AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.2.1

The human digestive system

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**47**
Available paper years	**2008–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.2.2.1 The human digestive system

Answer 01 · Mark scheme January 2008 | BLY2F | Original Q5 | Legacy

Question 5

	answers	extra information	mark
(a)	**A** carbohydrase **B** isomerase		1 1
(b)	less needed (to get same effect)		1
(c)(i)	they all work at atmospheric pressures they work well at 25 – 45 °C	accept any clear indication of correct statement(s) identified	1 1
(c)(ii)	any **two** from: • they are easily broken down by high temperature or the wrong pH • they are soluble in water, so it may be difficult to separate them from products • they are expensive to buy	accept any clear indication of correct statement(s) identified accept for **2** marks if written as two separate disadvantages	2
total			7

4.2.2.1 The human digestive system

Answer 01 · Mark scheme January 2008 | BLY2F | Original Q5 | Legacy

BLY2F

Answer 02 · Mark scheme June 2008 | BLY2F | Original Q5 | Legacy

question	answers	extra information	mark
5(a)(i)	0		1
5(a)(ii)	osmosis		1
5(b)	0.5 no change in mass / weight **or** no (net) osmosis / same amount of water in and out	 allow 'chip / it stays the same'	1 1
5(c)	repeat / use more chips in each solution	allow use of other people's results do **not** allow 'get more results' unqualified do **not** allow leave longer / use more concentrations / better instrumentation	1
Total			**5**

4.2.2.1 The human digestive system

Answer 02 · Mark scheme June 2008 | BLY2F | Original Q5 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.2.2.1 The human digestive system

Answer 03 · Mark scheme

June 2008 | BLY2F | Original Q7 | Legacy

question	answers	extra information	mark
7(a)	lipase	allow phonetic spelling allow lipidase	1
7(b)(i)	fall **then** rise owtte eg down **then** up minimum / least / fastest / best / optimum at 39–41(^{o}C)	allow faster **then** slower ignore explanations allow it falls to 40(^{o}C) if no other marks gained, 'falls to an optimum' gains **1** mark	1 1
7(b)(ii)	(yes) any **two** from: • less heat / energy / electricity / power required / used / wasted • conserves fuel supplies **or** less fuel used • less pollution from power stations owtte	there is no mark for circling 'yes' maximum **1** mark if No is circled ignore lower temperature accept less global warming **or** less CO_2 / carbon emissions / greenhouse gases **or** less SO_2 / acid rain **NB** only direct effects less pollution only is not enough	2

Question 7 continued on next page...

4.2.2.1 The human digestive system

Answer 03 · Mark scheme

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

Question 7 continued...

question	answers	extra information	mark
7(c)	any **two** from: • enzyme / lipase • destroyed / denatured • reference to (specific) shape changed	max **1** mark for reference to cell accept any named enzyme allow damaged / broken down **not** 'killed' ignore detergent / it	2
Total			**7**

4.2.2.1 The human digestive system

Answer 03 · Mark scheme

June 2008 | BLY2F | Original Q7 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.2.2.1 The human digestive system

Answer 04 · Mark scheme

January 2009 | BLY2F | Original Q2 | Legacy

question	answers	extra information	mark
2(a)	microorganisms		1
2(b)(i)	proteases	clear indications of correct answer	1
2(b)(ii)	amino acids (both words)	clear indications of correct answer	1
2(c)(i)	14		1
2(c)(ii)		mark independently	
	enzyme Z	clear indication of correct answer	1
	takes least time (to pre-digest protein) / works fastest	allow only 7 minutes / less time / faster do **not** allow works best	1
2(c)(iii)	temperature		1
	pH		1
Total			**8**

4.2.2.1 The human digestive system

Answer 04 · Mark scheme

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

4.2.2.1 The human digestive system

Answer 05 · Mark scheme

January 2009 | BLY2F | Original Q4 | Legacy

question	answers	extra information	mark
4(a)	respiration	clear indication eg tick, underlining, others crossed out	1
4(b)	lungs		1
4(c)	liver		1
4(d)	amino acids		1
Total			**4**

4.2.2.1 The human digestive system

Answer 05 · Mark scheme

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

4.2.2.1 The human digestive system

Answer 06 · Mark scheme June 2009 | BLY2F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	50	award **2** marks for correct answer irrespective of working award **1** mark for selection of 60 **and** 10	2
6(a)(ii)	any **two** from: • increases • (then) decreases • highest at 65 – 74 (years old) **or** maximum 112 (per thousand)	ignore comparisons with men allow peaks at 65 - 74	2
6(b)(i)	stomach		1
6(b)(ii)	any sensible reference to diet **or** carbohydrate intake **or** pancreas / stem cell transplant	eg eat less / no sugary food **or** eat more fibre **or** go on a diet **or** watch what you eat ignore eat more protein do **not** accept reduce salt	1
Total			**6**

4.2.2.1 The human digestive system

Answer 06 · Mark scheme

June 2009 | BLY2F | Original Q6 | Legacy

BLY2F

4.2.2.1 The human digestive system

Answer 07 · Mark scheme

June 2009 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	mineral ions water	each extra box ticked cancels **1** mark	1 1
2(b)(i)	blood plasma		1
2(b)(ii)	dialysis fluid		1
2(b)(iii)	diffusion		1
2(b)(iv)	partially permeable		1
2(b)(v)	small		1
2(c)	drug treatment is needed to suppress the immune system		1
Total			**8**

4.2.2.1 The human digestive system

Answer 07 · Mark scheme

June 2009 | BLY3F | Original Q2 | Legacy

BLY3F

4.2.2.1 The human digestive system

Answer 08 · Mark scheme

Question 1

question	answers	extra information	mark
1(a)	**Body part** / **Substance** kidneys → urine faeces lungs → breath skin → sweat	**1** mark per correct line extra line from a body part cancels the mark	3
1(b)(i)	1800 cm^3		1
1(b)(ii)	decreases		1
1(b)(iii)	any **one** from: • less / no sweat • less / no cooling *(*needed*)* • less / reduce / no heat loss / keep warm		1
1(c)	increases		1
Total			**7**

4.2.2.1 The human digestive system

Answer 08 · Mark scheme

January 2010 | BLY2F | Original Q1 | Legacy

BLY2F

4.2.2.1 The human digestive system

Answer 09 · Mark scheme

January 2010 | BLY2F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	fatty acids glycerol		1 1
5(b)(i)	any **one** from: • (same) amount / 1cm^3 fat • (same) amount / 10cm^3 lipase / enzyme • (kept for) 24 hours **or** (same length of) time		1
5(b)(ii)	temperature	allow heat / warmth	1
5(c)	(carry out experiments) using more temperatures / smaller intervals between 20 and 60 °C / around 40 °C	ignore repeat unqualified do not accept longer time accept extra single temperature in range 20 °C – 60 °C but cannot be 20 °C, 40 °C or 60 °C	1 1
5(d)(i)	'strong' acid		1
5(d)(ii)	enzyme works / not destroyed / not denatured / not damaged	do **not** accept enzyme not killed accept any indication that the fat is digested accept same as tube 3 / tube at 40 °C accept optimum temperature / at or near body temperature	1
Total			**8**

4.2.2.1 The human digestive system

Answer 09 · Mark scheme

January 2010 | BLY2F | Original Q5 | Legacy

BLY2F

Answer 10 · Mark scheme

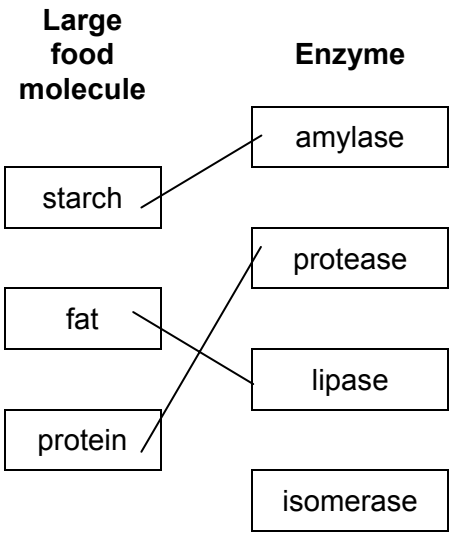
June 2010 | BLY1BP | Original Q9 | Legacy

No matching mark scheme was available in the supplied archive for this question.

4.2.2.1 The human digestive system

Answer 11 · Mark scheme June 2010 | BLY2F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)(i)		all three correct = **3** marks two correct = **2** marks one correct = **1** mark extra line from a large food molecule cancels the mark	3
3(a)(ii)	sugars fatty acids and glycerol amino acids	must be in this order	1 1 1
3(b)	liver		1
Total			**7**

4.2.2.1 The human digestive system

Answer 11 · Mark scheme

June 2010 | BLY2F | Original Q3 | Legacy

BLY2F

4.2.2.1 The human digestive system

Answer 12 · Mark scheme

June 2019 | BLY3F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)(i)	carbohydrase		1
3(a)(ii)	yeast		1
3(a)(iii)	distillation		1
3(b)	petrol will run out **or** petrol increasingly difficult to obtain **or** petrol non-renewable	ignore cost ignore ease of production allow: (more) pollution / named eg allow petrol damages environment allow (more) global warming	1
	more maize can be grown **or** maize is renewable	allow better for the environment allow causes less global warming	1
Total			**5**

4.2.2.1 The human digestive system

Answer 12 · Mark scheme June 2010 | BLY3F | Original Q3 | Legacy

BLY 3F

Answer 13 · Mark scheme January 2011 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)(i)	capillary		1
2(a)(ii)	diffusion		1
2(b)(i)	Z	ignore any names	1
2(b)(ii)	large / increased surface / area / **or** to absorb more food **or** improved diffusion	allow all food absorbed	1
Total			**4**

Answer 13 · Mark scheme January 2011 | BLY3F | Original Q2 | Legacy

BLY3F

4.2.2.1 The human digestive system

Answer 14 · Mark scheme June 2011 | BLY2F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	insulin	extra ring drawn cancels the mark	1
3(b)	pancreas	extra ring drawn cancels the mark	1
3(c)	diabetes	extra ring drawn cancels the mark	1
Total			3

Answer 14 · Mark scheme June 2011 | BLY2F | Original Q3 | Legacy

BLY2F

4.2.2.1 The human digestive system

Answer 15 · Mark scheme June 2011 | BLY2F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	carbohydrase	extra ring drawn cancels the mark	1
4(a)(ii)	fructose is sweeter than glucose so can be used in smaller amounts	extra box ticked cancels the mark	1
4(b)(i)	(enzymes) work at low temperatures (enzymes) can be re-used / used many times	ignore references to specific temperatures ignore correct answers which are unrelated to the information	1 1
4(b)(ii)	any **two** from: • workers have to use face masks when working with enzymes • (enzymes) work in a narrow range of pH values • (enzymes) are easily broken down by high temperature • (enzymes) are expensive (to buy)	it is not necessary for the complete statement to be written out in each case ignore effects on the body ignore correct answers which are unrelated to the information. ignore reference to specific pHs ignore reference to specific temperatures	2
Total			**6**

4.2.2.1 The human digestive system

Answer 15 · Mark scheme

June 2011 | BLY2F | Original Q4 | Legacy

BLY2F

4.2.2.1 The human digestive system

Answer 16 · Mark scheme

June 2011 | BLY2F | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)	any **one** from: • (same) volume / amount / 1 cm^3 lipase • (same) volume / amount / 5 cm^3 lipid • mixed after 3 minutes / same time before mixing	ignore reference to recording results every 5 minutes **or** concentrations of lipid / lipase allow amount of solution allow keep same volumes in the test tubes do **not** accept temperature	1
8(b)	so that the lipase and the lipid reached the right temperature		1
8(c)	any **two** from • decrease in time **or** faster (breakdown) • then increase in time **or** then slower (breakdown) • fastest / least time / optimum at 35°C	ignore explanations	2
8(d)	any **two** from: • test more regularly eg test every minute • test at smaller temperature intervals • test between 50 (°C) and 95 (°C) • repeat at same temperatures **or** repeat the investigation **or** compare results with others	ignore 'test at more temperatures' unqualified any interval < 5min any value <15°C allow test more temperatures in the range any value in range, eg test at 70 allow do **it** again	2

Question 8 continues on the next page

4.2.2.1 The human digestive system

Answer 16 · Mark scheme

June 2011 | BLY2F | Original Q8 | Legacy

Question 8 continued

question	answers	extra information	mark
8(e)(i)	(lipase / it) denatured / destroyed / changed shape	allow damaged / deformed do **not** accept killed ignore broken (down)	1
8(e)(ii)	fatty acids and glycerol		1
Total			**8**

4.2.2.1 The human digestive system

Answer 16 · Mark scheme

June 2011 | BLY2F | Original Q8 | Legacy

BLY2F

4.2.2.1 The human digestive system

Answer 17 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	glycogen		1
4(a)(ii)	respiration		1
4(b)(i)	483 kJ		1
4(b)(ii)	oxygen		1
4(b)(iii)	dilate		1
4(c)	supplies more / a lot of oxygen **or** removes more carbon dioxide **or** release more energy / faster respiration		1
Total			**6**

4.2.2.1 The human digestive system

Answer 17 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

BLY3F

4.2.2.1 The human digestive system

Answer 18 · Mark scheme

June 2012 | BL2FP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	A		1
5(a)(ii)	hydrochloric (acid) / HCl		1
5(a)(iii)	alkali / suitable named example	accept sodium hydrogen carbonate / sodium bicarbonate / milk of magnesia / other brand names allow bile (salts) ignore antacid	1
5(b)	• amylase breaks down starch • (broken down) into sugars / glucose • digestion of starch in the mouth • (also) starch broken down in small intestine • amylase produced in salivary glands / small intestine / pancreas		1 1 1 1 1
5(c)	small intestine	allow ileum / duodenum do **not** accept large intestine	1
Total			**9**

4.2.2.1 The human digestive system

Answer 18 · Mark scheme

June 2012 | BL2FP | Original Q5 | Legacy

BL2FP

4.2.2.1 The human digestive system

Answer 19 · Mark scheme

Question 8

question	Answers	extra information	mark
8(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
8(a)(ii)	0.6	allow ± 0.01	1
8(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
8(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 8 continues on the next page . . .

BL2FP

Question 8 continued . . .

question	answers	extra information	mark
8(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**

UMS Conversion Calculator: www.aqa.org.uk/umsconversion

4.2.2.1 The human digestive system

Answer 20 · Mark scheme

June 2013 | BL2FP | Original Q9 | Legacy

Question 9

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

Question 9 continues on the next page . . .

Question 9 continued . . .

9(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 or 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:

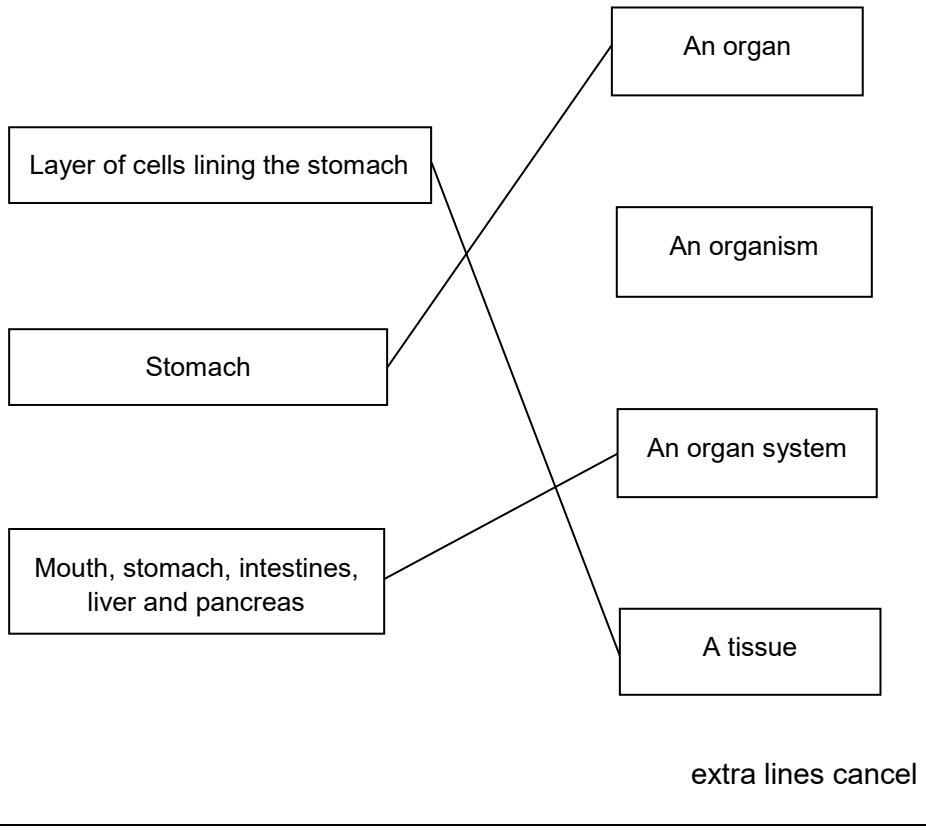
- mechanical breakdown in mouth / stomach
- fats →fatty acids and / or glycerol
- by lipase
- (produced by) pancreas
- and small intestine
- fat digestion occurs in small intestine
- bile
- produced by liver
- neutralises acid from stomach
- produces alkaline conditions in intestine
- refs. to increased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

Total			**9**

UMS Conversion Calculator: www.aqa.org.uk/umsconversion

4.2.2.1 The human digestive system

Answer 21 · Mark scheme June 2014 | BL2FP | Original Q1 | Legacy

1(a)(i)	A = (cell) membrane B = cytoplasm	 do **not** accept cytoplast	1 1	AO1 2.1.1a
1(a)(ii)	To control the activities of the cell		1	AO1 2.1.1a
1(b)	 extra lines cancel		3	AO1 2.2.1b, c,d
Total			**6**	

4.2.2.1 The human digestive system

Answer 21 · Mark scheme

June 2014 | BL2FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.2.2.1 The human digestive system

Answer 22 · Mark scheme June 2014 | BL2FP | Original Q3 | Legacy

3(a)(i)	a catalyst		1	AO1 2.5.1b
3(a)(ii)	lower temperatures		1	AO1 2.5.2j
3(a)(iii)	sugar		1	AO1 2.5.2i
3(b)	The enzyme can easily be used again The fructose does not have any enzyme in it		1 1	AO2 2.5.2i
Total			**5**	

4.2.2.1 The human digestive system

Answer 22 · Mark scheme

June 2014 | BL2FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.2.2.1 The human digestive system

Answer 23 · Mark scheme June 2014 | BL2FP | Original Q6 | Legacy

6(a)	chlorophyll is needed for photosynthesis light is needed for photosynthesis		1 1	AO3 2.3.1b, e
6(b)	increases levels off / reaches a maximum / remains constant / stays the same / plateaus goes up to / reaches a maximum / levels off at (a rate of) 200 (arbitrary units) **or** levels off at 225 – 240 (light units)	do **not** allow stops / stationary / peaks allow stops increasing ignore references to other numerical values	1 1 1	AO2 2.3.1c, d
6(c)(i)	higher light intensity does not increase rate of photosynthesis	accept the graph stays level (above this value) allow stops increasing allow the rate of photosynthesis stay the same (above this value)	1	AO3 2.3.1c, d
6(c)(ii)	any **two** from: • carbon dioxide (concentration) • temperature / heat • (amount of) chlorophyll / chloroplasts	allow water allow ions / nutrients ignore ref to surface area of the leaf	2	AO1 2.3.1c, d
Total			**8**	

4.2.2.1 The human digestive system

Answer 23 · Mark scheme

June 2014 | BL2FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.2.2.1 The human digestive system

Answer 24 · Mark scheme June 2014 | BL2FP | Original Q7 | Legacy

7(a)(i)	amino acid(s)	accept peptide(s) do **not** allow polypeptide(s)	1	AO1 2.5.2e
7(a)(ii)	protease		1	AO1 2.5.2e
7(b)(i)	2		1	AO3 2.5.2b, g
7(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
7(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
7(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**	

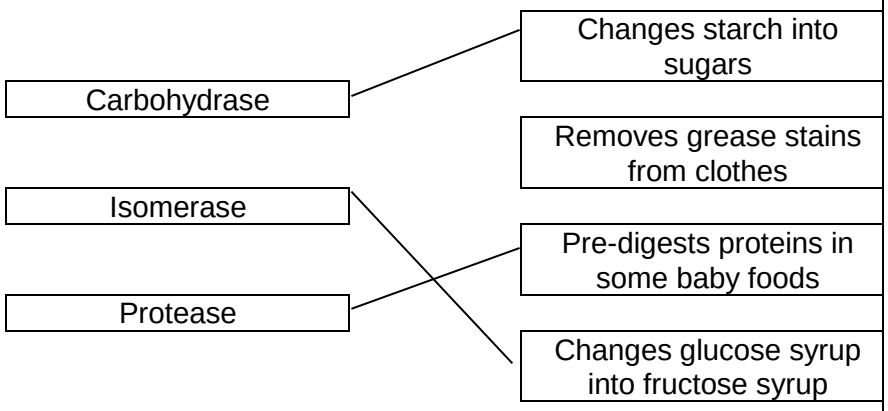
4.2.2.1 The human digestive system

Answer 24 · Mark scheme

June 2014 | BL2FP | Original Q7 | Legacy

4.2.2.1 The human digestive system

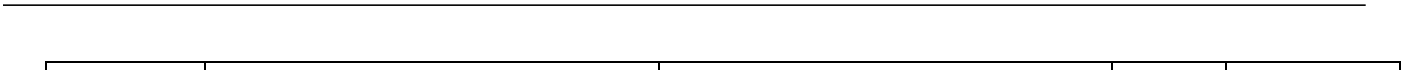
Answer 25 · Mark scheme June 2015 | BL2FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	a catalyst		1	AO1 2.5.1a,b, 2.6.1a
2(a)(ii)	protein		1	AO1 2.5.1b, 2.6.1a
2(a)(iii)	salivary glands		1	AO1 2.5.2d
2(b)	 extra lines from any enzyme cancels that mark		3	AO1 2.5, 2.5.2i
Total			6	

4.2.2.1 The human digestive system

Answer 25 · Mark scheme

June 2015 | BL2FP | Original Q2 | Legacy



4.2.2.1 The human digestive system

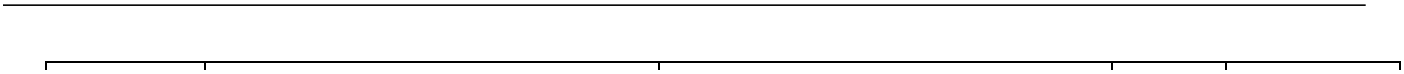
Answer 26 · Mark scheme June 2015 | BL2FP | Original Q3 | Legacy

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>3(a)</td><td>
<table>
<tr><th>Structure</th><th>Organ</th><th>Organ system</th><th>Tissue</th></tr>
<tr><td>Stomach</td><td>✓</td><td></td><td></td></tr>
<tr><td>Cells lining the stomach</td><td></td><td></td><td>✓</td></tr>
<tr><td>Mouth, oesophagus, stomach, liver, pancreas, small and large intestine</td><td></td><td>✓</td><td></td></tr>
</table>
all 3 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 marks
</td><td></td><td>2</td><td>AO1
2.2, 2.2.1a,b,c, d</td></tr>
<tr><td>3(b)(i)</td><td>diffusion</td><td>allow phonetic spelling</td><td>1</td><td>AO1
2.1.2a,b,c</td></tr>
<tr><td>3(b)(ii)</td><td>glucose</td><td></td><td>1</td><td>AO1
2.6.1b</td></tr>
<tr><td>3(b)(iii)</td><td>mitochondria</td><td></td><td>1</td><td>AO1
2.6.1b,d</td></tr>
<tr><td>Total</td><td></td><td></td><td>5</td><td></td></tr>
</table>

4.2.2.1 The human digestive system

Answer 26 · Mark scheme

June 2015 | BL2FP | Original Q3 | Legacy



4.2.2.1 The human digestive system

Answer 27 · Mark scheme June 2015 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	glycerol		1	AO1 2.5.2f
7(a)(ii)	pancreas / small intestine	accept duodenum / ileum ignore intestine unqualified	1	AO1 2.5.2f
7(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
7(c)(i)	fatty acid (production)		1	AO2 2.5.2f,h
7(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

4.2.2.1 The human digestive system

Answer 27 · Mark scheme

June 2015 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(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**	

4.2.2.1 The human digestive system

Answer 27 · Mark scheme

June 2015 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref

4.2.2.1 The human digestive system

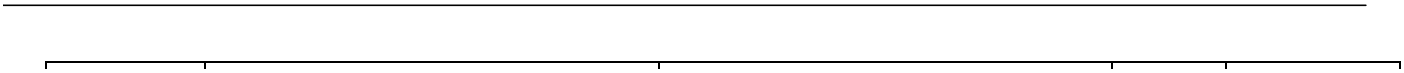
Answer 28 · Mark scheme June 2016 | BL2FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	large intestine = **E** small intestine = **D** stomach = **B**		1 1 1	AO1 2.2.1d
2(a)(ii)	**Function** / **Organ** Digestion of fat → Small intestine Absorption of water into the blood → Large intestine Production of hydrochloric acid → Stomach extra lines cancel		3	AO1 2.2.1d 2.5.2f/g
2(b)	The concentration in the blood is lower.		1	AO2 2.1.2b
Total			**7**	

4.2.2.1 The human digestive system

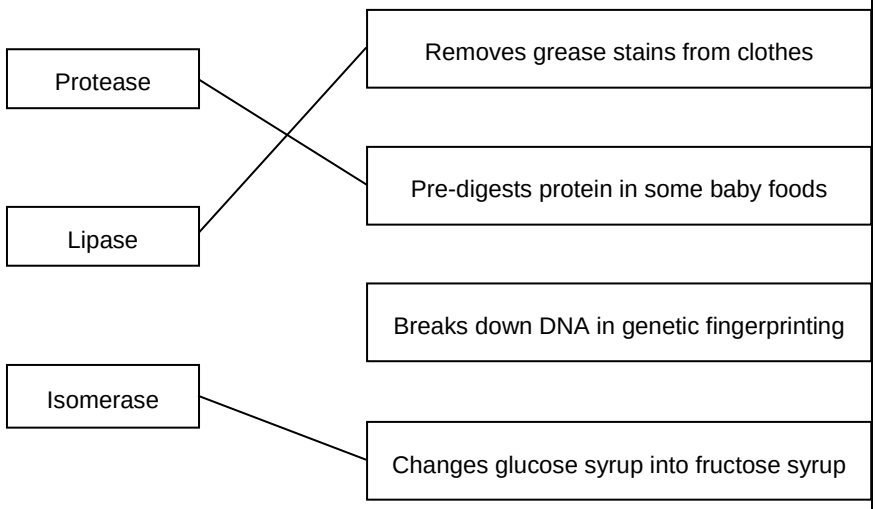
Answer 28 · Mark scheme

June 2016 | BL2FP | Original Q2 | Legacy



4.2.2.1 The human digestive system

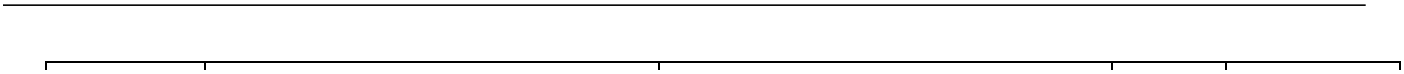
Answer 29 · Mark scheme June 2017 | BL2FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	a catalyst **or** speeds up a reaction any **one** from: • a protein • it is specific • sensitive to pH **or** temperature • not used up (in the reaction)	allow 'biological catalyst' for 2 marks	1 1	AO1 2.5.1a/b
3(b)	 extra lines cancel		3	AO1 2.5.2f/i
3(c)(i)	less energy **or** few(er) calories (for the same sweetness)	ignore less fattening ignore ref. to cost	1	AO2 2.5.2i
3(c)(ii)	The enzyme can easily be used again. The fructose solution produced does not have any enzyme in it.		1 1	AO3 2.5.2i
Total			**8**	

4.2.2.1 The human digestive system

Answer 29 · Mark scheme

June 2017 | BL2FP | Original Q3 | Legacy



4.2.2.1 The human digestive system

Answer 30 · Mark scheme June 2017 | BL2FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	sugar(s) / glucose	allow maltose do not allow if extra incorrect answers	1	AO1 2.5.2d Prac
8(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
8(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
8(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

4.2.2.1 The human digestive system

Answer 30 · Mark scheme

June 2017 | BL2FP | Original Q8 | Legacy

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

4.2.2.1 The human digestive system

Answer 31 · Mark scheme

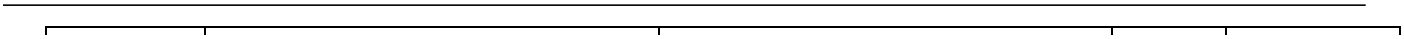
June 2017 | BL3FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	**A** = red **B** = white	allow lymphocyte / phagocyte	1 1	AO2 3.2.2a/c/d
3(b)(i)	low number of platelets so blood doesn't clot	ignore abnormal unqualified	1 1	AO2/3 3.2.2e
3(b)(ii)	To prevent rejection of the new blood cells.		1	AO2 3.3.1i
3(c)	carbon dioxide small intestine kidneys	allow CO_2 in this order only	1 1 1	AO1 3.2.2b
Total			**8**	

4.2.2.1 The human digestive system

Answer 31 · Mark scheme

June 2017 | BL3FP | Original Q3 | Legacy



4.2.2.1 The human digestive system

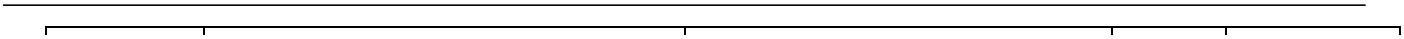
Answer 32 · Mark scheme June 2017 | BL3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	alveolus / alveoli	allow air sac(s) allow phonetic spelling	1	AO1 3.1.1k
5(a)(ii)	out / outwards down contract **or** shorten decrease / drop / fall	in this order only ignore expand allow to be flat	1 1 1 1	AO1 3.1.2c
5(a)(iii)	capillary / capillaries		1	AO1 3.1.2b 3.2.1g
5(b)(i)	villus / villi / microvilli		1	AO2 3.1.1k/l
5(b)(ii)	any **two** from: • large surface area • thin **or** one cell thick **or** short diffusion pathway • it contains many blood capillaries **or** has an efficient blood supply • (continuous) blood flow maintains the concentration gradient	allow many blood vessels	2	AO2 3.1.1k/l
Total			**9**	

4.2.2.1 The human digestive system

Answer 32 · Mark scheme

June 2017 | BL3FP | Original Q5 | Legacy



4.2.2.1 The human digestive system

Answer 33 · Mark scheme June 2018 | 8461/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	(A) stomach		1	AO1 4.2.2.1
	(B) small intestine	allow ileum ignore intestine unqualified	1	
	(C) liver		1	
03.2	soluble	this order only	1	AO1 4.2.2.1
	catalyse		1	
	denatured		1	
03.3	amino acids		1	AO1 4.2.2.1
03.4	any **one** from: • for growth • for repair / replacement (of cells / tissues / organs)	allow for enzymes / hormones / antibodies allow to strengthen bones ignore for energy	1	AO1 4.2.2.1
03.5	stomach		1	AO1 4.2.2.1

4.2.2.1 The human digestive system

Answer 33 · Mark scheme

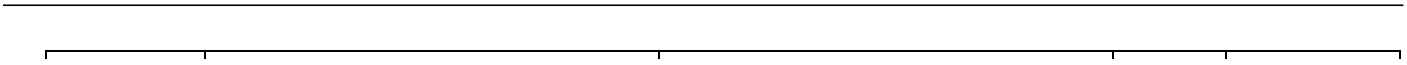
June 2018 | 8461/1F | Original Q3

Question	Answers	Mark	AO / Spec. Ref.
03.6	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO1 4.2.2.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content	0	
	Indicative content • grinding up the food • add Biuret reagent (allow $CuSO_4$ and NaOH) to food (sample) • protein turns solution (from blue) to purple / lilac • wear goggles to protect eyes • clean up spills immediately • Biuret / NaOH is an irritant / corrosive / poisonous for **level 2** a reference to Biuret, a positive result and reason for a safety precaution is required		
03.7	fat	1	AO1 4.2.2.1
03.8	type 2 diabetes	1	AO1 4.2.2.6
Total		15	

4.2.2.1 The human digestive system

Answer 33 · Mark scheme

June 2018 | 8461/1F | Original Q3



4.2.2.1 The human digestive system

Answer 34 · Mark scheme June 2018 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	diffusion		1	AO2 4.1.3.1
06.2	A		1	AO2 4.1.3.1
06.3	B		1	AO3 4.1.3.1
06.4	(earthworm) can absorb more oxygen (in a given time) **or** increases / more gas exchange	allow get / obtain / take in more oxygen ignore easier absorption of oxygen ignore references to food	1	AO2 4.1.3.1
06.5	lipase		1	AO1 4.2.2.1
06.6	 more oxygen (in soil with earthworms) (for) more (aerobic) respiration (of) bacteria / fungi / microorganisms / microbes / decomposers	reference to more is only needed once for the first two marking points allow earthworms bring oxygen to soil do **not** accept anaerobic respiration	 1 1 1	AO2 4.4.2.1 4.7.2.2
06.7	fertilisation	ignore sexual reproduction	1	AO1 4.6.1.1 4.6.1.2

4.2.2.1 The human digestive system

Answer 34 · Mark scheme

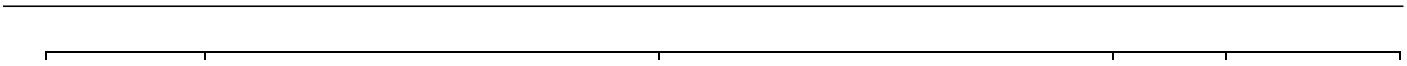
June 2018 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.8	asexual (reproduction)	allow cloning	1	AO2 4.6.1.1
Total			**10**	

4.2.2.1 The human digestive system

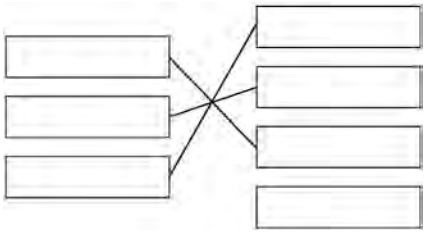
Answer 34 · Mark scheme

June 2018 | 8461/1F | Original Q6



4.2.2.1 The human digestive system

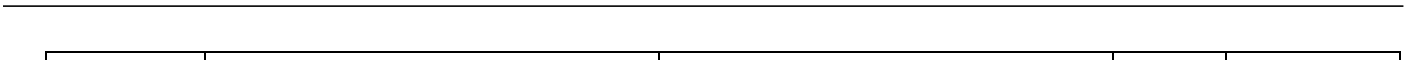
Answer 35 · Mark scheme June 2018 | 8461/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1		extra line from a scientific term cancels the mark	1 1 1	AO2 4.7.4.1
01.2	$\frac{10}{200} \times 100$ 5 / 5.0	an answer of 5 / 5.0 scores **2** marks	1 1	AO2 4.7.4.3
01.3	digestion respiration excretion	in this order only	1 1 1	AO2 4.5.3.3 4.7.4.3
01.4	fewer are eaten (by small fish)	allow there are fewer (small) fish eating them do **not** accept none are eaten	1	AO2 4.7.4.1
Total			**9**	

4.2.2.1 The human digestive system

Answer 35 · Mark scheme

June 2018 | 8461/2F | Original Q1



4.2.2.1 The human digestive system

Answer 36 · Mark scheme June 2019 | 8461/1F | Original Q1

01.1	rice		1	4.2.2.1 AO3
01.2	25 (%)	allow an answer between 23 and 27 (%) ignore ¼ / 0.25	1	4.2.2.1 AO2
01.3	(beans) contain all (four) food groups	allow converse for chicken allow chicken contains no / less carbohydrate **or** beans contain carbohydrate allow beans contain more nutrients ignore references to water / fat / protein	1	4.2.2.1 AO3
01.4	amylase		1	4.2.2.1 AO1
01.5	Benedict's reagent		1	4.2.2.1 AO1
01.6	(brick) red / green / yellow / orange / brown		1	4.2.2.1 AO1
01.7	C		1	4.2.2.1 AO3
01.8	small intestine	allow ileum ignore intestine unqualified do **not** accept large intestine / duodenum	1	4.1.3.3 4.2.2.1 AO1
01.9	active transport osmosis		1 1	4.1.3.2 4.1.3.3 AO1 AO1
Total			**10**	

4.2.2.1 The human digestive system

Answer 36 · Mark scheme

June 2019 | 8461/1F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.2.2.1 The human digestive system

Answer 37 · Mark scheme June 2019 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	protein		1	AO1 4.4.2.3 4.5.3.3
06.2	urea is a waste (product)	allow toxic / poisonous **or** may damage cells **or** denatures proteins ignore harmful / dangerous	1	AO1 4.5 4.5.3.3
06.3	respiration breathing	in this order	1 1	4.4.2.1 4.4.2.2 4.7.4.3 AO1
06.4	least medium most	in this order 3 correct = **2** marks 1 or 2 correct = **1** mark	2	AO3 4.5.2.4 4.5.3.3
06.5	diffusion		1	AO1 4.1.3.1 4.5.3.3
06.6	protein (molecules too) large	this mark may only be awarded if mp1 is correct or not attempted allow pores in membrane are too small	1 1	AO3 4.5.3.3
06.7	3	allow three	1	AO3 4.5.3.3
06.8	increases	ignore numbers	1	AO3 4.5.3.3

4.2.2.1 The human digestive system

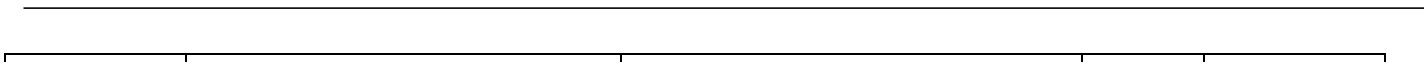
Answer 37 · Mark scheme June 2019 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.9	any **two** from: • has a low(er) concentration of urea • constant urea concentration / level • less time attached to machine **or** fewer hospital visits • no / less restriction on travel • not piercing skin repeatedly • less chance of infection / blood clots • cheaper in the long term • no restrictions on diet	allow converse points for person **A** / dialysis allow substance (if named must be correct) ignore cheaper unqualified	2	AO3 4.5.3.3
Total			**13**	

4.2.2.1 The human digestive system

Answer 37 · Mark scheme

June 2019 | 8461/2F | Original Q6



4.2.2.1 The human digestive system

Answer 38 · Mark scheme

November 2020 | 8461/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	$\frac{1430}{2600} \times 100$ 55 (%)		1 1	AO2 4.5.1 4.5.3.3
04.2	(volume) increases	allow (volume) goes up	1	AO2 4.5.1 4.5.2.4 4.5.3.3
04.3	drink (a lot / more)		1	AO2 4.5.1 4.5.3.3
04.4	filtration reabsorption excretion	this order only	1 1 1	AO1 4.5.3.3

4.2.2.1 The human digestive system

Answer 38 · Mark scheme

November 2020 | 8461/2F | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.5	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO3 4.5.3.3
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content	0	
	Indicative content **Advantages of kidney transplant** • no need for regular / long hospital visits **or** is a long-term solution • flexible lifestyle, such as can go on holidays • may not live near a hospital **or** reference to transport costs • no risk of infection from frequent needles / treatment • less / no need to control diet • maintains correct concentration of substances in blood / body • cheaper long term for NHS / hospital **Disadvantages of kidney transplant** • may be rejected • have to keep taking anti-rejection drugs **or** immunosuppressants • (suitable) donor may not be available **or** need for tissue matching • risk from surgery (e.g. anaesthesia or infection) • recovery from surgery will take a long time • does not last forever (therefore further surgery needed) For Level **2**, answers must refer to both advantages **and** disadvantages		
Total			**11**

4.2.2.1 The human digestive system

Answer 38 · Mark scheme

November 2020 | 8461/2F | Original Q4

4.2.2.1 The human digestive system

Answer 39 · Mark scheme November 2021 | 8461/1F | Original Q4

04.1	$C_6H_{12}O_6$		1	AO1 4.4.1.1 4.4.2.1
04.2	carbohydrase		1	AO1 4.2.2.1
04.3	beaker	allow water bath	1	AO1 4.2.2.1 RPA5
04.4	so that both solutions could reach 10 °C		1	AO2 4.2.2.1 RPA5
04.5	10 / ten (minutes)		1	AO3 4.2.2.1 RPA5
04.6	test the mixture with iodine solution every 30 seconds		1	AO3 4.2.2.1 RPA5
04.7	35 °C		1	AO3 4.2.2.1 RPA5
04.8	enzyme / amylase is denatured **or** enzyme / amylase stops working (so) starch is not broken down **or** starch is still present	allow active site / enzyme has changed shape do **not** accept enzyme / amylase has died	1 1	AO2 4.2.2.1 RPA5
Total			**9**	

4.2.2.1 The human digestive system

Answer 39 · Mark scheme

November 2021 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.2.2.1 The human digestive system

Answer 40 · Mark scheme

June 2022 | 8461/1F | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	(cell) wall **or** (large / permanent) vacuole	ignore cellulose	1	AO3 4.1.1.1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	rose black spot		1	AO1 4.3.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	$\frac{24 \times 60}{90}$ **or** $\frac{24}{1.5}$ 16	allow $\frac{1440}{90}$ do **not** accept if a unit is given	1 1	AO2 4.1.1.6 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	stomach		1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	biuret reagent		1	AO1 4.2.2.1 RPA4

4.2.2.1 The human digestive system

Answer 40 · Mark scheme

June 2022 | 8461/1F | Original Q8

Question	Answers	Mark	AO / Spec. Ref.
08.6	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3–4	AO2
	Level 1: Relevant points are made. They are not logically linked.	1–2	AO1
	No relevant content.	0	4.2.2.1 4.2.2.4 4.2.2.5 4.2.2.6

	Indicative content
	
	• meat-free burgers contain more fibre
	  • aids digestion **or** prevents constipation
	
	• meat burgers contain more protein
	  • for growth
	
	• meat burgers contain more fat
	  • can cause CHD **or** heart attack **or** narrowing of arteries
	  • may lead to needing a stent
	  • may lead to obesity
	  • obesity is a risk factor for (type 2) diabetes
	
	• meat burgers contain more cholesterol
	  • can cause narrowing of arteries **or** CHD **or** heart attack
	  • may lead to needing a stent
	  • may need to take statins
	
	• both burgers have similar amounts of carbohydrate
	  • good for providing energy
	
	• no information on vitamins / minerals provided for either burger
	
	• meat burgers require animals to be farmed
	  • increase in methane in atmosphere
	  • (methane) contributes to global warming
	
	• meat burgers require animals to be slaughtered
	  • ethical issues
	
	• some people won't eat meat-free burgers
	  • (because) some people don't like the idea of eating fungus
	  • (because) some people prefer the taste of meat
	
	For **Level 2**, comparisons and linked reasons using own knowledge are required.		

Total Question 8		**12**	

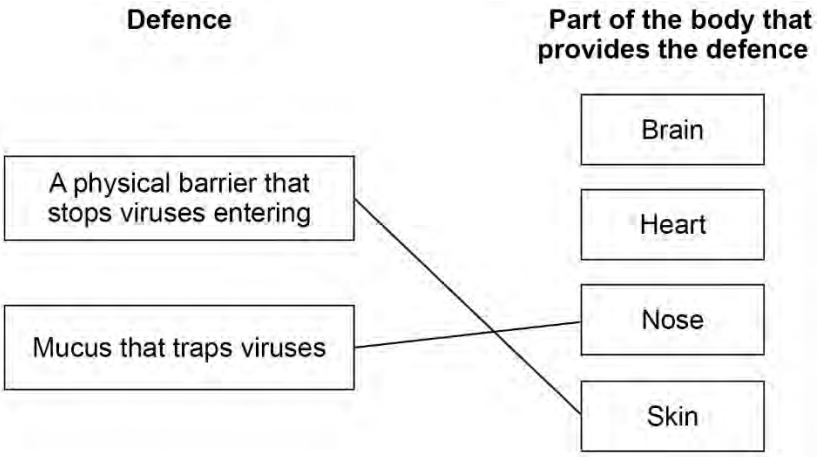
4.2.2.1 The human digestive system

Answer 41 · Mark scheme

June 2023 | 8461/1F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.1	pathogens		1	AO1 4.3.1.1

Question	Answers	Mark	AO / Spec Ref.
02.2	 do **not** accept more than one line from a box on the left	1 1	AO1 4.3.1.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.3	division		1	AO1 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.4	malignant tumours have cells that can spread to other parts of the body malignant tumours may form secondary tumours		1 1	AO1 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.5	(percentage) decreases		1	AO3 4.2.2.7 4.2.2.5

4.2.2.1 The human digestive system

Answer 41 · Mark scheme

June 2023 | 8461/1F | Original Q2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.6	more females were vaccinated (over time)	allow males may also be vaccinated allow more people were vaccinated allow increased use of (named) barrier methods of contraception allow more awareness / education (about HPV)	1	AO3 4.2.2.7 4.2.2.5

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.7	white blood cells		1	AO1 4.3.1.7

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.8	antibodies		1	AO1 4.3.1.7 4.3.1.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.9	any **one** from: • people are afraid of side / unknown effects • religious / cultural objections • (some people) believe they don't work • some people think (HPV) vaccine encourages sexual activity	ignore pain of injection allow there are side effects allow people think they cause (named) disease ignore religion unqualified ignore moral / ethical objections	1	AO3 4.3.1.7

Total Question 2	11

4.2.2.1 The human digestive system

Answer 42 · Mark scheme

June 2023 | 8461/1F | Original Q5

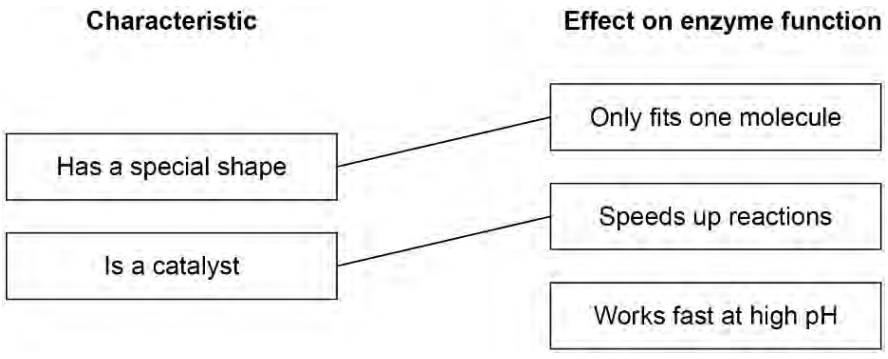
Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1	any **one** from: • growth • development	allow replacement (of old cells) allow for repair allow to heal wounds	1	AO1 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	amino acids		1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	Biuret reagent		1	AO1 4.2.2.1 RPA4

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.4	purple		1	AO1 4.2.2.1 RPA4

Question	Answers	Mark	AO / Spec Ref.
05.5	 do **not** accept more than one line from a box on the left	1 1	AO1 4.2.2.1

4.2.2.1 The human digestive system

Answer 42 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.6	9	allow answer in the range 8.5 to 9.5	1	AO3 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.7	fastest breakdown is at pH 2	allow acid **or** low pH for pH 2 throughout allow maximum / most breakdown is at pH2 allow works best at pH 2 allow (it / pH2) is the optimum pH allow a tolerance of ± 0.5 pH units	1	AO2
	stomach has (hydrochloric) acid		1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.8	active site		1	AO2 4.2.2.1
	substrate		1	

4.2.2.1 The human digestive system

Answer 42 · Mark scheme

June 2023 | 8461/1F | Original Q5

Question	Answers	Mark	AO / Spec Ref.
05.9	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5-6	AO2 4.2.2.1 RPA4 RPA5
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3-4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1-2	
	No relevant content.	0	
	Indicative Content: • add iodine solution to spotting tile • use measuring cylinder • (to) add amylase (solution), pH solution and starch (solution) together • start the timer • use pipette • (to) remove a drop of mixture at regular intervals (e.g. every 30 seconds) • add drop of mixture to iodine (solution) • if starch is present, mixture and iodine (solution) turns blue / black • continue until the iodine (solution) and the mixture remain yellow / orange / brown • record the time taken for the mixture to remain orange • repeat at different pH • compare times at each pH (control variables): • volume of starch (solution) / amylase (solution) / pH solution / iodine (solution) • concentration of starch (solution) / amylase (solution) / pH solution / iodine (solution) • temperature for Level **3** reference to control variables in an investigation involving different pHs is required for Level **2** students must describe the mixing of amylase, starch and a buffer at different pH values		

Total Question 5	**17**

4.2.2.1 The human digestive system

Answer 43 · Mark scheme

June 2023 | 8461/2F | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.1	fungi		1	AO1 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	the pH of the milk		1	AO2 4.7.2.3 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	put the beaker in a water bath		1	AO2 4.7.2.3 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.4	fatty acid		1	AO1 4.2.2.1 4.7.2.3 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.5	all the fat had been digested		1	AO2 4.7.2.3 4.2.2.1 RPA10

Answer 43 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.6	any **one** from: • (there is) more (kinetic) energy • enzyme activity is higher • bacteria / microorganisms are dividing / reproducing faster	allow converse if clearly describing 5 °C allow particles move faster allow more collisions between particles allow enzymes work faster ignore enzymes work better allow number of bacteria / microorganisms increasing faster allow more bacteria / microorganisms ignore bacteria / microorganisms grow faster ignore it is warmer	1	AO2 4.7.2.3 4.1.1.6 4.2.2.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.7	(30 °C, 2 days) 6(.0) **and** (30 °C, 3 days) 4.7 (fall) 1.3 (pH units/day)	allow a tolerance of ±½ small square allow −1.3 (pH units/day) allow correct answer using student's incorrect readings in the range of 5.95 to 6.05 and / or 4.65 to 4.75	1 1	AO2 4.7.2.3 4.2.2.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.8	$\frac{1.3}{0.1}$ 13	allow ecf from answer in question **05.7** do **not** accept if a unit is given	1 1	AO2 4.7.2.3 4.2.2.1 RPA10

Total Question 5	10

4.2.2.1 The human digestive system

Answer 44 · Mark scheme

June 2024 | 8461/1F | Original Q4

Question 4

Question	Answers	Mark	AO / Spec Ref.
04.1	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3–4	AO1 4.2.2.1 RPA4
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–2	
	No relevant content	0	
	Indicative content: **Starch** • iodine (solution) tests for starch • iodine (solution) turns to blue-black **or** black **or** dark blue (if starch is present) • iodine (solution) remains unchanged / yellow / orange / brown (if no starch is present) **Sugar** • Benedict's (reagent / solution) tests for sugar • boil or heat (to at least 60 °C) • Benedict's (reagent / solution) turns green / yellow / orange / brown / (brick) red (if sugar is present) • Benedict's (reagent / solution) remains unchanged / blue (if no sugar is present) For **Level 2**, the response must give details of the tests for starch and sugar.		

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.2	amylase sugar	must be in this order	1 1	AO1 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.3	the type of bread		1	AO2 4.2.2.1

4.2.2.1 The human digestive system

Answer 44 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.4	any **two** from: • white bread tastes sweet in the least time • wholemeal bread takes most time to taste sweet • brown bread takes more time than white bread to taste sweet	allow answers in terms of rate, such as fastest / slowest to taste sweet allow to break down for to taste sweet, throughout allow a correct comparison of time to taste sweet for two types of bread, for **1** mark allow any two correct comparisons of time to taste sweet for two types of bread, for **2** marks ignore use of figures, unqualified	2	AO3 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.5	repeated (each type of bread) calculated a mean		1 1	AO3 4.2.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.6	$\frac{58 + 55 + 61}{3}$ 58 (seconds)	allow $\frac{174}{3}$ allow student's total correctly divided by 3 if no answer given in answer space allow answer written in **Table 3**	1 1	AO2 4.2.2.1

4.2.2.1 The human digestive system

Answer 44 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.7	each person's sense of taste is different		1	AO3 4.2.2.1

Total Question 4	**14**

4.2.2.1 The human digestive system

Answer 45 · Mark scheme

June 2024 | 8461/1F | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.1	nucleus	allow chromosome ignore in the DNA	1	AO1 4.1.1.2 4.1.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.2	**A**, **D** and **E**		1	AO1 4.2.2.1 4.2.2.2

4.2.2.1 The human digestive system

Answer 45 · Mark scheme

Question	Answers	Mark	AO / Spec Ref.
08.3	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content.	0	4.2.2.1 4.4.2.1 4.4.2.3
	Indicative content: **Difficulty digesting food** • less / no lipase • (so) less / no fat broken down o into fatty acids o into glycerol • less / no carbohydrase / amylase • (so) less / no carbohydrate / starch broken down o into glucose / sugar • less / no protease • (so) less / no protein broken down o into amino acids **Difficulty gaining body mass** • less / no absorption o of small / soluble molecules o of fatty acids o of glycerol o of glucose / sugar o of amino acids • fewer molecules **or** fewer amino acids available for building protein / muscle / cells / tissues • less fat stored • less respiration • less energy • (so less energy) for building new molecules / cells / tissues For **Level 3** details of difficulty digesting food **and** difficulty gaining body mass are needed.		

4.2.2.1 The human digestive system

Answer 45 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.4	large surface / area	allow large surface / area to volume (ratio)	1	AO1 4.1.3.1 4.2.2.2
	(large) capillary network **or** good / efficient blood supply	allow many capillaries	1	
	walls are thin **or** walls are one cell thick	ignore references to membranes ignore alveoli are thin ignore alveoli are one cell thick do **not** accept thin cell walls ignore references to alveoli being moist ignore steep concentration gradient	1	

4.2.2.1 The human digestive system

Answer 45 · Mark scheme

June 2024 | 8461/1F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.5	less (aerobic) respiration	allow (more) anaerobic respiration	1	AO2 4.4.2.1 4.4.2.2 4.4.2.3
	(so) less energy (released)	do **not** accept less energy produced / made / created	1	
	(results in) less muscle contraction **or** (results in) reduced metabolism **or** (results in) increased breathing rate / depth **or** (results in) increased heart rate	allow relevant named metabolic processes allow (results in) person getting out of breath	1	
	OR			
	(more) anaerobic respiration (1)			
	(so) lactic acid produced (1)			
	(results in) muscle fatigue **or** (results in) less muscle contraction **or** (results in) increased breathing rate / depth **or** (results in) increased heart rate (1)	allow muscle ache / cramp / tiredness / pain allow (results in) person getting out of breath		

Total Question 8	14

4.2.2.1 The human digestive system

Answer 46 · Mark scheme

June 2024 | 8461/2F | Original Q10

Question 10

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.1	lack of oxygen for (aerobic) respiration	do **not** accept ref to respiration in dead plants	1	AO3
	(so) less / no energy (released)	do **not** accept energy produced / made / created	1	AO2
	(for) microorganisms / bacteria / fungi / microbes / decomposers **OR** low pH denatures enzymes (1)	allow low pH / acidity reduces enzyme activity	1	AO2 4.2.2.1 4.4.2.1 4.7.1.2 4.7.2.3
	(so) less / no (chemical) reactions / metabolism / respiration **or** less **/** no energy released (1)	do **not** accept energy produced / made / created		
	in microorganisms / bacteria / fungi / microbes / decomposers (1)			

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.2	34 g/m^2/year		1	AO2 4.7.4.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.3	DNA		1	AO1 4.6.1.5 4.7.1.2 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.4	protein		1	AO1 4.4.1.1 4.4.2.1 4.4.2.3 4.7.1.2 4.7.1.4

4.2.2.1 The human digestive system

Answer 46 · Mark scheme

June 2024 | 8461/2F | Original Q10

Question	Answers	Extra information	Mark	AO / Spec Ref.
10.5	increase in temperature	allow global warming allow heat (energy) is trapped ignore reference to greenhouse gases	1	AO3
	(because) carbon dioxide is released (from the peat bog)		1	AO2
	(because) carbon dioxide is produced by burning / decay of peat	ignore methane is released from burning / decay of peat allow fewer plants to take in carbon dioxide (for photosynthesis)	1	AO2
	(because) methane is released (from the peat bog)		1	AO2
				4.4.2.1 4.7.2.3 4.7.3.3 4.7.3.5

Total Question 10	**10**

4.2.2.1 The human digestive system

Answer 47 · Mark scheme

June 2025 | 8461/1F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.1	type 2 diabetes	ignore diabetes unqualified do **not** accept type 1 diabetes allow high blood pressure allow (coronary) heart disease **or** CHD allow cardiovascular disease **or** CVD allow stroke allow heart attack allow (osteo)arthritis allow cancer allow sleep apnoea allow liver disease allow other correct diseases ignore high cholesterol ignore heart failure	1	AO1 4.2.2.6 4.2.2.7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.2	correct scale **and** *y*-axis labelled 'mean obesity rate in arbitrary units'		1	AO2 4.2.2.6
	all points plotted correctly	allow a tolerance of ± ½ small square allow 3 or 4 correct plots for **1** mark ignore letters	2	
	line of best fit drawn	ignore line extended beyond plotted points ignore line joined point to point with straight lines	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.3	scatter (diagram / graph)	allow scattergram	1	AO2 4.2.2.6

4.2.2.1 The human digestive system

Answer 47 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.4	positive correlation		1	AO2 4.2.2.6

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.5	(30 °C) (iodine solution remains yellow-brown because) starch is not present	allow (iodine solution remains yellow-brown because) all / the starch had been broken down	1	AO3
	(because) amylase / enzyme broke starch down	allow (because) the amylase / enzyme is active / working allow (because this is close to) the optimum / best temperature for amylase / enzyme	1	AO2
	(90 °C) (iodine solution blue-black because) starch was (still) present	allow (iodine solution blue-black because) starch was not broken down allow (because) the amylase / enzyme had no effect on starch	1	AO3
	(because) the amylase / enzyme has denatured	allow description of denaturation allow amylase / enzyme is destroyed / damaged do **not** accept amylase / enzyme has been killed	1	AO2 4.2.2.1 RPA5

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.6	test more temperatures between 10 °C and 60 °C		1	AO3 4.2.2.1 RPA5

4.2.2.1 The human digestive system

Answer 47 · Mark scheme

Question	Answers	Mark	AO / Spec Ref.
07.7	**Protease enzyme** | **Optimum pH** | **Organ where enzyme is active** [ ] | [ ] | stomach [ ] | [ ] | small intestine allow ileum / duodenum	1 1	AO2 4.2.2.1

Total Question 7	**14**

4.2.2.1 The human digestive system

Answer 38 · Examiner comments — November 2020 | 8461/2F | Original Q4

Question 4 (low & standard demand)

This question was about water balance in the human body and the treatment of people with kidney failure. The most common error in calculating the percentage of water lost as urine was to simply subtract the volume of urine from the total volume. Some students went on to divide this total by 2600 or by 1430. Consequently, a significant proportion of students were not credited with any marks and half scored full marks.

In **04.2** some students appeared to misunderstand what they were being asked and rather than describing an 'increase' suggested that the water lost from the skin as sweat during a long-distance run 'evaporates', 'dries up' or 'decreases (due to evaporation)'. It was common for students to identify all three of the words required in **04.4**; however, a large proportion managed to get these words in the wrong order. Students appear to know what goes on in the kidney but could not associate the specific terms, 'filtration', 'reabsorption' and 'excretion', with the given descriptions.

For **04.5** references to the advantage of a kidney transplant as not needing frequent hospital visits and the disadvantages of possible rejection and long waiting lists were commonly described. However, many students got no further than these and only very rarely was there any suggestion regarding infection, dietary control, the need to take immunosuppressants or surgical risks. Some students gave a description without any attempt to identify whether these were advantages or disadvantages of transplants; whilst others just described advantages of both a transplant and dialysis.

Answer 40 · Examiner comments — June 2022 | 8461/1F | Original Q8

Question 8 (Standard demand)

08.1 Most students correctly identified 'vacuole' or 'cell wall' as features found in plant and fungal cells but not in animal cells. The most common error was to give 'membrane' or 'nucleus', though such answers were fairly rare.

08.2 Over 70% of students were able to identify the fungal disease rose black spot, but a significant number of students gave the incorrect response of gonorrhoea.

08.3 While many students were able to carry out a simple calculation to find the number of times a fungal cell would divide in 24 hours, some students made errors, including stating that one and half hours is 1.3 hours or reversing the numerator and denominator in their calculation. A small but significant proportion of students went further, perhaps deciding that the sum they had completed had not been sufficient to gain the 2 marks or had simply misread the question. These students attempted to determine the total number of cells there would be in 24 hours and frequently calculated 2^{16}.

08.4 Less than 45% of students correctly identified the stomach as the site where protein was digested in the human digestive system**.** A significant number of students selected the large intestine, indicating a misconception about enzyme action in the digestive system.

4.2.2.1 The human digestive system

Answer 40 · Examiner comments

08.5 A significant proportion of students identified Benedict's reagent as the chemical which could be used to test for protein rather than selecting the correct answer of Biuret reagent. Just over 40% of students selected the correct answer.

08.6 The extended response question was well attempted by most students. However, some failed to acknowledge the instruction to 'use your own knowledge', and gave lengthy comparisons about the nutrient content of both burgers, without referring to why this did, or did not, contribute to a balanced diet, thus limiting these students to level 1. Some students did not make effective comparisons, using statements such as 'high in fat' rather than 'higher in fat' or simply repeated figures from the table, therefore, gaining no credit. Some students who did go on to attempt to use their own knowledge gave only vague statements about the burger being 'better for the body' and many confused the significance of each food component, stating that fat is needed for muscle growth and that excess cholesterol causes obesity, for example. Many students understood that protein is needed for muscle development but failed to go on to use the term 'growth' to gain credit. A few students wasted time by giving fairly detailed, (but irrelevant in terms of the question) accounts of enzymic digestion of carbohydrates, fats and proteins in the digestive system. A small number of students offered a valued judgement as to which type of burger might be 'better overall'. However; as the evaluation was taken to be the comparison between the nutritional content of the two burgers, this was not required and so was ignored.

4.2.2.1 The human digestive system

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.2.2.1 The human digestive system

Answer 41 · Examiner comments

June 2023 | 8461/1F | Original Q2

Question 2 (Low demand)

02.1 Nearly all students were able to determine 'pathogens' as being the name given to microorganisms that cause disease.

02.2 Almost 90% of students correctly linked both defences to the part of the body that provided the defence. Students should be reminded that they must not draw more than one line from a box on the left in these questions, as this will not gain credit.

02.3 A pleasing 90% of students knew that a tumour can form when changes to cells cause uncontrolled cell division**.**

02.4 Students have a clear understanding of features of malignant tumours, and indeed only around 4% of students gained zero marks on this question. Almost two thirds of students gained both available marks.

02.5 Over 95% of students gained this mark. A number went on to use data in support of their statements but this was not necessary. Some simply said that Table 2 showed that 'the vaccine had worked', but as the question asked specifically about how the **percentage** of females with HPV had changed, no credit could be given.

02.6 Surprisingly, only around 42% of students could suggest a correct reason for the change in HPV cases from 2010-2016. Many of these students correctly referred to more females, and sometimes more males as well, being vaccinated. Those failing to gain credit however, often simply stated 'vaccination' as the reason but gave no idea as to why the percentage continued to fall over time.

02.7 Nearly 80% of students knew that white blood cells respond to an inactive virus, and gained the mark.

02.8 While the most common incorrect answer was 'antibiotics', it was pleasing to see over 93% of students correctly identifying antibodies as being produced in response to the inactive virus.

02.9 Most credited responses here were around concerns of side effects from the vaccine and this was expressed in many different ways. Around 60% were in fact successful in gaining the mark. Reference to 'anti-vax' parents was seen but unless qualified as to the reason behind refusal to vaccinate it failed to gain a mark. Many students correctly quoted religious or cultural objections although, 'religion' or 'beliefs' on their own were insufficient. The idea that the vaccine might simply not work was commonly credited but answers such as 'parents are scared of the vaccine' or 'it's too expensive' gained no marks.

4.2.2.1 The human digestive system

Answer 42 · Examiner comments

June 2023 | 8461/1F | Original Q5

Question 5 (Low and standard demand)

05.1 This question asked why a person needs new cells. The context was of mitosis but many students lost this focus. Although many referred to 'growth' some failed to give complete answers by focusing only on the fact that 'cells die', and not go on to say that new cells had to be made to **replace** these dead cells. Other vague responses included, 'to keep us alive' / 'to fight disease' / 'to keep us healthy' / 'to get stronger'. The mention of 'protein' in the question stem also led some to mistakenly bring 'denaturation' into their responses. Nearly half of students articulated themselves adequately to gain the mark.

05.2 Over 67% of students knew that proteins were made from amino acids.

05.3 Students continue to be confused between the Benedict's reagent and Biuret reagent, and this was shown here with more than half of students failing to select Biuret as the correct answer.

05.4 Over half of students knew that purple was the colour seen in a positive test for protein.

05.5 It was pleasing that over three quarters of students gained two marks here for correctly linking the characteristic of enzymes, with the effect on its function. Students should be reminded that they must not draw more than one line from a box on the left in these questions, as this will not gain credit.

05.6 The majority of students were able to identify the optimum pH for enzyme Y using the graph provided. Of the 16% who did not gain credit, they were often only marginally out of the accepted range.

05.7 This question was in the context of a graph (Figure 3) showing the rate of protein breakdown by two enzymes in respect of pH. The ability to process and understand this data discriminated well between students, with only just over 16% of students gaining 2 marks. Good answers described how enzyme X worked best at pH 2 (or in low pH or acidic conditions) and then explained that this was the same pH level as that found in the stomach. Some students incorrectly stated the enzyme itself was acidic. The first marking point was only awarded if students understood from the graph that the enzyme worked best / maximally / optimally at pH 2. Comparative words such as 'better' or 'faster' were insufficient. Knowledge of acid being present in the stomach was more evident but this was then often linked with confusing statements such as 'so enzyme X will neutralise the acid'. The fact that the graph showed breakdown of protein by a second enzyme Y led some to mistakenly think that they had to compare the two. The question context of digestion and pH confused others who drifted into discussions of amino acids / fatty acids. Students should be advised not to refer to 'it' in answers except where there can be no ambiguity. In this question 'it' could have meant either enzyme X or the stomach. Just under half of students scored zero marks for this question.

05.9 This levelled response question required students to describe a method to investigate the effect of pH on the rate of starch breakdown by amylase, based on the required practical activities 4 and 5 in the specification. It was hoped that the procedures involved in the investigation would be familiar to students but many struggled with writing clear and coherent

answers. It was very evident when students had been exposed to the required practical activities, and indeed almost 15% of students did not even attempt a response, and a similar percentage scored zero marks.

Figure 4, showed some of the apparatus used as an aid to help students in their responses. It was evident, however, that many were unfamiliar with spotting tiles, and mistook them for test tube racks or otherwise believed that the 'dimples' could accommodate large volumes of solutions. Required practical activities include the use of appropriate equipment. In this case, appreciation of how to use a pipette, a measuring cylinder and a timer, as shown in Figure 4, could have earned credit in answers. Answers could have been given in bullet point or numbered form – in fact, this method might well have helped students organise their thoughts.

Only around 1.3% of students achieved 5 or 6 marks, showing clear, logical sequencing of the investigation and evidence of how valid results might have been obtained.

Level 3 students routinely included reference to:

- appropriate mixing of amylase, pH and starch solutions
- timed additions of the mixture to iodine solution
- recorded time for the mixture to remain orange
- repeated experiments at different pH levels
- evidence of at least one variable having been controlled

Just under 16% of students gave a level 2 response, where students included mention of appropriate mixing of amylase, pH and starch solutions as well as referencing repeated experiments at different pH levels.

The majority of students gave answers that matched a level 1 response only. Marks within level 1 were dependent upon the degree to which indicative content points were mentioned. Students very often managed to achieve 2 marks by simply referring to the use of equipment given in Figure 4.

4.2.2.1 The human digestive system

Answer 43 · Examiner comments

June 2023 | 8461/2F | Original Q5

Question 5

This question was about the decay of milk and an investigation into the effects of temperature on the rate of decay.

05.1 Given that bacteria can cause decay, three-quarters of students correctly selected fungi as another type of organism that could do the same.

Questions 05.2 to 05.8 related to a laboratory investigation of pH changes in milk as it decayed at different temperatures.

05.2 Just over half the students were able to select the pH of the milk as the dependent variable in the investigation.

05.3 Approximately half the students selected putting the beaker of milk in a water bath as the method for keeping milk at 30 °C for 7 days.

05.4 Given the choice of amino acids, fatty acids or hydrochloric acid, nearly 60 percent of students correctly opted for fatty acids as the product of digestion of fats in the milk.

Answer 43 · Examiner comments

June 2023 | 8461/2F | Original Q5

05.5 The graph in Figure 9 showed the pH changes in milk at 5 °C, 20 °C and 30 °C over 7 days. Most students correctly selected the option that all the fat had been digested as the reason for the pH not falling below pH 4.5

05.6 Explanations of why the rate of fat digestion was higher at 30 °C than at 5 °C were often rather weak – such as ‘the enzymes work better’ or ‘the enzymes are at their optimum temperature’ or ‘chemical reactions are faster’, none of which really went beyond what had been stated in the question. Only about 1 in 6 could add a proper explanation in terms of more energy being available at the higher temperature or particles colliding more frequently or the enzyme having a higher activity or the bacteria reproducing faster.

05.7 This question was a structured calculation requiring reading two pH values on the 30 °C line on the graph in Figure 9 and then subtracting one from the other. Around three-quarters of students were successful but errors included incorrect values being read from the graph and an inability to do the subtraction.

05.8 Given that the fall in pH at 5 °C was 0.1 pH units per day, students had to calculate how many times faster their answer to question 05.7 was than 0.1. Just under half were successful. Many made the error of subtracting the values instead of dividing.

4.2.2.1 The human digestive system

Answer 44 · Examiner comments

Question 4 (low and standard demand)

04.1 This extended response question on the Required Practical Activity about food tests was not answered well. Many students confused the tests for starch and sugar either with one another, or with other tests such as that for protein. It is clear that some students have knowledge of food tests that are not covered in the specification, and for some, this led to further confusion about which chemical should be used to test for which food group. The most common correct test given as an answer was the use of iodine solution for starch and whilst many students gave a correct end colour, blue and purple as incorrect colours were seen frequently. A large proportion of responses lacked an attempt at both the positive and negative tests for each food.

Students who only recalled details of one test could achieve a mark in Level 1, whilst to reach Level 2, both tests needed to be correctly described. The higher mark within this level could only be matched if both the tests, together with the correct expected positive and negative results, were given. Very few students could recall that Benedict's reagent needed to be heated or boiled.

04.2 46% of students gained two marks in this question. The most common error was in the first sentence, where students had to name the enzyme that breaks down starch.

04.3 68% of students answered this question correctly.

04.4 This question was not well answered because many students did not appreciate exactly how to make conclusions from results. 47% of students did not score any marks and 35% achieved both marks. The results showed comparative times taken for different types of bread to taste sweet and by far the biggest error made by students was that they were not comparative in their answers. Many simply reiterated the results in the table by quoting data while others, instead, tried to explain the results by referring to amylase action. Neither of these routes actually compared the times taken and failed to gain credit. Several students incorrectly implied that the results reflected the sugar content or health value of the different breads. Of those who did attempt conclusions based on comparisons, some seemed to wrongly think that brown bread, at the top of the table, was the quickest to taste sweet.

04.5 Students were clearly familiar with the idea assessed in this question of how an investigation could be improved, and most answers correctly identified the need to repeat the test and find a mean. 64% of students achieved full marks in this question, and in the 27% of responses achieving one mark, the idea of calculating a mean was the more frequently omitted point, with answers sometimes mentioning increased accuracy instead.

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4.2.2.1 The human digestive system

Answer 44 · Examiner comments June 2024 | 8461/1F | Original Q4

04.6 81% of students scored both marks in this question. In all calculation questions, students should be encouraged to show their working as some incorrect final responses may well have gained one mark for working, had this been evident.

04.7 85% of students gained credit in this question.

4.2.2.1 The human digestive system

Answer 45 · Examiner comments

June 2024 | 8461/1F | Original Q8

Question 8 (standard demand)

08.1 57% of students gained credit in this question.

08.2 88% of students selected the correct answer in this question.

08.3 This extended response question was not answered well. Most students found it very difficult to access and the majority of responses simply restated the information given in the question or detailed everything the student knew about cystic fibrosis (CF) and the lungs. Less than 13% of students achieved anything more than one mark, with 57% achieving zero.

Students achieving Level 1 gave one or more simple, unconnected, but appropriate statements which reflected the difficulties encountered. To enter Level 2, there had to be at least the attempted linking of one idea with another, which reflected either the difficulty in digesting food or the difficulty in gaining body mass. To enter Level 3 students had to show at least some attempted linking of two or more ideas and they had to address, even if only minimally, both difficulties in digesting food and gaining body mass.

Responses invariably focused only on difficulties with digestion, as the context of this topic probably seemed more familiar. General comments which simply reworded what had been given in the question such as 'people with CF have fewer enzymes so will find it hard to breakdown food' or 'the gut will find it difficult to function' were repeated time and again in paragraphs but added nothing of value to answers. Some students gravitated towards the familiarity of 'enzymes' and proceeded to give unnecessary details of enzyme action in general and of possible denaturation. Others followed on from the mention of CF by inappropriately referring to breathing difficulties or by suggesting that excess mucus might 'block the gut'. When ideas were successfully linked, these were most often in relation to individual digestive enzymes and their substrates. Occasional additional points were given such as 'reduced absorption' or 'less fat could be stored' but these were not often considered at this level.

The statements students make in these extended response questions do not need to be long or complex and it is never necessary to include all the points listed in the indicative content on the mark scheme to achieve the highest level. Neither do responses have to be written in complete sentences - succinct bullet points often suffice and may even help students to organise their ideas more effectively. As is always the case with extended response questions, however, answers are considered holistically and always in a positive framework.

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4.2.2.1 The human digestive system

Answer 45 · Examiner comments June 2024 | 8461/1F | Original Q8

08.4 3% of students achieved full marks in this question, with 13% achieving two marks and 31% achieving one mark. This question asked for a description of the features of the (individual) alveoli that help maximise gas exchange rather than the lungs in general. Most students struggled to describe three features, often missing out on marks due to their responses lacking specificity. An answer such as they are 'one cell thick' or 'thin' had to be related to the alveolar walls to be given credit. Some students referred to there being a 'short diffusion distance' but as this is a consequence of the thin walls and not a described feature, they could not gain the mark. Students should be reminded to double check the command word given in each question; explanatory detail in 'describe' questions is not required, nor creditworthy.

08.5 Fewer than 20% of students scored any credit in this question, despite many making lengthy attempts. Answers were usually too general and invariably did not offer any clear explanations. Two routes were available in the mark scheme – one which reflected there being less oxygen for aerobic respiration and the other which reflected the inevitable increase in anaerobic respiration. The variety of answers which did not gain credit included vague suggestions such as 'tiredness', it being 'hard to breathe', the 'heart rate is affected' or 'weak muscles' as well as incorrect ones such as 'blood stops flowing' or there is 'no respiration'.

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4.2.2.1 The human digestive system

Answer 45 · Examiner comments

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

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4.2.2.1 The human digestive system

Answer 46 · Examiner comments

Question 10 (standard demand)

10.1 Some students appeared to be confused as to how decay happens, believing that the dead plant matter would decay itself. However, around 10% of students did indicate that some sort of microorganism is involved in the decay process, gaining the third mark in the mark scheme. Some students spent time unnecessarily describing the factors needed for decay and often needed to extend their answers onto the additional pages.

There were two routes students could use to gain marks. Many students' answers included elements of both routes, so examiners awarded marks for the described route which gave the higher mark. In most cases this was the first route given in the mark scheme.

The information in the question told students that layer B contains 'very little oxygen' and 'has a low pH'; thus, simply repeating either of these was insufficient to gain credit. To gain the first mark, students needed to link one of these pieces of information to their own knowledge: either in terms of respiration or in terms of enzymes being denatured or reducing in activity. Many students also gained this first marking point, although some who took the second route demonstrated confusion about what a 'low pH' constitutes, describing it as 'low acidity' or 'being 'alkaline'.

Achieving marking point 2 proved to be more problematic for many students. Most simply by omitting any reference to energy or metabolism. Students should be advised that when referring to respiration in their answers (as many did), they should then go on to describe the role of respiration: 'releasing energy'. For those who did refer to energy, it was noted that very few described energy being 'produced', which is never acceptable as this would contradict the principle of conservation of energy.

10.2 40% of students identified the correct answer regarding the approximate biomass of moss that becomes biomass in primary consumers.

10.3 Fewer than a tenth of students identified DNA as a substance that can be made using phosphates.

10.4 Around 20% of students could identify protein as the substance that can be made using nitrogen.

10.5 Almost 65% of students gained at least one mark in this question, and a quarter of those gained three of the four available marks. A number of students described a rise in temperature of the Earth's atmosphere, gaining marking point 1.

It should be noted that the 'greenhouse effect' and 'climate change' are not equivalent to 'global warming'. A significant number of students attempted to describe the mechanism of global warming. This was often confused, including references to the 'ozone layer' and incorrect descriptions of long and short-wave radiation. However, such descriptions are beyond the requirements of the specification, so were ignored.

Students who merely repeated the information that the peat bog 'contains' carbon dioxide and methane could not be awarded marking points 2 or 4. Instead further added value was required, in that these gases would be 'released' from the peat when the bog was destroyed. A significant number of students omitted any reference to methane, so were unable to gain marking point 4.

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4.2.2.1 The human digestive system

Answer 46 · Examiner comments June 2024 | 8461/2F | Original Q10

Again, students should be advised that repeating the information in the question will not gain credit, thus those that described 'the use of peat as a fuel' releasing carbon dioxide. To gain credit here, students needed to indicate that the peat would have to be 'burned' to produce carbon dioxide. In this case, examiners ignored the idea that burning would also release (trapped) methane, as this would inevitably also be burned, releasing more carbon dioxide.

Answer 47 · Examiner comments June 2025 | 8461/1F | Original Q7

Question 7 (standard demand)

07.1 Half of all students gave a creditworthy answer to this question, very often by referring to heart disease. Heart failure or heart problems were considered too vague and were unable to gain credit. The most frequently seen error was one of omission when students simply suggested diabetes without the qualification of 'Type 2'.

07.2 Over 50% of students gained at least 3 marks in this question. MP1 was occasionally missed due to labelling the axis with 'y' only, omitting to include 'arbitrary units' or the use of an incorrect scale. Gaining credit for correct plots was a little more challenging but, with the allowed tolerance, the majority of students were awarded at least 1 mark. It was occasionally difficult to see which points were chosen because they were either far too small or concealed by a very thick line of best fit. Students should ideally be advised to give clear crosses for plotted points and to draw graphs in pencil so that alterations can be made without ambiguity. MP4 was usually awarded for a straight line which went through/between the majority of plotted points, regardless of whether some of these had been incorrect. The most common error was to draw the straight line of best fit through the origin. It was rare to see students drawing straight lines between individual points but, where this alone was given, they were unable to achieve MP4.

07.3 Just over 50% of students answered this question correctly. Responses which could not gain credit included 'dot', 'line' or 'relationship graph', or references to conclusions in respect of correlations shown.

4.2.2.1 The human digestive system

Answer 47 · Examiner comments

June 2025 | 8461/1F | Original Q7

07.4 80% of students gained credit in this question.

07.5 Nearly 60% of students found this question difficult and did not pick up any marks. A lack of acknowledgement of the command word (explain) meant that a large number of answers were seen that simply restated the results in terms of the colour of the iodine solution without any attempt at an explanation. Many students confused the results they were seeing when attempting to explain why the colour changes had happened - a significant number read that the starting colour of iodine solution was yellow-brown and then, noting that the only result showing this same colour was at 30 °C, went on to suggest that at this temperature, there had either been no reaction at all or that the result was anomalous. Other errors included:

- the iodine test showing the presence or absence of both starch and sugars.
- amylase, rather than starch, being broken down.
- denaturation occurring at 30 °C
- iodine solution being responsible for any breakdown that occurred.

Vague suggestions that 'temperature affected amylase' or that at 90 °C 'amylase did not work', with no reference to starch or to denaturation, gained no credit.

07.6 Just over 30% of students gained credit in this question.

07.7 Nearly 10% of students scored full marks in this question, with nearly 30% scoring one mark, most commonly MP1. A wide range of answers was seen, covering organs outside the digestive system as well as within it. A substantial number of students gave the answers the wrong way around and the 'pancreas' was often chosen mistakenly in the context of being a site of production, rather than activity of, protease enzymes. Unqualified references to 'intestine' were frequently seen but were not credited.