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INTERNATIONAL A-LEVEL **BIOLOGY**

9610

BL05 Synoptic paper

Mark scheme

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1 9 6 X B L 0 5 / M S

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Question	Marking guidance	Mark	Comments
01.1	1. Correct cell drawn ; 2. Shape correct – cell wall + chromosomes + spindle ; 3. Large, clear drawing with smooth lines ;	3	To include connections to adjacent cells Not sketchy
01.2	70 ;	1	Allow answer in range 66 to 73
01.3	Only thymine is found specifically in DNA ; So radioactivity / thymine will (only) enter replicating chromosomes / replicating DNA ;	2	Allow other bases also found in RNA
01.4	23 ;	1	
01.5	6 ;;	2	Allow 2 marks for ecf to answer from question 01.4 Allow 1 mark for $\frac{2 \times [\text{Answer to 01.4}] \times 60}{480} \text{ eg } \frac{2 \times 23 \times 60}{480}$ Allow 1 mark for 5.7 / 5.75 / 5.8 Allow 1 mark for 0.096 / 0.1 (hours)

Question	Marking guidance	Mark	Comments
01.6	1. Scientists and students grew different varieties of onion ; 2. At different temperatures ; 3. With different amounts of oxygen supplied ; 4. Only 2 cells / very few cells in anaphase so not representative ; 5. Slight miscounting has large effect;	2 max	} Allow numerical example – eg if 1 cell → time = 3 mins } or if 3 cells → time = 9 mins } or miscount of 1 cell → 50% error Allow Scientists did not calculate mean from several cycles
01.7	Student deliberately chose an area with many cells in mitosis OR Student sample size in Figure 1 was too small so not representative / not valid / atypical ;	1	Allow student did not select cells at random / not systematically Allow not reliable Allow description – eg slight variation has greater proportional effect

Question	Marking guidance	Mark	Comments
02.1	To break H-bonds ; To make bases accessible for base-pairing / for binding of primers or To separate the two strands;	2	
02.2	Different base sequences (on the 2 single-stranded DNA molecules) so different complementary base pairing ;	1	
02.3	3 ;	1	
02.4	3.28×10^4 ;;	2	Allow 1 mark for 32 768 / 3.27×10^4 / 2^{15}

Question	Marking guidance	Mark	Comments
03.1	1. Same volume and concentration of yeast (suspension) for each sugar or same volume of a given yeast suspension ; 2. Same volume and concentration of sugar solution for each sugar; 3. Mixture kept at suitable constant temperature ; 4. Mixture of sugar and yeast drawn into syringe (using plunger) ; 5. Then join syringe to glass tube via rubber tubing ; 6. Adjust (plunger) so that meniscus is on scale / eg at zero ; 7. Measure time taken to displace a set volume OR Measure meniscus position on scale at set time(s) ; 8. Repetitions and calculate mean ; 9. Clean apparatus and rinse with new sugar + yeast mixture ;	6 max	} If same 'amounts' allow 1 mark for mp1 + mp2 In range 20 - 37°C if specified
03.2	Orientation + suitable scales + axes labelled including units ; Plots correct ; Lines = smooth curves ; Lines labelled to identify sugars ;	4	Either ignoring anomaly for glucose at (40,36) or suitable interpolation or straight lines of best fit from time when $y > 0$

Question	Marking guidance	Mark	Comments
03.3	Does not fit pattern OR Does not lie on curve OR Curve changes direction ;	1	
03.4	Sensible suggestion – eg dirt in glass tube causing meniscus to 'stick';	1	Accept any suitable suggestion eg temperature change / cooling or misread value on mm scale – eg 36 instead of 46 or measured at incorrect time – eg 35 minutes Ignore human error unqualified
03.5	Repeat experiment for glucose ;	1	

Question	Marking guidance	Mark	Comments
04.1	(2DG has very similar structure to glucose and so...) 2DG fits transporter protein and fits active site of enzyme ; But enzyme cannot catalyse reaction with 2DG due to difference in structure OR -OH group (on Carbon-2) is necessary for reaction / for metabolism OR 2DG fits active site and blocks it so glucose cannot fit in or 2DG acts as a competitive inhibitor;	2	
04.2	Can use increase in radioactivity in muscle/cells as measure of 2DG uptake ;	1	Accept can see if 2DG taken up by muscle/cells
04.3	Same except no TGZ ;	1	Allow same + a placebo
04.4	Pattern described – increases and then levels off / then zero rate ; Data – up to 18-20 hours / up to 2.8-2.85 AU ;	2	
04.5	It remains in the cells (unchanged) or is not converted to other substances / eg CO ₂ ; Therefore shows how much 2DG is taken up due to TGZ treatment or so rate of uptake is not changed ;	2	Ignore cannot be metabolised / cannot be broken down Allow cannot be broken down in respiration Allow shows how effective TGZ is for stimulating glucose uptake (since 2-DG can be taken into cells by glucose carriers)
04.6	TGZ had harmful side effects – eg drowsiness / nausea / muscle pain;	1	Allow TGZ caused liver disease

Question	Marking guidance	Mark	Comments
05.1	1. Light ; 2. Water ; 3. Temperature ; 4. Ions / named example / pH of soil;	3 max	Ignore wind / carbon dioxide / oxygen Allow moisture / rain / humidity Allow nutrients / soil fertility Ignore food
05.2	More representative sample OR so mean is more representative / valid / reliable ; To see if any difference was significant / not just chance OR to make a valid comparison / to draw a valid conclusion ;	2	Allow to reduce the effect of anomalies Allow so can perform a statistical test Ignore so 'results' are significant / valid Ignore accurate
05.3	Randomly OR at regular intervals ; Method of achieving randomness – eg random numbers for coordinates OR Use of transect line ;	2	Reject throwing quadrats
05.4	N-facing: 19 to 49 AND S-facing: 23 to 52 ;	1	

Question	Marking guidance	Mark	Comments
06.1	<p>Turgor / described – 1. for support ; 2. opening and closure of stomata ;</p> <p>Solvent – 3. transport of ions and organic molecules ; 4. medium for chemical reactions ;</p> <p>5. Hydrolysis – eg for mobilising stored food ;</p> <p>Photosynthesis – 6. light-dependent reaction / photolysis of water ; 7. production of reduced NADP / ATP ;</p> <p>8. Cooling – by evaporation ;</p>	6 max	Allow other relevant points

Question	Marking guidance	Mark	Comments
06.2	<p><u>Water entry</u> – 1. Root hairs ; 2. Osmosis / diffusion ;</p> <p><u>Travel through plant</u> – 3. apoplastic route / described ; 4. symplastic route / described ; 5. role of endodermis ; 6. xylem ; 7. root pressure ; 8. transpiration pull ; 9. importance of H-bonds for cohesion / adhesion;</p> <p><u>Leaving plant</u> – 10. evaporation ; 11. diffusion of water vapour ; 12. some via cuticle ; 13. mostly through stomata ;</p>	6 max	For full marks, must score at least 1 mark in each of the 3 sections

Question	Marking guidance	Mark	Comments
06.3	<p>1. Small leaves – eg spines to reduce surface area / to deter herbivores</p> <p>OR Rolled leaves – less exposure to air / lower ψ gradient ;</p> <p>2. Sunken stomata – less exposure to moving air ;</p> <p>3. Thick waxy cuticle – waterproofing ;</p> <p>4. Ridged stems – for casting shade ;</p> <p>5. Water storage tissue – eg swollen stems in succulent plants ;</p> <p>6. Extensive root systems – deep to reach water table OR near surface – opportunistic re. brief rainfall ;</p> <p>7. Reduced aerial part of plant – eg Lithops ;</p>	6 max	Allow fewer stomata

Question	Marking guidance	Mark	Comments
06	<p><u>Quality of written communication</u></p> <p>These are awarded for correct use of scientific terms and the ability to present a clear, logical account. They are not awarded for spelling, punctuation and grammar.</p> <p><u>2 marks</u> for:</p> <p>an answer in which technical terms are used correctly throughout and the accounts are presented clearly and logically.</p> <p><u>1 mark</u> for:</p> <p>an answer in which most technical terms are used correctly and most of the accounts are presented clearly and logically.</p> <p><u>0 marks</u> for:</p> <p>an answer in which few technical terms are used correctly or the accounts are seldom presented clearly and logically.</p>	2	Award mark for overall performance in 06.1, 06.2 and 06.3