



# Mark Scheme (Results)

October 2021

Pearson Edexcel International Advanced Level  
In Biology (WBI11) Paper 01  
Molecules, Diet, Transport and Health

Question number	Answer	Mark
1(a)	<p>C</p> <p>The only correct answer is C.</p> <p><i>A is incorrect because amino acids are not found in DNA</i>  <i>B is incorrect because a mutation is a change in DNA</i>  <i>D is incorrect because there are no bases in protein</i></p>	(1)

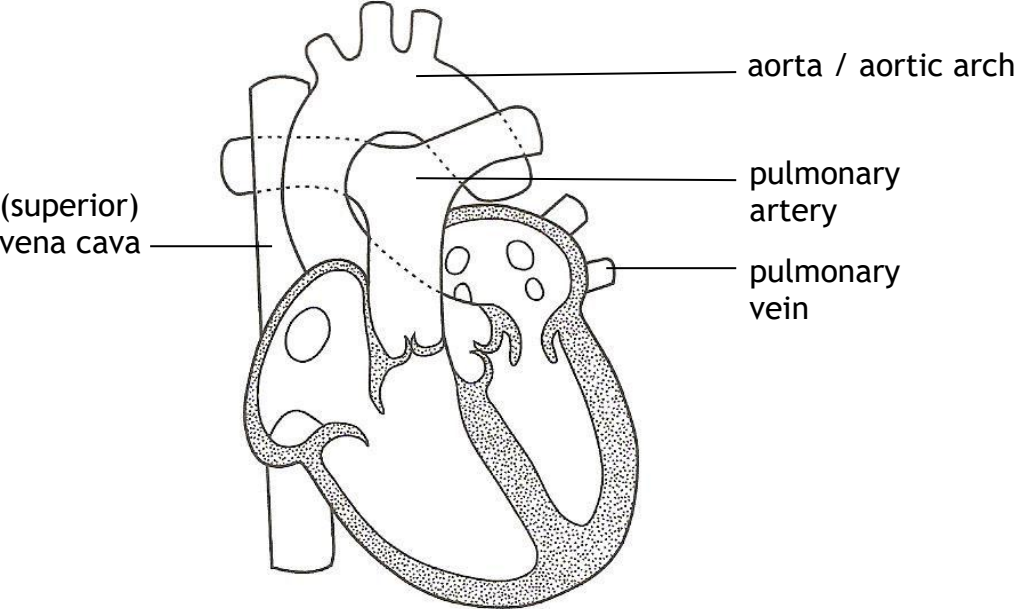
Question number	Answer	Additional guidance	Mark
1(b)	<p>Any two from:</p> <p>deletion  insertion  substitution (1)</p>	<p><b>ALLOW</b> {chromosome / translocation}  {point / gene} and {chromosome / translocation}</p> <p><b>IGNORE</b> subtraction / addition /  swapping / frameshift / nonsense /  duplication / specific examples</p>	(1)

Question number	Answer	Additional guidance	Mark
1(c)	<p>An answer that includes three of the following points:</p> <ul style="list-style-type: none"> <li>• as age increase the number of cases increases (in both males and females) (1)</li> <li>• up to 57 years of age {males and females have a similar number of cases / females have a higher incidence} (1)</li> <li>• above 57 the number of cases is higher in males (1)</li> <li>• onset of cancer is later in males than females (1)</li> </ul>	<p><b>ACCEPT</b> converse where appropriate  <b>ACCEPT</b> men and women throughout</p> <p><b>ACCEPT</b> positive correlation  <b>IGNORE</b> risk for cases</p> <p><b>ACCEPT</b> 58</p> <p><b>ACCEPT</b> 58  <b>NB</b> penalise wrong age once</p> <p><b>IGNORE</b> just figures quoted</p>	(3)

Question number	Answer	Additional guidance	Mark
2(a)(i)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> <li>• thromboplastin (1)</li> <li>• active site (1)</li> <li>• platelets / (red / white) blood cells / erythrocytes (1)</li> </ul>	<p><b>IGNORE</b> calcium ions / Ca<sup>++</sup></p> <p><b>IGNORE</b> clot / scab</p>	(3)

Question number	Answer	Mark
2(a)(ii)	<p>A</p> <p>The only correct answer is A.</p> <p><i>B is incorrect because antihypertensives are used to lower blood pressure</i></p> <p><i>C is incorrect because platelet inhibitors affect platelets</i></p> <p><i>D is incorrect because statins lower blood cholesterol</i></p>	(1)

Question number	Answer	Additional guidance	Mark
2(b)	<ul style="list-style-type: none"> <li>tangent drawn at 2 days (1)</li> <li>correct answer up to 2 decimal places and units (1)</li> </ul>	<p><b>Example of calculation:</b>  <b>ACCEPT</b> straight line touching outside of curve at 2</p> <p><b>ACCEPT</b> in range of 2.7 to 4.5 {s day<sup>-1</sup> / s per day / s/day}</p> <p><b>ACCEPT</b> with or without a minus sign</p>	(2)

Question number	Answer	Additional guidance	Mark
3(a)	 <p>(superior) vena cava</p> <p>aorta / aortic arch</p> <p>pulmonary artery</p> <p>pulmonary vein</p>	<p><b>IGNORE</b> ascending / descending</p> <p><b>DO NOT ACCEPT</b> inferior</p> <p>All 4 correct for 3marks</p> <p>3 correct for 2 marks</p> <p>1 or 2 correct for 1 mark</p>	(3)

Question number	Answer					Mark
3(b)	Structures	Present in arteries only	Present in capillaries only	Present in veins only	Present in arteries, capillaries and veins	(3)
	Lining of endothelial cells				X	
	Valves along the length of the blood vessel			X		
	Wall only one cell thick		X			

Question number	Answer	Additional guidance	Mark
3(c)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> <li>{velocity / (blood) flow} decreases as blood flows through the arterioles (1)</li> <li>{velocity / (blood) flow} low as blood flows through the capillaries (1)</li> <li>{velocity / (blood) flow} increases as blood flows through the venules (1)</li> </ul>	<p><b>NB</b> penalise ref to blood pressure instead of blood flow once</p> <p><b>ACCEPT</b> from arteries to capillaries <b>IGNORE</b> descriptions of what happens in arteries</p> <p><b>ACCEPT</b> slight increase <b>IGNORE</b> constant</p> <p><b>ACCEPT</b> from capillaries to veins <b>IGNORE</b> descriptions of what happens in veins</p>	(3)

Question number	Answer	Mark
4(a)(i)	<p><b>B</b></p> <p>The only correct answer is <b>B</b>.</p> <p><i>A is incorrect because fructose is a monosaccharide</i>  <i>C is incorrect because both glucose and fructose are monosaccharides</i>  <i>D is incorrect because fructose is a monosaccharide</i></p>	(1)

Question number	Answer	Mark		
4(a)(ii)	<p>C</p> <table border="1"> <tr> <td>peptide</td> <td>condensation</td> </tr> </table> <p>The only correct answer is C.</p> <p><i>A is incorrect because ester bonds are in lipids</i></p> <p><i>B is incorrect because ester bonds are in lipids and hydrolysis splits bonds</i></p> <p><i>D is incorrect because hydrolysis splits bonds</i></p>	peptide	condensation	(1)
peptide	condensation			

Question number	Answer	Mark		
4(a)(iii)	<p>B</p> <table border="1"> <tr> <td>absent</td> <td>lower</td> </tr> </table> <p>The only correct answer is B.</p> <p><i>A is incorrect because saturated fatty acids have more hydrogens than unsaturated fatty acid of same length</i></p> <p><i>C is incorrect because there are no carbon carbon double bonds in saturated fatty acids</i></p> <p><i>D is incorrect because there are no carbon carbon double bonds in saturated fatty acids</i></p>	absent	lower	(1)
absent	lower			

Question number	Answer	Additional guidance	Mark
4(b)(i)	<ul style="list-style-type: none"> <li>• volume of cylinder calculated (1)</li>   <li>• ratio of surface area : volume to max 2 dps (1)</li> </ul>	<p><b>Example of calculation:</b></p> $(3 \times 2 \times 2 \times 28 / \pi \times 2 \times 2 \times 28 / \frac{22}{7} \times 2 \times 2 \times 28) 336 / 352 \text{ (mm}^3\text{)}$ <p>e.g 1.02 : 1 / 1.07 : 1 / 1 : 1  <b>ACCEPT</b> ratio given the wrong way round e.g. 1 : 09  <b>NB</b> ecf if {incorrect rounding from above / diameter used} for 1 mark</p>	<b>(2)</b>



Question number	Answer	Additional guidance	Mark
4(b)(iii)	<p>A description that includes two of the following points:</p> <ul style="list-style-type: none"> <li>fibrous protein (1)</li> <li>{triple / three stranded} helix (held with hydrogen bonds) (1)</li> <li>(short) repeating sequences of amino acids / high {hydroxyproline / proline / glycine} content / every third amino acid is glycine (1)</li> </ul>	<p><b>IGNORE</b> refs to secondary / tertiary / quaternary structure throughout</p> <p><b>NB</b> piece together</p> <p><b>IGNORE</b> alpha</p>	(2)

Question number	Answer	Additional guidance	Mark
5(a)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> <li>because the rate of miscarriage increases with (increase in) age (1)</li> <li>there is no evidence age is causing the miscarriage (1)</li> </ul>	<p><b>ACCEPT</b> directly proportional to each other</p> <p>it shows that an increase in one variable is reflected by an increase in the other variable</p> <p><b>ACCEPT</b> no evidence of causation</p>	(2)

Question number	Answer	Additional guidance	Mark
5(b)(i)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> <li>aneuploidy results in miscarriage because the screened embryos result in fewer miscarriages (1)</li> <li>other {factors / named factor} cause miscarriages because {screened embryos / embryos that do not have aneuploidy} are miscarried (1)</li> </ul>	<p><b>ACCEPT</b> converse where appropriate</p> <p><b>e.g.</b> age, mutations, the process of implanting embryos, smoking, alcohol, dietary factors</p> <p><b>IGNORE</b> lifestyle / screening causes miscarriage</p>	(2)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	<p>An explanation that includes three of the following points:</p> <ul style="list-style-type: none"> <li>because no indication of sample size (1)</li> <li>because no statistics presented (1)</li> <li>because no idea how many of the unscreened embryos had aneuploidy (1)</li> <li>other {lifestyles / factors / named factor} not {taken into account / not shown} (1)</li> <li>false (negative / positive) results (1)</li> </ul>	<p><b>ACCEPT</b> small sample size</p> <p><b>IGNORE</b> age / sex</p>	(3)

Question number	Answer	Additional guidance	Mark
5(c)	<p>An answer that includes three of the following points:</p> <ul style="list-style-type: none"> <li>• (preimplantation) screened embryos still result in miscarriages so raising false hopes (1)</li> <li>• issues surrounding the embryos (that have aneuploidy) (1)</li> <li>• false (positive) results resulting in unnecessary {wastage / destruction} of embryos (1)</li> <li>• other (genetic) defects may be found (1)</li> </ul>	<p><b>DO NOT ACCEPT</b> {fetus / baby}</p> <p>e.g. discarding the embryos is unethical</p> <p><b>ACCEPT</b> false (negative) result leads to use of that embryo</p>	(3)

Question number	Answer	Additional guidance	Mark
6(a)(i)	<p>An answer that includes two of the following points:</p> <ul style="list-style-type: none"> <li>• (46 / 48 / 94 patients is) not a very large sample size (1)</li> <li>• {18 countries / variety of people} probably means that other variables not taken into account (1)</li> <li>• but AHP is a very rare disorder so not many patients available (1)</li> </ul>	<p><b>IGNORE</b> refs to reliability, validity</p> <p><b>ACCEPT</b> in the context of ‘these’ people named variable e.g. lifestyle, diet, other diseases</p> <p><b>IGNORE</b> sex / age</p>	(2)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	<ul style="list-style-type: none"> <li>mass of drug needed for that patient (1)</li> <li>{0.8 / 0.85 / 0.847} cm<sup>3</sup> (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>volume of drug to give 2.5 mg (1)</li> <li>{0.8 / 0.85 / 0.847} cm<sup>3</sup> (1)</li> </ul>	<p><b>Example of calculation:</b></p> $64 \times 2.5 / 160$ <p><b>IGNORE</b> units <b>ACCEPT</b> cc / mls</p> $2.5 \div 189 / 0.0132275$ <p><b>ACCEPT</b> cc / mls</p> <p><b>NB</b> Bald answer of {0.8 / 0.85 / 0.847} cm<sup>3</sup> = 2 marks Bald answer of {160 / 0.01 / 0.013 / 0.132} = 1 mark</p>	(2)

Question number	Answer	Additional guidance	Mark
6(a)(iii)	<ul style="list-style-type: none"> <li>27% of 48 calculated (1)</li> <li>12 / 13 (1)</li> </ul>	<p><b>Example of calculation:</b></p> $27 \times 48 \div 100 / 12.96$ <p><b>ACCEPT</b> 25 as an ecf for 1 mark (27% of 94)</p>	(2)

Question number	Answer	Additional guidance	Mark
6(b)(i)	G U C U U U C	All correct = 2 marks One wrong base given OR one wrong base given consistently = 1 mark	(2)

Question number	Answer	Additional guidance	Mark
6(b)(ii)	<p>A description that includes three of the following points:</p> <ul style="list-style-type: none"> <li>phosphodiester bonds between (adjacent) {ribose and phosphate / (mono)nucleotides} (in each strand) (1)</li> <li>covalent bonds attaching base to a {ribose (sugar) / sugar} (1)</li> <li>{hydrogen / H} bonds between (complementary) bases (holding two strands together) (1)</li> <li>{hydrogen / H} bonds holding double helix together (1)</li> </ul>	<p><b>ACCEPT</b> sugar</p> <p><b>DO NOT ACCEPT</b> deoxyribose</p> <p><b>ACCEPT</b> between {C and G / U and A} <b>DO NOT ACCEPT</b> between {T and A / other incorrect base pairs} <b>IGNORE</b> incorrect number of H bonds</p>	(3)

Question number	Answer	Additional guidance	Mark
6(b)(iii)	<p>An answer that includes three of the following points:</p> <ul style="list-style-type: none"> <li>• {no / less / affected} translation of the mRNA (1)</li> <li>• (altered mRNA) affects shape of {protein / active site} (1)</li> <li>• {no / less / slower} haem production (1)</li> <li>• {no / less} (toxic) porphyrin (1)</li> </ul>	<p><b>ACCEPT</b> a description of translation  <b>DO NOT ACCEPT</b> transcription / description of transcription</p> <p><b>ACCEPT</b> no {protein / enzyme} formed</p>	<b>(3)</b>

Question number	Answer	Additional guidance	Mark
*7(a)	<p>Indicative content:</p> <p><b>Graph:</b></p> <ul style="list-style-type: none"> <li>• HDL involved in removal of LDL from blood by liver (SE)</li> <li>• not just level of HDL that influences risk (D)</li> <li>• higher levels of LDL increase risk (D)</li> <li>• risk decreases with increase in HDL (D)</li> <li>• HDL results in uptake of cholesterol by liver (SE)</li> <li>• LDL forms the plaque (SE)</li> <li>• risk is a {combination / ratio} of HDL and LDL levels (SE)</li> <li>• the higher the HDL:LDL ratio the lower the risk (SE)</li> </ul> <p><b>Other risk factors:</b></p> <ul style="list-style-type: none"> <li>• the more cholesterol in the blood the more cholesterol to build up the atheroma (SE)</li> <li>• high blood pressure increases chance of damage to endothelial cell layer (SE)</li> <li>• smoking causes high blood pressure (SE)</li> <li>• smoking produces CO that binds to haemoglobin putting strain on heart (SE)</li> <li>• high salt in diet causes high blood pressure (SE)</li> <li>• obesity increases risk because of strain put on heart (SE)</li> <li>• age increases risk because affects heart muscle (SE)</li> <li>• genetic predisposition affects risk (SE)</li> </ul> <p><b>Extended explanation:</b></p> <ul style="list-style-type: none"> <li>• damage to the endothelial layer results in an inflammatory response</li> <li>• damage to the endothelial layer causes {build up of cholesterol / plaque}</li> <li>• plaque causes {more cholesterol to build up / blood clot to form</li> <li>• <u>coronary artery</u> becomes blocked</li> <li>• resulting in less oxygen reaching <u>heart</u> {cells / tissues}</li> <li>• heart attack results as <u>heart cells</u> cannot respire</li> </ul>	<p><b>Level 1:</b>  <b>1 mark</b> = 1 {risk factor named / comment on graph}  <b>2 marks</b> = 2 {risk factor named / comment on graph}  <b>Or</b>  outline of how cholesterol causes CVD ie recall of the story</p> <p><b>Level 2:</b>  <b>3 marks</b> = 2 simple explanations  <b>4 marks</b> = 3 simple explanations</p> <p><b>Level 3:</b>  <b>5 marks</b> = as for 4 marks + 1 point from extended explanation  <b>6 marks</b> = as for 5 marks + 2 points from extended explanation</p>	<b>(6)</b>

Question number	Answer	Additional guidance	Mark
7(b)(i)	<p>An answer that includes three of the following points, one of which must be a similarity for full marks:</p> <p>Similarities</p> <ul style="list-style-type: none"> <li>• both contain ApoA-1(1)</li> <li>• both contain a phospholipid layer (1)</li> </ul> <p>Differences</p> <ul style="list-style-type: none"> <li>• altered HDL is larger (1)</li> <li>• altered HDL has more CE (1)</li> <li>• altered HDL has fewer (long-chain polyunsaturated) PC (1)</li> </ul>	<p><b>ACCEPT</b> converse throughout <b>DO NOT PIECE TOGETHER</b></p> <p><b>ACCEPT</b> altered HDL has no {ApoM / S1P / RBP4/ CRABP1}</p>	(3)

Question number	Answer	Additional guidance	Mark
7(b)(ii)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> <li>• less reduction (in the number) of free radicals (1)</li> <li>• therefore {cell damage / damage to lining of blood vessels / oxidative stress} will not be reduced (1)</li> <li>• therefore formation of {plaque / atheroma} will not be reduced (1)</li> </ul>	<p><b>ACCEPT</b> free radicals will not be {reduced / neutralised} <b>IGNORE</b> free radicals won't increase <b>ACCEPT</b> {cell damage / oxidative stress} will occur</p> <p><b>ACCEPT</b> more plaques</p> <p><b>NB</b> max 1 mark if not in context of reduced antioxidant properties</p>	(3)

Question number	Answer	Additional guidance	Mark
8(a)(i)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> <li>gene is the {length of DNA / sequence of bases} coding for a (poly)peptide (1)</li> <li>allele is the (different) {version / form / variation} of the gene (1)</li> <li>gene for feather colour <u>and</u> allele for {white / black} feathers (1)</li> </ul>	<p><b>ACCEPT</b> protein / sequence of amino acids</p> <p><b>NB</b> piece together <b>DO NOT ACCEPT</b> speckled feathers</p>	(3)

Question number	Answer	Additional guidance	Mark
8(a)(ii)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> <li>genotype is the combination of alleles (1)</li> <li>phenotype is the {(observable) characteristics / appearance / traits} (1)</li> <li>phenotype is the colour of the feathers <u>and</u> genotype is the presence of white and or black alleles (1)</li> </ul>	<p><b>ACCEPT</b> mixture of alleles / the alleles present <b>DO NOT ACCEPT</b> genes <b>ACCEPT</b> feature / ref to colour of feathers <b>IGNORE</b> ref to environment</p> <p><b>ACCEPT</b> phenotype is {white / black / speckled / mixture of black and white} (feathers) genotype is {WW / BB / WB} or any other letters used <b>NB</b> piece together</p>	(3)

Question number	Answer	Additional guidance	Mark
8(b)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> <li>parent's genotypes shown as BB and BW (1)</li> <li>offspring's genotypes shown as BB and BW (1)</li> <li>number of speckled chicks given as 12 or 13 (1)</li> </ul>	<p><b>ACCEPT</b> other letters, including B and b  <b>DO NOT ACCEPT</b> X and Y  B for white and W for black  <b>ACCEPT</b> other letters, including B and b  <b>CE</b> from 1    <b>CE</b> from 2 provided whole number    <b>NB</b> Bald answer = 1 mark</p>	(3)

Question number	Answer	Additional guidance	Mark
8(c)(i)	Chi squared (1)	<p><b>ACCEPT</b> Chi square / X squared / x squared / <math>X^2</math> / <math>x^2</math> / <math>\chi^2</math>  distribution (test) / chi (test) / closeness of fit / goodness of fit    phonetic spellings e.g kai / cai / khi</p>	(1)

Question number	Answer	Additional guidance	Mark																															
8(c)(ii)	<p>An answer that includes the following points:</p> <table border="1"> <thead> <tr> <th rowspan="2">Steps in the calculation for the statistics test</th> <th colspan="3">Colour of feathers of chicks</th> </tr> <tr> <th>Speckled</th> <th>White</th> <th>Black</th> </tr> </thead> <tbody> <tr> <td>Observed number (O)</td> <td>243</td> <td>125</td> <td>112</td> </tr> <tr> <td>Expected number (E)</td> <td>240</td> <td>120</td> <td>120</td> </tr> <tr> <td>(O-E)</td> <td>3</td> <td>5</td> <td>-8</td> </tr> <tr> <td><math>\frac{(O-E)^2}{E}</math></td> <td>0.0375</td> <td>0.2083</td> <td>0.5333</td> </tr> <tr> <td></td> <td>9/240</td> <td>25/120</td> <td>64/120</td> </tr> <tr> <td></td> <td>3/80</td> <td>5/24</td> <td>8/15</td> </tr> </tbody> </table>	Steps in the calculation for the statistics test	Colour of feathers of chicks			Speckled	White	Black	Observed number (O)	243	125	112	Expected number (E)	240	120	120	(O-E)	3	5	-8	$\frac{(O-E)^2}{E}$	0.0375	0.2083	0.5333		9/240	25/120	64/120		3/80	5/24	8/15	<p>All correct = 2 marks One row correct = 1 mark</p> <p><b>ACCEPT 8</b> <b>DO NOT ACCEPT -3 / -5</b></p> <p><b>ACCEPT 2 or 3 or 4 dps but not necessarily consistently the same number.</b> <b>DO NOT ACCEPT</b> recurring</p>	(2)
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Question number	Answer	Additional guidance	Mark
8(c)(iii)	0.8 / 0.78 / 0.779 / 0.7791 (1)	<p>CE / rounding effect from (c)(ii) <b>DO NOT ACCEPT 0</b></p> <p>NB <math>187/240 = 0.7792</math></p>	(1)

Question number	Answer	Additional guidance	Mark
8(c)(iv)	<p>An explanation that includes two of the following points:</p> <ul style="list-style-type: none"> <li>• {calculate / use} the number of degrees of freedom</li> <li>• use (a probability) value of (up to or equal to) 5%/0.05 (1)</li> <li>• compare (calculated) {value / result} to (critical) value (1)</li> <li>• if the (calculated) {value / result} is greater than (critical) value then null hypothesis is rejected (1)</li> </ul>	<p><b>ACCEPT</b> description of how to work out degrees of freedom</p> <p><b>NB</b> mp 4 alone = 2 marks  <b>ACCEPT</b> the converse argument  any quoted figures for the calculated value</p>	<b>(2)</b>