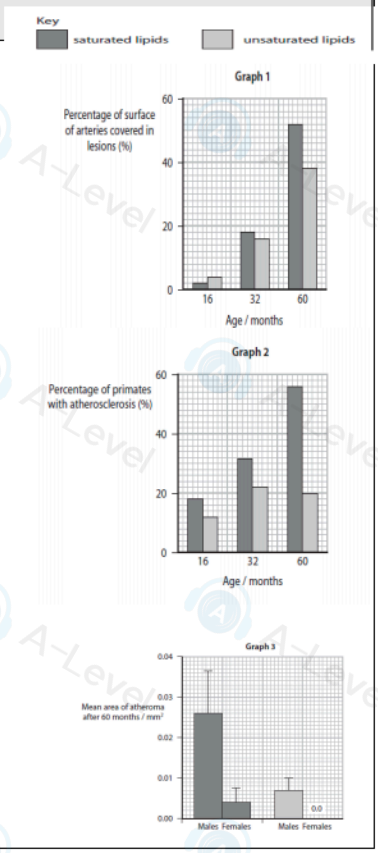
Question number	Answer	Additional guidance	Mark
8(a)	An answer that includes the following points: • at least one carbon-carbon double bond drawn (1) • rest of diagram correct (remaining CC single bonds and {Hs added /Lewis structures}) (1)	**DO NOT ACCEPT** double bond between C1 and C2 ecf from double bond between C1 and C2 ecf from saturated fatty acid	**(2)**

Question number	Answer	Additional guidance	Mark
8(b)(i)	• 1.1 / 1.14 / 1.136 (1)		**(1)**

Question number	Answer	Additional guidance	Mark
8(b)(ii)	• 1.5 : 1 / 1.45 : 1 (1)		**(1)**

Question number	Answer	Additional guidance	Mark
8(b)(iii)	• 0.022 (1) • 22 000 / 2.2×10^4 (1)	Bald answer of 22000 / 2.2×10^4 = 2 marks Bald answer of 22 of any magnitude or incorrect standard form format = 1 mark	**(2)**

Question number	Answer
*8(b)(iv)	**Graph 1 : surface area of arteries** **Conclusions :** • arteries have lesions with both lipids • percentage of surface covered in lesions increases with time for both sat and unsat lipids • (overall) increase is greater (over time) with sat lipid / converse • type of lid in diet does influence the percentage of arteries covered with lesions • data may not be {valid as no experimental details / repeatable as no error bars} (only once) **Graph 2 : % atherosclerosis** **Conclusions :** • atherosclerosis occurs with both lipids • atherosclerosis is higher with sat lipids in all three ages /converse • percentage increases with age for sat lipids • age has a less clear effect with unsat lipids • data may not be {valid as no experimental details / repeatable as no error bars / significant as no stats test} (only once) **Graph 3 : area of atheroma** **Conclusions :** • atheromas are larger in both males and females with sat lipids than unsat lipids • males have atheromas of greater area than females whichever lipid they are given • sex is an influence on area as well • data likely to be significant because error bars do not overlap • male data more variable



			Additional guidance
Level 0	0	No awardable content	
Level 1	1-2	Demonstrates isolated elements of biological knowledge and understanding to the given context with generalised comments made. Vague statements related to consequences are made with limited linkage to a range of scientific ideas, processes, techniques and procedures. The discussion will contain basic information with some attempt made to link knowledge and understanding to the given context.	Simple descriptions of data 1 mark = description of data in one graph 2 marks = description of data in two graphs
Level 2	3-4	Demonstrates adequate knowledge and understanding by selecting and applying some relevant biological facts / concepts. Consequences are discussed which are occasionally supported through linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows some linkages and lines of scientific reasoning with some structure.	Extended links made 3 marks = description of data in three graphs 4 marks = conclusion for one graph
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting and applying relevant biological facts / concepts. Consequences are discussed which supported throughout by sustained linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.	Understanding of graphs used to comment on effect of dietary supplements 5 marks = conclusion for two graphs 6 marks = conclusion for three graphs

Question number	Answer	Additional guidance	Mark
8(b)(v)	An answer that includes three of the following points: Unethical : • may cause {pain / harm / discomfort} / it is cruel (1) • animals may die (1) • animals should not be kept in captivity / being kept in captivity caused stress (1) • animals unable to consent (1) Ethical : • it is more ethical than experimenting on humans (1) • primates are (more) similar to humans (than other animals) (1) • might improve {human / animal} health (in future) (1)	**ACCEPT** may cause health issues **ACCEPT** against their will they have no say in the matter have not given their permission animals have their own rights **ACCEPT** humans are more important {should not harm / kill} humans	**(3)**

Question Number	Answer	Additional Guidance	Mark
5(a)	1. there are other risk factors/eq ;	Do not accept 'more than one / eq factor involved' as repeating stem ACCEPT correctly named risk factor e.g. age / gender / high blood pressure / genetics/genes IGNORE references to HDLs or LDLs	(1)

Question Number	Answer	Additional Guidance	Mark
5(b)	1. BMI identified as **25** ; 2. 92.16 / 92.2 / 92 (kg) ;	Correct answer only scores 2 marks no ecf from mp1 Do not accept '92.1'	(2)

Question Number	Answer	Additional Guidance	Mark
5(c)(i)	1. (plant) statin ; 2. muscle pain / liver damage / kidney failure / nausea / dizziness / headache etc;	Accept named examples of statins mp2 ACCEPT -depression IGNORE -too low cholesterol	(2)

Question Number	Answer	Additional Guidance	Mark
*5(c)(ii)	1. idea of {energy imbalance / eq} leading to obesity ; 2. (high LDL levels/eq) leads to {damage to the endothelium / lining} of artery ; 3. reference to or description of inflammatory response ; 4. (leads to) formation of {atheroma / plaque / atherosclerosis} ; 5. (leads to) a {loss of elasticity / narrowing of lumen / blockage} of artery ; 6. leads to a reduced blood flow to {heart / cells / tissues} ; 7. (causing) reduced amount of {oxygen /glucose/nutrients} to reach the{heart / tissues/cells/eq} ;	QWC emphasis is logical sequence MP2 Do not accept artery wall ACCEPT endothelial cells / wall/layer IGNORE blood vessel only MP3-deposition of LDLs or cholesterol / WBCs / platelets / foam cells / calcium salts mp3 IGNORE -clotting cascade only mp5-IGNORE narrow artery only	(5)

Question number	Answer	Additional guidance	Mark
8(a)	An answer that includes three of the following points: Similarities **Any two from:** • both contain a glycerol (1) • both contain fatty acids (1) • both contain ester bonds (1) Differences • triglycerides have three fatty acids and phospholipids have two fatty acids (1) • triglycerides do not contain a phosphate group but phospholipids do contain a phosphate group (1)	**NB** Do not piece together from two descriptions in separate sentences **IGNORE** diagrams	**(3)**

Question number	Answer	Additional guidance	Mark
8(b)	An explanation that includes the following points: • {protein / phosphate heads / phospholipid heads} are {soluble / hydrophilic / polar} and interact with {blood / plasma} (1) • {fatty acids / triglycerides /cholesterol} is {insoluble / non-polar / hydrophobic} (1) • therefore cholesterol is surrounded by {fatty acid tails / triglycerides} (1)		**(3)**

Question number	Answer	Additional guidance	Mark
8(c)(i)	• volume of sphere calculated / values substituted into the equation (1) • volume of sphere rounded up to nearest whole number (1) • ratio calculated (1)	Example of calculation = 6912 if using π = 3 = 7142.4 if using π = 3.1 = 7234.56 if using π = 3.14 = 7239.168 if using π = 3.142 = 7241.472 if using π = 3.143 = 7238.22947387 if pressing π on calculator = 6912 / 7142 / 7235 / 7239 / 7238 / 7241 **ACCEPT** 6910 / 7140 / 7240 **NB** Just these values given = 2 marks 14 : 1 13 : 1 if 6910 / 6912 CE apply throughout **NB** mark answer in table if different from in the working eg **Diameter of LDL / nm** | **Volume of LDL / nm³** | **Volume of cholesterol / nm³** | **Ratio of LDL volume to cholesterol volume** | | | | | 7235 = 2 marks | | 14 : 1 = 1 mark	**(3)**

Question number	Answer	Additional guidance	Mark
*8(c)(ii)	Indicative content: • as LDL increases, risk increases (K / G) • several factors beside LDLs can increase the risk of CVD (K) • example of a factor given e.g. high blood pressure (K) • LDLs can be different sizes (Q) • and therefore be absorbed by endothelial cells differently (Q) • and therefore get broken down at different rates (K / Q) • and therefore carry different volumes of cholesterol (Q) • level of HDL (in blood) affects risk (of CVD) (K / G) • example given from graph e.g. 0.65 a.u. has greater risk than 2.20 a.u. (G) • ratio of LDL : HDL affects risk (of developing CVD) (K / G) • the lower LDL : HDL the ratio the lower risk of CVD (K / G)		**(6)**
Own knowledge (K), information given in the graph (G), information in the question (Q) **Level 1 :** uses either (K), (G) **or** (Q) 1 mark = 1 comment, 2 marks = 2 comments **Level 2 :** uses two from (K), (G) **or** (Q) 3 marks = 3 comments, 4 marks = 4 comments **Level 3 :** uses (K), (G) **and** (Q) 5 marks = 5 comments, 6 marks = 6 comments			