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Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5090 BIOLOGY

5090/62 Paper 6 (Alternative to Practical), maximum raw mark 40

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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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

<table>
<tr><th>Question</th><th>Expected answers</th><th>Additional guidance</th><th>Marks</th></tr>
<tr><td>1 (a) (i)</td><td>44 – 46 mm inclusive ;</td><td></td><td>[1]</td></tr>
<tr><td>(ii)</td><td>correct method – image ÷ actual

correct answer with x or times ;</td><td>

A ecf from an incorrect measurement in a(i)</td><td>[2]</td></tr>
<tr><td>(b) (i)</td><td><table><tr><th>length / mm</th><th>time / s</th></tr><tr><td>27</td><td>2.2</td></tr><tr><td>32</td><td>2.7</td></tr><tr><td>33</td><td>2.9</td></tr><tr><td>35</td><td>3.8</td></tr><tr><td>36</td><td>4.2</td></tr><tr><td>41</td><td>3.3</td></tr></table></td><td>one mark per column if all numbers correct

if units included in table max. 1

if conc. not recorded in ascending or descending order then max. 1</td><td>[2]</td></tr>
<tr><td>(ii)</td><td>1. orientation – length on x-axis, time on y-axis;

2. both axes fully labelled ;

3. linear scales with values at the origin + length axis starting at min. 20 ;

4. all points plotted correctly ;

5. points neatly joined by ruled lines;</td><td>

A t / s and length / mm

A axes with scale breaks

± ½ small square (1 mm on grid)

R if line extrapolated</td><td>[5]</td></tr>
<tr><td>(iii)</td><td>2.5–2.6 (seconds) ;</td><td>accept figure consistent with graph</td><td>[1]</td></tr>
</table>

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Question	Expected answers	Additional guidance	Marks
(iv)	as length increases up to 36 (mm) time taken increases ; (above 36 mm / then) time taken decreases;	**R** ref. to (directly) proportional statement e.g. time increases with length and then decreases = max. 1 (decrease must be mentioned)	[2]
(v)	repeat **+** calculate mean ; use larger sample ; use greater range of lengths of fruit / use fruits increasing in length by regular intervals ;	take more readings unqualified is insufficient	[max 1]
(vi)	width ; (surface) area (of wing) ; mass / weight / volume ; dryness ; height above ground / position on tree; wind / air movement ;	 **A** surface area to volume ratio **A** draught **Ig** weather unqualified	[max 2]
			[Total 16]
2 (a) (i)	P (upper) epidermis ; Q palisade (mesophyll) ; R spongy (mesophyll) ;	**A** epidermal	[3]
(ii)	1. drawing at least 65 mm in depth + drawn with clear, continuous lines with no shading ; 2. drawing no more than 4 palisade cells wide **+** parts of 3 epidermal cells **+** P, Q and R cells shown ; 3. good proportions ;	 all palisade cells length at least 2× their width	[3]
(b) (i)	more stomata on lower epidermis (for all three plants) / ORA ; quantitative comparison ;	 e.g. sunflower has approx 1.5 times as many stomata on the lower epidermis as on the upper surface	[2]

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Question	Expected answers	Additional guidance	Marks
(ii)	sunflower **+** more / most stomata ; loses water (from leaf) ; by transpiration / evaporation (correct context) ;		[3]
(c)	1. cobalt chloride paper attached to / placed **+** on upper and lower epidermis / leaf surface ; 2. dry / blue (cobalt chloride) at start ; 3. pieces of cobalt chloride paper of the same size ; 4. cobalt chloride paper sealed / ensure no water from atmosphere or hands reaches it / only water from leaf reaches it ; 5. measure time taken for colour change ; **6.** the faster the colour change the greater the rate of transpiration ;	**R** leaving both for a fixed amount of time	[max 4]
			[Total 15]
3 (a)	to break cells open / release enzyme / phosphorylase from cells / AW ;		[1]
(b)	(add) <u>iodine</u> (solution) ; no starch present if iodine stays brown / does not go blue-black / remains the original colour / has no colour change	**R** iodide **R** if heated	[2]
(c)	volume / concentration of phosphorylase or enzyme ; volume / concentration of glucose / substrate solution ; volume / concentration of iodine solution ; pH ;	**Ig** amount for all answers	[max 3]

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Question	Expected answers	Additional guidance	Marks
(d)	neatly drawn table with ruled borders with at least 2 columns and 2 rows (including header) ; headers: temperature + time (taken) / rate ; units in header, °C + s or s^{-1}	 min. T (for temp) and t (for time) **A** min(utes), g / min, g / s	
			[Total 9]

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