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Cambridge International General Certificate of Secondary Education

BIOLOGY

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Paper 6 Alternative to Practical

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MARK SCHEME

Maximum Mark: 40

Published

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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><tr><td></td><td>type of fruit</td><td>volume of juice / cm³</td></tr><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></table> ; ;		type of fruit	volume of juice / cm ³	1	orange	13	2	grapefruit	18	3	lemon	7	1	Ignore units in table A 13.0, 18.0, 7.0
	type of fruit	volume of juice / cm ³													
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><tr><td><i>variable</i></td><td><i>controlled by</i></td></tr><tr><td>volume of fruit juice</td><td>measuring 2 cm³ for all</td></tr><tr><td>volume of Benedict's / solution</td><td>measuring 2 cm³ 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></table> ; ;	<i>variable</i>	<i>controlled by</i>	volume of fruit juice	measuring 2 cm ³ for all	volume of Benedict's / solution	measuring 2 cm ³ 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 ³ for all														
volume of Benedict's / solution	measuring 2 cm ³ for all														
time in water-bath	five minutes in water-bath														
temperature	thermostatically controlled / maintained water-bath														

Question	Answer	Marks	Guidance																				
1(c)	<table><tr><td>error</td><td>improvement</td></tr><tr><td>temperature of water-bath</td><td>any method of keeping the temperature the same</td></tr><tr><td>judging colour by eye</td><td>colour standard / colorimeter</td></tr><tr><td>idea of age of fruit differs</td><td>use fruit of the same age / ripeness</td></tr><tr><td>Benedict's and juice mixed at different times</td><td>test each fruit separately / get other people to add solutions</td></tr><tr><td>no replicates / repeats</td><td>at least <u>2</u> more replicates / repeats needed</td></tr><tr><td>no control</td><td>do with no vitamin C / water</td></tr><tr><td>contamination</td><td>wash apparatus</td></tr><tr><td>no mixing</td><td>method of mixing given</td></tr><tr><td>solids in the juice</td><td>Filter</td></tr></table>	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																						
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																						
1(d)	add biuret ; (blue) to lilac / mauve / purple / violet for positive test ;	2																					

Question	Answer	Marks	Guidance
1(e)	<i>any six from:</i> - at least two temperatures / or stated temperatures ; - use of water-bath ; - same volume juice ; - same fruit used ; - same time / stated time ; - add DCPIP ; - measure number of drops of DCPIP ; - control (no vitamin C / water) ; - repeats ; - safety ;	6	A iodine titration method if independent variable is time heated: - stated temperature > 80°C - use of water-bath ; - time intervals (at least two) ; - same volume juice ; - same fruit used ; - add DCPIP ; - measure number of drops of DCPIP ; - control (no vitamin C / water) ; - repeats ; - safety ;
1(f)	O single clear lines with no shading ; S at least 80 mm in diameter ; D1 inner star shape shown ; D2 8–16 segments shown ;	4	

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

Question	Answer	Marks	Guidance
2(a)(iii)	A (xes) – labelled with units ; S (cale) – even scales on both axes; P (lot) – all points plotted accurately $\pm$ half a small square ; L (ines) – line ;	4	
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 ;	3	ecf for incorrect graph
2(b)	(length of MN) 30 ± 1 mm ; 0.25 mm ;;	3	ecf for incorrect measurement