
BIOLOGY

0610/52

Paper 5 Practical Test

May/June 2017

MARK SCHEME

Maximum Mark: 40

Published

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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 drawn with appropriate lines and number of cells ; column and row headings and appropriate units; three trials for W and three for S identified (e.g. by number and letter) ; correct trend ; | 4 | R if units are in the body of table |
| 1(a)(ii) | conclusion fits with the candidate's results ; | 1 | |
| 1(a)(iii) | gas / oxygen (produced) is trapped within the leaf space ; density is reduced / becomes lighter / buoyancy increases ; | 1 | |
| 1(a)(iv) | <i>measured:</i> time taken for leaf disc to rise ; <i>changed:</i> solution ; | 2 | A light intensity / distance of lamp from test tubes |
| 1(a)(v) | size of leaf disc / AW ; number of leaf discs ; concentration of sodium hydrogencarbonate (solution) / 2% ; volume / height of, sodium hydrogencarbonate (solution) / liquid / water; plant species; light intensity / distance of the lamp ; | 2 | |

| Question | Answer | Marks | Guidance | | | | | | | | | | | | | | | | | | |
|--|---|-----------------|---|--|--|---|--------------------------|--|---|------------------------|--|----------------------------|----------------|-------------------------------|--|---------------------------|--|-----|-------------|---|---|
| 1(a)(vi) | <table border="1"> <tr> <td><i>error</i> ;;</td> <td><i>improvement</i> ;;</td> </tr> <tr> <td>measuring height / not measuring volume / imprecise volume of sodium hydrogencarbonate / water</td> <td>use same volume (in test-tubes of the same diameter) / measure volume / use a burette / measuring cylinder / graduated pipette</td> </tr> <tr> <td>leaf discs different distances from lamp / different light intensity / position of the lamp</td> <td>arrange equidistant / AW</td> </tr> <tr> <td>determining when disc starts to rise is subjective</td> <td>time until leaf disc reaches the surface / or rises to a particular level</td> </tr> <tr> <td>leaf disc did not sink</td> <td>use a greater number of leaf discs and measure time on only those which sank</td> </tr> <tr> <td>timing multiple leaf discs</td> <td>stagger timing</td> </tr> <tr> <td>heating of test-tubes by lamp</td> <td>heat-shield / water-bath / use LED lamp / AW</td> </tr> <tr> <td>leaf discs were destroyed</td> <td>use fresh leaf discs / have more leaf discs in the sample and measure only those that rise</td> </tr> <tr> <td>AVP</td> <td>matches AVP</td> </tr> </table> | <i>error</i> ;; | <i>improvement</i> ;; | measuring height / not measuring volume / imprecise volume of sodium hydrogencarbonate / water | use same volume (in test-tubes of the same diameter) / measure volume / use a burette / measuring cylinder / graduated pipette | leaf discs different distances from lamp / different light intensity / position of the lamp | arrange equidistant / AW | determining when disc starts to rise is subjective | time until leaf disc reaches the surface / or rises to a particular level | leaf disc did not sink | use a greater number of leaf discs and measure time on only those which sank | timing multiple leaf discs | stagger timing | heating of test-tubes by lamp | heat-shield / water-bath / use LED lamp / AW | leaf discs were destroyed | use fresh leaf discs / have more leaf discs in the sample and measure only those that rise | AVP | matches AVP | 4 | <p>each improvement must relate to the given error</p> <p>A test-tube rack blocks light / AW</p> |
| <i>error</i> ;; | <i>improvement</i> ;; | | | | | | | | | | | | | | | | | | | | |
| measuring height / not measuring volume / imprecise volume of sodium hydrogencarbonate / water | use same volume (in test-tubes of the same diameter) / measure volume / use a burette / measuring cylinder / graduated pipette | | | | | | | | | | | | | | | | | | | | |
| leaf discs different distances from lamp / different light intensity / position of the lamp | arrange equidistant / AW | | | | | | | | | | | | | | | | | | | | |
| determining when disc starts to rise is subjective | time until leaf disc reaches the surface / or rises to a particular level | | | | | | | | | | | | | | | | | | | | |
| leaf disc did not sink | use a greater number of leaf discs and measure time on only those which sank | | | | | | | | | | | | | | | | | | | | |
| timing multiple leaf discs | stagger timing | | | | | | | | | | | | | | | | | | | | |
| heating of test-tubes by lamp | heat-shield / water-bath / use LED lamp / AW | | | | | | | | | | | | | | | | | | | | |
| leaf discs were destroyed | use fresh leaf discs / have more leaf discs in the sample and measure only those that rise | | | | | | | | | | | | | | | | | | | | |
| AVP | matches AVP | | | | | | | | | | | | | | | | | | | | |
| 1(b)(i) | <p>X = 71 s ; Y = 229 s ;</p> | 2 | <p>max 1 if not rounded up to nearest whole number max 1 if both correct whole numbers but no units</p> | | | | | | | | | | | | | | | | | | |

| Question | Answer | Marks | Guidance |
|-----------------|--|--------------|--------------------------------|
| 1(b)(ii) | labelled axes with units ; even scale and at least 50% of grid used for time axis ; two correctly plotted bars ($\pm\frac{1}{2}$ a small square), of equal width and separated by a space ; | 3 | ecf from 1(b)(i) |

| Question | Answer | Marks | Guidance |
|-----------|---|----------|--|
| 2(a)(i) | <p>1 sun leaf / Fig 2.2, is thicker (overall) / has bigger cells; ora</p> <p>2 sun leaf has a thicker palisade mesophyll layer / thicker spongy mesophyll / thicker mesophyll ; ora</p> <p>3 sun leaf palisade layer is more tightly packed / denser ; ora</p> <p>4 sun leaf has a thicker epidermis ; ora</p> <p>5 sun leaf palisade <u>cells</u> are thinner / taller ; ora</p> <p>6 sun leaf has larger air spaces ; ora</p> <p>7 AVP e.g. sun leaf has a deeper / different shaped, vascular bundle ; ora</p> | 2 | |
| 2(a)(ii) | <p>Lines drawn that are clear and continuous ;</p> <p>Scale: to fill more than half the space ;</p> <p>Detail: 4 or 5 layers shown ;</p> <p>Proportion: palisade mesophyll layer is between third to a half of total mesophyll ;</p> | 4 | R shading / stippling / hatching / cells / ruled lines |
| 2(a)(iii) | <p>19 <u>mm</u> (± 1 mm) ;</p> <p>$19 \div 130$</p> <p>= 0.15 mm ;;</p> | 3 | ecf incorrect measurement of line PQ if answer incorrect, award 1 mark for correct working shown ($19 \div 130$) |

| Question | Answer | Marks | Guidance |
|----------|--|-------|---|
| 2(b)(i) | (70 – 105 =) 35(.00) ; ((35 ÷ 70) × 100) = 50(.0); | 2 | |
| 2(b)(ii) | comparative data quote in either section with units at least once ; <i>supports hypothesis:</i> shade leaves are longer ; ora <i>does not support hypothesis:</i> sun leaves are thicker ; ora | 3 | I larger or bigger A sun leaves may be wider / width not measured / width is not given, so cannot calculate area ; |
| 2(c)(i) | extinguish flame / do not use a Bunsen burner / no flames ; use a water-bath / place ethanol in a test-tube in boiled water ; | 1 | |
| 2(c)(ii) | to be able to see colour change / AW ; | 1 | |

| Question | Answer | Marks | Guidance |
|-----------|---|-----------|---|
| 2(c)(iii) | <p>a leaves from the same plant / species ;</p> <p>b at least three leaves from sun and three from shade ;</p> <p>c boil / heat in water ;</p> <p>d heat in ethanol;</p> <p>e rinse leaf;</p> <p>f spread on a white tile</p> <p>g add iodine solution ;</p> <p>h positive test gives a blue-black colour ;</p> <p>i detail of controlled variable, e.g. heated for same length of time / same volume or concentration of iodine (solution) / leaves picked at the same time ;</p> | 5 | <p>I de-starching leaves</p> <p>I use of a control</p> <p>I ref to lab safety</p> |
| | Total: | 21 | |