AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.2.3

Decomposition (biology only)

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**33**
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.

4.7.2.3 Decomposition (biology only)

Answer 01 · Mark scheme

Question 1

	answers	extra information	mark
(a)(i)	saves trees / woods / forests	allow reference to litter / waste tips allow more energy efficient	1
(a)(ii)	fewer quarries / mines	allow saves resources / raw materials allow reference to litter / waste tips allow more energy efficient	1
(b)(i)	eg less pollution from power stations	allow saves electricity allow uses renewable energy source owtte allow saves fuel ignore uses energy from sun	1
(b)(ii)	eg less need for reservoirs	allow uses of water / reuse of water accept conserves water / less mains water ignore stores water	1
(b)(iii)	eg less pollution in rivers	allow uses of fertiliser accept reduces the amount of sewage / pollution ignore turned into fertiliser	1
total			5

4.7.2.3 Decomposition (biology only)

Answer 01 · Mark scheme

January 2008 | BLY1F | Original Q1 | Legacy

BLY1F

4.7.2.3 Decomposition (biology only)

Answer 02 · Mark scheme January 2008 | BLY2F | Original Q7 | Legacy

Question 7

	answers	extra information	mark
(a)(i)	**D**		1
(a)(ii)	**A**		1
(b)(i)	air / oxygen (can enter)	ignore other factors entering or leaving	1
	for (aerobic) respiration	do **not** accept anaerobic respiration	1
(b)(ii)	(more) minerals / nutrients /salt(s) / ions **or** named mineral / element available	ignore fertility / fertiliser allow symbols allow eg mulching / reducing weeds **or** retain water	1
total			5

4.7.2.3 Decomposition (biology only)

Answer 03 · Mark scheme January 2008 | BLY3F | Original Q9 | Legacy

Question 9

question	answers	extra information	mark
(a)(i)	methane	apply list principle allow symbols	1
(a)(ii)	anaerobic respiration / (anaerobic) fermentation	ignore decay / decomposition etc	1
(b)(i)	any **two** from: • manure disposed of • gains fertiliser (for crops) • gets (free) fuel **or** cheap supply of energy **or** (free) cooking / heating / lighting • can sell crops at higher price	 allow converse allow not using wood / trees	2
(b)(ii)	in the UK lower temperature **or** not enough heat process is slower **or** enzymes action slower	allow converse arguments for Sri Lanka ignore other factor(s) ignore references to efficiency / 'bacteria working'	 1 1
total			6

4.7.2.3 Decomposition (biology only)

Answer 04 · Mark scheme

June 2008 | BLY2F | Original Q3 | Legacy

question	answers	extra information	mark
3(a)	microorganisms / bacteria / fungi / microbes	allow named example **or** mould ignore decomposers unqualified / germs / maggots / worms	1
3(b)	it is warm(er) / hot / increased heat / increased temperature	ignore 'sun is hot' unqualified	1
3(c)	oxygen		1
Total			**3**

4.7.2.3 Decomposition (biology only)

Answer 04 · Mark scheme June 2008 | BLY2F | Original Q3 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.7.2.3 Decomposition (biology only)

Answer 05 · Mark scheme

June 2008 | BLY3F | Original Q3 | Legacy

question	answers	extra information	mark
3(a)	methane		1
3(b)	(insulation maintains) higher temperature / warm(er) / keeps heat in / prevents heat loss / optimum temperature / heat increases rate of reaction	do **not** allow hot(ter) / high temperature ignore same / constant temperature	1
3(c)(i)	($)25 000	ignore units ignore working or lack of working add 3 figures and subtract 10 000 **or** use of 35 000 and 10 000 but wrong answer for **1** mark	2
3(c) (ii)	8 years = **2** marks **or** correct answer from (c)(i) = **2** marks	ignore working or lack of working $\frac{200\,000}{\text{(c)(i)}}$ but wrong answer = **1** mark	2
Total			**6**

4.7.2.3 Decomposition (biology only)

Answer 05 · Mark scheme

June 2008 | BLY3F | Original Q3 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

4.7.2.3 Decomposition (biology only)

Answer 06 · Mark scheme June 2009 | BLY2F | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	increase / higher / faster / quicker numerical comparison eg from 30 to 60 / by 30 **or** it is 30 at 15°C and 60 at 25°C	 award **2** marks for doubles / goes twice as fast or 30 units more	1 1
8(a)(ii)	any **two** from: • oxygen / air (in) • for microorganisms / bacteria / microbes / fungi / decomposers • (for aerobic) respiration • let heat out • heat kills microorganisms	 do **not** accept lets oxygen / air out ignore reference to other substances / light passing in or out ignore microorganisms passing in ignore worms / germs / bugs ignore heat in	2
8(b)	compost contains minerals / nutrients / elements / ions / named	allow improve moisture / drainage allow nitrogen ignore CO_2 / food / goodness / fertilisers do **not** accept vitamins / glucose etc	1
Total			**5**

4.7.2.3 Decomposition (biology only)

Answer 07 · Mark scheme

January 2010 | BLY3F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)	more reliable **or** in case one does not work / is anomalous	do **not** accept accurate ignore fair test	1
3(b)	any **three** from: **Flask A**: • bacteria could not get in • due to U-tube / bent tube / trapped in bend **Flask B**: • bacteria could get in • due to straight tube / not trapped	allow microorganisms	3
Total			**4**

4.7.2.3 Decomposition (biology only)

Answer 07 · Mark scheme

January 2010 | BLY3F | Original Q3 | Legacy

BLY3F

4.7.2.3 Decomposition (biology only)

Answer 08 · Mark scheme

Question 4

question	answers	extra information	mark
4(a)	very little of the biogas generator will be seen the temperature inside will not change much	cancel **1** mark for each extra box ticked	1 1
4(b)(i)	methane		1
4(b)(ii)	60	correct answer with or without working 100 – (35 + 1.5 + 1.5 + 2) but incorrect answer allow **1** mark	2
Total			**5**

4.7.2.3 Decomposition (biology only)

Answer 08 · Mark scheme

January 2010 | BLY3F | Original Q4 | Legacy

BLY3F

4.7.2.3 Decomposition (biology only)

Answer 09 · Mark scheme

June 2010 | BLY2F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	microorganisms		1
2(b)	moist		1
2(c)	respiration		1
2(d)	roots		1
Total			**4**

4.7.2.3 Decomposition (biology only)

Answer 09 · Mark scheme

June 2010 | BLY2F | Original Q2 | Legacy

BLY2F

4.7.2.3 Decomposition (biology only)

Answer 10 · Mark scheme

June 2019 | BLY3F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	A higher concentration would be difficult to stir		1
5(b)(i)	methane		1
5(b)(ii)	60	100 – (5 + 35) but incorrect answer allow **1** mark	2
5(c)(i)	aerobic respiration		1
5(c)(ii)	oxygen		1
Total			**6**

4.7.2.3 Decomposition (biology only)

Answer 10 · Mark scheme

June 2010 | BLY3F | Original Q5 | Legacy

BLY 3F

4.7.2.3 Decomposition (biology only)

Answer 11 · Mark scheme

Question 5

question	answers	extra information	mark
5(a)(i)	(compost produced) quicker / faster / takes less time	it = tumbler bin answers should be comparative eg **only** 6 weeks = 1 mark 6 weeks = 0 marks	1
5(a)(ii)	any **two** from: • takes less space • cheaper (to buy) • don't need to turn / rotate it	it = fixed bin references to space and cost should be comparative do **not** accept unqualified data	2
5(b)(i)	any **two** from: • faster rise (in tumbler) • higher (in tumbler) **or** 2 correct number readings • levels off (in tumbler) **or** continues to rise in fixed	it = tumbler bin ignore eg faster compost	2
5(b)(ii)	microorganisms / microbes / decomposers aerobic	allow bacteria / fungi / detritus feeders / worms / other named examples of detritus feeders / mould allow air(y) allow oxygen(ated)	1 1

Question 5 continues on the next page . . .

4.7.2.3 Decomposition (biology only)

BL1FP

Question 5 continued

question	answers	extra information	mark
5(b)(iii)	faster respiration / decay / **or** microorganisms / microbes / decomposers work faster (in tumbler) so more heat produced (in tumbler) **OR** more air / more oxygen(ation) (in tumbler) (1) so more respiration / faster decay / bacteria work faster (in tumbler) (1)	allow converse allow bacteria / fungi / mould ignore heat produced by friction	1 1
Total			**9**

4.7.2.3 Decomposition (biology only)

Answer 11 · Mark scheme

January 2012 | BL1FP | Original Q5 | Legacy

BL1FP

4.7.2.3 Decomposition (biology only)

Answer 12 · Mark scheme

June 2012 | BL1FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4 (a)	too cold / very cold **or** oxygen / microbes cannot reach it	allow not enough energy / heat / warmth ignore frozen	1
	for microorganisms / microbes / bacteria / fungi / enzyme / reaction (to work)	ignore other consumers	1
4 (b)	no longer exist **or** no more left **or** died out / all died	ignore died unqualified	1
4 (c)(i)	egg cell		1
4 (c)(ii)	nucleus		1
4 (c)(iii)	given an electric shock		1
4 (c)(iv)	womb		1
4 (d)	has mammoth genes / chromosomes	accept genetic information / DNA / alleles / nucleus accept converse	1
Total			**8**

4.7.2.3 Decomposition (biology only)

Answer 12 · Mark scheme

June 2012 | BL1FP | Original Q4 | Legacy

BL1FP

4.7.2.3 Decomposition (biology only)

Answer 13 · Mark scheme

January 2013 | BL1FP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)	any correct named physical environmental condition, e.g. light / water / rain / temperature / minerals / nutrients / space (between plants)	ignore carbon dioxide / climate / weather / sun / pollution	1
	genes / inheritance OR any correct named biotic factor e.g. predation / disease	ignore 'variety'	1
8(b)	mass of crop also depends on number of pods (per plant) / size / mass of each pea	ignore number of plants	1
8(c)	microorganisms / bacteria / fungi / decomposers / detritus feeders / named		1
	decompose / rot / break down / decay / digest	ignore feed / eat	1
	(these organisms) respire	do **not** allow respiration by pea (plants)	1
	(decay / respiration / microorganisms etc) releases carbon dioxide	do **not** allow combustion / fossilisation	1
Total			**7**

4.7.2.3 Decomposition (biology only)

Answer 13 · Mark scheme

January 2013 | BL1FP | Original Q8 | Legacy

BL1FP

4.7.2.3 Decomposition (biology only)

Answer 14 · Mark scheme

June 2013 | BL1FP | Original Q5 | Legacy

Question 5

question	answers	extra information	Mark
5(a)	8.05 / 8.1 / 8	correct answer with or without working gains **2** marks allow **1** mark for 8.0 **or** 8.10 allow 35/100 x 23 (million) for **1** mark if no answer or incorrect answer allow **1** mark for 805 **or** 8 050 000	2
5(b)(i)	any **one** from: • less landfill sites used • less cost (of landfill sites) / saves money • less effort / cost to collect	allow less to collect	1
5(b)(ii)	compost can be used on garden	allow idea of compost can be used to help plant growth **or** compost provides minerals / named **or** compost improves the soil	1
Total			**4**

4.7.2.3 Decomposition (biology only)

Answer 15 · Mark scheme June 2014 | BL1FP | Original Q10 | Legacy

10(a)	microoorganisms (microorganisms) respire (respiration / decay / microorganisms) releases (thermal) energy / 'heat'	allow microbes / bacteria / fungi / decomposers do **not** allow dead plants respire ignore produce 'heat' do **not** allow produce energy do **not** allow dead plants release 'heat'	1 1 1	AO1 / AO2 1.6.1b
10(b)(i)	any **three** from: • (opening) allows oxygen in • microorganisms / eggs need oxygen • oxygen needed for respiration • (opening) allows release of carbon dioxide (from microorganisms / respiration / eggs) • (opening) allows energy / 'heat' to escape • (closing) retains energy / 'heat' if too cool / at night • (closing) retains moisture	allow air for oxygen allow gaseous exchange (1 mark) of / for microorganisms / eggs (1 mark) if none of first four points given if no mark awarded for either of these points allow 1 mark for vents open in the day to prevent overheating **and** close at night to prevent it getting too cold allow (opening) releases moisture	3	AO1 / AO2 / AO3 1.6.1b, c, 1.6.2
10(b)(ii)	any **one** from: • maintains sex balance • (survival of species depends on there being) males and females in population	e.g. equal / best / correct numbers of male and female allow so the offspring are not all the same sex	1	AO3 1.6.1
Total			**7**	

4.7.2.3 Decomposition (biology only)

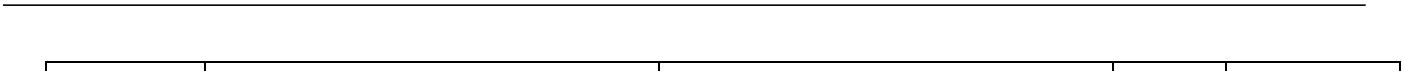
Answer 16 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	any **two** from: • amount of waste on each heap • (type of) materials on each heap • put heaps in same (environmental) conditions	 allow size of heap if neither marking points one or two awarded, allow **1** mark for same waste eg keep at same (outside) temperature allow put in same place	2	AO3 1.6.1
5(b)	microorganisms / microbes / bacteria / fungi / decomposers	ignore detritivores / examples (such as worms, maggots, insects) ignore pathogens / germs do **not** allow viruses	1	AO1 1.6.1b
5(c)(i)	oxygen / air added (when turning over)	allow idea that decay will be aerobic allow bacteria / microorganisms need oxygen / air allow (microorganisms) respire faster	1	AO2 1.6.1b
5(c)(ii)	any **two** from: • dead leaves / fruit / plants (fall off / onto the ground) • (fallen dead leaves / fruit / plants) decay • minerals / ions / nutrients are recycled / released	ignore references to carbon dioxide allow animal waste **or** dead animals	2	AO2 / AO3 1.6.1d
Total			**6**	

4.7.2.3 Decomposition (biology only)

Answer 16 · Mark scheme

June 2015 | BL1FP | Original Q5 | Legacy



4.7.2.3 Decomposition (biology only)

Answer 17 · Mark scheme

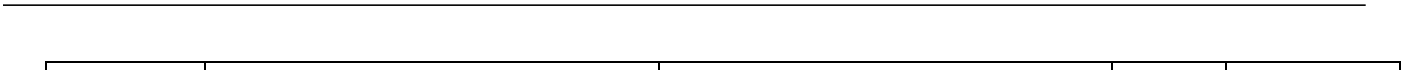
June 2015 | BL3FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	methane / CH_4	allow CH_4 do **not** allow CH^4 **or** ch4 or CH4	1	AO1 343c
4(b)	any **two** from: • didn't carry out repeats • only tested four types of manure • don't know the mass of manure was the same each time • inaccuracies in measuring (diameter of) balloon • bottles might have been different sizes • temperature of the room may have been different		2	AO3 343c
4(c)	The potato contains a lot of carbohydrate		1	AO1 343c
Total			**4**	

4.7.2.3 Decomposition (biology only)

Answer 17 · Mark scheme

June 2015 | BL3FP | Original Q4 | Legacy



4.7.2.3 Decomposition (biology only)

Answer 18 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	any **two** from: • (volume of) peat compost has been steady and then declined **or** volume of peat compost has declined since 2005 • (volume of) peat-free compost has increased (since 1999) • (volume of) peat is higher than peat-free until 2005, then peat-free compost is higher (than peat) • total volume of peat and peat-free compost has increased	allow 2007 instead of 2005 allow 2007	2	AO2 342d
9(b)	increases carbon dioxide (in the atmosphere)	ignore methane	1	AO1 342
9(c)	any **one** from: • reduces biodiversity • destruction of habitats • disruption of food chains		1	AO1 342b
Total			**4**	

4.7.2.3 Decomposition (biology only)

Answer 19 · Mark scheme

June 2016 | BL1FP | Original Q9 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	any **one** from: • continuous readings • do not need to be there • (more likely to be) accurate • reduces human error	 allow automatic readings allow greater resolution do **not** allow valid allow easier to read	1	AO3 1.6.2
9(b)(i)	microorganisms (microorganisms) respire respiration / decay / microorganisms releases carbon dioxide	allow microbes / bacteria / fungi / decomposers for microorganisms, throughout ignore carbon released	1 1 1	AO1 1.6.1a/b / 1.6.2a /1.5.1c
9(b)(ii)	all grass decomposed / decayed / rotted	allow idea that all microorganisms dead (due to accumulation of waste **or** lack of oxygen) allow lack of / no oxygen (for respiration of microorganisms)	1	AO3 1.6.1b
Total			**5**	

4.7.2.3 Decomposition (biology only)

Answer 20 · Mark scheme June 2016 | BL2FP | Original Q9 | Legacy

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

4.7.2.3 Decomposition (biology only)

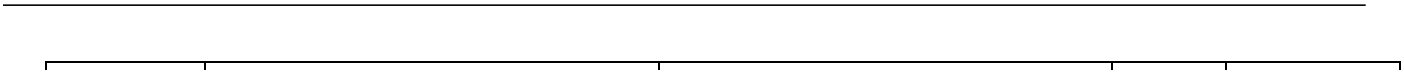
Answer 21 · Mark scheme June 2017 | BL1FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	any **one** from: • garden waste • (organic) kitchen waste	allow named examples eg food allow other appropriate materials	1	AO1 1.6
4(a)(ii)	The material in the bottom tray will be in smaller pieces.		1	AO3 1.6.1b
4(a)(iii)	microorganisms	allow bacteria / fungi / fungus / mould / microbe ignore worms / insects ignore decomposers do **not** allow virus(es)	1	AO1 1.6.1b
4(b)	any **one** from: • take off lid • put hole(s) in lid or sides of trays		1	AO3 1.6.1b
4(c)(i)	any **one** from: • variety / type of tomato • volume of water **and** liquid • temperature • light (intensity) • type / amount of soil	allow spacing of plants ignore number of plants allow amount of water **and** liquid	1	AO3 1.6.1
4(c)(ii)	1500	allow **1** mark for 12 x 125 with no or incorrect answer	2	AO2 1.6.1
4(c)(iii)	(more) minerals / ions / salts / nutrients (in liquid from composter)	allow correctly named minerals ignore 'food'	1	AO2 1.6.1c/d
Total			**8**	

4.7.2.3 Decomposition (biology only)

Answer 21 · Mark scheme

June 2017 | BL1FP | Original Q4 | Legacy



4.7.2.3 Decomposition (biology only)

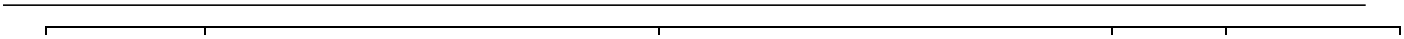
Answer 22 · Mark scheme June 2017 | BL3FP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	methane / CH_4	additional answers negate mark	1	AO1 3.4.3c
4(b)	any **two** from: • (same) mass of material • (same) volume of water • (left for the same amount of) time • (kept at the same) temperature	 allow (same) amount of material allow (same) amount of water	2	AO2 3.4.3c
4(c)(i)	8.2 in manure, test 3 circled	allow if clearly indicated, eg arrow pointing at 8.2	1	AO3 3.4.3c
4(c)(ii)	14.3		1	AO2 3.4.3c
4(c)(iii)	manure and beans produces the most biogas	allow ecf from 4(c)(ii)	1 1	AO2/3 3.4.3c
4(d)	Advantage any **one** from: • constant supply • produces own gas • saves money • uses up manure • is a renewable energy source Disadvantage any **one** from: • fire risk • smell • risk of explosion		1 1	AO3 3.4.3c
Total			**9**	

4.7.2.3 Decomposition (biology only)

Answer 22 · Mark scheme

June 2017 | BL3FP | Original Q4 | Legacy



4.7.2.3 Decomposition (biology only)

Answer 23 · 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

4.7.2.3 Decomposition (biology only)

Answer 23 · Mark scheme

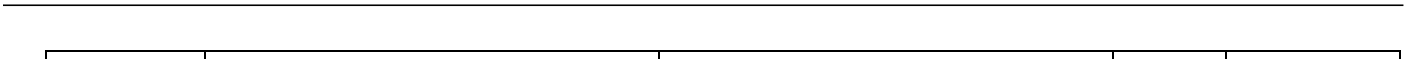
June 2018 | 8461/1F | Original Q6

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

4.7.2.3 Decomposition (biology only)

Answer 23 · Mark scheme

June 2018 | 8461/1F | Original Q6



4.7.2.3 Decomposition (biology only)

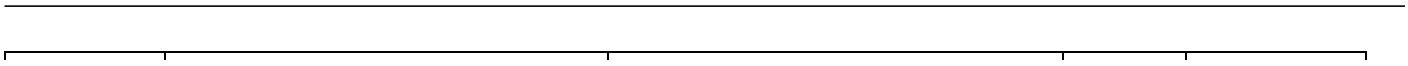
Answer 24 · Mark scheme June 2019 | 8461/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	bacteria fungi		1 1	AO1 4.7.2.3
04.2	both increase rate because oxygen is needed for (aerobic) respiration **or** oxygen is used to release energy as increased temperature causes faster reactions	 do **not** accept anaerobic ignore energy produced allow named example eg respiration allow increased rate of enzyme action	1 1 1	AO1 4.2.2.1 4.4.2.1 4.5.1 4.7.2.3 4.7.4.1
04.3	water	allow H_2O / H_2O / moisture / rain do **not** accept H^2O / H2O	1	AO1 4.7.2.3
04.4	methane		1	AO1 4.7.2.3
04.5	60	allow sixty	1	AO2 4.7.2.3
04.6	so plants / crops grow faster / better (decays further and) releases / contains mineral ions / named example	 allow releases / contains nutrients ignore nitrogen / food / carbon dioxide allow as a fertiliser allow retains water in soil allow improves drainage allow insulates / keeps warm allow suppresses weed growth allow improves soil structure	1 1	AO1 4.7.2.3
Total			**10**	

4.7.2.3 Decomposition (biology only)

Answer 24 · Mark scheme

June 2019 | 8461/2F | Original Q4



4.7.2.3 Decomposition (biology only)

Answer 25 · Mark scheme November 2020 | 8461/2F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	bacteria fungi	allow singular allow mould ignore microbes / germs / decomposers do **not** accept viruses	1 1	AO1 4.7.2.2 4.7.2.3
08.2	fatty acid(s)		1	AO2 4.7.2.3 4.2.2.1 RPA10
08.3	any **one** from: • universal indicator (paper / solution) • pH meter	 allow UI (paper / solution) ignore pH paper unqualified allow pH probe ignore datalogger unqualified ignore Cresol red ignore phenolphthalein / litmus	1	AO1 4.7.2.3 RPA10
08.4	any **two** from: • volume of milk • exposure to air / oxygen • sterilise test tubes • treatment of milk before investigation • freshness / age of milk (at start) • time of day pH was measured	 allow amount of milk allow bungs on test tubes allow example such as pasteurised or not allow starting pH of milk	2	AO1 4.7.2.3 RPA10
08.5	almond (milk)		1	AO3 4.7.2.3 RPA10

4.7.2.3 Decomposition (biology only)

Answer 25 · Mark scheme

November 2020 | 8461/2F | Original Q8

08.6	as temperature increases up to 15 °C the time taken (to reach pH 5) decreases above 15 °C the time taken (to reach pH 5) stays the same	allow converse if no other mark awarded allow **1** mark for as temperature increases the time taken (to reach 5 °C) decreases and then stays the same	1 1	AO2 4.7.2.3 RPA10
08.7	any **one** from: • bacteria / microbes / microorganisms / fungi dividing faster (when warmer) • reactions (in the bacteria) are happening faster (to decay milk) • (because there is) more (kinetic) energy • enzyme activity is higher (at 10 °C than at 5 °C)	allow converse if clearly describing 5 °C allow number of bacteria / microbes / microorganisms / fungi increasing (when warmer) allow more bacteria microbes / microorganisms / fungi allow particles move faster allow more collisions between particles allow enzymes work faster ignore enzymes work better	1	AO2 4.7.2.3 4.1.1.6 RPA10
08.8	any **two** from: • different concentration / type of fat / lipid • different concentration / type of proteins / carbohydrate / sugar • different (amount / type of) bacteria present • may have been pasteurised by a different process • different starting pH	allow different amounts of fat / lipid allow different amounts of proteins / carbohydrate / sugar allow may have been treated in different ways (before the investigation) ignore different oxygen concentration	2	AO3 4.7.2.3 RPA10

4.7.2.3 Decomposition (biology only)

Answer 25 · Mark scheme

08.9	determine the types of bacteria present in the milk		1	AO3 4.7.2.3 RPA10
Total			**13**	

4.7.2.3 Decomposition (biology only)

Answer 25 · Mark scheme

November 2020 | 8461/2F | Original Q8

4.7.2.3 Decomposition (biology only)

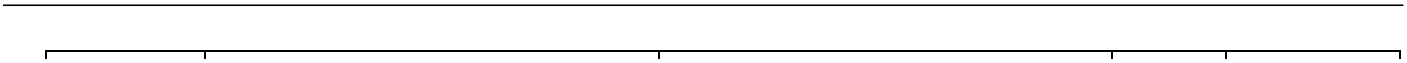
Answer 26 · Mark scheme November 2021 | 8461/2F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	(put beaker in a) water bath	allow (put beaker in an) incubator	1	AO1 4.7.2.3 RPA10
09.2	volume of the milk **or** type of milk	allow amount of milk allow named type of milk, eg cows' or semi-skimmed	1	AO1 4.7.2.3 RPA10
09.3	correct scale and axis labelled all points plotted correctly suitable curved line of best fit	scale must be at least 1 cm for 1 day allow a tolerance of ± ½ small square allow 4 or 5 correct plots for **1** mark ignore line joined point to point with straight lines	1 2 1	AO2 4.7.2.3 RPA10
09.4	similar shaped line drawn to left of 20 °C line on **Figure 4** same start pH	 allow a tolerance of ± ½ small square allow from student's line of best fit or student's plot for 0 days	1 1	AO2 4.7.2.3 RPA10
Total			**8**	

4.7.2.3 Decomposition (biology only)

Answer 26 · Mark scheme

November 2021 | 8461/2F | Original Q9



4.7.2.3 Decomposition (biology only)

Answer 27 · Mark scheme November 2021 | 8461/2F | Original Q11

Question	Answers	Mark	AO / Spec. Ref.
11	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4–6	AO1 4.7.2.1 4.7.2.2 4.7.2.3 4.2.2.1 4.2.3.1 4.2.3.2 4.4.1.1 4.4.1.3 4.4.2.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1–3	
	No relevant content	0	
	Indicative content *in microorganisms* • digestion **or** large molecules to small molecules • enzymes **or** named example • respiration • production of carbon dioxide • release of mineral ions **or** named example such as nitrate / phosphate / magnesium *in plants* • carbon dioxide (from air) taken in by leaves • by diffusion • via stomata • carbon dioxide used in photosynthesis • making glucose / sugar / starch / cellulose **or** making other correctly named example • (named) ions taken in by roots • by active transport • nitrate ions for making amino acids / proteins / DNA / chlorophyll • phosphate for making DNA For **Level 2** processes in microorganisms and in plants should be considered		
Total		**6**	

4.7.2.3 Decomposition (biology only)

Answer 28 · Mark scheme

June 2022 | 8461/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1 *view with Table 3*	kingdom genus	in this order only	1 1	AO1 4.6.3.5 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	Linnaeus		1	AO1 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	*Elrathia kingii*		1	AO2 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	trilobite **A** was found in older rocks than trilobite **B** trilobite **B** is more complex than trilobite **A**		1 1	AO3 4.6.3.4 4.6.3.5

4.7.2.3 Decomposition (biology only)

Answer 28 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	sediments soft parts minerals	in this order only	1 1 1	AO2 4.6.3.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	any **three** from: • drought • ice age • global warming • volcanic activity • asteroid collision • (new) predators • (new) disease / pathogen • competition for food • competition for mates • lack of habitat or habitat change	if none of these, allow climate change for **1** mark ignore weather if neither of these, allow catastrophic event **or** natural disaster for **1** mark allow named example allow hunters allow named example allow lack of food allow lack of mates ignore competition unqualified ignore isolation ignore pollution	3	AO1 4.6.3.6

4.7.2.3 Decomposition (biology only)

Answer 28 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.7	no / insufficient evidence **or** cannot perform experiment to find out	allow lack of evidence allow no-one was there to observe	1	AO3 4.6.3.5 4.6.3.6

Total Question 7		**13**

4.7.2.3 Decomposition (biology only)

Answer 29 · Mark scheme

June 2022 | 8461/2F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	**abiotic** any **two** from: • water • oxygen / air (in soil) • pH (of soil) • minerals / ions • temperature • size of soil particles **or** texture / type of soil **biotic** any **two** from: • food • predators / consumers / carnivores • disease / pathogens / bacteria / fungi	 allow moisture / humidity / rain(fall) allow dryness ignore carbon dioxide allow acidity / alkalinity (of soil) allow salts allow named example of an ion ignore nutrients allow named example of soil type ignore space / toxins / weather allow amount of dead / decaying matter (in soil) ignore nutrients allow example – such as birds allow microorganisms / microbes / parasites if **no** other marks awarded allow **2** marks for **four** factors in reverse categories	2 2	AO1 4.7.1.1 4.7.1.2 4.7.1.3

4.7.2.3 Decomposition (biology only)

Answer 29 · Mark scheme

June 2022 | 8461/2F | Original Q9

Question	Answers	Mark	AO / Spec. Ref.
09.2	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5–6	AO2
	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	AO2
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	AO1
	No relevant content	0	
	Indicative content • same concentration of chemical / **X** applied to the soil • same volume / amount of chemical / **X** applied to the soil • same size of area sampled – eg 1 m^2 or 0.25 m^2 • use of a quadrat • same time between application and collecting worms • same time allowed for collecting worms after application • each sample area selected randomly • method of achieving randomness – eg random coordinates • (collect and) count worms in each of areas **A** and **B** • at least 5 repeats in each of areas **A** and **B** • calculate mean (per unit area) **or** total for each of areas **A** and **B** • compare means / totals for areas **A** and **B**		4.7.2.1 RPA9

Total Question 9		**10**

Answer 30 · 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 30 · 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

4.7.2.3 Decomposition (biology only)

Answer 31 · 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

4.7.2.3 Decomposition (biology only)

Answer 31 · Mark scheme

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

4.7.2.3 Decomposition (biology only)

Answer 32 · 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

4.7.2.3 Decomposition (biology only)

Answer 32 · 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

4.7.2.3 Decomposition (biology only)

Answer 32 · Mark scheme

June 2025 | 8461/1F | Original Q7

Question	Answers	Mark	AO / Spec Ref.
07.7	<table><tr><th>Protease enzyme</th><th>Optimum pH</th><th>Organ where enzyme is active</th></tr><tr><td></td><td></td><td>stomach</td></tr><tr><td></td><td></td><td>small intestine allow ileum / duodenum</td></tr></table>	1 1	AO2 4.2.2.1

Total Question 7	14

4.7.2.3 Decomposition (biology only)

Answer 33 · Mark scheme

June 2025 | 8461/2F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	100 – 60 – 3 37 (%)	allow 100 – 63	1 1	AO2 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	*(conclusion 1)* (chicken manure) produces more biogas **or** (chicken manure) produces biogas at a faster rate *(conclusion 2)* more biogas produced (in the first week) **or** the line / graph is steep (in the first week) *(conclusion 3)* no (more) biogas produced (after 4 weeks) **or** not much more biogas produced (after 4 weeks)	allow correct pairs of data for chicken and cow eg 600 for chicken and 400 for cow allow use of figures from graph for chicken / cow to illustrate 'more' allow the line / graph levels off (after 4 weeks)	1 1 1	AO3 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.3	increases increases stays the same	in this order only	1 1 1	AO3 4.7.2.3

4.7.2.3 Decomposition (biology only)

Answer 33 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	any **one** from: • transport costs money • fish fat costs money • fish fat has an unpleasant smell • fish fat attracts animals	 allow it is too far to transport allow it takes too long to transport allow uneconomic	1	AO3 4.7.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5	so plants / crops grow faster / better (because manure) releases / contains minerals / ions / salts	 allow named mineral / ion(s) / salts allow (because manure): • retains water in soil • improves drainage • insulates / keeps warm • suppresses weed growth • improves soil structure ignore nutrients / nitrogen / food / carbon dioxide if no other marks awarded allow 'it is a fertiliser' for **1** mark	1 1	AO2 4.7.2.3

Total Question 7	**11**

4.7.2.3 Decomposition (biology only)

Answer 25 · Examiner comments — November 2020 | 8461/2F | Original Q8

Question 8 (standard demand)

The question was about the decay of milk. In **08.4**, the need to control the volume of milk was frequently recognised, although some students forgot the aim of the investigation and qualified their answer unsuitably as cows' milk. Very few other correct answers were offered, the most common being the time of day when the pH should have been measured. A significant number of students repeated information already provided, including the duration of the investigation, or incorrectly suggested 'temperature' (which was the independent variable).

A large majority of students in **08.6** either misinterpreted the graph itself or the aim of the investigation. Thus, there were many descriptions of temperature and pH falling as time progressed. It was particularly common for students to interpret the y-axis as showing pH, despite it being clearly labelled as the time taken. Thus, a very small proportion of students gained both marks here, and many students omitted any reference to data.

Answer 25 · Examiner comments — November 2020 | 8461/2F | Original Q8

In **08.7** most students did little more than repeat the information that the time taken is less at 10 °C than at 5 °C. Some contradicted the information and described the reverse relationship, whilst others again compared pH10 with pH5. Those who did gain the mark usually referred to enzyme activity. Hardly any referred to a higher rate of division of microorganisms at the higher temperature.

In **08.8** some students recognised that one possible cause was due to differences in composition between the different types of milk, however many of these did not go into detail about what those differences might be. Higher-attaining students picked up on the information and referred to lipid content, different bacteria present or differences in starting pH; however very few were able to offer two acceptable ideas.

4.7.2.3 Decomposition (biology only)

Answer 28 · Examiner comments — June 2022 | 8461/2F | Original Q7

Question 7

This question was about classification, evolution and extinction.

07.1 **Table 3** gave the classification of two species of trilobite with two of the classification groups left blank. Students had to choose the missing groups, *kingdom* and *genus*, from a list of five alternatives. Only a quarter of students chose correctly. 'Community' and 'mammal' proved to be good distractors.

07.2 A similarly small proportion knew that the given classification system was invented by Linnaeus. In fact, 'Darwin' was a more common choice.

07.3 The binomial name of trilobite **A** should have been relatively easy to deduce from **Table 3** but *Elrathia kingii* was the *least* common option selected from the three given alternatives.

Answer 28 · Examiner comments — June 2022 | 8461/2F | Original Q7

07.4 The correct two pieces of evidence in support of the scientist's hypothesis that trilobite **B** may have evolved from trilobite **A** were that **A** was found in older rocks and that **B** was the more complex of the two. Almost 40 percent of students ticked both these options, but the idea that both were found in the same type of rock, although incorrect, was commonly selected.

07.5 Completion of the three sentences to describe fossilisation, using words from the box, proved challenging for many with only one in eight getting all three correct.

07.6 Considering the number of times that causes of extinction have been asked for in previous examination years, performance here was not as strong as might have been expected. However those who gained marks often referred to climate change or global warming, predators and the lack of food. Common insufficient answers included 'changes' in temperature (which happen by the hour) and unsuitable 'weather' or 'environmental change', each of which is too vague. Fewer than one quarter were able to give three suitable suggestions.

07.7 A lack of evidence or that nobody was there at the time were each given frequently as a suggestion for why scientists cannot be sure of the cause of extinction of the trilobites. Weaker students got no further than saying that it was a 'long time ago' or that there are 'many ways to become extinct'. Only just over one third gained credit.

4.7.2.3 Decomposition (biology only)

Answer 29 · Examiner comments

June 2022 | 8461/2F | Original Q9

Question 9

This was the second of three questions common to both the Foundation and Higher Tier papers. The topic was biotic and abiotic factors that affected the populations of earthworms in two habitats.

09.1 Only one in forty students were able to identify four relevant factors. The most commonly suggested were water, oxygen and temperature for abiotic factors and food and predation for biotic factors. Most students appeared to have little understanding of the distinction between the two types of factor and it was common to find at least some factors in the incorrect category. A significant proportion of weaker students appeared to have a poor understanding of what was required and copied out the four bullet points regarding features of earthworms into the four available spaces or sometimes decided on a couple of factors and wrote them in both sections to gain one or two marks.

09.2 While it was clear that a significant proportion of students had spent time completing fieldwork, there were also many who made no attempt at an answer. There were also students who appeared to misunderstand the question and gave often accounts of why the earthworm populations might be different in the different areas.

Some students included sufficient detail regarding control variables, randomising test areas, counting worms and how to deal with the results for both areas to gain access to Level 3. However some omitted vital components of this, in particular randomising the sampling areas or using chemical **X**, and could only gain a mark at Level 2. Those students who omitted reference to both areas were limited to Level 1.

A small but significant number of students determined the number of earthworms in the whole of the field and lawn and then compared these. This was not an appropriate comparison (and may have reflected practice at a related question from the November 2021 examination) as the question specifically referred to the number of worms per m^2.

A considerable minority of students suggested that throwing quadrats is a suitable way of achieving randomness, which is not only potentially dangerous but also is unlikely to achieve randomness and appropriate representation of the whole area.

Fewer than one in eight achieved level 3 although another third wrote answers worthy of level 2.

4.7.2.3 Decomposition (biology only)

Answer 30 · 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 30 · 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.

4.7.2.3 Decomposition (biology only)

Answer 31 · Examiner comments

June 2024 | 8461/2F | Original Q10

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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4.7.2.3 Decomposition (biology only)

Answer 31 · 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 32 · 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.

4.7.2.3 Decomposition (biology only)

Answer 32 · Examiner comments

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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.

4.7.2.3 Decomposition (biology only)

Answer 33 · Examiner comments

June 2025 | 8461/2F | Original Q7

Question 7 (Low and Standard demand)

07.1

Many students were able to calculate the percentage of carbon dioxide in the biogas. Some wrote the necessary sum correctly and then possibly entered it into their calculator incorrectly to arrive at the wrong answer and thus gained just the one mark. Others knew it was necessary to subtract 63 from 100 but sadly arrived at an answer of 27 or 47.
The most common ways of not being able to score a mark were to involve 360 in the calculation or to subtract 3 from 60. In total, just over a third of students gained both marks.

07.2

Students were given a graph on the production of biomass from chicken and cow manure and asked to given evidence for 3 scientific conclusions. Over a third of students gained 2 of the available 3 marks, with mark points 1 and 3 being commonly seen. Many gained mark point 1 by giving the values for production of the two types of manure. Some could not be awarded mark point 1 for stating that more chicken *manure* was produced rather than more biogas.

4.7.2.3 Decomposition (biology only)

Answer 33 · Examiner comments

For mark point 3, reference to the line going straight after 4 weeks was not equivalent to the idea of the line levelling off and so did not gain credit.
Answers to mark point 2 were often ineffectively expressed and so students were unable to score this mark. Many students referred to the rate being fastest in the first week and then slowing down which was not creditworthy as just being a repeat of the question stem.
Students who tried to use data to support the conclusion often just gave the numbers for the production from the two types of manure after the first week which was insufficient for credit, without further qualification.

07.3
All combinations of words were seen, with some students seemed to think that they had to use all three options despite the instructions to the contrary. A pleasing 80% of students gained the full 3 marks.

07.4
Only 20% of students gained this mark.
All marking points were seen with the issues of cost being those most commonly credited. Many students missed out on the mark by referring to the distance from the sea without any mention of the implication of that on transport, time or cost. Several students gave the idea of the production of more biogases being a bad thing for the environment – which was not creditworthy.

07.5
Just under 10% of students gained both marks for fully explaining why the farmer spreads the manure on fields where crops will be grown. However, 70% of students did gain 1 mark – most commonly for the idea of helping the crops to grow. Many students gave an answer that included both mark point 1 and the compensation mark – which could consequently only be awarded 1 mark. The majority of students missed out on mark point 2 by referring to nutrients rather than to the more specific minerals/ions. The 'allows' in the extra information were rarely seen.