Biology GCSE Revision

Topic 2

Organisation

Booklet 1 of 2

- Digestive System

Mark Scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	digestive		1	AO1 2.2, 2.2.1d
4(b)(i)	covers / lines (surface)	allow protects ignore secretory functions	1	AO1 2.2.1b/c
4(b)(ii)	any **three** from: • produces enzyme(s) / protease • (digestive juice / enzyme) digests/breaks down protein • produces HCl / acid • (acid) kills bacteria/ pathogens **or** provides optimum pH	allow produces pepsin apply list principle for incorrect enzymes allow produces mucus allow (mucus) protects stomach lining against proteases **or** acid **or** against break down	3	AO1 2.2.1b/c 2.5.2b/c/e/ g
4(b)(iii)	contracts churns / mixes / moves stomach contents	ignore relaxes do **not** allow expands allow peristalsis **or** mechanical digestion	1 1	AO1 2.2.1b/c
Total			**7**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>2</td><td colspan="2">Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5.</td><td>6</td><td>AO1
1.1.1a/b/c</td></tr>
<tr><td>0 marks</td><td>Level 1 (1-2 marks)</td><td>Level 2 (3-4 marks)</td><td>Level 3 (5-6 marks)</td><td></td></tr>
<tr><td>No relevant content.</td><td>At least one component of the diet is given (C)
or
at least one reason why a component is required (R)
or
why a healthy diet is needed. (N)</td><td>Components of the diet are given (C)
and
for at least one of these components a reason why the component is required (R)
or
why a healthy diet is needed. (N)</td><td>Most components of the diet are given (C)
and
different reasons why components are required are given. (R)</td><td></td></tr>
<tr><td colspan="2">examples of biology points made in the response:
• (C) carbohydrate
• (C) protein
• (C) fat
• (R) (carbohydrate / protein / fat) for energy (release)
• (R) (carbohydrate / protein / fat) to build cells / growth / repair
• (C) vitamins
• (R) (vitamins) for healthy functioning of the body
• (N) (balanced diet) contains right balance of different foods to meet needs or avoid malnourishment or avoid under / over weight
• (N) (balanced diet) contains right amount of energy to meet needs</td><td colspan="2">extra information:
allow other components and needs, eg (C) fibre / roughage; (R) prevent constipation / bowel cancer
(C) water; (R) transport / as solvent / part of cytoplasm / produce sweat

allow correctly named vitamin (C) with correct reason (R)

ignore ref to minerals / ions as a component of the diet and their use in the body</td><td></td></tr>
<tr><td>Total</td><td colspan="3"></td><td>6</td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	any **two** from: • (shorter villi gives) a smaller surface area • (thicker cells give) a longer diffusion path • (capillaries are further from the lining) giving a longer diffusion path • fewer capillaries **or** less blood flow	allow converse if clearly explaining about healthy person if no marks awarded in this section allow one mark for two unqualified features eg there are shorter villi and thicker cells or capillaries are further from the lining 'longer diffusion pathway' unqualified only gains 1 mark	2	AO2/3 3.1.1a/h/k/l
	and (therefore) lower rate of diffusion / active transport / absorption		1	
	(so) less glucose / vitamins / minerals are absorbed	allow correct named example	1	
	(and) fat (stores) are broken down (to release glucose for energy so lose weight)		1	
8(b)	against the concentration gradient	allow from a low concentration to a high concentration **or** up the concentration gradient do **not** allow along the concentration gradient	1	AO1 3.1.1g
	requires energy	allow using ATP do **not** allow making energy allow correct use of terms carrier **or** transport proteins	1	
Total			**7**	

Question 2

question	answers	extra information	mark
2(a)	any **one** from:	ignore control variables that are not given in the method, such as 'equally crushed' **or** same time do **not** accept volume of apple juice	1
	• 20 g (of apple) **or** (same) mass / amount / weight of apple	ignore volume / size	
	• crushed (apple)		
	• 10 drops (of solution) **or** (same) number / amount / volume of drops	do **not** accept 10 drops of amylase alone	
	• apple **or** type of fruit	ignore type of apple	
2(b)	(may) have different volume / amount / sizes	ignore reference to human error ignore don't know / can't measure size of drop	1
2(c)	amylase has no / little effect on cell / walls / apple **or** amylase does not breakdown / digest cell / walls / apple	accept ideas that refer to shape of enzyme being 'incorrect' accept amylase only breaks down / digests starch	1
	pectinase breaks down cell / walls / apple	allow digest for breakdown allow shape of pectinase fits cell / walls / apple	1
	boiling breaks down cell / walls / apple		1
2(d)	11.6		1
	enzyme / pectinase destroyed / denatured / damaged / broken down	do **not** allow kill	1
	only effect of boiling (relevant)		1
Total			**8**

BL2HP

Question 2

question	Answers	extra information	mark
2(a)(i)	directly proportional **or** 0.1 rise in rate for 1% rise in concentration	gains full marks accept increased concentration: increased rate **or** positive correlation **or** proportional for **1** mark	2
2(a)(ii)	0.6	allow ± 0.01	1
2(b)	(0.5% trypsin) cheaper (35 °C) faster reaction so takes less time to make product extra heating cost outweighed by savings on enzyme cost	ignore more profit allow (35 °C) optimum / best temperature	1 1 1 1
2(c)(i)	any **two** from: • breaks down / digests food • from protein into amino acids / peptides • makes soft(er) / runni(er)	 allow pre-digests protein / food allow easier for baby to digest allow description of texture change allow make (more) soluble	2

Question 2 continues on the next page . . .

BL2HP

Question 2 continued . . .

question	answers	extra information	mark
2(c)(ii)	correct named enzyme correct function Eg carbohydrase starch → sugar **or** lactose → glucose **or** making sugar syrup **or** isomerase glucose → fructose **or** making slimming foods **or** lipase fats / oils → fatty acids **or** removal of grease stains	 to gain **2** marks function must relate to correctly named enzyme accept amylase / maltase / lactase accept other correct example	1 1
Total			**11**

Question 3

question	answers	extra information	mark
3(a)(i)	8.6	accept value in range 8.5 to 8.7	1
3(a)(ii)	hydrochloric acid / HCl	accept HCL accept hydrogen chloride ignore hcl / etc.	1
3(a)(iii)	X		1

Question 3 continues on the next page . . .

Question 3 continued . . .

3(b)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5.		6
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**
No relevant content.	There is a simple description of part of a process including a reference to at least one of: mechanical digestion, lipase, product of enzyme action, bile, site of production or site of digestion	There is a description of at least one process linking ideas.	There is a clear description of the process including reference to the majority of: mechanical digestion, lipase, bile, where they are produced, products, function of bile and site of digestion / absorption

examples of biological points made in the response:

- mechanical breakdown in mouth / stomach
- fats →fatty acids and / or glycerol
- by lipase
- (produced by) pancreas
- and small intestine
- fat digestion occurs in small intestine
- bile
- produced by liver
- neutralises acid from stomach
- produces alkaline conditions in intestine
- refs. to increased surface area related to emulsification or chewing
- products are small molecules / water-soluble
- products absorbed by small intestine

Total			**9**

Question	Answers	Extra information	Mark	AO / spec ref.
1(a)(i)	amino acid(s)	accept peptide(s) do **not** allow polypeptide(s)	1	AO1 2.5.2e
1(a)(ii)	protease		1	AO1 2.5.2e
1(b)(i)	2		1	AO3 2.5.2b, g
1(b)(ii)	repeat using smaller pH intervals between pH1 and pH3	do not allow other enzyme / substrate allow smaller intervals on both sides of / around pH2 allow smaller intervals on both sides of / around answer to (b)(i)	1 1	AO3 2.5.2b
1(b)(iii)	<u>enzyme / pepsin</u> denatured / shape changed <u>enzyme / pepsin</u> no longer fits (substrate)	do **not** allow enzyme killed allow enzyme 'destroyed' allow enzyme / pepsin does not work	1 1	AO1 / AO2 2.5.2a, b
1(c)	hydrochloric (acid)	allow phonetic spelling accept HCl allow HCL ignore hcl do **not** allow incorrect formula – e.g. H_2Cl / HCl_2	1	AO1 2.5.2g
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	a catalyst / speeds up a reaction it is a protein **or** it is specific / described **or** it has an active site	ignore it is not used up allow it only acts on one molecule	1 1	AO1 2.5.1a/b
3(b)	cytoplasm		1	AO1 2.1.1a 2.6.1a
3(c)	**Advantage:** any **one** from: • heat would denature proteins (in milk) • heat alters texture or flavour (of milk) • catalase / enzyme is specific **or** only affects hydrogen peroxide • less energy / fuel / lower temperature used so less expensive **or** less pollution **Disadvantage:** any **one** from: • (some pathogens may survive) causing illness • catalase / enzyme left in milk **or** may cause allergies **or** may alter taste		1 1	AO3 2.5, 2.5.2j
Total			**5**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	glycerol		1	AO1 2.5.2f
1(a)(ii)	pancreas / small intestine	accept duodenum / ileum ignore intestine unqualified	1	AO1 2.5.2f
1(b)	any **two** from: • type of milk • volume / amount of milk • vol. bile equals vol. water • volume of lipase • concentration of lipase • temperature	ignore time interval ignore solution unqualified do **not** allow pH ignore starting pH ignore volume / amount of bile / water ignore concentration of bile accept amount of lipase if neither volume nor concentration given	2	AO3 2.5.2f,h
1(c)(i)	fatty acid (production)		1	AO2 2.5.2f,h
1(c)(ii)	faster reaction / digestion (with bile) **or** pH decreases faster (with bile) **or** takes less time (with bile) **or** steeper fall / line (with bile)	allow use of data ignore easier	1	AO3 2.5.2f,h

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(c)(iii)	all fat / milk digested **or** same amount of fatty acids present **or** (lower pH) denatures the enzyme / lipase	allow all reactants used up ignore reference to neutralisation allow enzyme won't work at low pH do **not** allow enzyme killed	1	AO2 2.5.2f,h
Total			**7**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	sugar(s) / glucose	allow maltose do not allow if extra incorrect answers	1	AO1 2.5.2d Prac
3(b)(i)	any **two** from: • volume of pH solution • volume of amylase / enzyme solution • volume of starch / suspension / substrate • time left (before mixing)	allow amount for volume if neither mark given allow 1 mark for volume(s) of solution(s) ignore time between samples ignore ref. to (room) temperature ignore ref. to concentration	2	AO2 2.5.2b Prac
3(b)(ii)	4 minutes: (dark) blue **and** 6 minutes: (light) brown	allow black ignore purple do **not** allow light blue allow yellow / orange	1	AO3 2.5.2b Prac
3(b)(iii)	any **two** from: • take each reading more than once • use colour standards for deciding end-point • test more pH values between 6 and 8 **or** test at smaller pH intervals • test at shorter intervals • same temperature (in a water bath)	ignore take more readings allow compare with another group allow use a colorimeter ignore wider range of pH unqualified allow example – e.g. every half min	2	AO3 2.5.2b Prac

3(b)(iv)	no reaction **or** stays (dark) blue **or** takes >9 minutes	allow takes longer	1	AO2/3 2.5.2a/b
	enzyme denatured	allow description of denaturing, i.e. shape change allow description of trend on graph	1	
Total			**8**	