

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	Gold Level
Booklet	Mark Scheme 1

Time Allowed: 53 minutes

Score: / 53

Percentage: /100

Grade Boundaries:

M1.(a) any **three** from:

- blackbirds seen in higher % of / more gardens
- multiplying mean number by percentage of gardens seen in shows blackbird is higher
*allow 1 additional mark for correct figures showing this, ie
264 sparrows: 305 blackbirds*
- only done on one day / month / hour
eg only done in January
- only done in gardens (one bird may prefer a different habitat)
- problem of (correct) identification
- may re-count same ones
if neither point 5 or 6 given allow 1 mark for idea of error / miscounted
- people may quote false numbers / may make it up

3

(b) (i) 60.3

*award 2 marks for correct
answer, irrespective of working
award 1 mark for $33.5 + (33.5 \times 80 / 100)$ or equivalent with
no answer or incorrect answer **or** award 1 mark for 26.8*

2

(ii) any **two** from:

- change in temperature
*a comparison is required
eg cooler / warmer / less frost (in 2012)*
- fewer predators
- more food **or** less competition for food
- more nesting space **or** less competition for nesting space
- less disease (in 2012)
*allow idea that people may be better / worse at identifying
birds / goldfinches
allow idea of movement to gardens (due to poor food supply
elsewhere)*

2

[7]

M2.(a) (i) to get data re position of seaweed / of organism 1

in relation to distance from sea / distance down shore / how long each seaweed was exposed

1

(ii) repeat several times
minimum = 2 repeats

1

elsewhere along the shore

1

(iii) bladder wrack is further up the shore (than the sea lettuce) / exposed for longer

ignore found in dry areas / on bare rock

1

sea lettuce (only) in rock pools / in the sea / (only) in water

1

(b) gets more light / closer to light
allow better access to CO₂

1

(so) more photosynthesis
allow 1 mark for light for photosynthesis
allow 1 mark for CO₂ for photosynthesis
ignore reference to oxygen for respiration
'more' only needed once for 2 marks

1

[8]

M3.(a) extremophile(s)

1

(b) (i) common (periwinkle) and flat (periwinkle)
either order, both required

1

- (ii) (common and flat) both live in the same habitat / area / named area
allow habitats overlap the most

1

- (iii) any **two** from:

- would have wrong food
- would otherwise be exposed to (specific) predators
- cannot tolerate extended exposure to air **or** reduced submersion in seawater
allow cannot tolerate temperature / dehydration
- cannot tolerate high salt concentration (in rock pools)
allow low salt concentration (in rock pools)
- cannot compete with small periwinkle

2

[5]

- M4.(a)** variation (between organisms within species)

allow described example

*allow mutation – but **not** if caused by change in conditions*

1

those most suited / fittest survive

1

genes / alleles passed on (to offspring / next generation)

allow mutation passed on

1

- (b) (i) any **two** from:

allow converse

- increase in latitude reduces number of (living) species

ignore references to severity of conditions

- increase in latitude reduces time for evolution (of new species)
- the less the time to evolve the fewer the number of (living) species

2

(ii) any **two** from:

*do **not** accept intention or need to evolve*

- (increase in latitude reduces number of (living) species because) less food / habitats / more competition at high latitude
allow only extremophiles / well-adapted species can survive
- (increase in latitude reduces time for evolution (of new species) because) severe conditions act more quickly / to a greater extent on the weakest
- (the less the time to evolve the fewer the number of (living) species because) species that evolve slowly don't survive

2

[7]

M5.(a) (i) 5.2

*award **2** marks for correct answer, irrespective of working or lack of it*

*award **1** mark for $62.4 \div 12$ only with incorrect or no answer*

2

(ii) the smaller the (mass of the) bird the more energy is needed (per gram of body mass)

allow converse

ignore figures

1

(iii) smaller bird has larger surface area : volume / mass ratio

allow converse

1

so heat / energy lost more quickly

allow lose more heat / energy

*if (a)(ii) describes a trend of more energy with increasing body mass allow **one** mark for idea of more energy needed for flight*

1

- (b) larger birds spend less time feeding

accept converse

allow the less energy they need per day the longer they spend feeding

1

since they need less food per gram of body mass (to satisfy energy needs)

1

[7]

- M6.(a) use of quadrat / point frame

allow description

1

randomly placed / random sampling

ignore reference to transects

1

- (b) (i) 6

1

- (ii) more light in A / in field / where sunny

ignore sun

1

more / better / faster photosynthesis in A / with more light

allow converse

1

(iii) use light meter / measure light intensity in both habitats

1

take many measurements at same time of the day

1

or

laboratory / field investigation with 2 batches high light and low light (1)

count or number of flowers in each (1)

counting point is dependent on investigation point

(c) more glucose / energy available

allow other named product eg protein

allow if more energy produced

1

for growth

dependent on 1st mark

1

[9]

M7.(a) wing pattern similar to *Amauris*

allow looks similar to Amauris

1

birds assume it will have an unpleasant taste

1

(b) mutation / variation produced wing pattern similar to *Amauris*

*do **not** accept breeds with Amauris*

*do **not** accept idea of intentional adaptation*

1

these butterflies not eaten (by birds)

1

these butterflies breed **or** their genes are passed to the next generation

1

[5]

M8.(a) guard cell

ignore stoma / stomata

1

(b) Species A :

allow converse points for species B

stomata open in dark / at night **or** close in light / in day

1

stomata closed during warm(est) period **or** open when cool(er)

1

heat (energy) /warmth increases evaporation / transpiration

must give explicit link between heat and transpiration

1

reduces water loss / evaporation / transpiration

ignore photosynthesis

1

[5]