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**BIOLOGY**

**0610/63**

Paper 6 Alternative to Practical

**October/November 2017**

MARK SCHEME

Maximum Mark: 40

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**Published**

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.

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This document consists of **6** printed pages.

**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

Question	Answer	Marks	Guidance												
1(a)(i)	<table border="1"> <thead> <tr> <th></th> <th>type of fruit</th> <th>volume of juice / cm<sup>3</sup></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>orange</td> <td>13</td> </tr> <tr> <td>2</td> <td>grapefruit</td> <td>18</td> </tr> <tr> <td>3</td> <td>lemon</td> <td>7</td> </tr> </tbody> </table>		type of fruit	volume of juice / cm <sup>3</sup>	1	orange	13	2	grapefruit	18	3	lemon	7	1	Ignore units in table <b>A</b> 13.0, 18.0, 7.0
	type of fruit	volume of juice / cm <sup>3</sup>													
1	orange	13													
2	grapefruit	18													
3	lemon	7													
1(a)(ii)	table drawn with (ruled) lines, appropriate columns and (heading) underlined ;  suitable headings ;  all colours recorded for start and end;	3													
1(a)(iii)	Benedict's (reagent) ;	1													
1(a)(iv)	80 °C ;	1													
1(a)(v)	orange and grapefruit ;	1													
1(a)(vi)	idea of looking for colour change (as the starting colour may not be blue) ;	1													
1(b)	<table border="1"> <thead> <tr> <th><i>variable</i></th> <th><i>controlled by</i></th> </tr> </thead> <tbody> <tr> <td>volume of fruit juice</td> <td>measuring 2 cm<sup>3</sup> for all</td> </tr> <tr> <td>volume of Benedict's / solution</td> <td>measuring 2 cm<sup>3</sup> for all</td> </tr> <tr> <td>time in water-bath</td> <td>five minutes in water-bath</td> </tr> <tr> <td>temperature</td> <td>thermostatically controlled / maintained water-bath</td> </tr> </tbody> </table>	<i>variable</i>	<i>controlled by</i>	volume of fruit juice	measuring 2 cm <sup>3</sup> for all	volume of Benedict's / solution	measuring 2 cm <sup>3</sup> for all	time in water-bath	five minutes in water-bath	temperature	thermostatically controlled / maintained water-bath	2	one mark for the variable, one mark for method of controlling which must related		
<i>variable</i>	<i>controlled by</i>														
volume of fruit juice	measuring 2 cm <sup>3</sup> for all														
volume of Benedict's / solution	measuring 2 cm <sup>3</sup> for all														
time in water-bath	five minutes in water-bath														
temperature	thermostatically controlled / maintained water-bath														

Question	Answer	Marks	Guidance																				
1(c)	<table border="1"> <tr> <td data-bbox="322 217 745 268">error</td> <td data-bbox="745 217 1167 268">improvement</td> </tr> <tr> <td data-bbox="322 268 745 352">temperature of water-bath</td> <td data-bbox="745 268 1167 352">any method of keeping the temperature the same</td> </tr> <tr> <td data-bbox="322 352 745 403">judging colour by eye</td> <td data-bbox="745 352 1167 403">colour standard / colorimeter</td> </tr> <tr> <td data-bbox="322 403 745 488">idea of age of fruit differs</td> <td data-bbox="745 403 1167 488">use fruit of the same age / ripeness</td> </tr> <tr> <td data-bbox="322 488 745 572">Benedict's and juice mixed at different times</td> <td data-bbox="745 488 1167 572">test each fruit separately / get other people to add solutions</td> </tr> <tr> <td data-bbox="322 572 745 657">no replicates / repeats</td> <td data-bbox="745 572 1167 657">at least <u>2</u> more replicates / repeats needed</td> </tr> <tr> <td data-bbox="322 657 745 708">no control</td> <td data-bbox="745 657 1167 708">do with no vitamin C / water</td> </tr> <tr> <td data-bbox="322 708 745 759">contamination</td> <td data-bbox="745 708 1167 759">wash apparatus</td> </tr> <tr> <td data-bbox="322 759 745 810">no mixing</td> <td data-bbox="745 759 1167 810">method of mixing given</td> </tr> <tr> <td data-bbox="322 810 745 861">solids in the juice</td> <td data-bbox="745 810 1167 861">Filter</td> </tr> </table> <p style="text-align: right;">****</p>	error	improvement	temperature of water-bath	any method of keeping the temperature the same	judging colour by eye	colour standard / colorimeter	idea of age of fruit differs	use fruit of the same age / ripeness	Benedict's and juice mixed at different times	test each fruit separately / get other people to add solutions	no replicates / repeats	at least <u>2</u> more replicates / repeats needed	no control	do with no vitamin C / water	contamination	wash apparatus	no mixing	method of mixing given	solids in the juice	Filter	4	one mark for error, one mark for improvement which must match
error	improvement																						
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no mixing	method of mixing given																						
solids in the juice	Filter																						
1(d)	<p>add biuret ;</p> <p>(blue) to lilac / mauve / purple / violet for positive test ;</p>	2																					

Question	Answer	Marks	Guidance
1(e)	<p><i>any six from:</i></p> <ol style="list-style-type: none"> <li>1 at least two temperatures / or stated temperatures ;</li> <li>2 use of water-bath ;</li> <li>3 same volume juice ;</li> <li>4 same fruit used ;</li> <li>5 same time / stated time ;</li> <li>6 add DCPIP ;</li> <li>7 measure number of drops of DCPIP ;</li> <li>8 control (no vitamin C / water) ;</li> <li>9 repeats ;</li> <li>10 safety ;</li> </ol>	<b>6</b>	<p><b>A</b> iodine titration method if independent variable is time heated:</p> <ol style="list-style-type: none"> <li>1 stated temperature &gt; 80°C</li> <li>2 use of water-bath ;</li> <li>3 time intervals (at least two) ;</li> <li>4 same volume juice ;</li> <li>5 same fruit used ;</li> <li>6 add DCPIP ;</li> <li>7 measure number of drops of DCPIP ;</li> <li>8 control (no vitamin C / water) ;</li> <li>9 repeats ;</li> <li>10 safety ;</li> </ol>
1(f)	<p><b>O</b> single clear lines with no shading ;</p> <p><b>S</b> at least 80 mm in diameter ;</p> <p><b>D1</b> inner star shape shown ;</p> <p><b>D2</b> 8–16 segments shown ;</p>	<b>4</b>	

Question	Answer	Marks	Guidance
2(a)(i)	18.4 ;;	<b>2</b>	working $\frac{18 + 17 + 19 + 20 + 18}{5} / \frac{92}{5} = 1$ mark
2(a)(ii)	5 circled on Table 2.1 ;  12.8 ;	<b>2</b>	<b>ecf</b> if incorrect result circled  <b>A</b> 12.7

Question	Answer	Marks	Guidance
2(a)(iii)	<b>A</b> (xes) – labelled with units ; <b>S</b> (cale) – even scales on both axes; <b>P</b> (lot) – all points plotted accurately $\pm$ half a small square ; <b>L</b> (ines) – line ;	<b>4</b>	
2(a)(iv)	low concentrations increase root growth ; high concentrations decrease root growth ; 0.4% identified as the concentration that produces longest root growth ; correct data quote with units ;	<b>3</b>	<b>ecf</b> for incorrect graph
2(b)	(length of <b>MN</b> ) $30 \pm 1$ mm ; 0.25 mm ;;	<b>3</b>	<b>ecf</b> for incorrect measurement