PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



MARK SCHEME

TOPIC 1: BIOLOGICAL MOLECULES

CARBOHYDRATES

SCORE	PERCENTAGE
/62	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Mark
	The only correct answer is B ***A*** *is not correct because amylose has a helical and contains 1,4 glycosidic bonds* ***C*** *is not correct because amylose is not branched and does not contain 1,6 glycosidic bonds* ***D*** *is not correct because* amylose is not branched and does not contain 1,6 glycosidic bonds	**(1)**

Q2.

Question Number	Answer	Mark
		(3)

Bond	Molecule that bond may be found in			
	carbohydrate only	lipid only	both carbohydrate and lipid	neither carbohydrate nor lipid
covalent	☐	☐	X	☐
ester	☐	X	☐	☐
hydrogen	X	☐	☐	☐

Q3.

Question Number	Answer	Additional Guidance	Mark
(i)	• glucose is a monosaccharide and maltose is {a disaccharide /made of two glucoses / made of two monosaccharides} (1)	**ACCEPT** maltose has a glycosidic bond and glucosedoes not glucose has 6 carbons and maltose has 12 glucose has the formula $C_6H_{12}O_6$ and maltose $C_{12}H_{22}O_{11}$ **ACCEPT** a labelled diagram	(1)

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to two of the following: • neither sugars respired immediately because the yeast need to {acclimatise / adjust to the conditions} (1) • delay is longer for maltose as {enzymes need to be synthesised / maltose needs to be broken down into glucose} (1) • respiration of maltose is faster (than glucose) as maltose has {twice the number of sugar units / more glucoses / more hydrogens} (1)	**ACCEPT** glycosidic bonds have to be broken **ACCEPT** because maltose contains more energy / maltose is a disaccharide and glucose is a monosaccharide	(2)

Q4.

Question Number	Answer	Additional Guidance	Mark
	An explanation that makes reference to the following: • lactose is not {respired / used} as the yeast do not produce {theappropriate enzymes / lactase} (1) • sugars in the cytoplasm are {used / respired} (1)	**ACCEPT** yeast cannot break lactose down **NB** at least one reference to respiration for bothmarks to be awarded	(2)

Q5.

Question Number	Answer	Additional Guidance	Mark
	An explanation that makes reference to the following: • the osmotic potential of the red blood cells is equivalentto 3% glucose or 6% sucrose (1) • because the molecular mass of sucrose is twice that ofglucose (1) • because it is the number of molecules that determine theosmotic potential, not % concentration (1)	Allow twice the concentration of sucrose is needed to have the same effect Accept sucrose as a disaccharide whereas glucose is a monosaccharide	**(3)**

Q6.

Question Number	Answer	Additional Guidance	Mark
(i)	The only correct answer is **B** β glucose *A is incorrect because cellulose does not contain a glucose* *C is incorrect because cellulose does not contain ribose* *D is incorrect because cellulose does not contain ribose*		**1 comp**

Question Number	Answer	Additional Guidance	Mark
(ii)	A drawing showing the following: • Correct structure drawn (1) *Hexagonal ring with oxygen in correct place in ring. CH_2OH in correct place. All OHs apart from Carbon 1 in right places. Allow Hydrogens to be just stalks.* • OH groups shown correctly on carbon 1 (1) *pointing in same direction as CH_2OH*	**Do not accept** if water molecule also released / drawn	**2 grad**

Question Number	Answer	Additional Guidance	Mark
(iii)	An explanation that makes reference to three from the following points: • (cellulose molecules are) straight / not helical (1) • (many) hydrogen bonds hold molecules / chains / layers together (1) • (strong) to prevent cell lysis / cells bursting / maintain turgidity / resist (turgor) pressure (1) • (polar nature of glucose) allows water /minerals to diffuse through (1)	**Accept** not coiled **Accept** hydrogen bonds between microfibrils **Accept** other correct functions of strong cell wall	3 exp

Q7.

Question Number	Answer	Additional Guidance	Mark
(i)	The only correct answer is **C** (they are bonded to each other by hydrogen bonds) **A** is not correct because cellulose molecules are not branched polymers **B** is not correct because cellulose molecules do not contain α - glucose, they contain β - glucose **D** is not correct because cellulose molecules do not contain 1,6 glycosidic bonds, they contain 1,4 glycosidic bonds		**(1)**

Question Number	Answer	Additional Guidance	Mark
(ii)	The only correct answer is **A** (statement 1 and statement 2) **B** is not correct because calcium pectate does not prevent the movement of water **C** is not correct because calcium pectate is also found in the middle lamella **D** is not correct because calcium pectate does not prevent the movement of water		**(1)**

Q8.

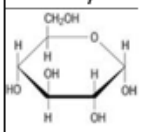
Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to two of the following: • less needed for same sweet effect (1) • therefore less {energy / calorie} intake (1) • therefore less risk of appropriate named health benefit (1)	**e.g.** reduced obesity / (type 2) diabetes / tooth decay / heart disease / atherosclerosis / high blood pressure / CVD / CHD	**(2)**

Question Number	Answer	Additional Guidance	Mark
	• 0.066 to 0.074	**DO NOT ACCEPT** 0.06°	**(1)**

Question Number	Answer	Additional Guidance	Mark
(iii)	An answer that makes reference to the following: • with and without magnesium ions (1) • use same {volume / stated cm^3 / concentration} of isomerase enzyme (1) • use excess {glucose / substrate} (1) • control {temperature / pH} (1) • repeat to {calculate mean / calculate average / standard deviation / standard error / recognise anomalies} (1)	**ACCEPT** same mass **DO NOT ACCEPT** if in list	**(5)**

Q9.

Question Number	Answer	Mark
(i)	The only correct answer is C hydrolysis reaction breaking glycosidic bonds *A is not correct because condensation reactions forms glycogen* *B is not correct because the bonds are not phosphodiester bonds* *D is not correct because the bonds are not phosphodiester bonds*	1

Question Number	Answer	Mark
(ii)	The only correct answer is A  *B is not correct because it is -glucose* *C is nor correct because it is ribose* *D is not correct because it is deoxyribose*	1

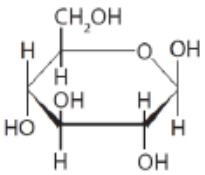
Question Number	Answer	Additional Guidance	Mark
(iii)	An explanation that make reference to three of the following: • glucose molecules joined {1,4 glycosidic} bonds (1) • compact for (energy) storage (1) • {1,6 glycosidic bonds / branched} for rapid / easy {breakdown / hydrolysis} (1) • {large / insoluble} molecule which does not {affect osmosis / leave cells / solute potential / water potential} (1)	**DO NOT ACCEPT** beta glucose once	3

Q10.

Question Number	Acceptable Answer	Additional Guidance	Mark
(a)	hydrolysis		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
(b)	A description that makes reference to the following: • a ring of one oxygen and 5 carbon atoms, with a 6th carbon projecting from the ring (1) • OH groups on carbon atoms 1 and 4 projecting to opposite sides of the molecule (1)	Allow marks if in drawing	**(2)**

Q11.

Question Number	Acceptable Answer	Additional guidance	Mark
	C ()		**(1)**

Q12.

Question Number	Acceptable Answer	Additional Guidance	Mark
	D (proteins, nucleic acids, starch)		**(1)**

Q13.

Question Number	Answer	Additional Guidance	Mark
	B monosaccharide disaccharide	A is incorrect because sucrose is a disaccharide C is incorrect because glucose is a monosaccharide D is incorrect because glucose is a monosaccharide and sucrose is a disaccharide	

Q14.

Question Number	Answer	Additional Guidance	Mark
(i)	An explanation that makes reference to the following: • because different types of lipid are found in the mitochondria and chloroplasts **(1)** • because mitochondria are associated with { respiration / oxidative phosphorylation} whereas chloroplasts are associated with {photosynthesis / light-dependent reactions / photophosphorylation} **(1)** • because mitochondria contain {electron transport proteins / cytochromes / cristae / stalked particles} whereas chloroplasts contain {grana / chlorophyll / photosystems / carotenoids} **(1)**	**Accept** a description of the differences e.g. a lipid high in mitochondria is low in chloroplast, only two of the lipids are found in both organelles **Do not accept** a list of values from the table without some sort of comparison **Accept** any other membrane difference	**(3)**

Question Number	Answer	Additional Guidance	Mark
(ii)	A diagram that shows the following: • a glycosidic bond between C 1 on galactose and C 6 on MGDG **(1)** • rest of molecules complete **(1)** • water molecule **(1)**	ecf if glycosidic bond drawn between C1 and C 4 **Accept** H_20 / water	**(3)**

Question Number	Answer	Mark
(iii)	**The only correct answer is B** ***A*** *is not correct because DGDG is larger than MGDG so will not travel as far and sulfolipid is the smallest quantity so will be the smallest spot* ***C*** *is not correct because DGDG is larger than MGDG so will not travel as far and sulfolipid is the smallest quantity so will be the smallest spot* ***D*** *is not correct because sulfolipid is the smallest quantity so will be the smallest spot*	**(1)**

Q15.

Question Number	Acceptable Answer	Additional Guidance	Mark
	C (lactose)		**(1)**

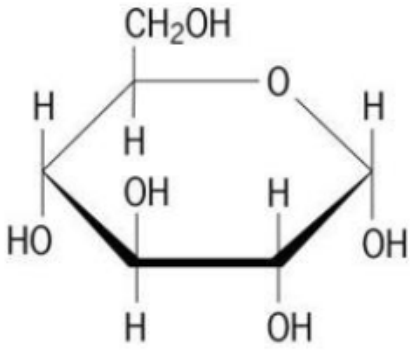
Q16.

Question Number	Correct Answer	Additional guidance	Mark
(a)	A		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
(b)	B		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
(c)	An explanation that makes reference to three of the following: • same energy in glucose molecule as in fructose molecule (1) • fructose is sweeter than glucose so less needs to be used (1) • produce products that reduce the risk of developing obesity (1) • cost savings for food industry (1)		**(3)**

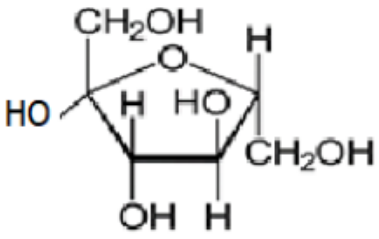
Q17.

Question Number	Answer	Additional Guidance	Mark
	• correct structure of alpha glucose		(1)

Q18.

Question Number	Answer	Mark
(i)	**The only correct answer is B** ***A*** *is not correct because condensation joins monomers* ***C*** *is not correct because phosphorylation adds phosphate* ***D*** *is not correct because translocation does not break down sucrose*	(1)

Question Number	Answer	Additional Guidance	Mark
(ii)	• glucose and fructose	Reject beta glucose	(1)

Question Number	Answer	Additional Guidance	Mark
(iii)		**ACCEPT** HO or OH **ACCEPT** correct variations of fructose **ACCEPT** C's in ring **ACCEPT** line with nothing as H	(1)

Q19.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to three of the following: Similarities • both {are hexoses / have formula of $C_6H_{12}O_6$} (1) • both contain covalent bonds (1) Differences • glucose is a hexagon and fructose is a pentagon (1) • glucose has one CH_2OH and fructose has two (1)	**ACCEPT** have 6 carbons	(3)

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to the following: • as a {respiratory substrate / energy source} for the sperm (1) • because movement (through female genital tract) requires ATP (1) • in order to reduce competition for carbohydrates with the {skin / genital tract} {bacteria / cells} (1)	**ACCEPT** provides energy **NB** ATP must be mentioned at least once for both mps to be awarded **ACCEPT** fructose may not be used by skin cells	(3)