AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.3.2

Control of blood glucose concentration

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**22**
Available paper years	**2007–2025**

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.

4.5.3.2 Control of blood glucose concentration

Answer 01 · Mark scheme June 2007 | BLY1B | Original Q5 | Legacy

Five	**1**	**1**	**4**	**3**

Answer 02 · Mark scheme November 2007 | BLY1A | Original Q2 | Legacy

Two	**A**	LDLs	**2**	
	B	polyunsaturated fats	**4**	
	C	salt	**3**	
	D	sugar	**1**	
	A	**B**	**C**	**D**

4.5.3.2 Control of blood glucose concentration

Answer 03 · Mark scheme June 2008 | BLY2H | Original Q5 | Legacy

question	answers	extra information	mark
5(a)	pancreas		1
5(b)	protease	allow proteinase	1
5(c)(i)	(same) enzymes / named enzymes produced in other parts / named parts of digestive system	if named, enzymes and part must be correct	1
5(c)(ii)	diet / activity varies / amount of glucose in blood varies	accept too much insulin leads to coma / hypo / low blood sugar accept too little insulin leads to coma / hyper / high blood sugar	1
5(d)	any **two** from: pros • less / no experimentation on humans • dogs (more) similar to humans (than lower / named organisms) • it allows us to find a treatment **or** improves medical understanding cons • harmful / cruel to dogs • dogs may not be (metabolically) like humans conclusion justified by argument	 accept allows us to find a cure accept kills dogs	2 1
Total			**7**

4.5.3.2 Control of blood glucose concentration

Answer 03 · Mark scheme June 2008 | BLY2H | Original Q5 | Legacy

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

Answer 04 · Mark scheme November 2008 | BLY1AP | Original Q2 | Legacy

Two	**A**	mono-unsaturated fats	**3**
	B	LDLs	**4**
	C	salt	**1**
	D	sugar	**2**

	A	B	C	D

4.5.3.2 Control of blood glucose concentration

Answer 05 · Mark scheme

question	answers	extra information	mark
2(a)(i)	pancreas	allow phonetic spelling	1
2(a)(ii)	glucose into cells / liver / muscles	allow any named organ / cell allow turned into / stored as glycogen **but** do **not** allow hybrid spellings for glycogen allow increases respiration allow stored as / turned into fat	1
2(b)(i)	reference to "98.6% of all people who used Diacure reported an improvement in their condition."	allow claim **1** / **1** / the first one	1
2(b)(ii)	(only) 30 patients **or** not enough / not many patients	allow only one trial **or** only done once **or** not repeated ignore bias	1
2(b)(iii)	little effect / difference suggest drug is not effective (in long term)	allow no effect allow only drops by 4 (±1) allow wouldn't persuade people to take it	1 1
2(b)(iv)	avoid bias / owtte	eg company could change / ignore results / might lie ignore fair / accurate / reliable / valid	1
Total			**7**

4.5.3.2 Control of blood glucose concentration

Answer 05 · Mark scheme January 2009 | BLY2H | Original Q2 | Legacy

COMPONENT NUMBER: BLY2H

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

4.5.3.2 Control of blood glucose concentration

Answer 06 · Mark scheme June 2009 | BLY2H | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	(wholemeal bread) any **two** from: lower maximum / peak / less change slower rise / change need to take less insulin / less likely to hyper	no mark for identifying the type of bread but max **1** mark if not identified ignore references to rate of fall **or** first to peak	 1 1
5(a)(ii)	any **four** from: • amylase / carbohydrase • starch to sugar • (sugar) absorbed / diffused / passes into blood • correct reference to pancreas • insulin produced • glucose (from blood) into cells / tissue / organ **or** named tissue / organ • glucose used in respiration / for energy	max 3 for explaining rise max 3 for explaining fall allow starch to glucose allow once only as rise or fall allow glucose to glycogen	4

Question 5 continues on the next page…

4.5.3.2 Control of blood glucose concentration

BLY2H

Question 5 Continued

question	answers	extra information	mark
5(b)	any **three** from: advantages (compared to insulin injections): • (may be) permanent / cure • no / less need for self monitoring • no / less need for insulin / injections • no / less need for dietary control disadvantages (compared to insulin injections): • low success rate • (may) still need insulin / dietary control • operation hazards • risk of infection from donor • rejection / need for drugs to prevent rejection	max **2** if only advantages **or** only disadvantages discussed can give converse if clear that it relates to insulin injections ignore reference to cost	3
Total			**9**

4.5.3.2 Control of blood glucose concentration

Answer 06 · Mark scheme

June 2009 | BLY2H | Original Q5 | Legacy

BLY2H

4.5.3.2 Control of blood glucose concentration

Answer 07 · Mark scheme

January 2010 | BLY2H | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)(i)	pancreas	allow phonetic spelling	1
3(a)(ii)	(increases movement of) glucose into cells / organs / named	allow (glucose) converted to glycogen / fat allow (glucose) used in (increased) respiration do **not** allow hybrid spellings of glycogen	1
3(b)	**Type of diabetes** / **Treatment** Type 1 → Careful attention to diet only Type 1 → Careful attention to diet **and** injection of insulin Type 2 → Careful attention to diet **and** injection of insulin Type 2 → Injection of insulin only	**1** mark per correct line extra line from a type of diabetes cancels the mark	2
3(c)(i)	protein		1
3(c)(ii)	gene / allele		1

Question 3 continues on the next page

BLY2H

Question 3 continued

question	answers	extra information	mark
3(c)(iii)	any **three** from: • (amino acids) broken down / converted • (amino acids) form / into urea • (break down / convert / urea formed) in liver • (urea / broken down amino acids) removed / filtered by kidney • (urea / broken down amino acids) in urine • (urine / urea / broken down amino acids) stored / held in bladder	max **2** if any one process goes on in the wrong organ	3
Total			**9**

4.5.3.2 Control of blood glucose concentration

Answer 07 · Mark scheme

January 2010 | BLY2H | Original Q3 | Legacy

BLY2H

Answer 08 · Mark scheme

November 2010 | BLY1AP | Original Q9 | Legacy

Nine	**3**	**3**	**3**	**1**

4.5.3.2 Control of blood glucose concentration

Answer 09 · Mark scheme

January 2011 | BLY2H | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	pancreas	allow phonetic spelling	1
3(b)	4(.0) to 7.2 **or** 7.2 to 4(.0)		1
3(c)	13 – 7 = 6 6/2 = 3 units increase (dose)	working shows 6 = **1** mark accept the correct answer to the calculation, 3 units, for **2** marks, irrespective of working accept indication of increase, eg extra / more / + could be in working lines	1 1 1
Total			**5**

4.5.3.2 Control of blood glucose concentration

Answer 09 · Mark scheme January 2011 | BLY2H | Original Q3 | Legacy

BLY2H

Answer 10 · Mark scheme June 2011 | BLY1AP | Original Q3 | Legacy

Three	**4**	**1**	**3**	**2**

Answer 11 · Mark scheme November 2011 | BLY1AP | Original Q6 | Legacy

Six	**3**	**4**	**3**	**3**

4.5.3.2 Control of blood glucose concentration

Answer 12 · Mark scheme

June 2013 | BL3HP | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	(concentration high) in the hepatic portal vein is blood with glucose absorbed from the intestine		1
	concentration is lower in the hepatic vein because insulin		1
	(has caused) glucose to be converted into glycogen **or** allows glucose into liver cells		1
7(b)(i)	(after 6 hours) most of the glucose has been absorbed from the intestine **or** from food into the blood		1
7(b)(ii)		if biological terms incorrectly spelt they must be phonetically accurate	
	because glucagon (made in the pancreas) causes	do **not** accept glucagon made / produced by the liver	1
	glycogen to be converted into glucose		1
	glucose released into blood	allow the liver maintains the correct / constant level of glucose in the blood	1
Total			**7**

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

4.5.3.2 Control of blood glucose concentration

Answer 13 · Mark scheme June 2014 | BL3HP | Original Q6 | Legacy

6(a)(i)	1 hour 15 mins / 1.25 hours / 75 mins	allow 1:15 ignore 1.15 hours	1	AO3 3.3.2
6(a)(ii)	increase in (core / body) temperature (due to an) increase in <u>respiration</u> **or** more <u>muscle</u> contraction releasing energy (as a waste product) skin temperature decreases (because there is) sweating (which) evaporates and cools the skin	ignore numbers allow produces 'heat' do **not** allow making energy ignore references to vasodilation or vasoconstriction	1 1 1 1 1 1	AO1 / AO2 / AO3 3.3.2a
6(a)(iii)	(there is) dilation of vessels (supplying skin capillaries) (so) more blood flows (near skin) (surface) **or** blood is closer (to the skin)	allow vasodilation allow blood vessels widen ignore expand do **not** accept dilating capillaries or moving vessels ignore ref to heat	1 1	AO1 / AO2 3.3.2d
6(b)	pancreas detects (low) blood glucose produces glucagon (so) glycogen is converted to glucose	 do **not** allow glucagon made in the liver allow adrenaline released which increases conversion of glycogen to glucose **or** reduced insulin production so less glucose into cells / less glucose converted to glycogen for 1 mark	1 1 1	AO1 3.3.3b
Total			12	

4.5.3.2 Control of blood glucose concentration

Answer 13 · Mark scheme

June 2014 | BL3HP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.5.3.2 Control of blood glucose concentration

Answer 14 · Mark scheme June 2015 | BL3HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	has the least amount of glucose (to) transfer energy (for the run)	allow least amount of fat **or** no fat allow (to) release energy (for the run) do **not** allow produces energy do **not** allow 'energy for respiration'	1 1	AO2 311d/e
5(a)(ii)	any **one** from: • cells will work inefficiently • absorb too much water / swell / overhydrate • lose too much water / shrink / dehydrate	ignore turgid / flaccid cells burst is insufficient allow cramp in muscle	1	AO2 311c/f
5(b)	any **three** from: • thermoregulatory centre • (has temperature) receptors • (which) monitor blood temperature (as it flows through the brain) • (temperature) receptors in the skin • (receptors) send impulses to the brain	ignore vasoconstriction / vasodilation / sweating allow hypothalamus impulses sent to the thermoregulatory centre = 2 marks	3	AO1 332b/c

4.5.3.2 Control of blood glucose concentration

Answer 14 · Mark scheme

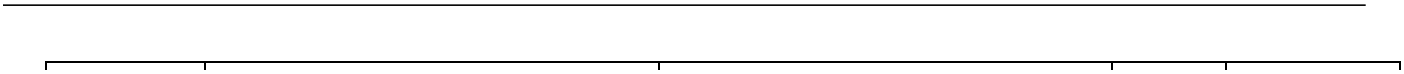
June 2015 | BL3HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(c)(i)	(sports drinks) contain a lot of glucose (a person with diabetes) does not produce insulin **or** does not produce enough insulin so <u>blood</u> glucose / sugar levels will rise too high **or** to a dangerous level	 allow (person with diabetes) has cells which do not respond to insulin do **not** allow insulin produced by liver	1 1 1	AO1 / AO2 333c
5(c)(ii)	inject insulin **or** have an insulin pump (fitted)	do **not** allow swallow insulin accept exercise accept inhale insulin accept take metformin **or** other correctly named drug allow pancreatic transplant	1	AO1 333d
Total			**10**	

4.5.3.2 Control of blood glucose concentration

Answer 14 · Mark scheme

June 2015 | BL3HP | Original Q5 | Legacy



4.5.3.2 Control of blood glucose concentration

Answer 15 · Mark scheme June 2015 | BL3HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	(the kidney) filters the blood	ignore refs to hormones and drugs	1	AO1 331a/c
	(and then) reabsorbs <u>all</u> of the glucose		1	
	reabsorbs some of the ions	allow salts ignore minerals	1	
	reabsorbs some of the water		1	
	releases urea (in urine)		1	
7(b)(i)	should fall from 28 (to the end of dialysis)	ignore any line drawn after end of dialysis allow + / - 0.5 square graph line must fall to / below below 15	1	AO2 331d/e
7(b)(ii)	should stay level at about 6 throughout	ignore slight variations allow + / - 1 square ignore any line drawn after end of dialysis	1	AO2 331d/f
7(c)(i)	immune system	allow white blood cells / lymphocytes	1	AO1 331g/h
	(produces) antibodies		1	
	(which) attack the antigens (on the transplanted kidney)	non-matching antigens insufficient	1	
7(c)(ii)	any **one** from: • tissue typing (to find match) • treating with drugs that suppress the immune system	accept treat with immunosuppressants	1	AO1 331i
Total			**11**	

4.5.3.2 Control of blood glucose concentration

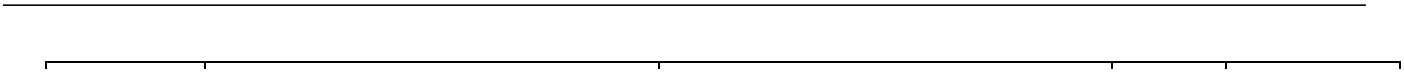
Answer 16 · Mark scheme June 2016 | BL3HP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	immune system	allow white blood cells / lymphocytes ignore phagocytes	1	AO1 3.3.1g/h
	produces antibodies		1	
	(which) attack the antigens on the transplanted organ / pancreas	allow transplanted organs have foreign antigens at start of explanation **and** linked to attacking the organ	1	
8(b)(i)		max 2 if no ref. to artificial pancreas		AO1/2 3.3.3/a
	change / rise detected by the sensor		1	
	information used to calculate how much insulin she is going to need (bring her blood glucose back to normal)		1	
	(pump delivers) insulin into the blood		1	
	(causing) glucose to move into cells	allow (liver) converts glucose to glycogen	1	
8(b)(ii)	any **one** from: • it is more accurate **or** less chance of human error • (glucose) level will remain more stable **or** no big rises and falls in blood sugar levels • you don't forget to test and / or inject insulin • if ill or in coma insulin is still injected	ignore continuous and automatic unqualified	1	AO3 3.3.3
Total			**8**	

4.5.3.2 Control of blood glucose concentration

Answer 16 · Mark scheme

June 2016 | BL3HP | Original Q8 | Legacy



4.5.3.2 Control of blood glucose concentration

Answer 17 · Mark scheme

June 2017 | BL2HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	any **two** from: • to avoid a psychological effect **or** avoid cyclists trying harder in one session **or** avoid cyclists pedalling for longer • to avoid bias(ed results) • to show the true effect of consuming glucose **or** to give a valid comparison		2	AO2/3 2.6 2.6.1b/f

4.5.3.2 Control of blood glucose concentration

Answer 17 · Mark scheme

June 2017 | BL2HP | Original Q5 | Legacy

5(b)(i)	any **four** from: Pro: • exercise is standardised / same intensity / same cyclists • results show blood glucose level doesn't fall too low with glucose drink • extra hour of cycling **or** cycle longer with glucose drink / with higher blood glucose • it was a blind trial **or** cyclists don't know if they are taking a placebo Con: • sample size is too small **or only** 7 • no other athletes tested **or only** tested on cyclists • **only** tested once / no repetition • effect may be due to hydration level (as opposed to glucose) • other factors before / outside of the sessions may not be controlled, e.g. diet, training regime, drugs, health • no data concerning variation between individuals' results • should have been a double-blind trial	max 3 marks for only pros or cons given points must clearly relate to a pro or con allow with glucose drink, blood glucose stays high or stays higher than placebo allow suggested improvement – e.g. should have some cycling with and some without glucose at same time, then swap for 2nd session	4	AO3 2.6 2.6.1b/f 2.6.2d

4.5.3.2 Control of blood glucose concentration

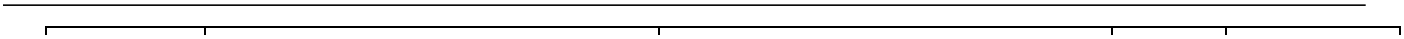
Answer 17 · Mark scheme

5(b)(ii)	increased <u>oxygen</u> supply increased removal of <u>carbon dioxide</u> increased <u>respiration</u> so increased <u>energy</u> release for muscle contraction / action	'increased' / 'more' must be given at least once for full marks allow idea of less lactic acid **or** less (muscle) fatigue **or** less oxygen debt **or** less anaerobic respiration do **not** allow increased anaerobic respiration do **not** allow makes (more) energy	1 1 1 1	AO1 2.6.1b/f/g/h 2.6.2d
Total			**10**	

4.5.3.2 Control of blood glucose concentration

Answer 17 · Mark scheme

June 2017 | BL2HP | Original Q5 | Legacy



4.5.3.2 Control of blood glucose concentration

Answer 18 · Mark scheme June 2017 | BL3HP | Original Q9 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	pancreas releases <u>insulin</u> glucose moves into the cells **or** pancreas stops releasing glucagon glycogen stops being converted to glucose	do **not** allow liver releasing / producing insulin allow glucose is converted to glycogen	1 1	AO1 3.3.3a
9(b)	(exercise) uses up <u>glucose</u> idea of no <u>glucose</u> released into the blood(stream) (because) no available glycogen **or** glycogen cannot be broken down **or** no glycogen stored (and) <u>blood</u> sugar levels fall too low **or** (and) blood sugar levels remain low	 allow glucagon has no effect (on faulty glycogen) **or** glucagon doesn't break down glycogen ignore glycogen does not form properly	1 1 1 1	AO2 3.3.3b
Total			**6**	

4.5.3.2 Control of blood glucose concentration

Answer 19 · Mark scheme June 2019 | 8461/1H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	plasma		1	4.2.2.3 AO1
06.2	Benedict's (reagent / solution)	allow Fehling's (reagent / solution)	1	4.2.2.1 AO1
06.3	add chemical / Benedict's (reagent to urine) **and** boil / heat positive result – (colour changes from blue to brick) red	allow ecf from question **06.2** allow any temperature above 65 °C ignore water bath unqualified allow orange / yellow / green / brown if no other mark awarded, allow **1** mark for reference to glucose testing stick / strip	1 1	4.2.2.1 AO1
06.4	the blood is more concentrated **or** less dilute (than the solution in the cells) (so) water moves out of cells by osmosis water moves through a partially permeable membrane	allow the solution in the cells is less concentrated **or** more dilute than the blood allow correct references to water concentration **or** water potential **or** hypotonic / hypertonic ignore reference to amount of water or glucose allow (so) water moves into the blood by osmosis allow semi-permeable / selectively permeable membrane	1 1 1	4.1.3.2 AO2

4.5.3.2 Control of blood glucose concentration

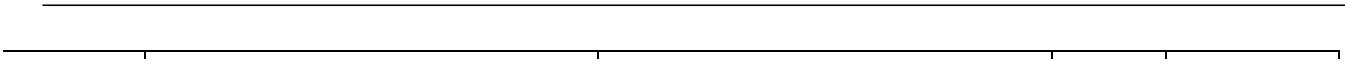
Answer 19 · Mark scheme June 2019 | 8461/1H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	projections / folds / villi provide a large surface area	ignore small intestine has a large surface area do **not** allow cilia	1	4.1.3.1 4.1.3.3 4.2.2.1 4.1.1.2 AO1
	walls of projections / folds / villi / capillaries are thin / one cell thick for shorter absorption / diffusion distance		1	AO2
	(small intestine is) very long, increasing time (for absorption)		1	AO1
	good / efficient blood supply to maintain concentration gradient	allow many capillaries to maintain concentration gradient	1	AO2
	cells have many mitochondria for (aerobic) respiration for active transport **or** cells have many mitochondria for energy release for active transport	do **not** accept anaerobic do **not** accept producing energy	1	
Total			**12**	

4.5.3.2 Control of blood glucose concentration

Answer 19 · Mark scheme

June 2019 | 8461/1H | Original Q6



4.5.3.2 Control of blood glucose concentration

Answer 20 · Mark scheme June 2019 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1		ignore incorrect organ secreting insulin / glucagon		4.5.1 4.5.3.2
	(blood glucose increases after meal causing) insulin secretion	allow (blood glucose increases after meal causing) insulin increase	1	AO2
	insulin causes glucose to enter cells / liver / muscles	allow glucose converted to glycogen in cells / liver / muscles for **2** marks	1	AO1
	(insulin causes) glucose conversion to glycogen		1	AO1
	(so) blood glucose decreases causing glucagon secretion	allow increase in glucagon when blood glucose is low	1	AO2
	glucagon causes glycogen to be converted to glucose		1	AO1
08.2	cells / liver / muscles absorb less glucose	allow cells / liver / muscles convert less glucose to glycogen do **not** accept no absorption / conversion of glucose	1	AO2 4.5.3.2
	(so) glucose concentration in blood remains high	allow (so) glucose concentration in blood does not decrease	1	
	(high blood glucose stimulates / causes) pancreas to release more insulin	allow more insulin is released from pancreas to 'try' to reduce blood glucose	1	

4.5.3.2 Control of blood glucose concentration

Answer 20 · Mark scheme June 2019 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	any **three** from: • age • height **and** mass • proportion of males and females **or** group size • (same) severity of diabetes • (same) activity (during investigation) • (same) type of meal • dose of drug • (similar) blood glucose concentrations at start • other health conditions **or** other drugs being taken	allow BMI allow sex of the participants allow how much / type of food / drink consumed before allow may not have followed drug-taking regime beforehand	3	AO3 4.5.3.2
08.4	Mean = 177.2 ± 15.4		1	AO2 4.5.3.2

4.5.3.2 Control of blood glucose concentration

Answer 20 · Mark scheme

June 2019 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.5	**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	
	Level 1: Relevant points are made. They are not logically linked.		1–2	
	No relevant content		0	
	Indicative content **Pro:** • Met + A gives larger (%) reduction (in blood glucose) than Met alone • so statement is supported • Met + B gives larger (%) reduction (in blood glucose) than Met alone • so statement is supported • Met + A SD does not overlap with Met SD • so difference is significant **Con:** • Met + B SD overlaps with Met SD • so difference is not significant • difference in results could be due to chance --- • number of people used is not very large • number of people in each group is different • so may not be representative **or** may not be repeatable / reproducible • so anomalies will have a bigger impact on smaller groups • 30 minute / starting levels of blood glucose are different • all 30 minute / starting levels are higher in the 2-drug trial • so may cause different % reductions • no information about control variables **or** named eg • concentration of drugs not given / may differ • so results may not be valid for level 3 an inclusion of a discussion of significance is required			4.5.3.2
Total			**18**	

4.5.3.2 Control of blood glucose concentration

Answer 21 · Mark scheme

June 2022 | 8461/2H | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	an answer in the range 1.1 to 2(.0) (hours)		1	AO2 4.5.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	*effect* : lowered *explanation*: glucose taken in **or** glucose converted to glycogen **or** glucose used in respiration by cells / liver / muscles		1 1 1	AO1 4.5.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	underweight		1	AO3 4.5.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	(from) 67.5 (kg to) 90 (kg)	allow in the range 67 to 68 (kg) for 67.5 (kg) allow in the range 90 to 90.5(kg) for 90 (kg) allow from 90 (kg to) 67.5 (kg)	1	AO2 4.5.3.2

4.5.3.2 Control of blood glucose concentration

Answer 21 · Mark scheme

June 2022 | 8461/2H | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	(person **C** has) higher glucose (than mean)	answers must be comparative allow comparison of higher glucose using numbers allow (person **C**'s) glucose is too high	1	AO3 4.5.3.2
	(person **C** has) higher insulin (than mean)	allow comparison of higher insulin using numbers allow (person **C**'s) insulin is too high do **not** accept (person **C** has) higher cholesterol ignore unprocessed data	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	(more) exercise	allow example of (more) exercise	1	AO1 4.5.3.2
	eat less carbohydrate / sugar **or** eat a low carbohydrate diet	allow eat less fat allow eat a carbohydrate controlled diet if no other marks awarded allow **1** mark for lose weight **or** maintain healthy weight **or** eat less **or** eat fewer calories ignore references to healthy / balanced diet **or** diet unqualified	1	

Total Question 3		10

4.5.3.2 Control of blood glucose concentration

Answer 22 · Mark scheme

June 2025 | 8461/2H | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1		allow converse allow answers in terms of likelihood of having / getting (Type 2) diabetes		AO3 4.5.3.2
	(percentage of people with Type 2) diabetes increases with age	allow more old people have (Type 2) diabetes	1	
	(percentage of people with Type 2) diabetes increases with increased (body) mass / weight	allow more obese people have (Type 2) diabetes allow (percentage of people with type 2) diabetes increases with obesity	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	7.65%		1	AO3 4.3.1.9 4.5.3.2

Question	Answers	Mark	AO / Spec. Ref.
09.3	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3 4.3.1.9 4.5.3.2
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3–4	
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	

	Indicative content allow 'investigation 1' for drug **A** and 'investigation 2' for drug **B** throughout **Methods** *Methods are not comparable because:* • different methods are used to administer the drugs - injection (drug **A**) and pill (drug **B**) **or** drug **A** acts more quickly (than drug **B**) • dosage for drug **A** and drug **B** might differ (as dosage is not stated) • drug **A** and drug **B** are tested for different time periods **or B** is given for a longer period (24 weeks) (than **A** - 12 weeks) • placebo / control only included when testing drug **B** • only drug **B** has intermediate readings **or** fewer readings were taken when testing drug **A** • different sample sizes were used **or** greater sample size used when testing drug **B** (**A** = 175, **B** = 631 / 1261) • different scientists carried out each investigation • no double-blind trial for drug **A** *Methods may be similar because:* • neither drug trial was double-blind • quantitative tests in both trials • (relatively) large sample size used for both drugs **Usefulness of drug A and drug B** allow 'blood glucose' for Hb-G throughout o both lower Hb-G (levels) o both lower Hb-G to similar levels o drug **A** reduced Hb-G more than drug **B** o neither drug reduced Hb-G to an acceptable value (<7%) o Hb-G increases after 18 weeks with drug **B** o no information on side effects for either drug o no information on the trend for drug **A** For **Level 1**, details about the method **or** usefulness of the drugs must be given. For **Level 3**, details about the method **and** usefulness of the drugs must be given.		

Total Question 9	**9**

4.5.3.2 Control of blood glucose concentration

Answer 21 · Examiner comments — June 2022 | 8461/2H | Original Q3

Question 3

This was the final common question on the topic of insulin and blood glucose, and the relationship between obesity and Type 2 diabetes.

03.1 Around three-quarters of students were able to state a time on the graph in **Figure 2** at which the concentration of insulin in the blood would be high – i.e. corresponding to a high blood glucose concentration. The most common error was to select a time when blood glucose was low, at 2.5 hours.

03.2 While the vast majority knew that insulin would lower the concentration of glucose in the blood, explanations of how this was achieved varied in detail. Some referred to the glucose being taken out of the blood without stating that it went into the body cells, or into organs such as the liver or muscles. Some correctly included the conversion of glucose to glycogen. Full marks were awarded to around half of the students.

03.3 and **03.4** These questions involved interpretation of the height – body mass graph in **Figure 3**. Over 90 percent of students correctly deduced that person **A** was underweight, but fewer than three-quarters could give sufficiently precise values for the range of healthy weights for person **B**, given a height of 1.9m, even though this fell on a major gridline.

03.5 This question involved the selection of appropriate data from a simple table that compared blood concentratons of cholesterol, glucose and insulin in an obese person with mean values for people who did not have Type 2 diabetes. Around half the students were able to point out that person **C** had *higher* concentrations of both glucose and insulin. Simply quoting figures from the table, without a comparison, was inadequate, as was the use of a non-comparative term such as 'high' concentration. Any mention of cholesterol was deemed inappropriate – the question tested the selection of *relevant* data.

Answer 21 · Examiner comments — June 2022 | 8461/2H | Original Q3

03.6 Nearly all students knew that exercise was a means of reducing the chance of developing Type 2 diabetes. Most also knew that 'diet' was relevant but many answers, such as 'a heathy diet' or 'a balanced diet' were inadequate; it was necessary to state that the diet contained less sugar / carbohydrate / fat or involved weight loss.

4.5.3.2 Control of blood glucose concentration

Answer 22 · Examiner comments

June 2025 | 8461/2H | Original Q9

Question 9 (Standard, Standard/high and High demand)

09.1

This question required students to provide two conclusions about the percentage of people with Type 2 diabetes, from data provided in the form of a bar chart. Two thirds of students scored 2 marks on this question.

Referring to 'diabetes' was sufficient for credit to be awarded, although 'it' was insufficiently clear without some qualification. Any student referring to Type 1 diabetes could not gain credit, but this was extremely rare.

Most students gained at least one mark, with nearly all describing the effect of age on the prevalence of Type 2 diabetes. This could be phrased in terms of an overall trend or a

4.5.3.2 Control of blood glucose concentration

Answer 22 · Examiner comments

description of one or other end of the age range. Some students referred to both ends of the age range as their two conclusions but could only be awarded one mark.

Descriptions of the effect of body weight on the prevalence of diabetes proved to be a little more problematic, with some suggesting that 'overweight people' have the highest percentage of diabetes; unfortunately, these students had not used the key sufficiently well, as 'overweight' was the middle category of body weight. Hence, students who described one or other end of the body weight scale were most successful, with answers such as 'diabetes is more common in obese people'.

Some students were confused by the information and wrote about the effect of age on body weight, 'people get more obese as they get older', which was not supported by the information and gained no credit. Other students attempted to describe both trends in one statement, often not clearly describing either trend.

09.2

Two thirds of students correctly identified the mean percentage of Hb-G after 12 weeks as being 7.65%

09.3

Around a third of students did not gain any marks in this extended response question. For credit, students were required to analyse information about two clinical studies on diabetes treatments. Students were expected to evaluate both the methods used and the effectiveness of the treatments in detail to be awarded a mark in Level 3 – achieved by just 20% of students.

The high demand of this question meant that a single statement for each of the usefulness of the drugs and the methods used was insufficient to access the lower mark in Level 1.

Many students did attempt to compare the usefulness of the drugs, with answers such as 'both drugs lower Hb-G levels', which even if seen in reference to the two drugs in statements well apart in the response, were still credited. Furthermore, a correct comparison of the relative impact of the two drugs in lowering Hb-G levels could gain credit for both drugs lowering Hb-G levels and for drug A having a greater effectiveness in this respect. However, many students referred only to the drugs 'changing Hb-G levels' or even for 'drug A changing Hb-G levels more than drug B' and could not gain credit for either of these statements.

In terms of comparing the methods used in the investigations, many students simply restated the methods or suggested alternative methods, such as 'investigation 1 should have used a placebo' which was not a clear comparison of the methods and gained no credit.

Some students were confused by the numbers of patients involved in Investigation 2, believing that only 1 patient had taken the drug, and 630 patients had been given the placebo.

Students should practise questions of this type in their studies and revision, as the command word 'evaluate' was not well understood in many cases. This requires students to make comparisons; in this case of the two investigations.

4.5.3.2 Control of blood glucose concentration

Mark Ranges and Award of Grades

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