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

Question number	Answer	Additional guidance	Mark
2(a)(i)	B is the correct answer • A is not the correct answer as actin does not join bone to bone • C is not the correct answer as muscle does not join bone to bone • D is not the correct answer as tendon does not join bone to bone		Computer **(1)**

Question number	Answer	Mark
2(a)(ii)	D is the correct answer • A is not the correct answer as actin does not join muscle to bone • B is not the correct answer as ligament does not join muscle to bone • C is not the correct answer as myosin does not join muscle to bone	Computer **(1)**

Question number	Answer	Mark
2(a)(iii)	D is the correct answer • A is not the correct answer as actin and myosin are not made of carbohydrates • B is not the correct answer as actin and myosin are not made of fatty acids • C is not the correct answer as actin and myosin are not made of nucleic acids	Computer **(1)**

Question number	Answer	Additional guidance	Mark
2(b)(i)	An explanation that includes two of the following points: • muscles are in antagonistic pairs / have extensor and flexor muscles (1) • the muscles contract (with equal strength) (1) • ligaments hold the joint in place (1)	muscles if named – rectus femoris and gastrocnemius / fibialis accept muscles work antagonistically ignore one contracts and the other relaxes accept ligaments hold the bones in place	Expert **(2)**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	A description that includes three of the following points: • ATP binds to the myosin head (1) • {releasing the myosin head from the actin strand/breaking the cross-bridge} (1) • ATP is hydrolysed (1) • (providing energy) to change the myosin head {shape / position}(1) • allowing myosin to bind to actin / form actin-myosin cross bridge (1)	mps need to be in logical order to gain credit ACCEPT ATP broken down into ADP and Pi Do not accept the power stroke	Expert **(3)**

Question number	Answer					Mark
6(a)		**Structure found in**				

Structure	amylose only	amylopectin only	both amylose and amylopectin	neither amylose nor amylopectin
glycosidic bonds	[x]	[x]	**[x]**	[x]
1-6 α bonds	[x]	**[x]**	[x]	[x]
hydrogen bonds	[x]	[x]	**[x]**	[x]

(3)

Question number	Answer	Additional guidance	Mark
6(b)	A description that includes the following points: • as temperature increases the loss of amylose increases (in all four sources) (1) • {most amylose is lost from cassava / least amylose lost from potato} (at all three temperatures) (1)		**(2)**

Question number	Answer	Additional guidance	Mark
6(c)(i)	An answer that includes three of the following with at least one similarity and one difference: **Similarities:** • (an increase in temperature causes an) increase in amylose and amylopectin loss (up to 85 and then a decrease) (1) • {the same temperature / a temperature of 85 (°C) causes highest loss of amylose and amylopectin (1) • both lose same quantity at {47 / 64 (°C)} (1) **Differences:** • amylopectin starts to be lost at lower temperatures (1) • more amylopectin is lost than amylose (overall / above 64°C / except between 47°C and 64°C) (1)	**ACCEPT** positive correlation (up to 85 (°C)) **ACCEPT** amylopectin starts to be lost at 20 (°C) and amylose at {40 / just above 40 (°C)} amylopectin lost at greater range of temperatures a temperature of {40 / just above 40 (°C)} causes a loss of amylose but a temperature of 20 °C causes a loss of amylopectin	(3)

Question number	Answer	Additional guidance	Mark
6(c)(ii)	An answer that includes three of the following points: • (water containing) amylose had the higher hardness and (water containing) amylopectin had the higher stickiness **OR** • (water containing) amylose and amylopectin has the higher (overall) hardness and stickiness (1) • (water containing) amylose contributes to hardness (1) • (water containing) amylopectin contributes to stickiness (1) • no {error bars / standard deviation} so data may not be repeatable (1)	 **ACCEPT** increases **ACCEPT** increases	(3)

Question number	Answer	Additional guidance	Mark
6(c)(iii)	An answer that includes the following points: • (lid on) so that {cooking fluid / water} is not lost / so more water will be absorbed by rice (1) • so that the {hardness / stickiness} is {desired / correct} (1) OR • (all liquid absorbed) no loss of amylose (1) • so that the {desired / correct} hardness is achieved (1) OR • (all liquid absorbed) no loss of amylopectin (1) • so that the {desired / correct} stickiness is achieved (1)		(2)

Question number	Answer	Additional guidance	Mark
6(a)(i)	An explanation that includes the following points: • because both lines rise and fall (in parallel) (1) • but the line for deaths from lung cancer is a period of time after the line for cigarettes smoked (1)	**Accept** {delay / timelag} for deaths	(2)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation that includes the following points: • alveoli will have a smaller surface area (to volume ratio) (1) • therefore the (rate of) diffusion of oxygen into the bloodstream will be slower (1)	**Accept** gas exchange area will be smaller **Accept** gas exchange for diffusion **Ignore** less gas exchange / diffusion	(2)

Question number	Answer
*6(b)	**Indicative content:**

Egg points (E)	1.	{number / density of pores}
	2.	{width / size} of pores
	3.	area of pores
	4.	thickness of shell and membranes
	5.	rate of respiration of developing embryo
	6.	rate of blood flow of embryo
	7.	temperature
	8.	shell is impermeable / pores are permeable
	9.	shell supports membrane so there is a large SA for gas exchange
Theory points (T)	10.	Ficks Law of diffusion can be used to calculate diffusion rate
	11.	State Fick's Law (3)
	12.	because rate of diffusion depends on surface area / mp11
	13.	because rate of diffusion depends on diffusion distance / mp11
	14.	because rate of diffusion depends on concentration gradient / mp11
	15.	speed of molecules depends on temperature
	16.	because rate of diffusion depends on what substances oxygen is passing through eg water / air
	17.	diffusion coefficient through air
	18.	diffusion coefficient through membranes
Explanation points (X) Accept converse for all	19.	increasing SA (or any named factor increasing this) causes increase in rate of diffusion
	20.	increasing distance (or any named factor increasing this) causes decrease in diffusion
	21.	increasing conc gradient (or any named factor increasing this) causes increase in rate of diffusion
	22.	increasing temperature increases rate of diffusion

Question Number	Answer	Additional Guidance	Mark
7(a)(i)	pulmonary vein ;		(1)

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	1. arrow drawn on the left hand side of the diagram and in the right direction ; 2. arrow going from ventricle through / into the pulmonary artery ;	Do not accept if arrows drawn on both sides	(2)

Question Number	Answer	Additional Guidance	Mark
7(a)(iii)	1. (normally) oxygenated and deoxygenated blood is separated ; 2. as a result of the condition deoxygenated and oxygenated blood is {mixed / not separated / eq} ; 3. (so) more oxygen flows to lungs /eq ; 4. results in a {less steep / eq} oxygen concentration gradient in the alveoli ; 5. less diffusion of oxygen from alveoli to (blood) capillaries ; 6. less oxygen to {body/ cells/tissues/eq} ;	MP4 IGNORE lungs IGNORE concentration gradient is not maintained	(4)

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	1. credit length of atrial systole / complete cardiac cycle / time for complete cardiac cycle ; 2. time shown as 0.1 seconds ;	ACCEPT 5 mm / 35 mm / 0.8 seconds mp2-ACCEPT to any no of dps Correct answer with no working shown gains 2 marks	(2)

Question Number	Answer	Additional Guidance	Mark
7(b)(ii)	1. ventricular **and** atrial {diastole / relaxation} occurs ; 2. the semilunar valves are closed **and** the atrioventricular valves open ; 3. blood enters atria / atria fill with blood ; 4. atrial {systole / contraction} then occurs ;	MP2 accept AV valve / tricuspid / bicuspid mp3-IGNORE ventricles fill	(3)

Question number	Answer	Mark
1(a)	The only correct answer is **C** *A is incorrect as statement 1 is wrong as hydrogen bonds do not join the O and H* *B is incorrect as statement 1 is wrong as hydrogen bonds do not join the O and H* *D is incorrect as statement 1 is wrong as hydrogen bonds do not join the O and H*	(1)

Question number	Answer				Mark
1(b)					(3)

Structure	Structure found in			
	amylose only	amylopectin only	both amylose and amylopectin	neither amylose nor amylopectin
glycosidic bonds	[x]	[x]	[x]	[x]
1-4 α bonds	[x]	[x]	[x]	[x]
branched side chains	[x]	[x]	[x]	[x]

Question number	Answer	Additional guidance	Mark
1(c)	• peptide bond drawn correctly	 **ACCEPT** O on the C and H on the N facing up or down	(1)