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**BIOLOGY****5090/62**

Paper 6 Alternative to Practical

**May/June 2016**

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2016 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

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Mark schemes will use these abbreviations:

<b>;</b>	separates marking points
<b>/</b>	alternatives
<b>()</b>	contents of brackets are not required but should be implied
<b>R</b>	reject
<b>A</b>	accept (for answers correctly cued by the question, or guidance for examiners)
<b>lg</b>	ignore (for incorrect but irrelevant responses)
<b>AW</b>	alternative wording (where responses vary more than usual)
<b>AVP</b>	alternative valid point (where a greater than usual variety of responses is expected)
<b>ORA</b>	or reverse argument
<b><u>underline</u></b>	actual word underlined must be used by candidate (grammatical variants excepted)
<b>max</b>	indicates the maximum number of marks that can be given
<b>+</b>	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: <u>number</u> of <u>spines</u> + (at) <u>1 m</u> + (at) <u>3 m</u> ; 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 ( <u>mean</u> 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 1 m have more spines / <b>ORA</b> ; number of spines is more variable 1 m above ground / <b>ORA</b> ; 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 <b>and</b> range of 8 spines for leaves <b>A</b> not much difference / not statistically significant difference / more or less random	[max 3]
(v)	larger sample of leaves ; take leaves from other <u>holly</u> trees ; take leaves from further up / down / different heights / specified heights ;	<b>A</b> take more than 12 / larger number / repeat	[2]

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>(b)</b>	<p><i>either:</i></p> <ol style="list-style-type: none"> <li>1. remove epidermis / make impression (of both surfaces) ;</li> <li>2. place (each) on a slide ;</li> <li>3. use of a coverslip / stain / water ;</li> <li>4. use of microscope ;</li> <li>5. idea of counting number of stomata (in field of view / known area) on both surfaces ;</li> </ol> <p><i>or:</i></p> <ol style="list-style-type: none"> <li>1. water (vapour) lost through stomata ;</li> <li>2. cobalt chloride paper on both leaf surfaces ;</li> <li>3. blue cobalt chloride paper turns pink (with water) ;</li> <li>4. time to change colour measured ;</li> <li>5. faster time = more stomata ;</li> </ol>		[max 4]
			<b>[Total 18]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>2 (a)</b>	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 ;	<b>A</b> goggles, test-tube holder	[1]  [max 4]
<b>(b) (i)</b>	all centres of successive crosses joined with ruled lines ;		[1]
<b>(ii)</b>	pH decreases / becomes more acid (ic) ; faster at first then more slowly ; appropriate manipulation of data ;	<b>A</b> 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]
<b>(iii)</b>	1. bacteria / enzymes / named example ; 2. convert sugar / lactose / protein / fats ; 3. into lactic acid / amino acids / fatty acids ;		[3]
			<b>[Total 11]</b>

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<b>Question</b>	<b>Expected answers</b>	<b>Additional guidance</b>	<b>Marks</b>
<b>3 (a)</b>	<b>A</b> humerus ; <b>B</b> ulna ;		[2]
<b>(b)</b>	1. outline continuous and clean ; 2. length 90–105 mm inclusive ; 3. proportions / detail approximately correct ;		[3]
<b>(c) (i)</b>	95 –100 ;		[1]
<b>(ii)</b>	measurement from <b>3(c)(i)</b> / 243 ; 0.4 ;		[2]
<b>(d) (i)</b>	hinge ;	<b>A</b> synovial <b>Ig</b> elbow	[1]
<b>(ii)</b>	bending (of the arm) ; and straightening ;  movement in one plane / 2 dimensions / 180° ;	<b>A</b> flexion and extension for 2 marks	[2]
			<b>[Total 11]</b>