Energy, Carbohydrates and Fats - Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
(i)	• correct numbers from table used to calculate increase (1) • correct answer (1)	<u>Example of calculation</u> 12886-10090 or 2796 (Answer / 10090)*100 = 27.71(%) / 27.7(%) / 28(%) Correct answer without working gains full marks	**(2)**

Question Number	Answer	Mark
(ii)	**The only correct answer is C - 2223 kcal** ***A*** *is not correct because the decimal place is in the wrong place as they have not taken into account converting kJ to joules or calories to kcal.* ***B*** *is not correct because the decimal place is in the wrong place as they have not taken into account converting kJ to joules or calories to kcal.* ***D*** *is not correct because they have not taken into account converting kJ to joules or calories to kcal.*	**(1)**

Question Number	Answer	Additional Guidance	Mark
(iii)	An answer that makes reference to the following: • stored as {glycogen / fat / lipids} (in body cells) (1)	Answer must be in context of energy	**(1)**

Q2.

Question Number	Answer	Additional Guidance	Mark
(i)	• correct figures from graph used to calculate total cholesterol • value for ratio correctly calculated	<u>Example of calculation</u> 28 + 136 = 164 5.9:1 / 5.86:1 One mark for 164:28	**(2)**

Question Number	**Indicative content**	
* **(ii)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. Basic information • testosterone increases production of { LDL / cholesterol } • testosterone {increases breakdown of / reduces } HDL • { high cholesterol / LDL } associated with increased risk of {CVD / atherosclerosis} Evidence for linkages • role of HDL in transporting cholesterol from the bloodstream to the liver • role of LDL in accumulation of cholesterol and development of atherosclerosis Evidence for sustained scientific reasoning • testosterone associated with increased synthesis of the enzyme HMGCR which is involved in cholesterol production • { performance enhancing drugs / testosterone } can harm the health of an athlete by increasing risk of CVD	

Level	Mark	Descriptor	
Level 0	Marks	No awardable content	
Level 1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.	Increase in CVD due to increase in cholesterol/LDL due to increase in production/ rate of breakdown
Level 2	3-4	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.	Explanation of the role of LDL Development of atherosclerosis
Level 3	5-6	An explanation is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.	Links made between all data. Explanation of the role of HMGCR Detailed description of the effect on atherosclerosis

Q3.

Question Number	Answer	Additional guidance	Mark
(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
(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} bonds / ionic bonds / Van der Waals forces ; 6. between the R groups / eq ;	2. ALLOW from a labelled diagram ALLOW NH_2 and COOH 4. ALLOW ref to alpha helix or beta pleated sheet	**(4)**

Question Number	Answer	Additional guidance	Mark
(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
(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. only 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
(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 of sterols/named example 5. ALLOW self testing	**(2)**

Question Number	Answer	Additional guidance	Mark
(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)**

Q4.

Question Number	Answer	Additional Guidance	Mark
(i)	A description that makes reference to two of the following: • carrier protein (in cell surface membrane) • (glucose moves from) high to low concentration • glucose binds to (carrier) protein / (carrier) protein changes shape to move glucose (across the membrane) (1)	IGNORE channel protein ALLOW 'down a concentration gradient'	**(2)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to three of the following: • polymer of glucose • to provide glucose for respiration • {branched / contains 1,6-glycosidic bonds / has many terminal ends} for rapid hydrolysis • compact to allow large amount (of glucose / energy) to be stored in a small space / insoluble therefore no osmotic effect on cells	ALLOW polysaccharide /made of many glucose monomers DO NOT ALLOW β- glucose IGNORE 'easy to hydrolyse' ALLOW break down instead of hydrolyse	**(3)**

Q5.

Question number	Answer	Additional guidance	Mark
(i)	A description that makes reference to the following: • condensation (1) • involving OH groups (on both molecules) / water is formed (1)		(2)

Question number	Answer	Additional guidance	Mark
(ii)	An answer that makes reference to the following: • both are formed from two molecules of (α)glucose / both contain a glycosidic bond (1) • maltose has (α-)1,4 linkage and trehalose has (α-)1,1 linkage / in trehalose one of the glucose monomers is inverted (1)	ALLOW both are disaccharides of glucose DO NOT ALLOW β - glucose	(2)

Q6.

Question Number	Answer	Additional Guidance	Mark
	1. glycosidic bond correctly drawn ; 2. molecule of water shown to be produced ; 3. remaining groups around disaccharide drawn correctly ;	1. **IGNORE** labelling of bond 2. **ACCEPT** water named or formula 3. **DO NOT ACCEPT** two separate glucose molecules NB: check carefully H on C5	**(3)**

Q7.

Question Number	Answer	Mark
(a)(i)	D ;	(1)

Question Number	Answer	Mark
(a)(ii)	A ;	(1)

Question Number	Answer	Mark
(a)(iii)	B ;	(1)

Question Number	Answer	Mark
(a)(iv)	D ;	(1)

Question Number	Answer	Additional guidance	Mark
(b)(i)	1. idea that only one factor has changed ; 2. if intake went up, increase risk / obesity a risk factor / if intake went down could decrease CHD risk / eq ;	1. ACCEPT Less valid investigation / method , to allow comparison, variables need to be controlled IGNORE reliability, fair test	(2)

Question Number	Answer	Additional guidance	Mark
(b)(ii)	1. both diets decrease the risk / eq ; 2. both diets have less saturated fats / eq ; 3. saturated fat associated with heart disease / eq ; 4. idea that changing to unsaturated lipids has the greater effect ; 5. idea that excess carbohydrates may be stored as saturated lipids ; 6. idea that unsaturated lipids change HDL/LDL ratio ;	4. 30% more decrease	(3)

Q8.

Question Number	Answer	Mark
(a (i)	D ;	(1)

Question Number	Answer	Mark
(a (ii)	B ;	(1)

Question Number	Answer	Mark
(a)(iii)	B ;	(1)

Question Number	Answer	Mark
(a)(iv)	A ;	(1)

Question Number	Answer	Additional Guidance	Mark
(b)(i)	1. (total) cholesterol levels in people with mutation are not higher than people without mutation / eq ; 2. LDL (cholesterol) levels in people with mutation are not higher than people without mutation / eq ; 3. HDL (cholesterol) levels in people with mutation are not lower than people without mutation / eq ; 4. credit correct use of manipulated figures ;	1, 2, 3: ACCEPT converse, similar / little difference. Decreased/reduced is **not** equivalent to lower. 1. IGNORE same 2. IGNORE same 3. ACCEPT ref to HDL to LDL ratio higher in people with the mutation. 4. must be manipulated e.g. difference calculated and not just quoted (difference in LDL= 10, total cholesterol= 7) ACCEPT without units	(2)

Question Number	Answer	Additional Guidance	Mark
(b)(ii)	(plant) statin ;	IGNORE named drug, sterol, stanin	(1)

Question Number	Answer	Additional Guidance	Mark
(b)(iii)	1. muscle {inflammation / pain / eq} 2. liver {damage / failure / eq} 3. joint {aches / pains / eq} 4. nausea/ constipation / diarrhoea / indigestion / flatulence / loss of appetite / eq 5. kidney {damage /failure /eq} 6. cataracts / blurred vision 7. diabetes 8. allergies / skin inflammation / skin rash / eq 9. respiratory problems / persistent cough / nosebleeds / eq 10. headaches / dizziness / depression / insomnia / ringing in ears / fatigue / eq ;	NOT cancer or reduced vitamin absorption IGNORE affect ACCEPT problems as equivalent to damage etc 2. ACCEPT disease 4. ACCEPT vomiting 5. ACCEPT kidney disease 10. ACCEPT mood swings	(1)