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

**BIOLOGY** **0610/51**

Paper 5 Practical Test **October/November 2017**

MARK SCHEME

Maximum Mark: 40

**Published**

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**Mark schemes will use these abbreviations**

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

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(a)(i) | one table drawn with appropriate number of columns **;**<br><br>correct column and row headings with appropriate units (pH and intensity / minutes) **;**<br><br>pH recorded for each solution **;**<br><br>colour of apple slices recorded by intensity for 0 and 10 minutes (numerical values not words) **;**<br><br>colour of apple slices recorded by intensity for 20 minutes (numerical values not words) **;**<br><br>suitable trend **;** | **6** | **I** control if added to table<br><br>**R** if units in data cell<br><br>**I** units in data cells<br><br>**A** if the correct data is not linked to a time |
| 1(a)(ii) | 2 and/or 3, 7, then 8 and / or 9 **;** | **1** | **A B** and **C** in either order, **A**, **D** and **E** in either order |
| 1(a)(iii) | to compare (what happens to the apple) with the solution and with no solution / at different pH values and no pH / with different pH values and the air / with the solution and with the air **;** | **1** | **I** for comparison unqualified<br><br>**A** to see what happens to the crushed apple when it is not exposed to the solution<br>**A** to observe what would happen without the effect of pH<br>**A** idea that the control shows that the liquid (or change in pH) is causing the results (and not the air) |
| 1(a)(iv) | lemon juice **;**<br><br>has low pH / is acidic / (lemon juice has a pH of 2 and) previous experiment showed that apple won't go brown at pH 2 **;** | **2** | **A** olive oil<br><br>**A** (olive oil) keeps out air / oxygen<br>**A** enzyme doesn't work / denatured at pH 2 |

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(b)(i) | <table><tr><th>variable</th><th>controlled by</th></tr><tr><td>volume / amount / mass, of solution / named solution / liquid</td><td>adding 20 $cm^3$</td></tr><tr><td>(same / one) apple</td><td>all slices cut from the same apple</td></tr><tr><td>time soaking in solution</td><td>all soaked for 2 mins</td></tr><tr><td>observation time / time intervals</td><td>left for 20 min / results checked every 10 minutes</td></tr></table> ; ; | **2** | 1 mark for the variable, 1 mark for method of controlling which must related<br><br>**I** temperature<br><br>**I** time unqualified unless explanation clarifies<br><br>**A** time apple was left in the Petri dish<br>**A** oxygen / air exposure time |
| 1(b)(ii) | oxygen is needed (from the air) for the reaction **;** | **1** | **A** to expose the apple to oxygen<br>**I** air |

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(c)</td><td>any 1 from:<br>idea that it is a qualitative / subjective, method / judged by eye / similar browning looks the same / AW ;</td><td>1</td><td>A there are more than three shades of brown</td></tr>
<tr><td>1(d)</td><td>any pair from:<br><table><tr><th>error</th><th>improvement</th></tr><tr><td>amount of apple not the same / cutting inaccurate</td><td>use same mass / weight / use a set volume of crushed apple</td></tr><tr><td>crushing uneven</td><td>use a blender / mortar and pestle</td></tr><tr><td>idea some may have more time in solution than others</td><td>test each separately</td></tr><tr><td>some apple exposed to air while others being crushed</td><td>test each separately</td></tr><tr><td>only one slice of apple per solution</td><td>have at least two more replicates</td></tr></table>; ;</td><td>2</td><td>A (cut to the same size) by using a cutter / ruler, slicer, cutting instrument / AW</td></tr>
</table>

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(e) | **1** ref to using at least three temperatures **;**<br><br>**2** stated temperatures or a description **;**<br><br>**3** method described to maintain temperature(s) **;**<br><br>**4** methodology described e.g. ref to leaving the enzyme and substrate separately to reach a set temperature **;**<br><br>**5** ref to constant pH / experiment carried out at the optimum pH**;**<br><br>**6 and 7** *controlled variables any two from:*<br>same concentration of enzyme / same concentration of substrate / same volume of enzyme / same volume of substrate **;;**<br><br>**8** leaving for 20 minutes / leaving for a set time / check at stated time intervals **;**<br><br>**9** ref to substrate at optimum temperature turning brown first or having the highest colour intensity value **;**<br><br>**10** repeat (at least) twice **;**<br><br>**11** AVP e.g. repeat the investigation at temperatures near the optimum to obtain a more accurate optimum temperature **;** | **6** | **A** ref. to measuring time for brown colour to appear<br><br>**A** optimum temperature shows the darkest colour |

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(f)(i) | **A**(xes) – labelled with units (time / minutes and percentage of enzyme activity remaining) **;**<br><br>**S**(cale) – suitable, even scale and data occupies at least half the grid **;**<br><br>**P**(lot) – all points plotted accurately ±½ square **;**<br><br>**L**(ines) – each line drawn with a ruler point to point or smoothed line **;**<br><br>Lines labelled or a key shown **;** | **5** | |
| 1(f)(ii) | for both fruits the enzyme activity decreased as time went on **;**<br><br>the apricot enzyme shows the greatest reduction after 15 minutes **;**<br><br>avocado retains enzyme activity for longer after heating than the apricot **;** | **1** | **A** apricot enzymes are the most easily destroyed by heat / denatured faster / **ora ;** |

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(a)(i) | red blood cells do not have a nucleus / white blood cells have a nucleus **;**<br><br>red blood cells, have a light area in the centre / are biconcave **;**<br><br>there are more red blood cells / fewer white blood cells **;**<br><br>red blood cells contents not granular AW / white blood cells contents granular **;**<br><br>red blood cells smaller than phagocytes / **ora** **;**<br><br>red blood cells are overlapping / white blood cells do not overlap **;** | **2** | |
| 2(a)(ii) | **O** single clear lines on both cell membranes <u>and</u> no shading in the nucleus **;**<br><br>**S** monocyte larger than 2.5 cm and neutrophil larger than 2 cm provided **;**<br><br>**D1** monocyte is larger than the neutrophil **;**<br><br>**D2** neutrophil nucleus has two distinct parts joined by a narrow section, larger part at least twice the size of the smaller part **;** | **4** | |

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2(b)(i)</td><td>
<table>
<tr><td>type of blood cell</td><td>diameters / mm</td><td>average diameter / mm</td></tr>
<tr><td>red blood cell</td><td>13±1<br>12±1</td><td>12.5±1</td></tr>
<tr><td>lymphocyte</td><td>12±1<br>11±1</td><td>11.5±1</td></tr>
<tr><td>phagocyte</td><td>22±1<br>18±1</td><td>20.0±1</td></tr>
</table>
;;;</td><td>3</td><td>mp1 for header units<br>mp2 for six measurements<br>mp3 for three correct averages from candidates results</td></tr>
<tr><td>2(b)(ii)</td><td>8 or 9 (µm) ;;;</td><td>3</td><td>A ecf from 2(b)(i)</td></tr>
</table>

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