

Proteins & Water

Mark Scheme 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Biological Molecules
Sub Topic	Proteins & Water
Booklet	Theory
Paper Type	Mark Scheme 2

Time Allowed : 46 minutes

Score : / 38

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 (a) (i) idea of sugars unable to pass through phospholipid bilayer ;
hydrophilic / polar / not lipid-soluble / water soluble ;
large ; [max 2]
- (ii) forms bonds with hydrophilic heads (of phospholipids) ;
hydrophobic parts of SWEET ;
bond with, fatty acid chains / hydrophobic tails, (of phospholipids) ;
ref. hydrogen bonding / ionic bonds / hydrophobic interactions ; [max 3]
- (b) (i) (SWEET) gene cannot be switched on ;
no SWEET (protein) produced ;
no, glucose / sugar, secreted (into intercellular spaces) ;
(so) Xoo / bacteria, do not multiply / numbers remain low ;
(small numbers of Xoo / bacteria) so no disease ; [max 3]
- (ii) allele is recessive ;
idea of not expressed when dominant allele present ;
ref. promoter ; e.g. normal promoter must be inactivated or removed / must transfer mutated promoter [max 2]
- (iii) prevents diffusion of air (from leaves to roots) ;
ref. aerenchyma ;
roots respire anaerobically ;
(so) less ATP produced (for growth) ;
bacteria use of oxygen ;
more ethanol produced may be beyond tolerance / **AW** ; [max 4]

[Total:14]

- 2 (a) put ticks and crosses against the boxes
 1 – 4 and 7 – one letter only – if more than one letter mark as wrong
 allow two or three correct letters for 5
 allow two correct letters for 6

	statement	letter
1	contains peptide bonds	H
2	part of the molecule forms the hydrophobic part of cell membranes	L
3	contains 1-4 and 1-6 glycosidic bonds	K
4	forms the primary structure of a protein	H
5	used for energy storage in plants	K / M / H
6	forms a helical structure	M / H
7	the sub-unit molecule is β -glucose	J

[Total: 7]

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3 (a)

Statement	
an amino acid that is a major constituent of collagen	J
a component of RNA	G ;
a molecule polymerised to form glycogen	D ;
a molecule with a peptide bond	H ;
an important store of energy, insoluble in water	K ;
a molecule with hydrophilic and hydrophobic regions	F ;
an amino acid that forms disulfide (disulphide) bonds in proteins	E ;

[6]

- (b) Assume the answer is about DNA unless indicated otherwise. A comparison is not required. Information given below is for either DNA or collagen features. **A** ideas from either column. Do not penalise if points are not corresponding on one line / sentence as long as biologically correct. Only reject if biologically incorrect. If no attempt at 2 can **A** both marks from 1 if biologically correct.

DNA	Colla
4 (different) monomers ;	more than four (different) monomers
(monomers =) nucleotides / polynucleotides ;	(monomers =) amino acids / polypeptides
double helix ; A two strands	triple helix A three stands
right handed helix ;	left handed helix
loose helix ;	tightly coiled
sugar ;	no sugar
phosphate / phosphorus ;	no phosphate / phosphorus A sulfur (sulphur) present
base(s) ;	no base(s)
phosphodiester bonds ;	peptide bonds
antiparallel strands ;	strands not antiparallel

A sugar phosphate backbone for 2 marks if nothing written by 2.

[2]

[Total: 8]

- 4 (a)
1. human ;
 2. applies selection pressure
 3. for benefit of human
 4. choose / breed, parents with suitable trait
 5. named example (species and characteristic)
 6. select offspring
 7. repeat over several generations
 8. increased allele frequency

[4 max]

- (b) (i) 140 (%) ;
2 marks for correct answer
($14/10 \times 100 = 1$ mark)

[2]

- (ii) genetic variation ;
ref. polygenes ;
environmental variation ;
AVP ; e.g. sampling / experimental, error

[2 max]

[Total: 8]

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