BIOLOGY MIND

Edexcel

A-Level

BIOLOGY

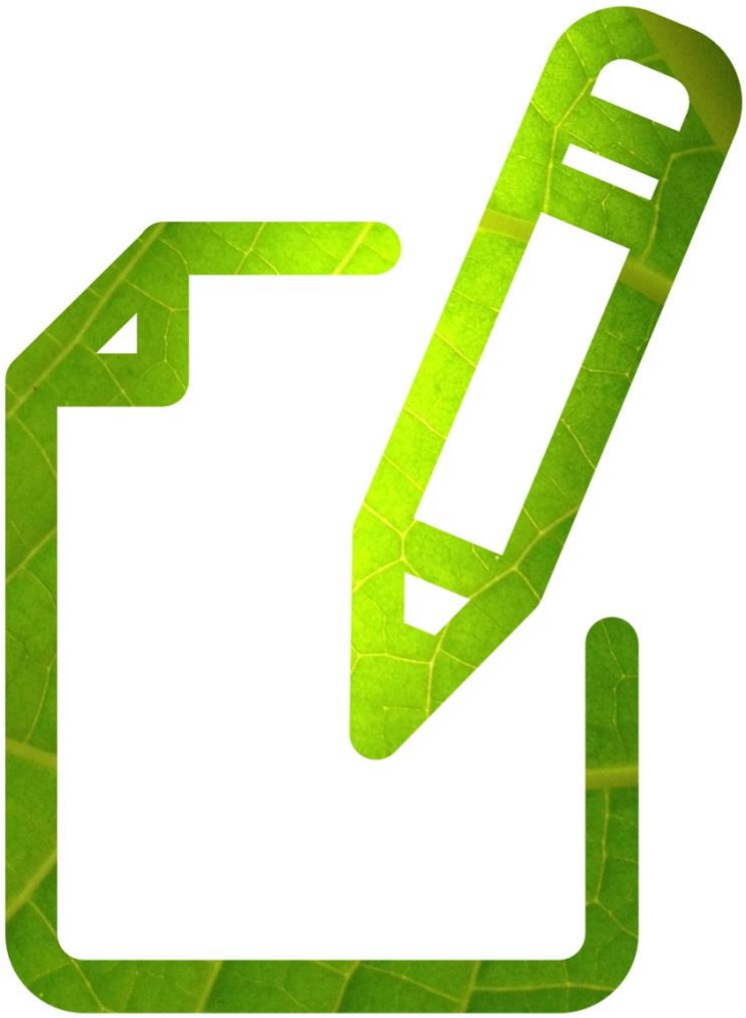
Biological Molecules

Enzymes 4

Time allowed

38 minutes

MARK SCHEME



Score	Percentage
/32	%

Question Number	Answer	Comments	Mark
1(a)	(QWC– Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. (α) *glucose* ; 2. *glycosidic* {bonds / links} ; 3. *amylose* and *amylopectin* ; 4. *amylose* has 1- 4 (*glycosidic)* {bonds / links} **AND** *amylopectin* has 1- 4 and 1- 6 (glycosidic) bonds / eq ; 5. *amylose* is {spiralled / coiled} ; 6. *amylopectin* is branched / eq ; 7. compact *molecule* / eq ;	QWC spelling of words in italics should be correct. Penalise just once – ALLOW max score of 5 if 6 mpts met but one lost due to spelling mistake.	**(5)**

Question Number	Answer	Additional guidance	Mark
1(b)(i)	1. speeds up the rate of reaction / eq ; 2. without being {changed/used up / eq} ; 3. lowers activation energy / provides an alternative reaction pathway / eq ; 4. does not change {products / position of equilibrium / eq } / eq ;		**(2)**

Question Number	Answer	Additional guidance	Mark
1(b)(ii)	1. breaks the (glycosidic) bonds / eq ; 2. reference to use of water ;	1. IG RE hydrogen bonds 2. NOT makes water / eq	**(2)**

Question Number	Answer	Additional guidance	Mark
1 (c)	idea that { maltose / disaccharide / glucose / monosaccharide} {is produced / tastes sweet} ;	ALLOW dextrins / sugar NOT any other named sugar eg sucrose	**(1)**

Question Number	Answer	Additional guidance	Mark
2(a)	1. idea that products of light-dependent stage are {needed for / used in / eq} {light-independent stage / Calvin cycle} ; 2. reference to (products of light-dependent stage) are {reduced NADP / eq} and ATP ; 3. reference to use of {reduced NADP / eq} for {reduction / eq} of {carbon dioxide / GP / eq} ; 4. reference to use of ATP as source of energy ;	**3. Acce** source of hydrogen ions for GALP **Ignore** ref to ATP	**(3)**

Question Number	Answer	Mark
2(b)(i)	D volume of oxygen produced ;	**(1)**

Question Number	Answer	Additional guidance	Mark
2(b)(ii)	1. (minimum temperature) is {between 0 °C and 10 °C / above 0 °C but less than 10 / 10 °C} ; 2. idea of no photosynthesis at 0°C but photosynthesis is taking place at 10 °C ; 3. reference to no {data / readings / measurements / evidence / eq} between 0 °C and 10 °C ; 4. idea that at 0 °C water is frozen ;	**3. Accep** if correct temp range has been given already	**(2)**

Question Number	Answer	Additional guidance	Mark
2(b)(iii)	1. reference to abiotic factors {are non-living / non-biological / do not involve organisms / eq} ; 2. idea that other factors need to be kept constant ;	**2. Igno** controlled	**(2)**

Question Number	Answer	Additional guidance	Mark
2(b)(iv)	**Supporting conclusion:** 1. idea that shape of graph is typical of an enzyme-temperature graph ; 2. rate increases (up to 30 ^{o}C) because more {enzyme-substrate complexes / collisions between enzymes and substrates} / eq ; 3. rate decreases (after 30^{o}C) due to enzyme denaturation / eq ; **Not supporting conclusion:** 4. idea that other factors could be affecting photosynthesis ; 5. idea of {gas / oxygen / carbon dioxide} solubility changing with temperature ; 6. idea of {correlation / not causation} ;	**1.** idea that rate of photosynthesis is affected by temperature in a similar way to enzymes	**(4)**

Question Number	Answer	Mark
3(a)(i)	1. no {amino / amine / NH_2 / NH_3^+ } group ; 2. no {carboxyl / carboxylic acid / COOH / COO^- } group ; 3. no {central / alpha} carbon (atom) / eq ; 4. no {R / residual} group(s) ; 5. ring structures present (amino acids only have them in some R groups) / eq ;	**(2)**

Question Number	Answer	Mark
3(a)(ii)	1. idea that position of CH_3 different ; 2. idea that position of {H / NH/ N-H} different ; 3. reference to being isomerically different ;	**(2)**

Question Number	Answer	Mark
3(a)(iii)	1. idea of specificity of {active site/enzyme} ; 2. idea that the products are different {shapes / structures} ; 3. idea that P450 consists of (at least) three {enzymes / active sites} ; 4. idea that products could be interconverted ;	**(3)**

Question Number	Answer	Mark
3(b)	**Conclusion 1:** 1. idea that the first conclusion is {valid for some of the data / not valid (for all data) / misleading /eq} ; 2. coffee and hot chocolate do have different concentrations **OR** only 4 drinks tested / concentration not measured / volumes not controlled / eq ; **Conclusion 2:** 3. idea that the second conclusion is not valid ; 4. no indication of the volumes of tea and cola / volume not controlled / impossible to calculate concentration of caffeine in all four drinks (using information given) / eq ;	**(3)**