



Mark Scheme (Results)

January 2019

Pearson Edexcel
International Advanced Level in Biology
(WBI11) Paper 01
Molecules, Diet, Transport 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 grade 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.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

() means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.

ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities. Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question number	Answer	Mark
1(a)(i)	<p>The only correct answer is B.</p> <p><i>A is incorrect because it should be $C_n H_{2n} O_n$</i></p> <p><i>C is incorrect because it should be $C_n H_{2n} O_n$</i></p> <p><i>D is incorrect because it should $C_n H_{2n} O_n$</i></p>	(1)

Question number	Answer	Additional guidance	Mark
1(a)(ii)	<ul style="list-style-type: none"> condensation (reaction) 	IGNORE polymerisation	(1)

Question number	Answer	Mark
1(b)(i)	<p>The only correct answer is C.</p> <p><i>A is incorrect because amylose is a polysaccharide found in plants.</i></p> <p><i>B is incorrect because galactose is a monosaccharide.</i></p> <p><i>D is incorrect because sucrose is found in plants.</i></p>	(1)

Question number	Answer	Mark
1(b)(ii)	<p>The only correct answer is C.</p> <p><i>A is incorrect because amylopectin is a polysaccharide.</i></p> <p><i>B is incorrect because galactose is a monosaccharide.</i></p> <p><i>D is incorrect because sucrose contains fructose.</i></p>	(1)

Question number	Answer	Mark
1(b)(iii)	<p>The only correct answer is C.</p> <p><i>A is incorrect because amylose is found in plants.</i></p> <p><i>B is incorrect because fructose is a disaccharide found in plants.</i></p> <p><i>D is incorrect because sucrose is a disaccharide found in plants.</i></p>	(1)

Question number	Answer	Mark
1(b)(iv)	<p>The only correct answer is B.</p> <p><i>A is incorrect because amylose is not branched.</i></p> <p><i>C is incorrect because fructose is a monosaccharide.</i></p> <p><i>D is incorrect because maltose is a disaccharide.</i></p>	(1)

Question number	Answer	Mark
2(a)	<p>The only correct answer is B.</p> <p><i>A is incorrect because anticoagulants prevent blood clotting.</i></p> <p><i>C is incorrect because platelet inhibitors reduce blood clotting.</i></p> <p><i>D is incorrect because statins reduce cholesterol levels.</i></p>	(1)

Question number	Answer	Additional guidance	Mark
2(b)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> because there is a link between (total) blood cholesterol levels and heart disease (1) because {HDL is not thought to be a risk factor / LDL is associated with the development of heart disease / the {ratio / balance} of LDL : HDL determines the level of risk} (1) 	<p>ACCEPT CHD / CVD / atherosclerosis for heart disease throughout</p> <p>ACCEPT causes / leads / is a risk factor / correlation</p> <p>ACCEPT HDL reduces risk / HDL needed to get the LDL</p>	(2)

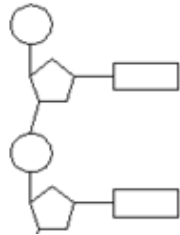
Question number	Answer	Additional guidance	Mark
2(c)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • (10 year CHD risk) increases (1) • because smoking {increases blood pressure / increases heart rate / damages (endothelial) lining of arteries} (1) • damage to lining results in {atheroma / plaque} building up OR {high blood pressure / increase in heart rate} makes the heart work harder (1) 	<p>ACCEPT CVD / CHD / heart disease / atherosclerosis / throughout</p> <p>ACCEPT increases the chance of blood clotting / makes platelets sticky</p> <p>ACCEPT blood clots can block arteries</p>	(3)

Question number	Answer		Mark
2(d)(i)	<ul style="list-style-type: none"> • salt intake / fibre intake / alcohol intake / (body) mass / BMI / obesity / hip waist ratio / level of exercise / stress levels / family history / genetic factors / taking statins / diastolic blood pressure 	IGNORE LDL / antihypertensives / blood pressure	(1)

Question	Answer	Additional guidance	Mark
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number			
2(d)(ii)	<ul style="list-style-type: none"> {salt / low fibre / alcohol / high BMI / obesity / little exercise / stress / family history / genetic factors / high diastolic blood pressure} increase the risk value OR <ul style="list-style-type: none"> {low salt / high fibre / low alcohol / suitable mass / exercise / low stress levels / taking statins / low diastolic blood pressure} decrease the risk value 	ACCEPT if answer given in (i)	(1)

Question number	Answer	Additional guidance	Mark
2(d)(iii)	An explanation that includes two of the following points: <ul style="list-style-type: none"> because there are other (risk) factors not included (1) because people will underestimate {their mass / how much they smoke} (1) because {total cholesterol / HDL / blood pressure} might be an estimate (1) 	ACCEPT named factor but not those shown on the risk calculator ACCEPT {total cholesterol / HDL / blood pressure} are variable are not aware that they have diabetes	(2)

Question number	Answer	Additional guidance	Mark
3(a)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> • two mononucleotides shown (joined in one strand only) (1) • each base bonded to C1 of pentose sugar (1) • phosphate group bonded to C3 of one sugar and C5 of the other sugar (1) 	<p>IGNORE labels</p> <p>including second strand if drawn / additional mononucleotides / one mononucleotide</p> <p>including second strand if drawn / additional mononucleotides</p> <p><u>example of diagram</u></p> 	(3)

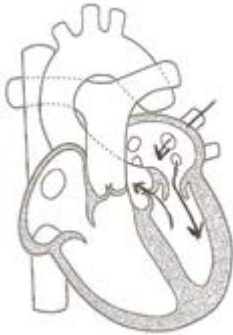
Question number	Answer	Additional guidance	Mark
3(b)(i)	<ul style="list-style-type: none"> • 0.38 (nm) 	ACCEPT 0.4	(1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • R (or Q) because it forms two hydrogen bonds (1) • R (or S) because it is {large / double-ring / purine} base (1) 	<p>ACCEPT not bases P and S because they form 3 hydrogen bonds</p> <p>ACCEPT not bases P and Q because they are {small / single-ring / pyrimidine}</p> <p>ACCEPT Q for correct reason or S for correct reason if neither mark points awarded</p>	(2)

Question number	Answer	Additional guidance	Mark
3(c)	<p>An answer that includes at least one similarity and one difference:</p> <p>similarities:</p> <ul style="list-style-type: none"> • both contain {RNA (mono)nucleotides / ribose sugar / uracil (and adenine, cytosine and guanine) / phosphodiester bonds} (1) • both are single stranded (1) <p>differences:</p> <ul style="list-style-type: none"> • mRNA is a straight chain and tRNA is {folded / clover-leaf shaped} / mRNA does not have hydrogen bonds and tRNA does (1) • {size / length} of mRNA is variable and the {size / length} of tRNA is constant (1) • mRNA has codons and tRNA has {anticodons / amino acid binding sites} (1) 	<p>DO NOT PIECE TOGETHER</p> <p>ACCEPT letters for bases</p>	<p>(4)</p>

Question number	Answer	Additional guidance	Mark
4(a)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> because (X / coronary artery) carries {oxygen / oxygenated blood} to the heart {cells / muscle / tissue} (1) for {(aerobic) respiration / metabolism} (in the heart) (1) aorta is closest blood vessel carrying oxygenated blood (1) 	<p>IGNORE glucose / nutrients</p> <p>ACCEPT aorta supplies X blood with <u>high levels of oxygen</u></p>	(3)

Question number	Answer	Additional guidance	Mark
4(b)(i)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> diastole / atrial systole / ventricular diastole (1) because the {atrioventricular / AV / bicuspid / tricuspid} valves are open (1) 	ACCEPT semi lunar valves are closed	(2)

Question number	Answer	Additional guidance	Mark
4(b)(ii)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> • arrows shown on left-hand side of heart (only) (1) • arrows pointing in correct direction (1) • arrows shown entering atrium through pulmonary vein and leaving through the aorta (1) 	<p><u>example of diagram</u></p> 	(3)

Question number	Answer	Additional guidance	Mark
4(c)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • increase in diameter due to {high pressure / large volume / surge} of blood (leaving the left ventricle) (1) • therefore expansion of elastic fibres (1) • decrease in diameter due to recoil (of elastic fibres) (1) 	<p>ACCEPT to reduce pressure of blood</p>	(3)

Question number	Answer	Additional guidance	Mark
5(a)(i)	<p>A calculation in which:</p> <ul style="list-style-type: none"> substitute values correctly into the equation (1) correct answer with units (1) 	<p><u>Example of calculation</u></p> $V = \frac{4 \times \pi \times 50 \times 50 \times 50}{3}$ <p>volume = 523 599 / 5.2 x10⁵ nm³</p> <p>CE applies if 100 has been used in calculation instead of 50</p> <p>ALLOW correct conversions with different units</p> <p>No working: e.g. 523 599 / 5.2 x10⁵ nm³ / 523 333 nm³ gains 2 marks e. g. 4 186 667 / 4.2 x10⁶ nm³ gains 1 mark</p>	(2)

Question number	Answer	Additional guidance	Mark
5(a)(ii)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> because {hydrophobic / non-polar} tails {move away from / repelled by} the {aqueous environment / water} (1) {hydrophilic / polar} heads {interact with / associate / dissolve in} the {aqueous environment / water} (1) 	<p>NB if no other marks awarded, allow 'hydrophilic heads face water and hydrophobic tails face away from water' for 1 mark</p>	(2)

Question number	Answer	Mark
5(b)(i)	<p>The only correct answer is B.</p> <p><i>A is incorrect because the liposome has no protein and cannot generate ATP.</i></p> <p><i>C is incorrect because liposomes cannot take up molecules by endocytosis.</i></p> <p><i>D is incorrect because water only moves by osmosis.</i></p>	(1)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> • increase in temperature increases membrane permeability (1) • increase in cholesterol decreases membrane permeability (1) • cholesterol has a greater effect on membrane permeability at higher temperatures (1) 	ACCEPT converse throughout	(3)

Question number	Answer	Additional guidance	Mark
5(b)(iii)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • because an increase in temperature increases the movement of phospholipids (1) • because the cholesterol decreases fluidity (of the membrane) (1) 	<p>ACCEPT fills the gaps between the phospholipid tails / acts as a barrier / reduces movement of phospholipids</p>	<p>(2)</p>

Question number	Answer	Additional guidance	Mark
6(a)(i)	<ul style="list-style-type: none"> 9 : 1 	ACCEPT 6 : 1 / 5 : 1	(1)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> will not have any effect on the total membrane phospholipids (1) the inner layer will have a relatively higher content of the other phospholipids / the outer layer will have a relatively lower content of the other phospholipids (1) 	ACCEPT increase phospholipid content in outer layer and decrease content in inner layer	(2)

Question number	Answer	Additional guidance	Mark
6(a)(iii)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> will alter membrane {properties / permeability / fluidity} (1) so that platelets will release thromboplastin (1) thromboplastin is {an enzyme / a catalyst} (1) that converts prothrombin into thrombin (1) 	NB thromboplastin catalyses prothrombin into thrombin = 2 marks	(4)

Question number	Answer	Additional guidance	Mark
6(b)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • thrombin is an <u>enzyme</u> (1) • because the inhibitor will change the shape of the active site (of thrombin) (1) • therefore thrombin cannot bind to fibrinogen (1) • therefore {less / no} fibrinogen will be converted into fibrin (1) • therefore there is {less / no} {mesh / fibrin / fibres} to trap {blood cells / platelets} (1) 	<p>ACCEPT inhibitor blocks the active site / fewer active sites available</p> <p>ACCEPT {less / no} thrombin to bind to fibrinogen / fewer collisions / fewer enzyme substrate complexes formed</p> <p>ACCEPT slower conversion</p>	(4)

Question number	Answer	Additional guidance	Mark
7(a)	<p>An answer that includes two of the following points:</p> <ul style="list-style-type: none"> • because it would be {unethical / wrong} to {kill / harm} the insects (1) • because the insects would contain {protein / amino acids} (1) 		(2)

	<ul style="list-style-type: none"> it would give an {incorrect / higher} value (for the {protein / amino acid} content of the galls) (1) 		
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Question number	Answer	Mark
7(b)(i)	<p>The only correct answer is B.</p> <p><i>A is incorrect because aspartate is the most polar molecule.</i></p> <p><i>C is incorrect because aspartate is the most polar molecule.</i></p> <p><i>D is incorrect because aspartate is the most polar molecule.</i></p>	(1)

Question number	Answer	Additional guidance	Mark
7(b)(ii)	<p>A calculation in which:</p> <ul style="list-style-type: none"> solubility of leucine calculated (1) solubility comparison with histidine calculated (1) 	<p>Example of calculation:</p> <p>5.5g in 250 cm³ = 22.0 (g dm⁻³)</p> <p>43.5 ÷ 22 = 1.98 / 2.0</p>	(2)

Question number	Answer	Mark
*7(c)	<p>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 indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p>Indicative content</p> <ul style="list-style-type: none">• there is a high concentration of protein in the galls• because the saliva stimulates protein synthesis• so there is a store of protein for the insect • there is a high concentration of amino acids in the galls• because the amino acids are needed for protein synthesis	(6)

		<ul style="list-style-type: none"> • because the enzymes in the saliva were breaking proteins down • for use by the insects • {alanine / arginine / histidine} are very abundant in the galls • because these amino acids are abundant in the protein in the galls • none of the amino acids are abundant in the tissues of the leaf with galls • because they have moved into the gall • leucine and tryptophan are not abundant in the galls • as they have been used by the insects 	
Level	Marks		
	0	No awardable content.	
1	1-2	<p>An explanation may be attempted but with limited interpretation or analysis of the scientific information and with a focus on mainly just one piece of scientific information.</p> <p>The explanation will contain basic information, with some attempt made to link knowledge and understanding to the given context.</p>	
2	3-4	<p>An explanation will be given, with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information.</p> <p>The explanation shows some linkages and lines of scientific reasoning with some structure.</p>	
3	5-6	<p>An explanation is made that is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information.</p> <p>The explanation shows a well-developed and sustained line of scientific reasoning, which is clear and logically</p>	

		structured.
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Question number	Answer	Additional guidance	Mark
8(a)	<p>A calculation in which:</p> <ul style="list-style-type: none"> • actual height of elephant • how many times taller the elephant is than the mouse 	<p>Example of calculation:</p> <p>$4.5 \div 0.02 = 225 / 230 / 235$ (cm)</p> <p>75 / 76.67 / 76.7 / 77 / 78 / 78.3 / 78.33</p> <p>IGNORE units</p>	(2)

Question number	Answer	Additional guidance	Mark
8(b)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> • attachment of lungs to {chest cavity / diaphragm} {increases volume / decreases pressure} (1) <p>Any two from:</p> <ul style="list-style-type: none"> • <u>alveoli</u> provide a large surface area for faster diffusion (1) 	<p>ACCEPT to {take in / hold} large volume of air</p> <p>ACCEPT thin walls</p>	(3)

	<ul style="list-style-type: none"> • <u>alveoli</u> formed from {one cell layer / flattened / squamous} epithelial cells for small diffusion distance (1) • concentration gradient maintained by {ventilation / blood flow / good blood supply} (1) 	ACCEPT large network of capillaries	
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Question number	Answer	Mark
*8(c)	<p>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.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material indicated as relevant. Additional content included in the response must be scientific and relevant.</p>	(6)

	<p>Indicative content</p> <ul style="list-style-type: none"> • oxygen dissociation curve for the mouse is shifted to the right • mouse haemoglobin has a lower affinity for oxygen than the elephant haemoglobin • therefore haemoglobin can supply oxygen to the tissues at lower pp of oxygen • because the rate of respiration in the mouse is higher • a mouse has a higher mass-specific metabolic rate than the elephant • because the mouse loses more body heat • because it has a larger surface area to volume ratio • because the mouse is more active • because it has to escape predators • the rate of respiration of the mouse is going to be greater than the elephant • therefore pp of oxygen in mouse tissues will be lower • therefore haemoglobin needs to be releasing oxygen • when blood cannot supply oxygen at a fast enough rate 		
Level	Marks		
	0	No awardable content.	

1	1-2	<p>An explanation may be attempted but with limited interpretation or analysis of the scientific information and with a focus on mainly just one piece of scientific information.</p> <p>The explanation will contain basic information, with some attempt made to link knowledge and understanding to the given context.</p>
2	3-4	<p>An explanation will be given, with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information.</p> <p>The explanation shows some linkages and lines of scientific reasoning with some structure.</p>
3	5-6	<p>An explanation is made that is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information.</p> <p>The explanation shows a well-developed and sustained line of scientific reasoning, which is clear and logically structured.</p>

