OCR

RECOGNISING ACHIEVEMENT

Subject : Biology Foundation Code : 2801

Session : June Year : 2005

Mark Scheme

MAXIMUM MARK	60

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 ( ) = words which are not essential to gain credit ____ = (underlining) key words which **must** be used to gain credit ecf = error carried forward AW = alternative wording ora = or reverse argument

Question	Expected Answers	Marks
1	**A** mitochondrion ; (*A*) *cristae / matrix* **B** nuclear envelope / nuclear membrane ; (*A*) *nucleus* **C** nucleolus ; (*A*) *heterochromatin* **D** (cell) wall ; (*A*) *middle lamella*	4
	[Total : 4]	
2 (a)	*Similar ~ allow valid similarities such as* same number , carbon / oxygen / hydrogen (atoms) / OH (groups) ; (*A*) *hexose* same formula ; NOT *similar* NOT *molecule* ring / ring with O (atom) in it ; NOT *covalent* correct ref. CH_2OH ; contain C, H and O ;	1 max
	Different ~ allow valid differences such as (*assume referring to fructose*) (fructose has) 5-membered ring / glucose has 6-membered ring ; NOT *pentose* (*4 C in ring v. 5C in ring / furanose v. pyranose in glucose*) (in fructose) 2 CH_2OH side chains / 1 CH_2OH side chain in glucose ; different angles between C atoms ; ref. alignment of H and OH groups (on carbon 3 / carbon 4) ; (in fructose) carbon 1 not in ring / carbon 1 in ring in glucose ;	1 max
(b) (i)	glycosidic ; NOT *glucosidic*	1
(ii)	1 carbon positions 1 and 2 on glucose and fructose ; 2 formation of , water / H_2O , from 2 OH groups (plus separation) ; 3 oxygen bridge / - O – , shown ;	2 max
(c) (i)	add / use , Benedict's (reagent) ; heat ; NOT *water bath alone* (blue to) green / yellow / orange / brown / red (precipitate) ;	3
(ii)	hydrolysis ; boil / heat , with (dilute) , acid / HCl ; (*A*) *(dil) NaOH* (add) hydrolytic enzyme / sucrase / invertase ;	1 max
	[Total : 9]	

Question		Expected Answers	Marks
3	(a)	active site correctly labelled ;	1
	(b)	C ;	1
	(c)	shape of active site ; complementary ; correct shape / correct molecule / correct substrate / C , will , fit / form ESC ; any other shape / any other molecule / any other substrate / A / B / D / E , will not ; *(2 marks if 'only correct .....')*	3 max
	(d)	*Look for points relating to the substrate changing shape.* *Ignore refs. to enzyme changing shape.* puts strain on the bonds in the substrate / bonds break more easily ; *(A) weakens bonds* lowers activation energy ; AVP ; (e.g. referring to anabolic reaction)	1 max
			[Total : 6]
4	(a) (i)	fructose ;	1
	(ii)	glucose ;	1
	(iii)	(passive) diffusion ;	1
	(iv)	*Ignore ref. to movement of sugars / solute potential* 1 surrounding solution higher concentration (of solutes) than cell contents ; *ora* 2 cell has higher water potential ; *ora* 3 water moves out of cell ; 4 (so) volume decreases ; 5 (water has moved) by osmosis ; *(only award in relation to water)* 6 down water potential gradient / from high Ψ to low Ψ ;	4 max
	(b)	active transport / facilitated diffusion / bulk transport / endocytosis / etc. ; *(A) using channel proteins, etc.* NOT *osmosis*	1
			[Total : 8]

Question	Expected Answers	Marks
5 (a) (i)	niche ;	1
(ii)	population ;	1
(iii)	community ;	1

(b)

1 sun is the energy source (for the system) ;
2 producers / (green) plants , trap / use / absorb (sun's energy) ;
3 photosynthesis ;
4 not all energy trapped and reason ;

5 energy used for , plant metabolism / plant processes / e.g. ; *(A) respiration*
6 so this energy not , passed on / available , to consumer ;
7 (some energy) used for , growth / storage ;
8 so this energy is , passed on / available , to consumer ;

9 1° consumer / herbivore , eats , producer / plant ;
10 some producer , not edible / not accessible / e.g. ;

11 some , not digested / egested / lost as faeces ;

12 2° consumer / carnivore / omnivore , eats , 1° consumer / herbivore ;
13 some parts of animal not edible / e.g. ;

14 energy used by animal in moving (to feed) ;
15 energy , used / lost , in , digestion / excretion / sweating / e.g. ;
(A) respiration

16 transfer / loss , to , decomposers / bacteria / fungi / saprotrophs ;

17 energy lost as heat from respiration ;
18 net productivity = gross productivity – respiration ;
19 some ref. to estimate of efficiency of transfer (a general statement) ;
20 quote of (comparative) figures from diagram ;
21 manipulation of figures to illustrate a point ; *NOT 6612 and 14198*

22 AVP ; ; *(two marks)*
23 loss out of ecosystem
another manipulation of figures
available energy limiting length of chain **max 9**

QWC ~ quality of spelling, punctuation and grammar **1**

[Total : 13]

Question	Expected Answers	Marks
6 (a)	*Mark 1st two unless neutral.* *(e.g. cell division / cell replication / produces identical cells)* produces , genetically identical cells / clones ; *(A) same genes* asexual reproduction ; maintains , chromosome number / ploidy / AW ; growth (of organism) ; NOT *of cells* replacement of cells / repair (of tissues) ; NOT *repair of cells*	2 max
(b)	*Ignore refs. to early and late stages.* NOT *ref. to I and II*	1
(i)	telophase ;	1
(ii)	metaphase ;	1
(iii)	prophase ;	1
(iv)	anaphase ;	1
(v)	anaphase ;	1
(c) (i)	one set of (parental) chromosomes / one copy of each chromosome ; *(A) half the diploid number / half of 2n / one chromosome from each pair* NOT *half chromosomes / half the number* number of chromosomes in a gamete ; *(A) 23 chromosomes*	1 max
(ii)	maintain / restore , same chromosome number / ploidy / 46 chromosomes / diploid number ; ref. , fusion / fertilisation ; prevents , doubling / increase , of the chromosome number (each generation) ; *(not just 'too many')* combining two (single) sets (will restore correct number) ; *(not just n)*	2 max
		[Total : 10]

Question	Expected Answers	Marks
7 (a)	cheaper ; ref. compatibility / less chance of rejection / fewer side effects ; stated ethical issue ; (*don't need to kill animals / removes religious objections*) ref. contamination / easier to purify / ref. disease ; consistent quality ; more effective (as human in origin) ; production level can meet demand / reliability of supply / faster production ; *Ignore greater production*	**2 max**
(b) (i)	glycoprotein ;	**1**
(ii)	(cell) recognition / antigen ; attachment / receptor ; NOT *carrier* holds enzymes ; AVP ; (stabilises membrane in aqueous environment)	**1 max**
(c) (i)	restriction (enzyme) / endonuclease ;	**1**
(ii)	*This may be answered in the context of inserting into a plasmid.* cut DNA with restriction enzyme ; ref. sticky ends ; complementary ; base pairs / CCC and GGG / C pairing with G / alternative ; (DNA) ligase / ligation ; ref. bonding / AW ; (*H or phosphodiester / sugar-phosphate*) AVP ; (add sticky ends to blunt ends cut both at the same place)	**3 max**
(iii)	codes for , protein / polypeptide / enzyme ; (*A*) *ref. to protein synthesis / transcription / translation* (enzyme) catalyses / causes , condensation / formation of glycosidic bonds / reaction (between , mannose / sugars) ;	**2**

[Total : 10]