Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)(i)</td><td>one table drawn with appropriate number of columns ;

correct column and row headings with appropriate units (pH and intensity / minutes) ;

pH recorded for each solution ;

colour of apple slices recorded by intensity for 0 and 10 minutes (numerical values not words) ;

colour of apple slices recorded by intensity for 20 minutes (numerical values not words) ;</td><td>5</td><td>I control if added to table

R if units in data cell

I units in data cells

A if the correct data is not linked to a time

e.g.
<table><tr><th rowspan="2">(solution)</th><th rowspan="2">pH</th><th colspan="3">(colour) intensity (at time) / minutes</th></tr><tr><th>0</th><th>10</th><th>20</th></tr><tr><td>A</td><td>7</td><td>1</td><td>2</td><td>2</td></tr><tr><td>B</td><td>2</td><td>1</td><td>1</td><td>1</td></tr><tr><td>C</td><td>3</td><td>1</td><td>1</td><td>1</td></tr><tr><td>D</td><td>8</td><td>1</td><td>2</td><td>3</td></tr><tr><td>E</td><td>9</td><td>1</td><td>2</td><td>3</td></tr></table></td></tr>
<tr><td>1(a)(ii)</td><td>2 and / or 3, 7, then 8 and / or 9 ;</td><td>1</td><td>A B and C in either order, A, D and E in either order</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(a)(iii)</td><td>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 ;</td><td>1</td><td>I for comparison unqualified

A to see what happens to the crushed apple when it is not exposed to the solution
A to observe what would happen without the effect of pH
A idea that:
the control shows that the liquid (or change in pH) is causing the results (and not the air)</td></tr>
<tr><td>1(a)(iv)</td><td>lemon juice ;

has low pH / is acidic / (lemon juice has a pH of 2 and) previous experiment showed that apple won’t go brown at pH2 ;</td><td>2</td><td>A olive oil as keeps out air / oxygen for 2 marks.
Olive oil or lemon juice with wrong explanation = 1 mark.
Accept enzyme doesn’t work (denatured) at pH2</td></tr>
<tr><td>1(b)(i)</td><td><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>; ;</td><td>2</td><td>one mark for the variable, one mark for method of controlling which must related

I temperature

I time unqualified unless explanation clarifies

A time apple was left in the Petri dish
A oxygen / air exposure time</td></tr>
<tr><td>1(b)(ii)</td><td>oxygen is needed (from the air) for the reaction ;</td><td>1</td><td>A to expose the apple to oxygen
I air</td></tr>
<tr><td>1(b)(iii)</td><td>using / cutting (with a knife or scalpel) and
cutting away from the hand / cutting on a surface ;</td><td>1</td><td>I wearing gloves / supervision / blunt knives
A cutting carefully / using a slicer / AW</td></tr>
</table>

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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:
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
<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>

Question	Answer	Marks	Guidance
1(e)	**1** ref to using at least three temperatures **;** **2** stated temperatures or a description **;** **3** method described to maintain temperature(s) **;** **4** methodology described e.g. ref to leaving the enzyme and substrate separately to reach a set temperature **;** **5** ref to constant pH / experiment carried out at the optimum pH**;** **6 and 7** *controlled variables any two from:* same concentration of enzyme / same concentration of substrate / same volume of enzyme / same volume of substrate **;;** **8** leaving for 20 minutes / leaving for a set time / check at stated time intervals **;** **9** ref to substrate at optimum temperature turning brown first or having the highest colour intensity value **;** **10** repeat (at least) twice **;** **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 **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) **;** **S**(cale) – suitable, even scale and data occupies at least half the grid **;** **P**(lot) – all points plotted accurately ±½ square **;** **L**(ines) – each line drawn with a ruler point to point or smoothed line **;** Lines labelled or a key shown **;**	**5**	
1(f)(ii)	for both fruits, the enzyme activity decreased as time went on **;** the apricot enzyme shows the greatest reduction after 15 minutes **;** 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 ;**

Question	Answer	Marks	Guidance
2(a)(i)	red blood cells do not have a nucleus / white blood cells have a nucleus **;** red blood cells, have a light area in the centre / are biconcave **;** there are more red blood cells / fewer white blood cells **;** red blood cells contents not granular AW / white blood cells contents granular **;** red blood cells smaller than phagocytes / **ora ;** red blood cells are overlapping / white blood cells do not overlap **;**	**2**	

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<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2(a)(ii)</td><td>O single clear lines on both cell membranes <u>and</u> no shading in the nucleus ;

S monocyte larger than 2.5 cm and neutrophil larger than 2 cm provided ;

D1 monocyte is larger than the neutrophil ;

D2 neutrophil nucleus has two distinct parts joined by a narrow section, larger part at least twice the size of the smaller part ;</td><td>4</td><td></td></tr>
<tr><td>2(b)(i)</td><td><table>
<tr><th>type of blood cell</th><th>diameters / mm</th><th>average diameter / mm</th></tr>
<tr><td>red blood cell</td><td>13±1
12±1</td><td>12.5±1</td></tr>
<tr><td>lymphocyte</td><td>12±1
11±1</td><td>11.5±1</td></tr>
<tr><td>phagocyte</td><td>22±1
18±1</td><td>20.0±1</td></tr>
</table>;;;</td><td>3</td><td>mp1 for header units

mp2 for six measurements

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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