

MARK SCHEME for the October/November 2007 question paper

9700 BIOLOGY

9700/32

Paper 32 (Advanced Practical 2), 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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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| Skill | Total marks | Breakdown of marks | | Question 1 | Question 2 |
|---|--------------------|---|---------|-------------------|-------------------|
| Manipulation, measurement and observation | 16 marks | Successful collection of data and observations | 8 marks | 2 | 6 |
| | | Nature of measurements or observations | 8 marks | 5 | 3 |
| Presentation of data and observations | 12 marks | Recording data and observations | 4 marks | 1 | 2 |
| | | Display of calculation and reasoning | 2 marks | 1 | 1 |
| | | Data layout | 6 marks | 4 | 2 |
| Analysis, conclusions and evaluation | 12 marks | Interpretation of data or observations and identifying sources of error | 6 marks | 5 | 1 |
| | | Drawing conclusions | 3 marks | 4 | 0 |
| | | Suggesting improvements | 3 marks | 3 | 0 |

MMO = Manipulation, measurement and observation

Collection = Successful collection of data and observations

Decisions = Decisions relating to measurements or observations

PDO = Presentation of data and observations

Recording = Recording data and observations

Display = Display of calculation and reasoning

Layout = Data layout

ACE = Analysis, conclusions and evaluation

Interpretation = Interpretation of data or observations and identifying sources of error

Conclusions = Drawing conclusions

Improvements = Suggesting Improvements

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| Question no. | Mark scheme points | Mark | Extra notes |
|---|---|------|---|
| 1 (a) MMO Decisions | add excess/same volume/stated volumes as S/Potato AND Benedict's AND heat to >80°C/boil; | 1 | AW but needs all three points for 1 mark |
| ACE Conclusions | (relate to observations) S1 has reducing sugar, presence/absence in potato; | 1 | Colour changes are not required but if they give the colour changes the conclusion must be correct. Reject glucose. |
| 1 (b) (i) PDO recording | table, 3 solutions/described recorded; | 1 | Allow no outer boundary (does not need the bottom or top or edge lines) lines do not need to be ruled – see examination report all cell lines must be shown Reject units in body of table Allow 0.5 but not 0.1/2/3/4/6/7/8/9 or 0.55 mm |
| PDO layout | (first/top) solution, final and initial length/mm, change/difference in length/mm ; | 1 | |
| MMO collection | lengths recorded to 0.5 mm, in correct order; 0/+ and - changes in length recorded/correct ref to hard vs soft/AW; | 2 | |
| 1 (b) (ii) ACE Interpretation | +/-, 0.5mm/0.5/actual size x100%; | 1 | |
| 1 (b) (iii) ACE Interpretation | ruler made with lines too thick/not enough divisions/user not viewing at right angles/parallax/end of potato not vertical/potato bendy; | 1 | Reject ruler/measurement is wrong/inaccurate |
| 1 (c) (i) ACE interpretation | waterbath/thermostatically controlled environment/AW; | 1 | Allow room with thermostat/air conditioning/incubator Reject oven/microwave |

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| Question no. | Mark scheme points | Mark | Extra notes |
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| 1 (c) (ii) ACE Interpretation | measuring device/ruler; variable surface area/dimension; number of strips/only 1 strip used/no repeats; evaporation from liquid; strips not covered/immersed/one surface in contact with container/strips float; | 2 max | Must be sources of error, ignore improvements. Reject volume and methods of measurement. Reject length of time/pH Ignore mistakes. |
| 1 (d) (i) PDO display | <u>-8.7/8.8;</u> | 1 | Reject 8.75 See examination report. Allow if not in table but shown in working area. Working does not need to be shown. |
| 1 (d) (ii) MMO Decisions | discard result/repeat it, should be negative reading/reading anomalous/does not fit trend/pattern/AW; | 1 | Needs both parts for the one mark |
| 1 (d) (iii) PDO layout | O conc/mol dm ⁻³ /dm ³ on x axis, <u>and</u> percentage/% change in length (of strips) on y axis; S/P scale even and positive and negative, more than half grid(x and y) used for plotted area AND all points correctly plotted with crosses/dots (in circles); L points joined with ruled lines/line of best fit; | 3 | Annotate as O, S/P, L with tick/cross Wrong orientation/labels loses O mark but can gain S/P, L Reject awkward scales e.g. y axis 1 cm to 2% See examination report. Any points with .5/.3 etc must not be on a line remember ecf from d i May ignore 0.6 (anomalous) line of best fit then 'should have even distribution of points either side of line'/allow ruled lines joining points if no line of best fit no extrapolation beyond axes or 2 squares if different scale thickness of line no more than half a square |
| 1 (e) MMO decisions | repeat/replicate (at each concentration); more readings/different concentrations; between 0.2 and 0.4/examples; | 3 | |

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| Question no. | Mark scheme points | Mark | Extra notes |
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| 1 (f) ACE Conclusions | 1. hypothesis is not supported/not true/partly true; 2. (not true for) 0.0 to 0.3; 3. no change at, reading from graph; 4. (true for) 0.3 to 1.0; | 3 max | May answer as converse of hypothesis i.e. the less concentrated the smaller the strips therefore pt 2 would be true for 0.0.to 0.3 and pt 4 not true for 0.3 to 1.0 Ignore ref. to osmosis |
| 1 (g) ACE Improvements | 1.how method of measuring improved; 2. view at right/correct angles; 3. repeat (with each concentration)/use more strips; 4. increase number of concentrations; 5. cover the petri dishes; 6. use test tubes/add enough solution to cover strips; 7. <u>volume</u> of sucrose/solution the same; 8. use same potato; | 3 max | Must be methods to remove errors. Mount two razor blades on piece of 1 cm wide cork/vernier calliper/measure change in mass/cork borers Reject waterbath, syringes for volume |
| 2 (a) (i) MMO Collection | no cells, sharp, clear, unbroken lines, no shading, circular/oval/maybe triangular; C shaped cartilage/may not be continuous; | 1 1 | Needs to be between 4 and 6 lines through the cartilage May be in patches |
| 2 (a) (ii) MMO Collection PDO Display | correct measurement of line shown on drawing to within 1 mm AND measurement of diameter of specimen between 1.5 and 5 mm, to no more than 0.5 mm reported accuracy; method of working shows measurement from drawing divided by measurement from slide; | 1 1 | Check the line on diagram to within +/- 1 mm If no units anywhere, then reject point 1. Accept cm 0.15 and 0.5 cm, reject all other units. Accept a written formula plus correct answer or if specimen size given and correct answer. Correct to whole number ignore unless more than three significant figures. |

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| Question no. | Mark scheme points | Mark | Extra notes | | | | | | | | | | | | | | |
|---|---|------------------------------------|-------------|---------------|---------------|------------|---------------|--------------------|------------------------|-------------------------------|-----------|-----------------------------|--------------------------|--------------|------------------|---|--|
| 2 (b) (i) PDO Layout MMO Collection MMO Decisions | sharp, clear, unbroken lines; 2 cells/2 lacunae/or both; drawing (1 cell/lacuna) more than 3 cm across the largest point; (cell) not symmetrical; (nucleus) oval/circular; granular cytoplasm; 2 correct labels/nucleus/i/cell membrane/cytoplasm; | 1 2 3 max | | | | | | | | | | | | | | | |
| 2 (b) (ii) PDO layout MMO Collection & PDO Recording | organisation of comparison as table/venn diagram/linked boxes/K1 and Fig. 2.1 labelled; <table border="1" style="margin-left: 40px;"> <tr> <td>K1</td> <td>Fig. 2.1</td> </tr> <tr> <td>lumen/hollow,</td> <td>lumen/hollow;</td> </tr> <tr> <td>cartilage,</td> <td>no cartilage;</td> </tr> <tr> <td>ciliated epithelia</td> <td>no ciliated epithelia;</td> </tr> <tr> <td>oval/not circular/triangular,</td> <td>circular;</td> </tr> <tr> <td>not continuous muscle layer</td> <td>continuous muscle layer;</td> </tr> <tr> <td>goblet cells</td> <td>no goblet cells;</td> </tr> </table> | K1 | Fig. 2.1 | lumen/hollow, | lumen/hollow; | cartilage, | no cartilage; | ciliated epithelia | no ciliated epithelia; | oval/not circular/triangular, | circular; | not continuous muscle layer | continuous muscle layer; | goblet cells | no goblet cells; | 1 3 max | Use T = for first mark Allow as minimum <u>K1/2.1</u> <u>2.1/K1</u> comparative statements must be opposite each other and similarity clearly applies to both. Accept comparative labels on drawings. Ignore specific terminology e.g. tunica media |
| K1 | Fig. 2.1 | | | | | | | | | | | | | | | | |
| lumen/hollow, | lumen/hollow; | | | | | | | | | | | | | | | | |
| cartilage, | no cartilage; | | | | | | | | | | | | | | | | |
| ciliated epithelia | no ciliated epithelia; | | | | | | | | | | | | | | | | |
| oval/not circular/triangular, | circular; | | | | | | | | | | | | | | | | |
| not continuous muscle layer | continuous muscle layer; | | | | | | | | | | | | | | | | |
| goblet cells | no goblet cells; | | | | | | | | | | | | | | | | |
| 2 (b) (iii) ACE Interpretation | hollow/lumen/tubes/space/cavity; | 1 | | | | | | | | | | | | | | | |