AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.2.1

Levels of organisation

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**29**
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.

4.7.2.1 Levels of organisation

Answer 01 · Mark scheme

January 2007 | BLY1F | Original Q8 | Legacy

Question 8

	answers	extra information	mark
(a)(i)	20		1
(ii)	12000		1
(b)	area of strips **or** length / width / size of transect **or** number of transects		1
(c)(i)	since squirrels mobile **or** squirrels could be counted twice **or** squirrels hide		1
(ii)	any **two** from: • numbers of larders observed likely to be lower than actual • since unlikely that all could be spotted if 5 m away • old larder • squirrels moved on / died • young squirrels • haven't made a larder	do **not** accept squirrels share larders or squirrels have more than one larder	2

Continued on next page

4.7.2.1 Levels of organisation

Answer 01 · Mark scheme

	answers	extra information	mark
(d)(i)	0 to 6.8		1
(ii)	any **one** from: • squirrels prefer blue spruce cones / seeds / nuts as food • more cones / food • more nesting sites • fewer predators / competitors	do **not** accept squirrels prefer blue spruce	1
total			8

4.7.2.1 Levels of organisation

Answer 02 · Mark scheme March 2008 | BLY1BP | Original Q3 | Legacy

Three	**A** **3** **B** **2** **C** **4** **D** **1**

Answer 03 · Mark scheme June 2008 | BLY2F | Original Q2 | Legacy

question	answers	extra information	mark
2(a)	photosynthesis		1
2(b)	oxygen		1
2(c)	chlorophyll		1
2(d)	starch		1
Total			**4**

Answer 03 · Mark scheme June 2008 | BLY2F | Original Q2 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

Answer 04 · Mark scheme November 2008 | BLY1BP | Original Q7 | Legacy

Seven	**3**	**4**	**1**	**1**

4.7.2.1 Levels of organisation

Answer 05 · Mark scheme March 2009 | BLY1BP | Original Q7 | Legacy

Seven	**3**	**3**	**4**	**3**

Answer 06 · Mark scheme November 2009 | BLY1BP | Original Q9 | Legacy

Nine	**2**	**2**	**2**	**1**

4.7.2.1 Levels of organisation

Answer 07 · Mark scheme

Question 7

question	answers	extra information	mark
7(a)	any **one** from eg: • shorter distance between samples • sample to greater height • specify the size of each site	ignore repeat investigation / measurements ignore longer transect	1
7(b)(i)	Parmelia		1
7(b)(ii)	Evernia		1
7(c)	any **two** from: • Lecanora does not extend over whole range of transect / does not grow everywhere /does not grow in town centre / does not grow in countryside • Lecanora grows in a range of sulfur dioxide concentrations ***or*** Lecanora only grows in limited range of sulfur dioxide concentrations **or** Lecanora lives over large range of sulfur dioxide concentrations • other factors eg different pollutant might also influence growth of Lecanora • sulfur dioxide / pollutant concentration was not measured • amount of Lecanora not measured	ignore Lecanora does not give accurate measure of sulfur dioxide concentration	2
Total			**5**

4.7.2.1 Levels of organisation

Answer 08 · Mark scheme

March 2010 | BLY1BP | Original Q4 | Legacy

Four	**A**	spiral wrack	**3**
	B	bladder wrack	**2**
	C	serrated wrack	**4**
	D	kelp	**1**

4.7.2.1 Levels of organisation

Answer 09 · Mark scheme

January 2011 | BLY2F | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	6000	award **2** marks for correct answer irrespective of working allow **1** mark for 20 x 300 with incorrect or no answer allow answer in table if answer line blank	2
8(a)(ii)	bar width 6000 **or** to match answer to (a)(i) drawn below slugs	anywhere on scale ignore depth / height of bar label **not** required	1 1
8(b)	any **three** from: • respiration (by hedgehog) • (results in) loss of CO_2 • faeces (of hedgehog) **or** not digested • excreted / urine / urea (by hedgehog) • not all slug(s) are eaten (by hedgehogs) **or** some slugs eaten by other things	ignore reference to size / mass / number of organisms assume reference is to / of hedgehog unless stated otherwise do **not** accept idea that respiration uses / produces energy accept waste for **1** mark if neither faeces nor excretion point made ignore sweat alone ignore some slugs die ignore reference to movement / heat / growth allow references to energy losses by these methods, rather than biomass losses	3
Total			**7**

4.7.2.1 Levels of organisation

Answer 10 · Mark scheme

June 2012 | BL1FP | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3 (a)(i)	sun	ignore light apply list principle	1
3 (a)(ii)	photosynthesis	apply list principle allow approximate spelling do **not** accept phototropism	1
3 (b)(i)	chemical		1
3 (b)(ii)	carbon dioxide		1
3 (b)(iii)	carbohydrates		1
3 (c)	As carbon dioxide from the caterpillar As faeces (droppings) from the blue-tit	if more than 2 boxes ticked deduct one mark for each additional incorrect box	1 1
Total			**7**

4.7.2.1 Levels of organisation

Answer 10 · Mark scheme June 2012 | BL1FP | Original Q3 | Legacy

BL1FP

4.7.2.1 Levels of organisation

Answer 11 · Mark scheme

June 2012 | BL2FP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	(white) clover		1
8(a)(ii)	reed sweet-grass	allow reed allow grass	1
8(a)(iii)	(only) found in swamp and aquatic zones **or** only found in water **or** doesn't grow in marsh	ignore wet conditions	1

8(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking. — 6

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is a basic description which describes how a quadrat **or** a metre tape could be used to collect data	There is a clear description of how a quadrat **and** a metre tape could be used to collect data along a line	There is a clear, logical and detailed description of a method that will produce valid, repeatable results across / at intervals along the stream.

examples of procedural points made in the response:

- use of tape measure to produce transect
- placing of quadrats
- transect placed across stream
- score presence of each plant species
- use quadrat at regular intervals along tape
- repeat transect several times (≥ 3)
- along stream
- at random **or** regular intervals

Total			9

4.7.2.1 Levels of organisation

Answer 11 · Mark scheme

June 2012 | BL2FP | Original Q8 | Legacy

BL2FP

4.7.2.1 Levels of organisation

Answer 12 · Mark scheme

January 2013 | BL1FP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	1800(g)		1
6(a)(ii)	triangular pyramid with four layers correctly labelled in order of food chain	accept ecf from (a)(i) allow inverted pyramid	1 1
6(b)	any **two** from: • (lost as) crab faeces / not all digested • (lost as) crab urine / urea • loss of carbon dioxide by crab • not all the limpet is eaten eg don't eat the shell • not **all** limpets are eaten (by crabs)	allow waste / excretion for **one** mark if neither faeces nor urine are given accept (lost via) respiration allow not enough crabs to eat **all** the limpets / the limpet population ignore energy losses, such as movement	2
Total			**5**

4.7.2.1 Levels of organisation

Answer 12 · Mark scheme

January 2013 | BL1FP | Original Q6 | Legacy

BL1FP

4.7.2.1 Levels of organisation

Answer 13 · Mark scheme

January 2013 | BL2FP | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)	place all the quadrats randomly on the lawn		1
4(b)(i)	1 4 2 2 3 2 4 0 Total = 15	all 4 counts correct total correct for their figures	1 1
4(b)(ii)	1.5	allow ecf from **(b)(i)**	1
4(b)(iii)	180	correct answer with or without working if answer incorrect, allow **1** mark for $\frac{15}{10} \times 120$ **or** 15×20 **or** $\frac{15}{10} \times 12 \times 10$ **or** $1.5 \times 12 \times 10$ **or** 1.5×120 allow ecf from **(b)(ii)** allow **1** mark if only 1 error	2
4(c)	use a larger sample size / more quadrats **or** use bigger quadrats	ignore repeats but allow repeat in different places ignore 'count them all'	1
Total			**7**

4.7.2.1 Levels of organisation

Answer 13 · Mark scheme

January 2013 | BL2FP | Original Q4 | Legacy

BL2FP

4.7.2.1 Levels of organisation

Answer 14 · Mark scheme

June 2013 | BL2FP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)	chose places randomly method of obtaining randomness, e.g. (grid and) random numbers	 allow thrown qualified e.g. over shoulder, eyes shut allow max 1 for mention of a transect with sampling at regular or random intervals	1 1
8(b)(i)	7 **or** 8	allow fractions / decimals between 7 and 8	1
8(b)(ii)	count number of whole squares and add estimate of area covered by part squares	allow reference to counting squares with ½ cover or more allow clear working on diagram and / or (b)(i)	1
8(b)(iii)	28 – 32 (in range)	allow ecf if answer incorrect allow **1** mark for reasonable reference to divided by 25 or multiplied by 4	2
8(c)	nutrients / minerals / ions / fertiliser / water	allow light / pH / trampling / soil texture / grazing / mowing / weed killer / where seeds originally fell ignore pollution / soil / competition if unqualified ignore temperature / wind	1
Total			**7**

4.7.2.1 Levels of organisation

Answer 15 · Mark scheme June 2014 | BL1FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
8(a)	3-layered triangular pyramid	as blocks or layered triangle, ignore (small) gaps between layers	1	AO2 1.5.1b
	(pyramid) labelled in food chain order	all three labels are required for **2** marks the pyramid must be fully correct	1	
8(b)(i)	C		1	AO3 1.5.1c
8(b)(ii)	shortest **or** fewest stages / transfers / (trophic) levels	allow only if (b)(i) is C or blank	1	AO1 / AO2 1.5.1c
	less losses in waste / faeces / urine / CO_2 / excretion	allow smaller amount uneaten	1	
	less loss in respiration / heat / movement	allow less lost keeping warm do **not** allow energy for respiration do **not** allow respiration makes energy	1	
		allow less loss (of biomass / energy) **or** less transfer (of biomass / energy) to surroundings if neither 2nd nor 3rd point given, for **1** mark		
Total			**6**	

4.7.2.1 Levels of organisation

Answer 15 · Mark scheme

June 2014 | BL1FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
9	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.		6	AO1 1.4.1d,f
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**	
No relevant content.	At least **one** way in which animals **and / or** plants are adapted to survive.	A description of ways in which animals **and / or** plants are adapted **and** an attempt to link at least **one** adaptation to how it increases the chance of survival.	A description of ways in which animals **and** plants are adapted **and** a description of how at least **one** adaptation increases the chance of survival.	
examples of biology points made in the response: (animals) • (A) change / decrease in surface area / example ○ (decrease in surface area which) reduces area from which sweat / water may be lost • (A) hump with fat / fat stores ○ (fat in hump) to convert to water (via respiration) • (A) long eyelashes ○ (long eyelashes) to keep (wind-blown) dust out of eyes • (A) nocturnal / 'keep out of the sun' ○ reduce sweat loss (in heat of the day) (plants) • (A) decrease in surface area • (A) leaves are spikes ○ (reduced area / leaves are spikes) reduces water loss / transpiration / evaporation • (A) long / wide spread / extensive roots ○ (long / wide spread /extensive roots) to absorb (more) water • (A) fleshy / thick stem ○ (fleshy / thick stem) to store water	**extra information** allow adaptations of specific animals to living in specified dry conditions, eg a desert • (A) change / increase in surface area / example ○ (increase in surface area which) increases area heat may be lost from (by radiation) • (A) changes to thickness of insulating coat ○ (thicker coat on upper surface) increases insulation from sun's heat • (A) thin (layer) / reduced amount of body fat ○ (reduced amount of body fat which) reduces insulating layer • (A) wide feet ○ (wide feet) to reduce pressure / spread weight / prevent sinking allow adaptations of specific plants to living in specified dry conditions, eg a desert • (A) thick wax ○ (thick wax) to reduce evaporation / water loss / transpiration • (A) few(er) stomata ○ (few stomata) to reduce evaporation / water loss / transpiration		
Total			**6**	

4.7.2.1 Levels of organisation

Answer 15 · Mark scheme

June 2014 | BL1FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.7.2.1 Levels of organisation

Answer 16 · Mark scheme June 2014 | BL2FP | Original Q2 | Legacy

2(a)	any **three** from: • place 30-m tape measure across field / from one wood to the other • place quadrat(s) next to the tape • count / record the number / amount of dandelions / plants in the quadrat • repeat every 2 metres	ignore 'record the results' ignore measures / estimates dandelions allow every metre / at regular intervals	3	AO2 2.4.1b
2(b)(i)	low light / it is shady **or** not enough water / ions / nutrients **or** wrong pH of soil	allow no light ignore sun / rays accept correct named ion ignore no water / ions / nutrients accept competition with trees for light / water / ions ignore competition for space and competition unqualified accept soil too acidic / too alkaline ignore temperature	1	AO2 2.4.1a
2(b)(ii)	sensible suggestion for a small area, eg chance variation / anomaly / poisoned by animal waste / wrong pH of soil / eaten (by animals) / cut down / footpath		1	AO3 2.4.1a
2(c)	repeat (transect) / compare with the results of other groups at different / random location(s) / elsewhere (across the field)	allow 'do it in two different locations' for 2 marks do **not** allow 'in other fields'	1 1	AO3 2.4, 2.4.1b
Total			**7**	

4.7.2.1 Levels of organisation

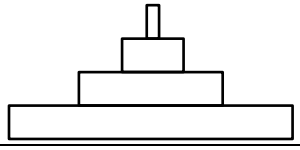
Answer 16 · Mark scheme

June 2014 | BL2FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.7.2.1 Levels of organisation

Answer 17 · Mark scheme June 2016 | BL1FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	any **two** from: • *idea of* absorption of light / energy • transfer to chemical energy • provides food / energy for animals / caterpillar • releases oxygen	allow produce sugars / glucose / starch / carbohydrate / food / biomass	2	AO1 1.5.1a
3(b)			1	AO2 1.5.1b/c
3(c)	15(%)	allow **1** mark for $\frac{3 \times 100}{20}$ with no answer or incorrect answer **or** allow **1** mark for 0.15	2	AO2 1.5.1c
3(d)(i)	any **two** from: • markings look like eyes / face / mouth of much larger animal • looks fierce / scary / dangerous • to frighten blue tit / bird	allow it looks like a snake max 1 if reference to camouflage	2	AO2/AO3 1.4.1d/g
3(d)(ii)	any **two** from: • sharp / long / big claws • sharp / hooked beak • large wings **or** flies quickly • good eyesight	ignore strong ignore strong / big allow streamlined / aerodynamic ignore powerful wings	2	AO2 1.4.1d/f
Total			**9**	

4.7.2.1 Levels of organisation

Answer 17 · Mark scheme

June 2016 | BL1FP | Original Q3 | Legacy

4.7.2.1 Levels of organisation

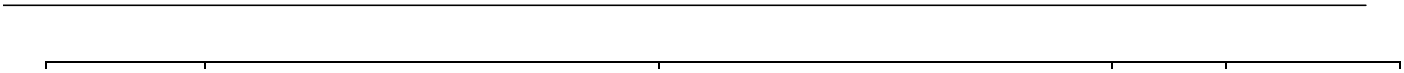
Answer 18 · Mark scheme June 2016 | BL2FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	88 000	correct answer = 2 marks allow 1 mark for 1.1 (in 1 m^2) **or** allow 1 mark for answer = [candidate's value in 1m^2] x 80 000	2	AO2 2.4.1b
3(b)	Place the quadrat in 100 random positions.		1	AO3 2.4, 2.4.1b
3(c)	any **three** from: Advantages: • less cost / free • less likely to kill other (harmless species of) plants • weedkiller may be toxic **or** may cause water pollution • weedkiller may accumulate up food chains Disadvantages: • volunteers may mistake other species for ragwort • volunteers may miss plants • some ragwort left to poison horses • time consuming • difficulties getting enough volunteers	must include at least one advantage and one disadvantage for full marks allow uneven distribution of ragwort so much wastage of weedkiller allow weeds will grow back if no other disadvantages; allow ref. to issues with volunteers – eg don't turn up / not careful / don't finish the job	3	AO3 2.4, 2.4.1b
Total			**6**	

4.7.2.1 Levels of organisation

Answer 18 · Mark scheme

June 2016 | BL2FP | Original Q3 | Legacy



4.7.2.1 Levels of organisation

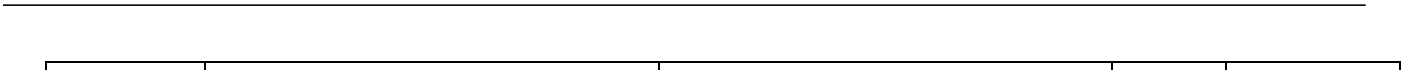
Answer 19 · Mark scheme June 2017 | BL2FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	photosynthesis		1	AO1 2.3
1(a)(ii)	light		1	AO1 2.3
1(b)(i)	chlorophyll	allow phonetic spelling	1	AO1 2.1.1b 2.3.1b
1(b)(ii)	traps / absorbs light **or** traps / absorbs energy	ignore provides energy ignore stores energy	1	AO1 2.1.1b 2.3.1b
1(b)(iii)	transport	ignore names of substances but do **not** allow large molecules – e.g. starch / protein do **not** allow energy allow support (of leaf)	1	AO1 2.2.2b
1(b)(iv)	carbon dioxide / CO_2 water / H_2O	in either order ignore light do **not** allow CO^2 / H^2O	1 1	AO1 2.3.1a/b
Total			**7**	

4.7.2.1 Levels of organisation

Answer 19 · Mark scheme

June 2017 | BL2FP | Original Q1 | Legacy



4.7.2.1 Levels of organisation

Answer 20 · Mark scheme

June 2017 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7			6	AO1/2/3 2.4 2.4.1a/b Prac

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	A simple correct statement is made about the investigation, e.g. counting plants in a quadrat **or** measuring pH **or** random placement of a quadrat.	There is a description of how a quadrat could be used to collect data at different locations. **or** how a pH meter could be used to collect data at different locations. **For four marks** an additional point is made e.g. reference to randomness **or** compare to other's results.	There is a description of how a quadrat **and** pH meter could be used to collect data at different locations. **For full marks** an additional point to ensure validity is made e.g. repeat in a different marshland **or** randomness **or** measure pH at the same depth each time **or** large number of repeats **or** graph or correlate results.

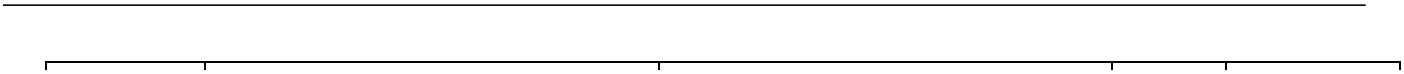
examples of points made in the response:	extra information
• placing of quadrat and measuring plants	
• randomly in area where plant is growing • randomly in area where plant is not growing	allow • regular intervals along a transect • from an area where plants are growing to an area where plants are not growing
• many times • score number **or** % cover **or** dry mass or heights of plants per quadrat • measure soil pH in each quadrat • control variables such as measurements at same depth • repetition of pH measurements in a quadrat • calculate mean pH for each quadrat • relate quantity of plants to soil pH – e.g. graph	allow presence / absence

Total		6

4.7.2.1 Levels of organisation

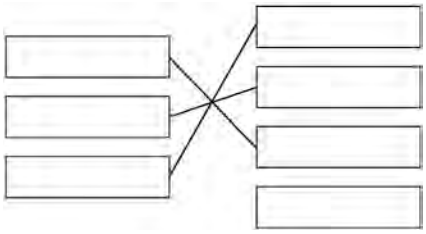
Answer 20 · Mark scheme

June 2017 | BL2FP | Original Q7 | Legacy



4.7.2.1 Levels of organisation

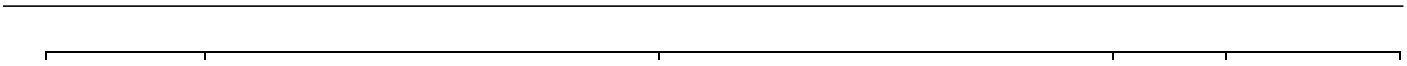
Answer 21 · Mark scheme June 2018 | 8461/2F | Original Q1

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

4.7.2.1 Levels of organisation

Answer 21 · Mark scheme

June 2018 | 8461/2F | Original Q1



4.7.2.1 Levels of organisation

Answer 22 · Mark scheme June 2018 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	description of a method to achieve random placement	examples could include random number generator or random coordinates allow throw over the shoulder **or** with eyes shut ignore throw unqualified	1	AO1 4.7.2.1
06.2	any **one** from: • random (location) • avoid bias • obtain valid / representative results	allow by chance allow more accurate / precise mean ignore fair test / accurate / precise unqualified	1	AO1 4.7.2.1
06.3	as a control / comparison **or** B varies from A in only one factor (to) show results (in A) are due to weed killer	allow see the difference do **not** accept a control variable allow to see the effect of the weed killer allow so the results are valid	1 1	AO2 4.7.2.1 AO3 4.7.2.1
06.4	11	allow eleven	1	AO2 4.7.2.1
06.5	$\frac{10 - 2}{10} \times 100$ 80	an answer of 80 scores **2** marks	1 1	AO2 4.7.2.1

4.7.2.1 Levels of organisation

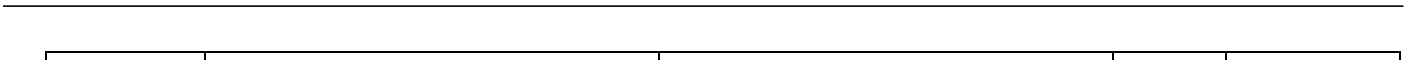
Answer 22 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	use more quadrats	allow use larger quadrats allow repeat	1	AO3 4.7.2.1
	original may not be representative **or** reference to weeds being distributed unevenly	allow mean is more reliable / accurate / precise ignore more valid	1	
	or leave for more than two weeks (1) original may not be representative (1)	allow mean is more reliable / accurate / precise allow weed killer may take longer than two weeks to work (fully) ignore more valid		
Total			**9**	

4.7.2.1 Levels of organisation

Answer 22 · Mark scheme

June 2018 | 8461/2F | Original Q6



4.7.2.1 Levels of organisation

Answer 23 · Mark scheme

June 2019 | 8461/2F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	primary consumer		1	AO2 4.7.2.1 4.7.4.1
07.2	correct shape: 4 tiers with largest at bottom and smallest at top correctly labelled: dragonfly / nymph + hydra + daphnia + algae	 in this order **or** allow: 3rd-order **or** tertiary consumer **or** apex / top predator **or** (trophic level) 4 2nd-order **or** secondary consumer **or** (trophic level) 3 1st-order **or** primary consumer **or** herbivore **or** (trophic level) 2 producer **or** (trophic level) 1 allow for **2** marks inverted pyramid if correctly labelled	1 1	AO2 4.7.4.2
07.3	any **one** from: (Daphnia biomass smaller because) • non-digestible parts (of algae) or lost in faeces • not all absorbed • lost in urine / urea • used in respiration **or** lost as carbon dioxide / CO_2 • algae not all eaten **or** eaten by other organisms • some algae decompose	 ignore waste allow excretion allow (to supply energy) for movement / warmth allow used to supply energy	1	AO1 4.7.4.3
07.4	 14 14 000	an answer of 14 000 scores **2** marks allow evidence of an incorrectly calculated mean × 1000 allow 1.4×10^4	 1 1	AO2 4.7.2.1

4.7.2.1 Levels of organisation

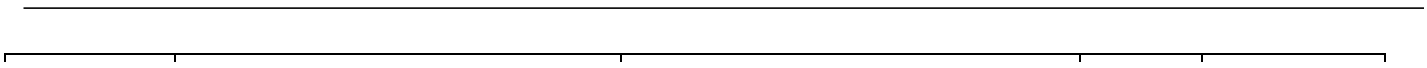
Answer 23 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.5		an answer of 2.625×10^4 **or** 2.63×10^4 **or** 2.6×10^4 scores **4** marks an answer of 26250 scores **3** marks allow ecf from Question **07.4**		AO2 4.7.2.1
	(volume of pond =) 1.875 **or** $2.5 \times 1.5 \times 0.5$	an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps	1	
	$14\,000 \times 1.875$	allow ecf from Question **07.4**	1	
	26250		1	
	2.625×10^4	allow 2.63×10^4 **or** 2.6×10^4	1	
07.6	increased (growth / reproduction of) algae		1	AO2 4.7.2.1 4.7.3.2
	(more algae so) more food for Daphnia		1	4.7.4.1
		allow fertiliser toxic to Hydra (1) (so) fewer Daphnia eaten (1)		
07.7	(Hydra have) less food		1	AO3 4.7.2.1
	because (graph shows) fewer Daphnia (with more fertiliser)		1	4.7.3.2
		allow other valid suggestions, eg fertiliser toxic to Hydra (1) **or** fertiliser causes growth of algae (on surface) which block light and so die and decay **or** eutrophication (1) (decay / eutrophication) uses up oxygen (so lack of oxygen for Hydra) (1)		
Total			**14**	

4.7.2.1 Levels of organisation

Answer 23 · Mark scheme

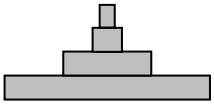
June 2019 | 8461/2F | Original Q7



4.7.2.1 Levels of organisation

Answer 24 · Mark scheme

November 2021 | 8461/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	carbon dioxide water		1 1	AO1 4.7.2.2 4.4.1.1
03.2	light		1	AO1 4.7.4.3 4.4.1.1
03.3			1	AO3 4.7.4.2
03.4	 2.3 **and** 0.5 $\frac{(2.3 - 0.5)}{2.3} \times 100$ **or** $\frac{1.8}{2.3} \times 100$ 78.2(6087....) 78	allow figures in millions allow in range 2.25 to 2.3 for 2.3 allow in range 0.5 to 0.55 for 0.5 allow correct substitution of student's incorrect graph readings allow correct answer from student's substitution of incorrect graph readings ignore incorrect rounding allow correct rounding of calculated value	 1 1 1 1	AO2 4.7.5.3
03.5	increase (in biomass of herring) from 0.1 to 1.8 (million tonnes) **or** change of 1.7 (million tonnes) **or** change of 1700%	 allow a tolerance of ± ½ small square for graph readings	1 1	AO3 AO2 4.7.5.3

4.7.2.1 Levels of organisation

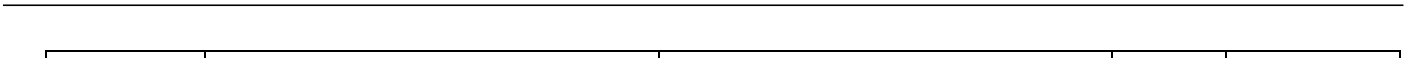
Answer 24 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	smaller / 4-yr-old fish not caught	allow younger fish not caught allow (only) older fish caught	1	AO3 4.7.5.3
	(so) escaping fish can reproduce	allow so younger fish can survive to reproduce	1	
Total			**12**	

4.7.2.1 Levels of organisation

Answer 24 · Mark scheme

November 2021 | 8461/2F | Original Q3



4.7.2.1 Levels of organisation

Answer 25 · Mark scheme November 2021 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	place the quadrat using random coordinates		1	AO1 4.7.2.1 RPA9
06.2	$\frac{40 + 52 + 88 + 80 + 40}{5}$ **or** $\frac{300}{5}$ 60		1 1	AO2 4.7.2.1 RPA9
06.3	the area of buttercup plants in quadrat 5 is much larger		1	AO3 4.7.2.1 RPA9
06.4	any **two** from: • place (many) more quadrats • divide quadrats into more / smaller squares • estimate actual percentage cover in quadrat (instead of counting squares) • only count squares with at least 50% cover	 allow repeat allow combine results with results of other students allow use a point quadrat ignore place quadrats randomly	2	AO3 4.7.2.1 8.2.9

4.7.2.1 Levels of organisation

Answer 25 · Mark scheme

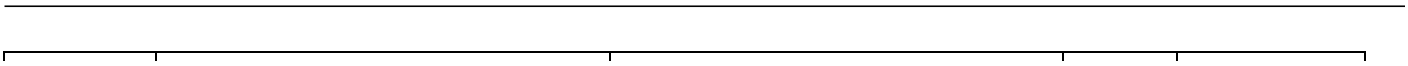
November 2021 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	any **three** from: • light • water • minerals / ions / salts • pH • temperature • herbivores • trampling / cultivation • pathogens / disease • use of weedkiller	 allow rain / moisture allow named example such as nitrate / phosphate allow fertiliser allow named example allow wind allow oxygen / air in the soil ignore carbon dioxide ignore weather	3	AO1 4.7.1.1 4.7.1.2 4.7.1.3
Total			**9**	

4.7.2.1 Levels of organisation

Answer 25 · Mark scheme

November 2021 | 8461/2F | Original Q6



4.7.2.1 Levels of organisation

Answer 26 · Mark scheme

June 2023 | 8461/2F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.1	(30 m) tape measure quadrat	must be in this order	1 1	AO1 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.2	choose locations at random		1	AO1 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.3	area mean	must be in this order	1 1	AO1 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.4	multiply mean by area	allow multiply 2 by 150 allow multiply total (of five quadrats) by a fifth of the area allow multiply 10 by 30	1	AO1 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.5	count and record more samples		1	AO3 4.7.2.1 RPA9

4.7.2.1 Levels of organisation

Answer 26 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
02.6	any **one** from: • water / moisture • light • temperature • oxygen in the soil • wind • minerals / ions	 allow humidity allow rain allow drought ignore sun unqualified allow shade (by eg building) ignore oxygen unqualified allow named ions allow fertiliser / salts ignore carbon dioxide ignore nutrients ignore (soil) pH	1	AO2 4.7.1.2

Total Question 2	**8**

4.7.2.1 Levels of organisation

Answer 27 · Mark scheme

June 2023 | 8461/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.1	any **one** from: • sun • light	ignore photosynthesis	1	AO1 4.7.2.1 4.7.4.3

Question	Answers	Mark	AO / Spec Ref.
03.2	<table><tr><th>Feeding relationship</th><th>Organism</th></tr><tr><td>Secondary consumer</td><td>lynx</td></tr><tr><td>Primary consumer</td><td>(snowshoe) hare</td></tr><tr><td>Producer</td><td>grass</td></tr><tr><td>Herbivore</td><td>(snowshoe) hare</td></tr><tr><td>Carnivore</td><td>lynx</td></tr><tr><td>Prey</td><td>(snowshoe) hare</td></tr><tr><td>Predator</td><td>lynx</td></tr></table> if no other mark awarded allow **1** mark for 3 correct answers	1 1 1	AO3 4.7.2.1 4.7.4.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.3	camouflaged / hidden **or** not (easily) seen	allow description eg blends in with surroundings	1	AO3
	from lynx / predator / carnivore		1	AO2
	not killed / eaten	allow less likely to be killed / eaten	1	AO2
				4.7.1.2 4.7.1.3 4.7.1.4 4.7.2.1

4.7.2.1 Levels of organisation

Answer 27 · Mark scheme

June 2023 | 8461/2F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.4	any **two** from: • fewer lynx (to eat them) • more food / grass (available) • hares reproduce / breed / multiply	allow not many predators / lynx do **not** accept no lynx / predators allow a lot of food / grass	2	AO2 4.7.1.3 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.5	(number of lynx) increases		1	AO3 4.7.1.3 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.6	less food **or** fewer (snowshoe) hares (to eat) **or** fewer prey	ignore the lynx were hunted do **not** accept no food	1	AO2 4.7.1.3 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.7	any **two** from: • (lost in) respiration (of snowshoe hare) • egestion / faeces • excretion / urea / urine • not all eaten	allow as carbon dioxide allow not all digested allow not all (named) parts eaten if no other mark awarded, allow **1** mark for waste	2	AO1 4.7.2.1 4.7.4.3

Total Question 3	13

4.7.2.1 Levels of organisation

Answer 28 · Mark scheme

June 2024 | 8461/2F | Original Q11

Question 11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	any **one** from: • collect more samples each time • collect samples more frequently • use a bigger bucket / sample • do not return tadpoles until after the fourth sample • sample at the same time of day • randomise collecting positions • collect at range of depths • standardised sweeps with a net instead of a bucket	 allow suggested time interval allow a method to avoid double counting tadpoles	1	AO3 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.2	6	if no answer on line, allow answer in **Table 1**	1	AO2 4.7.2.1 RPA9

4.7.2.1 Levels of organisation

Answer 28 · Mark scheme June 2024 | 8461/2F | Original Q11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.3	correct linear scale and axis labelled weeks	scale must use at least half available space	1	AO2 4.7.2.1 RPA9
	all points plotted correctly	allow a tolerance of ±½ small square allow 4 or 5 correct plots for **1** mark	2	
	curved line of best fit	ignore line drawn point to point	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.4	correct value at 0 and 4 weeks from line on student's graph, eg 60 and 22	allow a tolerance of ± ½ small square	1	AO2 4.7.2.1
	correct calculation eg $\frac{22}{60} \times 100$		1	
	36.7	allow 37 or 36.6... allow correct calculation using values from the student's graph if no line drawn on Figure allow a calculation based on values of 60 and 24 for up to full marks if line drawn on Figure but data from table used (60 and 24) only mp2 and mp3 can be awarded	1	

4.7.2.1 Levels of organisation

Answer 28 · Mark scheme

June 2024 | 8461/2F | Original Q11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.5	any **two** from: • disease / (named) pathogens • being eaten **or** predators • lack of food • low oxygen (concentration in water) • change in temperature • change in pH • (some of the) pond dried out • toxic chemical	allow competition for food ignore competition unqualified allow eutrophication allow lack of space allow named example such as sewage / fertiliser ignore pollution ignore waste	2	AO2 4.7.1.2 4.7.1.3

Total Question 11	11

4.7.2.1 Levels of organisation

Answer 29 · Mark scheme

June 2025 | 8461/2F | Original Q9

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	to remove all / the water	allow to make sure there is no water left allow to make sure the soil is (completely) dry ignore to remove water unqualified	1	AO3 4.7.1.2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.2	$\frac{71}{252} \times 100$ 28.1(746…) 28 (%)	 allow student's incorrectly calculated percentage using mass data for 20 metres, rounded to nearest whole number	1 1 1	AO2 4.7.1.2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.3	as distance increases the percentage of water increases	allow positive correlation allow as one increases the other increases allow as one decreases the other decreases ignore directly proportional	1	AO3 4.7.1.2 4.7.2.1 RPA9

4.7.2.1 Levels of organisation

Answer 29 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	any **two** from: • repeat (at each distance) **and** calculate a mean • test at intermediate / further distances • test around more / different trees • test at different angles around the (same) tree	allow repeat (at each distance) **and** remove / identify anomalies allow test more areas	2	AO3 4.7.1.2 4.7.2.1 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.5	any **three** from: • light (intensity) • temperature • type of soil • pH (of soil) • minerals / ions (in soil) • wind (intensity / direction) • oxygen in soil	if neither awarded allow shade for **1** mark ignore sun allow acidity / alkalinity (of soil) allow salts **or** named examples of ions, such as nitrate allow fertiliser ignore nitrogen / nutrients ignore (availability of) space ignore carbon dioxide	3	AO2 4.7.1.1 4.7.1.2 4.7.2.1 RPA9

Total Question 9	10

4.7.2.1 Levels of organisation

Answer 26 · Examiner comments June 2023 | 8461/2F | Original Q2

Question 2

This question was about the use of quadrats for estimating the size of a population of buttercups on a lawn.

02.1 The selection from the word box of a 30 m tape measure for measuring the length and width of the lawn and a quadrat as the name of a 1 m × 1 m square frame was done successfully by almost three-quarters of students.

02.2 The sampling at random locations was selected as the appropriate method by a almost three-quarters of students.

02.3 The vast majority of students correctly selected the area of the lawn as the product of its length and width and the mean as a description of the total number of plants divided by the number of samples.

02.4 This question required students to describe how they could use the sampling data in Table 1 and the illustration of the lawn in Figure 2 to demonstrate that the population estimate was 300 buttercup plants. Students answered in various ways: multiplying the mean (per m^2) by the area, '2 × 150', or the total in 5 samples multiplied by a fifth of the area; all of which were correct. A not uncommon incorrect answer was to multiply the total in the 5 samples by the area. Just over one-quarter of students gave a correct answer.

02.5 Improving the accuracy of the estimate by counting and recording more samples was correctly selected by just under three-quarters of students.

02.6 Having been given soil pH as an example of an abiotic factor, most students were able to suggest another – 'light' and 'temperature' being the most common.

Answer 27 · Examiner comments June 2023 | 8461/2F | Original Q3

Question 3

This question was about a simple food chain and predator-prey relationships.

03.1 This was generally well done, with sun and light being very common correct answers as the source of energy for the grass. Some students included extra suggestions, such as water which was incorrect and thus disqualified the mark.

4.7.2.1 Levels of organisation

Answer 27 · Examiner comments June 2023 | 8461/2F | Original Q3

03.2 Completion of Table 2 to name one organism from the food chain in Figure 3 that matched each of the given descriptions (secondary consumer, producer, herbivore, etc) was done successfully by two-thirds of students. However, those who did not read the question carefully used the names of other organisms, such as 'lions' and 'cows' which could not be credited.

03.3 The two photographs in Figure 4 of the snowshoe hare, respectively in the summer and in the winter, showed its different fur colour in these different seasons. Students had to explain how this change in fur colour would increase the hare's chance of survival. Many students realised that the change of fur colour was important for camouflage and described this in a variety of ways. These students often went on to explain that this would help the hare to avoid being seen by predators. However, the most common omission was a description of why avoiding being seen was important for survival, with large numbers of students only restating the question '…so they survive', which was not creditworthy. Only 1 in 10 students scored all 3 marks in this question, although around a half included the ideas of camouflage and not being seen by predators such as the lynx.

03.4 Figure 5 showed students how the populations of snowshoe hare and lynx oscillated over the course of 35 years. Appropriate suggestions about why the hare population increased at various times included the decline in population of the lynx, the abundance of food for the hares and the fact that the hares reproduced. One-third of students were able to suggest two of these reasons.

03.5 Students were required to look at the relationship shown in Figure 5 to see that an increase in the number of hares resulted in an increase in the number of lynx – just over one-half were able to describe this.

03.6 A reason why the lynx population fell over the given years should have been evident from Figure 5 which showed the fall in hare population immediately before it – around 60 percent of students realised this.

03.7 This question was very poorly answered. Few students (around 1 in 20) gained both marks and the majority struggled to gain even one. Suitable reasons for the loss of biomass in the food chain between the grass and the snowshoe hare would be respiration of the hare or egestion or excretion.

4.7.2.1 Levels of organisation

Answer 28 · Examiner comments

June 2024 | 8461/2F | Original Q11

Question 11 (standard demand)

11.1 Just under 40% of students successfully identified an improvement to the method. The most common creditworthy responses were 'repeats', 'collect more water' or a description of avoiding double counting of the tadpoles. As the experimental time frame given was 8 weeks, improvements that suggested extending this time period were not given credit.

11.2 Almost 80% of students correctly carried out the simple calculation. Students using the row rather than the column was the main reason to not score marks.

11.3 Students were asked to complete a graph to show how the total number of tadpoles changed over the 8-week period. Almost 50% of students scored three or more marks, with a marks commonly not achieved for either not labelling the *x*-axis or failing to use a linear scale.

Plotting the points was mostly done well and students that did miss out on these marks was due to accuracy as each small square vertically was 2 units. The line of best fit should have been a smooth curve through the points, but many students used a ruler to draw a straight line of best fit or simply joined the plots dot-to-dot – neither of which were correct. 15% of students did not attempt this question.

11.4 Students are asked to calculate the percentage of the tadpoles that would still be found in the pond at four weeks compared to zero weeks using the data from their graph. 25% of students did not attempt this calculation. Many students achieved marking point 1 only for using the values from their graph at 0 and 4 weeks. They could not then use the values correctly to determine the answer.

A common incorrect approach was to take the answer for 4 weeks away from 60 before multiplying by 100. A noticeable number of students chose not to use their graph but instead used data from the table, allowing some credit to be given as long as the values from the table were correct.

11.5 Almost one third of students gained full marks in this question for correctly suggesting two reasons why the tadpoles died. The most common correct answers were 'not enough food', and then reference to predators or disease. The most common uncreditworthy responses seen were vague references to changes in environment/conditions, lack of parental care and natural selection. Effects of the experimental method were ignored.

© 2024 AQA and its licensors. All rights reserved.

4.7.2.1 Levels of organisation

Answer 28 · Examiner comments

Mark Ranges and Award of Grades

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

© 2024 AQA and its licensors. All rights reserved.

4.7.2.1 Levels of organisation

Answer 29 · Examiner comments

June 2025 | 8461/2F | Original Q9

Question 9 (Standard demand)

09.1
Students were given a method for an investigation into numbers of daisy plants growing in a field at different distances from the tree. A quarter of students knew that the steps were repeated to remove all the water, or to ensure all the water had evaporated. Common incorrect answers seen included 'to improve accuracy', 'to identify anomalies' and 'to remove excess water'.

09.2
Students were given data from an investigation into the number of daisy plants growing at different distances from a tree. They were asked to calculate a percentage and give their answer to the nearest whole number. This calculation was attempted by around 80% of students, with 20% being awarded the full 3 marks. Of those students that did not gain all 3 marks, those that showed their working out were able to gain one or two marks. Students should be encouraged to always show their working out for calculations.

Answer 29 · Examiner comments

June 2025 | 8461/2F | Original Q9

09.3
A pleasing number of students was able to describe the effect of distance from the tree on the percentage of water in the soil – with almost 45% gaining credit. Students who simply stated 'it increased' did not gain credit as both reference to the distance and the percentage of water were required for the mark.

09.4
Students were asked to consider changes to the investigation that would increase the validity of the conclusion. Bullet point 1 was most commonly seen, although students stating simply to 'repeat it' without qualification could not be given credit at this level of demand. Around a third of students gained at least one mark for this question.

09.5
Around a third of students were able to suggest at least two abiotic factors that might have caused more daisy plants to grow further from the tree, with a further 7% of students gaining all three marks. The full range of possible correct responses outlined on the mark scheme were seen, with light being the most common. A few students negated a correct abiotic factor by suggesting the tree (biotic) was the cause – for example 'shade from the tree'.
Vague answers such as 'soil' or 'weather' did not gain credit, and despite being told in the question not to refer to water, a small number of students referred to rainfall, humidity or drought which again could not be credited.