

Question Number	Answer	Additional Guidance	Mark
1 (a) (i)	Any <b>two</b> from:  {mineral(s) / named mineral} ;;  {vitamin(s) / named vitamin} ;;  {carbohydrate / named soluble carbohydrate};  water ;  antibodies ;	Allow two named minerals or vitamins allow salt, potassium, sodium, etc IGNORE nitrogen, NB minerals AND named mineral = 1 mark vitamins AND named vitamin = 1 mark  NOT sugar, lactose, starch, fibre, glycogen  IGNORE amino acids , fats, fatty acids, glycerol, cholesterol	(2)

Question Number	Answer	Additional Guidance	Mark
1 (a) (ii)	1. more protein AND more lipid ;  2. idea that protein is needed for making more tissue ;  3. idea that lipids are a source of energy ;  4. idea of greater energy imbalance (for seals) ;  5. idea that excess energy is needed for {weight gain / stored as fat / eq} ;  6. Credit manipulation of figures e.g. calculation of difference between human and seal milk ;	1. IGNORE simple quote of figures ACCEPT as separate comments  2. ACCEPT growth    6. e.g. 12.4%, 9.9 / 9.86x more protein, 32.7%, 9.6 / 9.61x more lipid IGNORE about 10x	(4)

Question Number	Answer	Additional Guidance	Mark
1 (b) (i)	it contains no double bonds (in the hydrocarbon chain) / eq ;	ACCEPT no carbon carbon double bonds, no kinked chains NOT carbon oxygen double bonds	(1)

Question Number	Answer	Additional Guidance	Mark									
1 (b) (ii)	<table border="1"> <thead> <tr> <th>Group</th> <th>Total concentration of saturated fatty acids / mg per g milk</th> <th>Total concentration of unsaturated fatty acids / mg per g milk</th> </tr> </thead> <tbody> <tr> <td>Vegan</td> <td>325</td> <td><b>657</b></td> </tr> <tr> <td>Control</td> <td>497</td> <td><b>466 ;</b></td> </tr> </tbody> </table>	Group	Total concentration of saturated fatty acids / mg per g milk	Total concentration of unsaturated fatty acids / mg per g milk	Vegan	325	<b>657</b>	Control	497	<b>466 ;</b>		(1)
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1 (b) (iii)	<ol style="list-style-type: none"> <li>idea that animal products have a higher proportion of saturated fats than plant material ;</li> <li>credit correct manipulation of figures to illustrate differences in milk content ;</li> </ol>	<ol style="list-style-type: none"> <li>ACCEPT converse / saturated come from {meat / dairy} / unsaturated from plants</li> <li>e.g. 172 mg per g milk more saturated in control, 191 mg per g milk more unsaturated from vegans ACCEPT ECF for figure use from 4bii</li> </ol>	(2)

Question Number	Answer	Additional Guidance	Mark
2(a)	<ol style="list-style-type: none"> <li>1. glycerol drawn correctly with three OH groups ;</li> <li>2. 3 fatty acids ;</li> <li>3. fatty acid(s) have COOH included at the end ;</li> </ol>	<p>Mp1 and 3 ACCEPT OH / HO NOT double bond to OH</p> <p>2. ACCEPT 3x one fatty acid stated ACCEPT R or zig-zag chain for fatty acid chain</p>	(3)

Question Number	Answer	Additional Guidance	Mark
2(b)	<ol style="list-style-type: none"> <li>1. idea of energy imbalance ;</li> <li>2. loss of weight / eq ;</li> <li>3. reduced metabolic rate / eq ;</li> <li>4. lack of protein / reduced insulation / eq ;</li> <li>5. idea that they will need to eat more {carbohydrate / protein / eq} for energy balance ;</li> </ol>	<ol style="list-style-type: none"> <li>2. ACCEPT lower BMI</li> <li>3. ACCEPT fatigue</li> <li>4. ACCEPT muscle wastage, Malnourishment, reduced immune system</li> </ol>	(2)

Question Number	Answer	Additional Guidance	Mark
2(c) *QWC	<p><b>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</b></p> <ol style="list-style-type: none"> <li>1. idea that there is a change in the {DNA sequence / base sequence of a gene / eq} ;</li> <li>2. change in amino acid / change in primary structure of { protein / enzyme } ;</li> <li>3. reference to different R groups ;</li> <li>4. leading to different {type / position / eq} bonding ;</li> <li>5. idea of change in folding e.g. different 3D structure ;</li> <li>6. idea of change in {shape / properties} of the active site ;</li> <li>7. idea of {lipid / substrate / eq} does not fit in the enzyme's active site ;</li> </ol>	<p><b>QWC emphasis clarity of expression</b></p> <ol style="list-style-type: none"> <li>1. IGNORE mRNA</li> <li>4. ACCEPT named bond e.g. hydrogen, ionic, disulphide NOT peptide</li> <li>5. ACCEPT change to tertiary structure</li> <li>7. ACCEPT no enzyme-substrate complex made</li> </ol>	(5)

Question Number	Answer	Mark
3(a)(i)	<ol style="list-style-type: none"> <li>1. reference to {COOH/ carboxylic/ acid} grouping (at one end) ;</li> <li>2. (long hydro)carbon chain / eq ;</li> <li>3. 18 carbons / 17 carbons in hydrocarbon chain / eq ;</li> <li>4. Correct reference to (poly) unsaturated ;</li> <li>5. 3 carbon-carbon double bonds / 4 double bonds ;</li> <li>6. kinked structure / eq ;</li> </ol>	max (2)

Question Number	Answer	Mark
3(a)(ii)	<p>Any one from</p> <ol style="list-style-type: none"> <li>1. omega 3 has {3 carbon-carbon double bonds / 4 double bonds} , omega 6 has {2 / 3 } / eq ;</li> <li>2. omega 3 has less hydrogens / eq ;</li> <li>3. omega 3 is {kinkier / shorter} / eq ;</li> <li>4. omega 3 less saturated / eq ;</li> </ol>	max (1)

Question Number	Answer	Mark
3(a)(iii)	<ol style="list-style-type: none"> <li>1. indication that fatty acid forms a bond with the OH group of the glycerol molecule ;</li> <li>2. indication that water is formed ;</li> <li>3. ester bond correctly drawn ;</li> </ol>	(3)

Question Number	Answer	Mark
<b>3(b)</b>	<ol style="list-style-type: none"> <li>1. less grass less omega 3 / eq ;</li> <li>2. less grass more omega 6 / eq ;</li> <li>3. more grass reduces the omega 6 to omega 3 ratio / eq ;</li> <li>4. credit correct manipulation of figures ;</li> </ol>	<b>max (3)</b>

Question Number	Answer	Mark
<b>3(c)(i)</b>	<p>Any two from:</p> <ol style="list-style-type: none"> <li>1) high {salt / sodium}</li> <li>2) high cholesterol</li> <li>3) high saturated fat / high trans-fat</li> <li>4) high calories</li> <li>5) high alcohol</li> <li>6) low fibre / low NSP</li> <li>7) low antioxidants / low vitamin C / low vitamin E ;</li> </ol>	<b>(1)</b>

Question Number	Answer	Mark
<b>3(c)(ii)</b>	<p>blood pressure falls too low / coughs / swelling of ankles / impotence / tiredness / constipation / headache / confusion / depression / excessively low heart rate / allergy / stroke / provoked type II diabetes / frequent urination / fainting / dizziness / vomiting / dry mouth / breathing difficulties / irregular heart rate / chest pain / hives / rash / dehydration / reduced circulation effects / low potassium / blurred vision / eq ;</p>	<b>(1)</b>

Question Number	Answer	Mark
4(a)(i)	1 glycerol molecule and 3 fatty acid molecules ;	(1)

Question Number	Answer	Mark
4(a)(ii)	ester bond ;	(1)

Question Number	Answer	Mark
4(a)(iii)	condensation ;	(1)

Question Number	Answer	Mark
4(a)(iv)	have double bonds between carbon atoms and between carbon and oxygen atoms ;	(1)

Question Number	Answer	Mark
4(a)(v)	more hydrogen atoms than unsaturated lipids ;	(1)

Question Number	Answer	Mark
4(b)(i)	<ol style="list-style-type: none"> <li>1. phosphate and base joined to pentose sugar ;</li> <li>2. base correctly joined to sugar ;</li> <li>3. phosphate correctly joined to two pentose sugars ;</li> </ol>	(3)

Question Number	Answer	Mark
4(b)(ii)	(DNA) polymerase / ( DNA) ligase / (DNA) helicase ;	(1)