

Organisation of an Ecosystem

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.7 Ecology
Sub-Topic	Organisation of an Ecosystem
Difficulty Level	Silver Level
Booklet	Mark Scheme 1

Time Allowed: 57 minutes

Score: / 57

Percentage: /100

Grade Boundaries:

- M1.(a)** (placed) randomly
allow description of placement 1
- sufficient number (of quadrats) used 1
- count (dandelions) in each quadrat 1
- use mean number of dandelions, area of quadrat and area of field to estimate population
accept (area of field / area quadrat) × mean number of dandelions per quadrat 1
- (b) $(40 \times 145) / 0.25 = 23\,200$ 1
- $(0.42 \times 23\,200 =) 9744$
allow 9744 with no working shown for 2 marks
allow ecf from correct attempt at the previous step) × 0.42 for 1 mark 1
- (c)
- Level 2 (3–4 marks):**
A detailed and coherent explanation is given. Logical links between clearly identified relevant points are made to explain why dandelion growth may be limited.
- Level 1 (1–2 marks):**
Discrete relevant points are made. The logic may be unclear.
- 0 marks:**
No relevant content

Indicative content

factors that may be considered:

competition for resources including:

- light
- water
- space
- mineral ions (allow nutrients / salts / ions from the soil)

reference to why growth may be limited:

- (light) energy for photosynthesis
- water as a raw material for photosynthesis / support
- surface area exposed to light
- sugar / glucose produced in photosynthesis
- (space) to grow bigger
- (space) for growth of root system
- (mineral ions) for growth
- (mineral ions / sugar) for production of larger molecules **or** named example

4

[10]

M2.(a) wolves

1

(b) moose and wolves are on different scales

1

(c) wolf population has increased so more moose are eaten
*do **not** accept there are more wolves than moose*

1

(d) any **two** from:

- (other) predators
allow correct examples
allow 'humans hunting moose'
- (new) pathogens
allow diseases
- competition

2

(e) any **four** from:

- variation (within species) of antler size
allow description relating to antlers
- (caused by) different genes
- as a result of sexual reproduction / process of meiosis / mutation
- (phenotype) most suited to environment most likely to survive and breed
ignore natural selection unqualified
- genes for large antlers (more likely to be) passed on to next generation

4

reference to mate selection

or

fighting

or

gaining territory

or

competition for mates

or

avoiding predation

1

[10]

M3.(a) (i) counts / 12

1

$\times 120 \times 80 / \times 9600$

or

\times area of field

1

(ii) (more) quadrats / repeats

1

placed randomly

ignore method of achieving randomness

1

(b) (i) any **three** from:

- temperature / warmth / heat
- water / rain
- minerals / ions / salts (in soil)
allow nutrients / fertiliser / soil fertility
- pH (of soil)

	<ul style="list-style-type: none"> trampling herbivores <i>ignore predators</i> competition (with other species) pollution qualified e.g. SO₂ / herbicide wind (related to seed dispersal). <i>ignore space / oxygen / CO₂ / soil unqualified</i> 	3
(ii)	light needed for photosynthesis	1
	for making food / sugar / etc.	1
	effect on buttercup distribution eg more plants in sunny areas / fewer plants in shady areas	1
(c) (i)	fertiliser / ions / salts cause growth of algae / plants	1
	(algae / plants) block light	1
	(low light) causes algae / plants to die	1
	microorganisms / bacteria feed on / break down / cause decay of organic matter / of dead plants	
	<i>do not allow germs / viruses</i>	1
	(aerobic) <u>respiration</u> (by microbes) uses O ₂	
	<i>do not allow anaerobic</i>	1
(ii)	sewage / toxic chemicals / correct named example eg metals / bleach / disinfectant / detergent etc	
	<i>allow suitable named examples eg metals such as Pb / Zn / Cr / oil / SO₂ / acid rain / pesticides / litter</i>	
	<i>ignore chemicals unqualified</i>	
	<i>ignore waste unqualified</i>	
	<i>ignore human waste / domestic waste / industrial waste unqualified</i>	1
(d) (i)	2	

1

- (ii) more food

*allow other sensible suggestion eg more species colonise
from tributary streams after forest*

1

- (iii) number of stonefly species decreases (from **A** to **B** / **B** to **C** / **A** to **C**) as
more pollution enters river / less oxygen

*allow fewer species in more polluted water
ignore none are found at site C*

1

[19]

M4.(a) photosynthesis

1

- (b) (i) 140

1

- (ii) (10 billion tonnes) more added (to atmosphere) than removed
allow ecf from part (b)(i)

1

[3]

M5.(a) (i) correct bar heights

three correct 2 marks

two correct 1 mark

one or none correct 0 marks

ignore width

2

- (ii) (Stream Y)

has many sludge worms / bloodworms

or

has no mayflies / caddis or few shrimp

allow 1 mark if invertebrate not named but correct association given

1

which indicate medium or high pollution

1

(b) (i) suspended solids increase (as a result of sewage overflow)

1

then decrease downstream / return to original levels

1

oxygen levels decrease (after sewage overflow)

1

and then rise again

1

(ii) any **three** from:

- mayflies decrease (to zero) near overflow
accept 'have died out'
- because oxygen is low **or** mayflies have high oxygen demand
- mayflies repopulate / increase as oxygen increases again
- can't be sure if dissolved oxygen or suspended solids is the cause

3

(c) they respire / respiration

aerobic respiration gains 2 marks

1

this requires / uses up the oxygen

1

[13]