

Adaptations - Interdependence - Competition

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.7 Ecology
Sub-Topic	Adaptations – Interdependence - Competition
Difficulty Level	Silver Level
Booklet	Mark Scheme 1

Time Allowed: 54 minutes

Score: / 52

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
- ignore food*
- pH (of soil)

- trampling
 - herbivores
 - ignore predators*
 - competition (with other species)
 - pollution qualified e.g. SO₂ / herbicide
 - wind (related to seed dispersal).
 - ignore space / oxygen / CO₂ / soil unqualified*
- 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
- do **not** allow germs / viruses*
- 1
- (aerobic) respiration (by microbes) uses O₂
- do **not** allow anaerobic*
- 1
-
- (ii) sewage / toxic chemicals / correct named example eg metals / bleach / disinfectant / detergent etc
- allow suitable named examples eg metals such as Pb / Zn / Cr / oil / SO₂ / acid rain / pesticides / litter*
- ignore chemicals unqualified*
- ignore waste unqualified*
- ignore human waste / domestic waste / industrial waste unqualified*
- 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) gets more light (near surface)

*allow warmer (near surface)
allow bladders contain (more) carbon dioxide*

1

(so) photosynthesises more

1

(because) bladders aid floating (when tide is in)

or

(so) more biomass / glucose / starch produced

*ref to 'more' needed only once, eg gets more light for
photosynthesis gains **two** marks*

if 'more' not given do not award mark on the first occasion

1

(b) lets angler fish see / attract its prey / mates **or** see predators as it is dark (at
1000m)

or

lets angler fish see / attract prey to get food

or

lets angler fish see / attract mates to reproduce

or

lets angler fish see predators to avoid being eaten

*must be in a correct pair to gain **two** marks*

2

[5]

M5.(a) any **three** from:

- parts of organisms have not decayed
accept in amber / resin
allow bones are preserved
- conditions needed for decay are absent
accept appropriate examples, eg acidic in bogs / lack of oxygen
- parts of the organism are replaced by other materials as they decay
accept mineralised
- or other preserved traces of organisms, eg footprints, burrows and rootlet traces
allow imprint or marking of organism

3

(b) (i) teeth for biting (prey)
must give structure + explanation

1

claws to grip (prey)
accept sensible uses

1

wing / tail for flight to find (prey)

1

(ii) any **two** from:

- new predators
- new diseases
- better competitors
- catastrophe eg volcanic eruption, meteor
- changes to environment over geological time
accept climate change
allow change in weather
- prey dies out **or** lack of food
allow hunted to extinction

2

[8]