tr> <td>fat</td><td>ethanol + water</td><td>colourless</td><td>clear / colourless</td><td>x</td></tr> </tbody> </table> | substance          | reagent                                                                                                                                                       | results |  |  | initial colour | final colour | positive or negative (✓ or x) | water | cobalt chloride | blue | pink; | ✓ | reducing sugar | Benedict's ; | blue | orange / red; | ✓ | protein | biuret; | blue | blue / <b>AW</b> ; | x | fat | ethanol + water | colourless | clear / colourless | x | [6] | One mark per box.<br><br><b>A</b> green yellow/yellow<br><br><b>R</b> mauve as it is the <b>positive</b> result for the presence of protein. |
| substance      | reagent         | results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                                                                                                                                                               |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
|                |                 | initial colour                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | final colour       | positive or negative (✓ or x)                                                                                                                                 |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
| water          | cobalt chloride | blue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | pink;              | ✓                                                                                                                                                             |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
| reducing sugar | Benedict's ;    | blue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | orange / red;      | ✓                                                                                                                                                             |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
| protein        | biuret;         | blue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | blue / <b>AW</b> ; | x                                                                                                                                                             |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
| fat            | ethanol + water | colourless                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | clear / colourless | x                                                                                                                                                             |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |
|                |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>[Total: 8]</b>  |                                                                                                                                                               |         |  |  |                |              |                               |       |                 |      |       |   |                |              |      |               |   |         |         |      |                    |   |     |                 |            |                    |   |     |                                                                                                                                              |