BIOLOGY MIND

Edexcel

A-Level

BIOLOGY

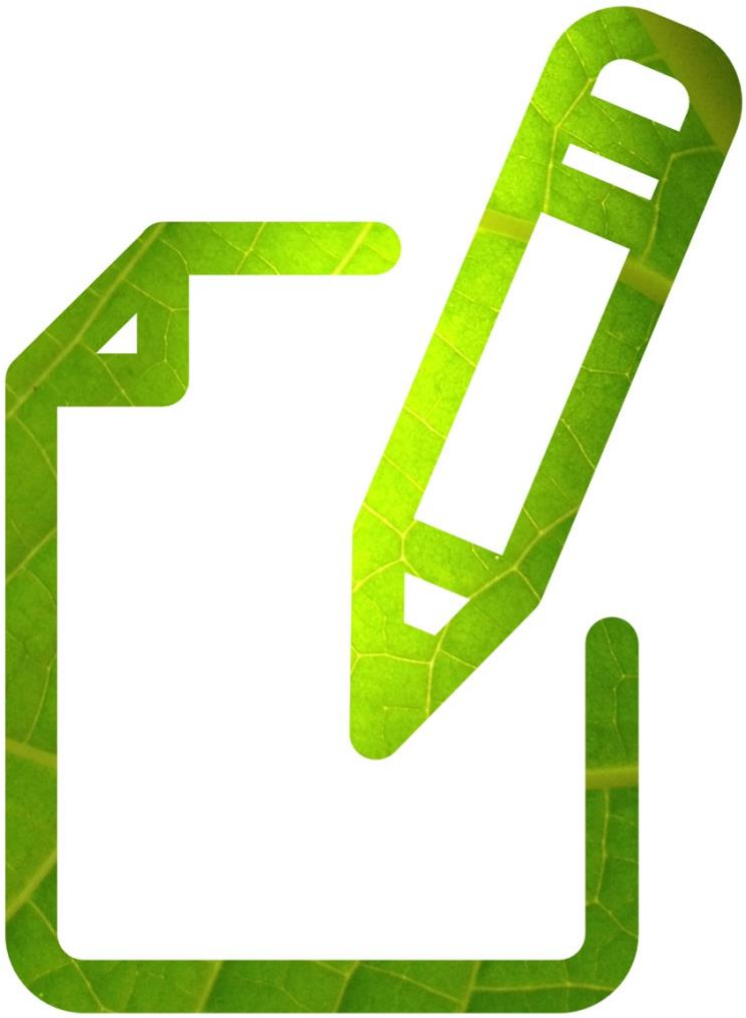
Biological Molecules

Proteins 2

Time allowed

55 minutes

MARK SCHEME



Score	Percentage
/46	%

Question Number	Answer	Additional guidance	Mark
1(a)	Idea that (a change in) one variable (directly) results in the change of another variable ;	ALLOW causes, affects, etc and clear examples Eg increase in blood cholesterol causes an increase in the risk of CVD IGNORE correlation, link, relationship, trend, etc alone	**(1)**

Question Number	Answer	Additional guidance	Mark
1(b)(i)	1. reference to peptide bonds (joining amino acids); 2. between amino group (of one amino acid) and carboxyl group (of another) / eq ; 3. the sequence of amino acids is the primary structure of the protein / eq ; 4. reference to folding (of primary structure) held together by bonds / eq ; 5. {disulfide bridges / eq} / {hydrogen / H} bond / ionic bonds / Van der Waals forces ; 6. between the R groups / eq ;	2. AL W from a labelled diagram ALLOW NH_2 and COOH 4. AL W ref to alpha helix or beta pleated sheet	**(4)**

Question Number	Answer	Additional guidance	Mark
1 (b)(ii)	1. HDL is smaller ; 2. HDL contains more protein / eq ; 3. HDL contains less cholesterol / eq ;	**ALLOW** converse for LDL	**(2)**

Question Number	Answer	Additional guidance	Mark
1(c)(i)	1. (risk due to) high blood pressure has fallen overall / eq ; 2. (risk due to) high blood cholesterol has fallen overall / eq ; 3. (risk due to) obesity has risen overall / eq ; 4. obesity was the lowest risk factor but is now the highest / eq ; 5. credit use of manipulated figures ;	Answers should cover total time period and not just 1980-1990 5. o y credit overall change figures e.g. 17% drop for high blood pressure 16% drop for high blood cholesterol 10.5% increase in obesity	**(3)**

Question Number	Answer	Additional guidance	Mark
1(c)(ii)	1. people more aware of the risks / eq ; 2. people consuming foods with lower {cholesterol levels / saturated fats / eq} / eq ; 3. people consuming foods with more fibre in them / eq ; 4. use of statins / eq ; 5. more screening / eq ; 6. more exercise / eq ;	1. ALLOW more aware of healthy diets 4. Use f sterols/named example 5. AL W self testing	**(2)**

Question Number	Answer	Additional guidance	Mark
1(c)(iii)	Any **two** from: (being) male increase in age lack of exercise / inactivity smoking genetics high alcohol consumption high salt diet high saturated fat intake stress diabetes ;	IGNORE fat, LDL or cholesterol consumption	**(1)**

Question Number	Answer	Mark
2(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
2(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
2(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
2(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)**

Question Number	Answer	Mark
3(a)	1. amino acids ; 2. peptide ; 3. condensation / polymerisation ; 4. amino / amine / NH_3^+ / NH_2 ; 5. carboxyl / carboxylic (acid) / COO^- / COOH ; [Accept answers for 4 and 5 the opposite way round]	**(5)**

Question Number	Answer	Mark
3(b)(i)	ALLOW Mps in context of clearly labelled diagram 1. globular / eq ; 2. reference to active site ; 3. reference to specific shape of active site ; 4. reference to {bonds /named bond / interaction / eq} between R groups ; 5. credit correctly named {bond/interaction} e.g. disulphide bond, hydrogen bonds, hydrophobic interactions (between R groups) ;	**(3)**

Question Number	Answer	Mark
3(b)(ii)	1. (primary structure) {position / sequence / order /eq} of the {amino acids / R groups} / eq ; 2. idea that this determines the {positioning / type} of the {bonds / folding / eq} ; 3. determining the {shape / properties} of the active site / eq ; 4. idea of interaction of active sites and substrates e.g. enzyme substrate complex forms ; 5. idea of {polar / hydrophilic} on the outside of enzymes / {non polar / hydrophobic} on the inside / eq ; 6. reference to solubility ;	**(3)**

Question Number	Answer	Mark
4(a)(i)	C ;	**(1)**

Question Number	Answer	Mark
4(a)(ii)	D;	**(1)**

Question Number	Answer	Mark
4(a)(iii)	D ;	**(1)**

Question Number	Answer	Mark
4(b)(i)	1. humans more closely related to chimp (than to orang utan and gorilla) / eq ; 2. reference to humans and chimps more closely related to orang utan than gorilla ; 3. reference to similarity of sequence indicates closeness of ancestral relationship / eq ; 4. human and chimp sequence identical / eq ; 5. orang utan has one difference, gorilla has two differences / eq ; 6. reference to {number 19 for orang utan / number 9 and 19 for gorilla} different ;	**(4)**

Question Number	Answer	Mark
4(b)(ii)	1. reference to similarity (of DNA) indicates closeness of relationship ; 2. because genes are sections of DNA / eq ; 3. genes are the codes for protein / eq ;	**(2)**

Question Number	Answer	Mark
4(b)(iii)	1. reference to source of DNA sample, e.g. blood, saliva, semen ; 2. reference to small samples of DNA can be amplified by PCR ; 3. reference to use of (restriction / eq) enzymes to {break / eq} DNA ; 4. reference to use of {electro potential / potential difference / eq} ; 5. reference to {treatment / staining / eq} ; 6. show up as {bands / bars / eq} ; 7. reference to the {number of bands / eq} that match indicates similarity of the DNA ;	**(3)**