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 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
Mark schemes will use these abbreviations:

; separates marking points
/
alternatives
() contents of brackets are not required but should be implied
R reject
A accept (for answers correctly cued by the question, or guidance for examiners)
Ig ignore (for incorrect but irrelevant responses)
AW alternative wording (where responses vary more than usual)
AVP alternative valid point (where a greater than usual variety of responses is expected)
ORA or reverse argument
underline actual word underlined must be used by candidate (grammatical variants excepted)
max indicates the maximum number of marks that can be given
+ statements on both sides of the + are needed for that mark
<table>
<thead>
<tr>
<th>Question</th>
<th>Expected answers</th>
<th>Additional guidance</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a) (i)</td>
<td>1. ruled border lines + column line(s) ; 2. headings: number of spines + (at) 1m + (at) 3m ; 3. all data for 1m and 3m transferred to table ; 4. all entered data correctly ranked lowest to highest ;</td>
<td></td>
<td>[4]</td>
</tr>
<tr>
<td>(ii)</td>
<td>(at 1m) 16 ; (at 3m) 14 ;</td>
<td></td>
<td>[2]</td>
</tr>
<tr>
<td>(iii)</td>
<td>1. linear scale with both axes labelled (mean number of spines, height above ground/m) + bars centrally labelled 1m and 3m (above ground) ; 2. two bars of same width drawn with ruled lines + tallest bar at least half of grid high (50 mm) ; 3. both means plotted accurately ;</td>
<td></td>
<td>[3]</td>
</tr>
<tr>
<td>(iv)</td>
<td>leaves nearer ground / at 1m have more spines / ORA ; number of spines is more variable 1m above ground / ORA ; a comparative manipulation of data ; e.g. difference in mean number is 2, range of 12 spines for leaves 1m above ground and range of 8 spines for leaves A not much difference / not statistically significant difference / more or less random ranges of data overlap / means are similar ;</td>
<td></td>
<td>[max 3]</td>
</tr>
<tr>
<td>(v)</td>
<td>larger sample of leaves ; take leaves from other holly trees ; take leaves from further up / down / different heights / specified heights ;</td>
<td>A take more than 12 / larger number / repeat</td>
<td>[2]</td>
</tr>
<tr>
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</table>
| (b)      | either:  
1. remove epidermis / make impression (of both surfaces) ;  
2. place (each) on a slide ;  
3. use of a coverslip / stain / water ;  
4. use of microscope ;  
5. idea of counting number of stomata (in field of view / known area) on both surfaces ;  

or:  
1. water (vapour) lost through stomata ;  
2. cobalt chloride paper on both leaf surfaces ;  
3. blue cobalt chloride paper turns pink (with water) ;  
4. time to change colour measured ;  
5. faster time = more stomata ; | | [max 4] |

[Total 18]
### Question 2 (a)

- **Expected answers**
  1. use of water bath / other safety feature;
  2. blue + Benedict’s solution;
  3. heat;
  4. same length of time / temperature;
  5. equal volumes of Benedict’s solution / milk used;
  6. colour changes observed + compared;

- **Additional guidance**
  A goggles, test-tube holder

- **Marks**
  [max 4]

#### Question 2 (b) (i)

- **Expected answers**
  all centres of successive crosses joined with ruled lines;

- **Marks**
  [1]

#### Question 2 (b) (ii)

- **Expected answers**
  pH decreases / becomes more acid (ic);
  faster at first then more slowly;
  appropriate manipulation of data;

- **Additional guidance**
  A there is an inverse relationship between pH and time

- **Marks**
  [max 2]

#### Question 2 (b) (iii)

- **Expected answers**
  1. bacteria / enzymes / named example;
  2. convert sugar / lactose / protein / fats;
  3. into lactic acid / amino acids / fatty acids;

- **Marks**
  [3]

**[Total 11]**
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<tr>
<td>3 (a)</td>
<td>A humerus ; B ulna ;</td>
<td></td>
<td>[2]</td>
</tr>
</tbody>
</table>
| (b)      | 1. outline continuous and clean ;  
         | 2. length 90–105 mm inclusive ;  
         | 3. proportions/detial approximately correct ; | [3]   |
| (c) (i)  | 95 –100 ;         |                     | [1]   |
| (ii)     | measurement from 3(c)(i) /243 ;  
         | 0.4 ;               | [2]   |
| (d) (i)  | hinge ;           | A synovial Ig elbow | [1]   |
| (ii)     | bending (of the arm) ;  
         | and straightening ;  
         | movement in one plane /2 dimensions/ 180° ; | [2]   |

[Total 11]