Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

BIOLOGY **5090/62**

Paper 6 Alternative to Practical **May/June 2016**

MARK SCHEME

Maximum Mark: 40

Published

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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

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Question	Expected answers	Additional guidance	Marks
1 (a) (i)	1. ruled border lines **+** column line(s) **;** 2. headings: number of spines **+** (at) 1 m **+** (at) 3 m **;** 3. all data for 1 m and 3 m transferred to table **;** 4. all entered data correctly ranked lowest to highest **;**		[4]
(ii)	(at 1 m) 16 **;** (at 3 m) 14 **;**		[2]
(iii)	1. linear scale with both axes labelled (mean number of spines, height above ground / m) **+** bars centrally labelled 1 m and 3 m (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 **;**		[3]
(iv)	leaves nearer ground / at 1m have more spines / **ORA** **;** number of spines is more variable 1m above ground / **ORA** **;** a comparative manipulation of data **;** ranges of data overlap / means are similar **;**	e.g. difference in mean number is 2, range of 12 spines for leaves 1 m above ground **and** range of 8 spines for leaves **A** not much difference / not statistically significant difference / more or less random	[max 3]
(v)	larger sample of leaves **;** take leaves from other holly trees **;** take leaves from further up / down / different heights / specified heights **;**	**A** take more than 12 / larger number / repeat	[2]

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Question	Expected answers	Additional guidance	Marks
(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]

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Question	Expected answers	Additional guidance	Marks
2 (a)	use of water bath / other safety feature ; 1. blue + Benedict's solution ; 2. heat ; 3. same length of time / temperature ; 4. equal volumes of Benedict's solution / milk used ; 5. colour changes observed + compared ;	**A** goggles, test-tube holder	[1] [max 4]
(b) (i)	all centres of successive crosses joined with ruled lines ;		[1]
(ii)	pH decreases / becomes more acid (ic) ; faster at first then more slowly ; appropriate manipulation of data ;	**A** there is an inverse relationship between pH and time e.g. overall decrease in pH of 1.05 / decrease of 0.6 in first two weeks	[max 2]
(iii)	1. bacteria / enzymes / named example ; 2. convert sugar / lactose / protein / fats ; 3. into lactic acid / amino acids / fatty acids ;		[3]
			[Total 11]

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Question	Expected answers	Additional guidance	Marks
3 (a)	**A** humerus ; **B** ulna ;		[2]
(b)	1. outline continuous and clean ; 2. length 90–105 mm inclusive ; 3. proportions / detail 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° ;	**A** flexion and extension for 2 marks	[2]
			[Total 11]

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