

Mark Scheme 2806/01
June 2005

Unifying Concepts in Biology

Abbreviations, annotations and conventions used in the Mark Scheme	/	= alternative and acceptable answers for the same marking point
	;	= separates marking points
	NOT	= answers which are not worthy of credit
	R	= reject
	()	= words which are not essential to gain credit
	<u> </u>	= (underlining) key words which must be used to gain credit
	ecf	= error carried forward
	AW	= alternative wording
A	= accept	
ora	= or reverse argument	

Expected Answers**Marks**

1 (a) 2 marks for the correct answer

$$\frac{46 \text{ mm } \pm 1}{20\,000} ;$$

answer 2(μm) ; *accept error carried forward if answer is a whole number*

max 2

(b) (i) Golgi (apparatus) / dictyosome ;
modifies proteins ; **A** collects / processes
adds, carbohydrate / sugars / polysaccharide ;
A makes glycoproteins / glycosylation
(packages into) vesicles (for export) / lysosomes ;

max 3

(ii) vesicles fuse with, cell membrane / plasmalemma ;
ref to exocytosis ; **A** reverse pinocytosis
cell wall permeable ;
reference to spaces between cellulose microfibrils ;
AVP ; e.g. reference to enzymes
breaking up / disrupting, cell wall

max 2

(iii) respiration ;
(protein / glycoprotein) synthesis / exocytosis ;
requires, energy / ATP ; **A** active
(mitochondria) release energy / produce ATP ;
R produce / make / create, energy

max 2**[Total: 9]**

Question	Expected Answers	Marks
2 (a) (i)	<p><i>penalise lack of units once in answer</i></p> <p>increase in, elongation / length, with auxin concentration up to, 1.4 / 1.8, $\mu\text{mol dm}^{-3}$; peak / maximum, at 1.4 $\mu\text{mol dm}^{-3}$; decrease between 1.4 and 1.8 $\mu\text{mol dm}^{-3}$; data quote with any 2 points ; linear / directly proportional, before <u>1.2</u> or linear inversely proportional after <u>1.5</u> ; R length decreases</p>	max 3
(ii)	<p><i>mark first three factors</i></p> <p>temperature ; age of stems ; light, <u>intensity</u> / wavelength ; concentration of dissolved, ions / salts ; (concentration of) other named growth substance ; AVP ;;; e.g. pH, genotype (of plant), concentration of named metabolite (e.g. glucose / amino acids), O_2 concentration, CO_2 concentration</p> <p>R 'amount of'</p>	max 3
(b)	<p><u>cell</u>, enlargement / elongation ; R stem enzyme synthesis ; vacuolation ; increase in plasticity of cell walls ; (cell) wall softened by, H^+ / lowered pH ; high concentration of auxin causes inhibition of growth ; AVP ; e.g. cell division, mitosis, replication, cytokinesis, increase in number of cells</p> <p>R ref to uptake of nutrients</p>	max 2
(c)	<p><i>assume answer is about plant growth substances unless stated otherwise</i> <i>treat refs to target, cells / tissue(s) and external stimuli as neutral</i></p> <p>growth substances produced by, dividing cells / meristems ; <i>ora</i> hormones produced by, islets of Langerhans / alpha cells / beta cells / <u>endocrine</u> gland / pancreas growth substances move, in phloem / in xylem / from cell to cell ; <i>ora</i> hormones / named hormone(s), move in blood growth substances usually produce a permanent change in the plant ; <i>ora</i> hormones produce reversible change in blood sugar (GS) not homeostatic / no negative feedback ; <i>ora</i> for hormones R positive feedback A description of negative feedback (GS) not protein / not polypeptide ; <i>ora</i> insulin / glucagon, are proteins AVP ;</p>	max 2

[Total: 10]

Question	Expected Answers	Marks
3 (a)	<p>accept any three correct statements based on the data;;; for example populations of, mites / springtails, much greater / more than twice the number, in the climax forest than before trees established <i>ora</i> number of species of springtail greatest in the climax community <i>ora</i> small difference in numbers / no significant difference, between areas with young trees and areas with mature trees there were always (many) more mites than springtails in the sample</p>	max 3
(b)	<u>succession</u> ;	1
(c)	<p>1 consumers have alternative sources of food ; <i>ora</i> 2 change in numbers of one species has less effect on another trophic level ; 3 ref competition ; 4 regulation of population size ; 5 food / energy, exploited efficiently / AW ; R general ref to energy flow 6 interlinking food chains ; 7 role of named organisms in recycling / recycling of C or N or Fe or P ; 8 food available throughout the year / AW ; 9 niche / idea ; 10 example(s) of any of the points 1 to 9 ;</p>	max 3
(d)	<p>no trees to, take up / absorb / use, nitrate ; decomposition of, organic matter / named plant part ; R animal nitrate soluble (in water) ; leaching / run off ; detail of any stage in protein to nitrate ; R ref to 'nitrogen' at any point</p>	max 2

- (e) *all points refer to strip felling but accept reverse argument*
- 1 uncut strip acts as, reservoir / refuge ;
 - 2 faster regeneration (of trees) ;
 - 3 species less likely to become extinct / maintains biodiversity ;
 - 4 does not disturb, food webs / habitats / ecosystems ; **A** conserves / maintains
 - 5 ref to, nest sites / breeding sites / territories / migration channels ;
 - 6 creates new habitats (on margins) ;

 - 7 soil less likely to dry out (with strip felling) / AW ;
 - 8 soil erosion / mud slides, less likely ; **A** refs to, surface run off / gullies
 - 9 ref to roots of trees binding soil ; **R** 'trees protect soils'
 - 10 ref to flooding ;
 - 11 ref to, nutrient / mineral / C / N / Fe / P, cycles ; **R** refs to, CO₂ / global warming
 - 12 ref to, nutrient leaching / eutrophication ;

 - 13 less change to microclimate / more humid beneath the trees ;

 - 14 ref to, amenity / aesthetics ;

 - 15 ref to sustainability ;
 - 16 ref to cost ;
 - 17 larger total area of forest may be exploited or disturbed ;
 - 18 more, roads / access, needed than if one (compact) area exploited ;
 - 19 ref to, pollution / noise / hunters / AW ;
 - 20 AVP ; e.g. damage, wastage, not all timber used, prolonged disturbance,
 - 21 AVP ; labour intensive, niches preserved, quality of timber, ref to fertiliser max 6

 - QWC – legible text with accurate spelling, punctuation and grammar** 1
- [Total: 16]**

Question	Expected Answers	Mark
4 (a)	ref limiting factor ; not carbon dioxide ; named factor e.g. light / temperature / limited number of chloroplasts ; R water photosynthesis at maximum rate ; explanation of effect of named factor e.g. ref to enzyme action ;	2 max 2
(b)	ref respiration ; production of carbon dioxide ; R release (at low concentrations, CO ₂ was) diffusing / moving down a concentration gradient ; respiration faster than photosynthesis / AW ; AVP ; e.g. below compensation point	2 max 2
(c)	control of variables / light is a variable ; R 'fair test' unqualified	1
(d)	<i>accept ora here</i> maintenance of water supply ; xylem / vascular bundles, intact ; water required for, photosynthesis / turgor ; A water prevents wilting stomata might close if the leaf detached ; leaves site of photosynthesis ; AVP ; e.g. ABA, water stress, sugar transport	2 max 2
(e)	1 one similarity between barley and sugar cane ; 2 one difference between barley and sugar cane ; 3 temperature ref between or within species ; 4 CO ₂ <u>concentration</u> ref between or within species ; A ppm for concentration 5 data quote comparison with units ; 6 ref to habitat ; e.g. tropics, named country, biomes (biological zones), climate 7 ref to biochemistry ; e.g. C4 / C3, different enzymes 8 ref to enzymes ; 9 AVP ; e.g. ref compensation point	5 max 5
[Total: 12]		

Question	Expected Answers	Marks
5 (a)	AATCCC / adenine adenine thymine cytosine cytosine cytosine ; (first 6)	1
(b)	does not result in the synthesis of (messenger) RNA ; not <u>transcribed</u> ; does not code for, protein / polypeptide / amino acid sequence / AW ; R amino acid	max 2
(c)	more, cell division / generations of cells / mitosis / replication ; loss of, telomere / DNA / nucleotides / part of chromosome, at each replication ; R loss of bases	max 1
(d)	(bacterial / prokaryote) DNA is, circular / loop / not linear ; A no chromosome(s)	1
(e)	provides sites for binding ; ref to, spindle fibres / microtubules ; ref to genes being spaced out along chromosome ; places to break and rejoin (during meiotic division) ; A chiasmata formation function may not yet have been discovered ; 'junk' implies no, function / purpose ; <i>ora</i> AVP ; e.g. raw material for, evolution / natural selection, required for, cell division / mitosis / meiosis	max 2
(f)	straight line sloping up from left to right ; (does not need to start at origin)	1
(g)	ATP / NAD / NADP / RNA / phospholipid / GP / TP / RuBP / ADP / RUP / AMP / cAMP/ phosphocreatine / AVP ; R DNA	1
(h)	<i>penalise ref to nitrate once only in answer</i> increase, uptake / absorption ; promotes / increased / more, growth of, (aquatic) plants / algae ; A algal bloom more food for herbivores ; species that need low phosphate concentration may be adversely effected ; less light penetrating water / ref to plants or algae blocking light ; less photosynthesis in submerged plants ; plants die (in context) ; increase in, decomposers / bacteria ; <u>eutrophication</u> ; ref to (bacteria) use O ₂ / <u>aerobic</u> respiration / depletion of O ₂ / raises BOD ; ref to death of, animals / named animals / named group of animals, linked to O ₂ ; AVP ; e.g. effect on humans, decrease in biodiversity	max 4

[Total: 13]