A Level AQA Biology

1 Biological molecules – answers

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO
Spec reference</th></tr>
<tr><td>01.1</td><td>a small(er) unit / molecule that can join with (many) other monomers to form a larger molecule;</td><td>Accept all other suitable answers</td><td>1</td><td>AO1
3.1.1</td></tr>
<tr><td>01.2</td><td>(named) monosaccharide(s);
(named) amino acid(s);
(named) (mono)nucleotide(s);</td><td></td><td>2 max</td><td>AO1
3.1.1</td></tr>
<tr><td>01.3</td><td>hydrolysis;
use of water;
catalysed by enzymes;</td><td></td><td>2 max</td><td>AO1
3.1.1</td></tr>
<tr><td>01.4</td><td>limited number of / 4 monomers;
monomers are not joined in a chain;</td><td></td><td>1 max</td><td>AO1
3.1.1
3.1.3</td></tr>
<tr><td>02.1</td><td>
<table>
<tr><th>Molecule being hydrolysed</th><th>Bond broken</th><th>Molecule(s) formed</th></tr>
<tr><td>starch</td><td>glycosidic</td><td>maltose</td></tr>
<tr><td>sucrose</td><td>glycosidic</td><td>glucose and fructose</td></tr>
<tr><td>triglyceride</td><td>ester</td><td>fatty acids and glycerol</td></tr>
<tr><td>polypeptide/peptide /dipeptide</td><td>peptide</td><td>amino acids</td></tr>
</table>
</td><td>Award one mark for each correct row in the table</td><td>4</td><td>AO1
3.1.2
3.1.3
3.1.4.1</td></tr>
<tr><td>02.2</td><td>(contains) sulfur / sulfate</td><td></td><td>1</td><td>AO2
3.1.2</td></tr>
<tr><td>02.3</td><td>(the polysaccharide is) helical / coiled</td><td></td><td>1</td><td>AO2
3.1.2</td></tr>
</table>

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Spec reference</th></tr>
<tr><td>03.1</td><td>green colour indicates sugar is present;
no conclusion can be made about the concentration of reducing sugar without knowing the concentration and volume of Benedict's added;
the sugar could be another reducing sugar (and not glucose);</td><td></td><td>3</td><td>AO3
3.1.2
AT f</td></tr>
<tr><td>03.2</td><td>conduct Benedict's test (which would give a negative result);
add dilute HCl;
boil;
neutralise with sodium hydrogen carbonate;
conduct the Benedict's test again;</td><td></td><td>3 max</td><td>AO1
3.1.2
AT f</td></tr>
<tr><td>03.3</td><td>B – blood plasma;
Explanation
positive result for (named) reducing sugar;

C – sieve tube fluid;
Explanation
positive result for sucrose / non-reducing sugar;

A – cannot be either sample because neither would contain starch;</td><td></td><td>4 max</td><td>AO3
3.1.2
3.3.4.1
3.3.4.2
AT f</td></tr>
<tr><td>03.4</td><td>the sample should be mixed first with ethanol rather than water;
then pour into test tube of water rather than ethanol;
the mixture does not need to be heated;</td><td></td><td>2 max</td><td>AO3
3.1.3</td></tr>
<tr><td>04.1</td><td><table>
<tr><td>Polysaccharides</td><td>glycogen</td><td>amylopectin</td></tr>
<tr><td>Type of glycosidic bonds</td><td>1,4 and 1,6 links</td><td>1,4 and 1,6 links</td></tr>
<tr><td>Helical?</td><td>yes</td><td>no</td></tr>
<tr><td>Branched?</td><td>yes</td><td>yes</td></tr>
</table></td><td>Award one mark for each correct row in the table</td><td>3</td><td>AO1
3.1.2</td></tr>
</table>

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Question	Answers	Extra information	Mark	AO Spec reference
04.2	insoluble; compact due to branching; branches increase rate of hydrolysis when glucose is required;		2 max	AO1 3.1.2
04.3	H and OH on carbon 1 face different directions	Accept an annotated diagram Accept all other suitable answers	1	AO1 3.1.2
04.4	insoluble; hydrogen bonds/cross links between polysaccharide chains; increase strength; (for) structural support;		3 max	AO1 3.1.2
05.1	both have 1,4 links; neither has branching or helices; both have cross links between polymer chains; cellulose has β-glucose monomers, chitin does not; chitin contains nitrogen, cellulose does not;		4 max	AO2 3.1.2
05.2	both have 1,4 links; both have branching; neither has links between polymer chains; amylopectin has 1,6 links rather than 2,3 links like arabinoxylan; amylopectin is not helical, whereas arabinoxylan is; amylopectin has only one monomer (α-glucose), arabinoxylan has two;		5 max	AO2 3.1.2
06.1	phospholipid has a phosphate group and two fatty acids **and** a triglyceride has three fatty acids (and no phosphate)		1	AO1 3.1.3
06.2	glycerol **and** 3 fatty acids; (3) ester bonds; 1 saturated fatty acid; 2 unsaturated fatty acids;		3 max	AO2 3.1.3

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Question	Answers	Extra information	Mark	AO Spec reference
06.3	caldarchaeol has 2 glycerols **and** triglyceride has 1 glycerol; caldarchaeol has OH groups (on glycerol) that have not reacted with fatty acids; caldarchaeol is cyclic / has a ring structure; caldarchaeol has longer fatty acids / fatty acids with two COOH groups;	Accept all OH groups in triglyceride glycerol have reacted Accept triglyceride is not cyclic / does not have a ring structure Accept triglyceride has shorter fatty acids / fatty acids with only one COOH group	3 max	AO2 3.1.3
06.4	strengthens / stabilises membranes	Accept all other suitable answers	1	AO2 3.1.3
07.1	1% *idea of* dilute 1 part protein solution to 9 parts water; 0.1% *idea of* dilute 1 part protein solution to 99 parts water (using the 10% solution);	Accept dilute 1 part protein solution to 9 parts water using the 1% solution	2	AO2 3.1.2 3.6.4.2 AT b and c
07.2	**Error** 40 °C temperature is too low; **Explanation** (higher temperature enables) glucose to react with Benedict's reagent / Cu_2O to form / precipitate to form; **Error** blue filter; **Explanation** red filter should be used (because red wavelengths are absorbed by any unreacted Benedict's solution);	Accept temperature should be higher / 80–100 °C Or words to this effect	4	AO3 3.1.2 3.6.4.2 AT b and c

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Question	Answers	Extra information	Mark	AO Spec reference
08	The following are suitable topic areas from the specification that could be used to describe and explain the roles of lipids in organisms. Please note that to obtain full credit, students must explain the roles of lipids (e.g., link structure to function), not just write about topics that include lipids. In order to fully address the question and reach the highest mark bands students must also include at least five topics in their answer, to demonstrate a synoptic approach to the essay. **Specification reference** / **bond broken** 3.1.1 Monomers and polymers 3.1.3 Lipids 3.2.1 Cell structure 3.2.3 Transport across cell membranes 3.3.3 Digestion and absorption 3.5.1 Photosynthesis 3.5.2 Respiration 3.6.2 Nervous coordination Students may be able to show the relevance of other topics from the specification. **Note:** other topics from beyond the specification can be used, providing they relate to the title and contain factually correct material of at least an A-level standard. Credit should not be given for topics beyond the specification which are below A-level standard.		25	AO1 3.1.1 3.1.3 3.2.1 3.2.3 3.3.3 3.5.1 3.5.2 3.6.2

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Skills box answers

1.

Test tube	Final concentration of sodium chloride / mol dm^{-3}	Volume distilled water / cm^3	Volume 1 mol dm^{-3} sodium chloride solution / cm^3	Final volume / cm^3
A	0.00	10.0	0.0	10.0
B	0.25	7.5	2.5	10.0
C	0.50	5.0	5.0	10.0
D	0.75	2.5	7.5	10.0
E	1.00	0.0	10.0	10.0

2.

Test tube	Final concentration of glucose / mol dm^{-3}	Volume distilled water / cm^3	Volume 2 mol dm^{-3} glucose solution / cm^3	Final volume / cm^3
A	0.0	10.0	0.0	10.0
B	0.1	9.5	0.5	10.0
C	0.3	8.5	1.5	10.0
D	0.5	7.5	2.5	10.0
E	0.7	6.5	3.5	10.0
F	0.9	5.5	4.5	10.0
G	1.0	5.0	5.0	10.0