WJEC (Wales) Biology A-level
Topic 1.1: Biological Compounds
Questions by Topic - Mark Scheme

1. (a)

(i)

α glucose OH on C1 down, H up + β glucose OH on C1 up, H down; Allow HO (both for 1 mark). 1

(b)

(i)

Cellulose -Beta Starch - alpha; (both for 1 mark). 1

Allow symbols.

(ii)

Starch: any 2

correct reference to amylose and/or amylopectin;

glycosidic bonds (α 1-4);

molecules coil/branch (in amylopectin); NOT compact

NOT: amylopectin - coiled or amylase branched

easy to add/remove {glucose / maltose} units; 2

Cellulose: any 2; 2

alternate units rotate / head up, head down / 180° rotation;

straight chain only / no branches; NOT parallel

hydrogen bonds between / reference to cross linking;

gives strength or stability / forming microfibrils;

Question total 6

2.

Question			Marking details	Marks Available
2	*(a)*	(i)	Ester;	1
		(ii)	Hydrolysis;	1
		(iii)	Glycerol and fatty acid drawn correctly; Glycerol and fatty acid named;	2
		(iv)	Glycerol and fatty acids have different structures / OWTTE; (not just reference to monomers)	1
	(b)	(i)	(Oleic acid is) unsaturated; It contains at least one C=C double bond (in the hydrocarbon chain) / is not fully saturated with hydrogen (atoms); NOT hydrogen bonds/ fewer hydrogens	2
		(ii)	Any 2 protection of internal organs against impact; thermal insulation; buoyancy; waterproofing skin/fur; source of metabolic water;	Max 2
			Question 2 total	**[9]**

3.

Question			Marking details		Marks Available
3	*(a)*		**Statement**	**Letter(s)**	
			Is a monosaccharide Any 2 from 3 correct	A,F,G ;	
			Is a dipeptide	C ;	
			Would be found in nucleic acids	A ;	7
			contain C=C bonds	E ;	
			Contains a glycosidic bond	B ;	
			Is a triose sugar	G ;	
	(b)	(i)	Add Benedicts/Fehlings (reagent) and {heat / boil};		
			Colour would change from blue to {red / orange / green / brown};		2
			Blue precipitate = neutral		
		(ii)	Glucose is a reducing sugar / reduces copper II sulphate (to copper I oxide) / sucrose is a non reducing sugar;		1
			Question 3 total		**[10]**

4.

needed for / found in / used in /component of chlorophyll;

(allow: middle lamella / enzyme co-factors)

component haemoglobin; enzyme Co factors

component nucleic acids/DNA/RNA/ATP/ (plasma) membrane/ phospholipids/

hardens bone / nucleotide;

hardens/deposited in bones/teeth/ossification/synaptic transmission

enzyme co-factors/middle lamella (not: strengthen bones) **[4]**

5. (a) (i) hydrogen/H 1

(ii) {Holds/binds} {cellulose/glucose} {chains/molecules} 1
together/ forms microfibrils;

strengthens (the wall)/ (cellulose fibres are) strong/ rigid/ 1
gives structural stability/
can resist turgor/ osmotic pressure/ prevents plant cells
bursting.

(b) (i) condensation/ polymerisation 1

(ii) (Has) amino acid (added)/glucosamine 1
(to form a mucopolysaccharide)/ amine/ NH_2

(iii) (exo)skeleton – strong/waterproof/ light/ rigidity/ tough 1
NOT exoskeleton gives protection

(c) (i) glycogen 1

(ii) starch (accept amylose/ amylopectin) 1

(Total 8 marks)

6. (a) (i) glycerol;

(3) fatty acids; **[2]**

(ii) ester; **[1]**

hydrolysis;

chemical insertion of water/water added to bond **[2]**

(iii) energy storage / respiratory substrate/source of energy

waxy cuticle/leaf waterproofing;

membrane structure; **[2]**

(Total 7 Marks)

7.	(a)	nitrogen (not: N)	1
	(b) (i)	heat/boil with {Benedict's/ Fehlings A + B} solution; NOT boil	1
		with acid	1
		colour change from blue to {green/yellow/orange/brick red/ brown}	
	(ii)	A	1
	(c)	C	1
	(d) (i)	D	1
	(ii)	saturated- no double bonds/ all carbon atoms have/attached	1
		to two hydrogens ;	
		Fewer hydrogen atoms (or converse)	1
		Must have comparison for each	

(Total 8 marks)

8. cell wall;

beta/β;

glycosidic;

180;

hydrogen;

microfibrils; (not: microfibres) **[6]**

9.

(a) (i)	amino acid;	
	triglyceride; (not: lipid/triglycerol)	**2**
(ii)	nitrogen/sulphur; (not: chemical symbols)	**1**
(b)	condensation;	
	peptide;	**2**
(c) (i)	add Biuret to test solution; (not: if ref. to boiling)	**1**
	blue changing to mauve/purple colour is positive result;	**1**
(ii)	little colour change/mauve colour may be masked;	**1**
		(Total 8 marks)

10.

Question	Marking details	Marks Available
(a)	Iron / Fe^{2+};	1
(b)	{Four polypeptide chains / two alpha and two beta subunits}; in tertiary form are {combined/joined};	2
(c)	Add {biuret (reagent) / copper sulphate and sodium hydroxide}; Reject boil/heat Colour changes from blue to {purple/lilac/violet};	2

Question 3 Total [5]

11.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
11	(a)	(i)		Molecules drawn with a peptide bond correct (1) Molecule of water/H_2O also produced (1)	2			2		
		(ii)		peptide bond	1			1		
	(b)	(i)		Quaternary	1			1		
		(ii)		α helix (1) By hydrogen bonding (1) Ignore reference to peptide bonds	2			2		

12. *(a)* Quaternary/ 4°; 1

(b) (i) (Labelled) arrow in correct position; 1

(ii) COOH/ carboxyl/ carboxylic acid; 1

(iii) Disulphide {bond/ bridges} / ionic bonds / hydrogen / hydrophobic interactions / Van der Waals; (Any 2) 1
NOT peptide / S-S (covalent – neutral)

(c) **Mark points must be comparative** Max 2

phospholipid	triglyceride
2 fatty acids	3 fatty acids;
phosphate (head)	do not contain a phosphate (head)
polar/hydrophilic head and non-polar/hydrophobic tails	non-polar/hydrophobic;

(d) (i) {Heads/ phosphates} are {hydrophilic/ polar} and are {attracted to/ in} the water; 2
{Tails/ fatty acids} are {hydrophobic/ non polar} and are {repelled by/ above/ avoid} water;
NOT react/ dissolve with water

13. (a)

(i)

OH and H removal shown on diagram;

formation of water (H2O) shown;

dipeptide correctly drawn with C joined to N; [3]

(ii)

Condensation; [1]

(iii)

Peptide; NOT dipeptide; [1]

14. *(a)* (i) Molecule of water (drawn with arrow towards the O atom of the glycosidic bond); NOT water going out
Monosaccharides drawn with –OH groups in correct position on C1 and C4 (involved in bond); 2

(ii) Hydrolysis; NOT hydrolysation (ignore reference to acid) 1

(iii) Glycosidic; 1

(iv) Glucose and galactose; ignore alpha/ beta 1