

# Mark Scheme – Results

January 2014

International Advanced Level Biology  
(WBI01) Paper 01

Unit 1: Lifestyle, Transport, Genes and  
Health

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
  - i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
  - ii) select and use a form and style of writing appropriate to purpose and to complex subject matter
  - iii) organise information clearly and coherently, using specialist vocabulary when appropriate

Question Number	Answer	Mark
1(a)(i)	B	(1)

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

Question Number	Answer	Mark
1(a)(iii)	D	(1)

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

Question Number	Answer	Additional Guidance	Mark
1(b)	1. idea that water is a solvent ; 2. idea that water is {slightly charged / dipole / polar / eq} ; 3. idea that {polar molecules / ions / eq} can dissolve in water ; 4. idea that water is {viscous / fluid / eq} ; 5. idea of water as a liquid assists mass flow 6. correct reference to cohesion / adhesion ;	2. ACCEPT references to hydrogen bonding	(3)

Question Number	Answer	Additional Guidance	Mark
2(a)	1. Arrow(s) indicating blood flow through right side ; 2. Arrow(s) indicating blood flow through left side ;	ACCEPT for one mark arrow showing blood moving from atria to ventricles OR ventricles to arteries on both sides	(2)

Question Number	Answer	Additional Guidance	Mark
2(b) (i)	0.8 / 0.80 ;		(1)

Question Number	Answer	Additional Guidance	Mark
2(b) (ii)	1. idea that (semilunar) valves are closed ; 2. because blood { has flowed back onto the valve / pressure in artery is greater (than the ventricle) } / eq ;	1. ACCEPT open at 0.4 and closed at 0.5 2. ACCEPT blood is flowing into ventricle from the artery	(2)

Question Number	Answer	Additional Guidance	Mark
2(b) (iii)	calculation shows that they are using 60% and 50cm <sup>3</sup> ; 30 ;	Answer of 30 gets both marks	(2)

Question Number	Answer	Additional Guidance	Mark
<b>2 (c)</b>	<ol style="list-style-type: none"><li>1. valve does not shut properly / eq ;</li><li>2. some backflow of blood (from ventricle to atrium) / eq ;</li><li>3. during ventricular systole / when ventricles contract / eq ;</li><li>4. idea of lower blood pressure ;</li><li>5. idea of less efficient supply of oxygen ;</li><li>6. idea that blood pressure in lungs increases ;</li></ol>	IGNORE comments about inefficient pumping	<b>(3)</b>

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	<ol style="list-style-type: none"> <li>1. idea that energy is required ;</li> <li>2. idea that chloride ions are moving against their concentration gradient ;</li> <li>3. idea of (ATP causes) conformational change to (transport) protein ;</li> </ol>	<ol style="list-style-type: none"> <li>2. ACCEPT against diffusion gradient</li> <li>3. IGNORE activation unqualified, CFTR</li> </ol>	(2)

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	<ol style="list-style-type: none"> <li>1. { more / high / eq } chloride ions in lumen of intestine / eq ;</li> <li>2. idea that other ions (sodium) follow chloride into the lumen ;</li> <li>3. water moves into the lumen / eq ;</li> <li>4. by osmosis ;</li> <li>5. idea that chloride ions cannot be reabsorbed fast enough ;</li> <li>6. idea that excess water not reabsorbed into the blood / eq ;</li> </ol>		(4)



Question Number	Answer	Additional Guidance	Mark
<b>3(a)(iii)</b>	1. idea that both use proteins ;  2. idea that facilitated diffusion goes down a concentration gradient while active transport can transport against the concentration gradient ;  3. active transport uses {ATP / energy} while facilitated diffusion does not / eq ;	ACCEPT piecing together to get comparison  2. NOT along gradient ACCEPT up instead of against	<b>(2)</b>

Question Number	Answer	Additional Guidance	Mark
<b>3(b)</b>	1. idea of replacing lost water ;  2. idea that extra water lowers the solute concentration in lumen ;  3. idea of less water enters the { lumen / intestine / eq } from blood ;  4. starch is not soluble / idea that starch does not affect osmosis ;  5. idea that starch is digested slowly ;  6. starch is a polysaccharide ;	1. IGNORE fluid          3. ACCEPT reduces osmosis from blood	<b>(4)</b>

Question Number	Answer	Additional Guidance	Mark
4(a)	1. alveoli / alveolus ; 2. surface area ; 3. oxygen ; 4. diffusion ;	1. IGNORE air sac  3. ACCEPT O <sub>2</sub>	(4)

Question Number	Answer	Additional Guidance	Mark
4(b)	<ol style="list-style-type: none"> <li>1. idea that mass flow generated by heart ;</li> <li>2. idea that moving blood helps to maintain a concentration gradient ;</li> <li>3. idea that a { steep / eq } concentration gradient gives a { fast / eq } rate of diffusion ;</li> <li>4. idea of { network / lots / eq } of capillaries ;</li> <li>5. large surface area of capillaries / eq ;</li> <li>6. idea that large surface area increases the rate of diffusion ;</li> <li>7. idea that capillaries have very thin walls ;</li> <li>8. idea that diffusion is fastest over small distances ;</li> <li>9. idea that no {organs / cells / tissues } are far away from blood / capillaries cover alveoli / eq ;</li> <li>10. idea that efficiency is related to double circulation ;</li> </ol>	<ol style="list-style-type: none"> <li>7. IGNORE thin capillaries</li> <li>8. ACCEPT references to Fick's law</li> </ol>	(5)

Question Number	Answer	Additional Guidance	Mark
5(a)QWC	<p>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> <li>1. idea of energy imbalance ;</li> <li>2. idea of individual becoming { <i>overweight / obese / eq</i> } ;</li> <li>3. idea of increased <i>blood pressure</i> ;</li> <li>4. idea of <i>obesity</i> leads to <i>diabetes</i> (a CVD risk factor) ;</li> <li>5. idea of increased (blood) { <i>cholesterol / LDL levels / LDL to HDL ratio</i> } ;</li> <li>6. idea of { damage to <i>endothelium / overloading of receptors</i> } ;</li> <li>7. formation of { <i>atheroma / plaque / atherosclerosis</i> } / eq ;</li> <li>8. idea of { loss of elasticity of <i>artery / narrowing of lumen / eq</i> } ;</li> </ol>	<p>QWC emphasis spelling</p> <ol style="list-style-type: none"> <li>1. ACCEPT fat not used for energy</li> <li>3. ACCEPT reference to <i>hypertension</i></li> <li>6. ACCEPT lining</li> <li>8. IGNORE narrowing of artery</li> </ol>	(5)

Question Number	Answer	Additional Guidance	Mark
5 (b) (i)	1. increase in number of risk factors increases the risk of developing CVD / eq ;  2. credit use of quantitative manipulated data ;	1. ACCEPT positive correlation  2. ACCEPT any that follow this pattern subtraction e.g. 0 to 1 = 0.9 % increase e.g. 1 to 2 = 36.4% times increase e.g. 2 to 3 = x 2 / doubles	(2)

Question Number	Answer	Additional Guidance	Mark
5(b) (ii)	Any <b>one</b> from: 1. idea of less energy intake ;  2. less salt ;  3. {less / moderate / no} alcohol ;  4. (plant) {statins / sterols} ;  5. antioxidants e.g. vitamin C / eq ;  6. more (dietary) fibre / roughage / eq ;	4. ACCEPT stanols IGNORE polyunsaturated fats unless qualified by replacing saturated fats	(1)

Question Number	Answer	Additional Guidance	Mark
5 (c)	Reference to any one of the following:  1. muscle inflammation  2. liver { damage/failure}  3. { muscle/joint} { aches/pains}  4. { nausea/constipation/diarrhoea}  5. kidney { damage/failure}  6. cataracts  7. diabetes  8. insomnia / eq ;  9. headache		<b>(1)</b>

Question Number	Answer	Additional Guidance	Mark
5 (d)	1. idea of less blood volume ;  2. idea of lower blood pressure ;  3. less chance of { damage to wall of artery / atherosclerosis / eq } ;	3. IGNORE reference to vessels	<b>(2)</b>

Question Number	Answer	Additional Guidance	Mark
6(a)	<ol style="list-style-type: none"> <li>1. correct CHOH drawn on C1 on galactose :</li> <li>2. correct CHOH drawn on C4 of other molecule ;</li> </ol>	<p>DEDUCT one mark if water molecule shown as product</p> <ol style="list-style-type: none"> <li>1. OH above H on C1</li> <li>2. H above OH on C4</li> </ol> <p>IGNORE other parts of the molecule</p>	(2)

Question Number	Answer	Additional Guidance	Mark
6(b) QWC	<p>QWC – (Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> <li>1. change in DNA sequence / eq ;</li> <li>2. idea of different mRNA ;</li> <li>3. change in { amino acid / AA sequence / primary structure of protein } / reference to different R groups ;</li> <li>4. idea of different { bonding / tertiary structure / 3D shape / folding } ;</li> <li>5. change in { shape / properties } of the active site / enzyme not made ;</li> <li>6. galactose does not fit in the enzymes active site / no enzyme available to break down galactose / eq ;</li> </ol>	<p>QWC emphasis is clarity of expression</p> <p>6. ACCEPT substrate</p>	(4)

Question Number	Answer	Additional Guidance	Mark
6(c)(i)	<ol style="list-style-type: none"> <li>1. { parents / 8 and 9 } do not have galactosaemia but { some of their children / 12 and 13 } do ;</li> <li>2. { parents / 8 and 9 } must be { heterozygous / carriers } ;</li> <li>3. idea that it is very unlikely to have a spontaneous mutation happening { 2 / 3 } times in the same family tree ;</li> <li>4. idea of low frequency of recessive alleles ;</li> </ol>	<p>ACCEPT for Mp1 and Mp2 an argument based on individuals 4, 6 and 7 being heterozygous in order to produce 12 and 13</p> <p>2. ACCEPT parent 8 and 9 are likely to be</p> <p>4. ACCEPT only 3 in this family tree have galactosaemia</p>	<b>(2)</b>

Question Number	Answer	Additional Guidance	Mark
6 (c) (ii)	<ol style="list-style-type: none"> <li>1. genotype of heterozygous parents shown e.g. Gg x Gg ;</li> <li>2. genotypes of possible children correctly shown ;</li> <li>3. (probability =) <math>\frac{1}{4}</math> / 25% / 1 in 4 / 0.25 ;</li> </ol>	<p>3. only ACCEPT C.E. if correct probability given from their genetic diagram</p>	<b>(3)</b>



Question Number	Answer	Additional Guidance	Mark
7(a)(i)	1. idea that increasing protease concentration increases the rate of reaction ;  2. idea that it is a non- linear increase ;  3. correct manipulation of figures ;	1. ACCEPT positive correlation  2. ACCEPT comparison of degree of change before and after 0.2 / 0.23 gdm <sup>-3</sup> IGNORE start or beginning  3. IGNORE direct reading from the graph ACCEPT subtractions, divisions, percentages	(2)

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	amino acid ;		(1)

Question Number	Answer	Additional Guidance	Mark
7(a)(iii)	<ol style="list-style-type: none"> <li>1. time to digest { stain / blood stain } ;</li> <li>2. description of how to measure the dependent variable – e.g. (blood) stain reduced to standard colour / stain absence ;</li> <li>3. need to control { concentration / volume / mass / source } of blood / size of stain ;</li> <li>4. idea of same volume of enzyme ;</li> <li>5. reference to another named controlled variable e.g. pH, temperature, material ;</li> <li>6. description of how variable controlled ;</li> <li>7. idea of { replicates / repeats } (at each of the enzyme concentrations used) ;</li> </ol>	For 1 & 2, ACCEPT other methodology e.g. use of colorimeter to measure blood removed from cloth.	(5)

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	<ol style="list-style-type: none"> <li>1. idea of increased surface area ;</li> <li>2. idea of more chance of { a collision between enzyme and substrate / enzyme-substrate complex } ;</li> </ol>		(2)

Question Number	Answer	Additional Guidance	Mark
7(b) (ii)	1. fatty acid ; 2. glycerol ; 3. monoglyceride / diglyceride ;		(2)

Question Number	Answer	Mark
8(a) (i)	B	(1)

Question Number	Answer	Mark
8(a) (ii)	C	(1)

Question Number	Answer	Mark
8(a) (iii)	A	(1)

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

Question Number	Answer	Additional Guidance	Mark
8 (b)	1. abortion / false positives / killing healthy fetus / eq ; 2. miscarriage / damage to embryo / eq ; 3. stress to parents / eq ; 4. social stigma of having disabled child / eq ; 5. other social issues	3. ACCEPT difficult decisions  5. ACCEPT availability / cost implications to health service or individuals	(2)

Question Number	Answer	Additional Guidance	Mark
8 (c)	1. idea of thick mucus in the reproductive system ; 2. idea that sperm can't reach egg / eq ; 3. idea that egg movement affected ; 4. idea that { fallopian tube / cervix / eq } { blocked / narrowed / eq } ; 5. idea that implantation impaired ;	1. ACCEPT sticky mucus 2. ACCEPT prevents fertilisation 4. ACCEPT oviduct	(2)

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