

# MARK SCHEME

## **GCSE**

BIOLOGY

AQA - COMBINED SCIENCE

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B 7 - TEST 3

ECOLOGY

Intermediate

## Mark schemes

1.

- (a) camouflaged in summer and winter / all year

*allow matches background for (camouflage) all year*

1

- (so) fewer eaten (by predators)

*allow to avoid / hide from predators*

1

**or**

light coloured coat emits less energy / heat (than darker coat)(1)

*accept converse argument but answer must be comparative*

*do **not** accept darker coat absorbs more energy / heat*

*(in summer)*

(so helps) hare stays warmer in winter(1)

- (b) small(er) surface area

*allow small(er) surface area : volume ratio*

*do **not** accept small volume : SA **or** large SA : volume*

*ignore references to being less visible*

1

(so) lose less energy / heat

*allow retains / conserves more energy / heat*

*ignore prevents / stops heat loss*

*ignore keeps heat in*

*ignore absolutes*

1

[4]

2.

- (a) photosynthesis

*for 1 mark*

1

- (b)
- grass eaten by rabbit
  - rabbit eaten by fox
  - carbon becomes part of fats/proteins in the fox's body
  - or passes along the chain as (carbohydrate) / fat / protein

*each for 1 mark*

*[Do not accept 'carbon gets into fox's body', for third mark]*

3

[4]

- 3.** (a) 1 for insulation / prevents heat loss  
*keeps cold out neutral keeps it warm neutral* 1
- 2 camouflage / other animals cannot see it 1
- (b) 1 heat loss  
*reject shade* 1
- 2 insulation from hot sand / prevents heat passing from sand / prevents burning 1
- [4]**

- 4.** (a) from 20.00 to 4.00  
*for 1 mark* 1
- (b) line correct length  
*for 1 mark* 1
- (c) e.g. it is dark so fewer predators can see it,  
*for 1 mark each* 2
- [4]**

- 5.** (a) any **two** from
- deforestation reduces carbon dioxide removal from the atmosphere  
*accept less photosynthesis for reduces carbon dioxide removal*  
*accept cutting down trees for deforestation*  
*ignore cutting down plants*  
*accept there are less trees to remove carbon dioxide*
  - burning wood / trees (releases carbon dioxide)
  - microbes decay / decompose wood / trees (releasing carbon dioxide) 2
- (b) may cause a rise in sea level  
*accept may cause polar / ice caps to melt / flooding*  
*do **not** accept global warming **or** greenhouse effect **or** erosion* 1
- may cause changes in the Earth's climate  
*accept causes changes in the weather **or** named, comparative **type** of weather **or** drought*  
*accept seasonal changes* 1

(c) methane

*accept natural gas or CH<sub>4</sub>*

1

[5]

6.

(a) any **two** from:

*ignore CO<sub>2</sub> release unqualified*

- burning
- activity of microbes / microbial respiration
- less photosynthesis

**or**

trees take in CO<sub>2</sub>

*do **not** accept CO<sub>2</sub> taken in for respiration*

**or**

less CO<sub>2</sub> locked up in wood

- CO<sub>2</sub> given off by clearing machinery

2

(b) (i) range of different species

*accept idea of variety of organisms or plants or animals*

1

(ii) any **two** from:

- organisms may produce substances useful to humans  
*do **not** accept if food is only example*
- duty to preserve for future generations
- effect on other organisms, eg food chain effects  
*ignore effect on human food supply*
- loss of environmental indicators

2

[5]

7.

(a) (i) forest at the edges (of the island) has been removed

*allow centrally the forest remains*

1

an appropriate area on the island is identified eg south east **or** bottom right

1

- (ii) any **two** from:
- (to provide land) for farming / agriculture
  - (to provide land) for quarrying
  - (to provide land / wood) for building  
*allow to provide timber*
  - to provide fuel
  - to produce paper  
*allow forest fires*

2

- (b) any **two** from:
- decreased biodiversity
  - loss of habitats
  - increased carbon dioxide (concentration)
  - global warming  
*allow effects of global warming eg flooding / rise in sea level*  
*allow soil erosion*

2

[6]

8.

- (a) predator/carnivore  
*(not consumer/hunter)*  
*for 1 mark*

1

- (b) (i) number decrease  
not 'no' less food (for large mites)/less prey/fewer small mites to eat  
(not 'fewer small mites' etc)  
starve/cannot grow/cannot breed/die/die out  
*each for 1 mark*

3

- (ii) increase small mites breeding faster (than they are eaten)  
*each for 1 mark*

(accept different food found)  
decrease = 0 maths but 1 mark for possible reason can be awarded -  
more (small mites) eaten  
*each for 1 mark*

2

[6]

9.

(a) any **two** from:

- the area of ocean with sea ice has reduced since 1979
- the amount of ice follows the same pattern during a year  
*allow ice reduces in the summer and increases in the winter*
- most ocean with sea ice in February / March
- least ocean with sea ice in September / October
- area of ocean with sea ice decreases from March to September each year
- area of ocean with sea ice increases from September to February / March each year
- decrease is greater between 1995 and 2016 compared with 1979 to 1995  
*allow other correct conclusions derived from the graph*

2

(b)

<b>Level 3:</b> Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5-6
<b>Level 2:</b> Relevant points (reasons/causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.	3-4
<b>Level 1:</b> Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1-2
No relevant content	0
<b>Indicative content</b> <ul style="list-style-type: none"> <li>• deforestation has reduced the number of trees on the planet</li> <li>• which has reduced the amount of carbon dioxide that can be removed from the atmosphere</li> <li>• increased combustion releases more carbon dioxide into the atmosphere</li> <li>• therefore there is a build-up of carbon dioxide in the atmosphere</li> <li>• (build up) allows short-wavelength radiation to pass into the Earth's atmosphere</li> <li>• and absorbs long-wavelength</li> <li>• causing an increase in global temperature</li> <li>• the increase in temperature causes ice to melt</li> </ul>	

6

[8]

10.

(a)

Factor	Biotic	Abiotic
Diseases	✓	
Herbivores	✓	
Temp		✓
Water		✓

*allow 1 mark for 2 or 3 correct*

2

(b) (leaves block light near tree so) more light (as you move outwards)

*allow low light intensity under tree  
ignore Sun*

1

for photosynthesis

*allow less photosynthesis under the tree*

1

(which) produces (more) glucose / proteins (for growth)

*ignore growth  
ignore food  
allow molecules, cell components or other correct  
substances instead of proteins  
if no other mark awarded allow less water / ions /  
minerals / nutrients under the tree*

1

(c) quadrat

*correct spelling only*

1

light meter

*allow lux meter  
allow light intensity meter  
allow light data logger*

1

*in this order*

(d) 1.5(0) (m<sup>2</sup>)

*allow 15 000 cm<sup>2</sup>*

1

- (e) to keep light (intensity) as similar as possible  
*allow the light (intensity) might change*  
*ignore references to temperature*  
*ignore weather*  
*ignore Sun*

1

- (f) any **one** from:
- repeat (investigation) around the tree  
*allow repeat in different directions*
  - repeat (investigation) for other trees / areas
  - sample every one metre
  - count the number of each species present (rather than percentage cover)  
*ignore repeats unqualified*  
*ignore repeat at different times / days / seasons*  
*ignore different size quadrat*  
*ignore random sampling*

1

- (g) daisy

1

- (h) as light (intensity) increased so did the percentage / cover of plants  
*ignore directly proportional*  
*ignore positive correlation unqualified*

1

up to 100% / maximum at 175 (arbitrary units)  
*ignore distance*

1

- (i) any pair from:
- (lack of) water / rain (1)  
 because the leaves are stopping the rain  
**or**  
 because the roots of the tree are absorbing it (1)  
*allow soil moisture*
  - (lack of) minerals / ions (1)  
*allow magnesium / nitrate / nutrients*  
 because the tree (roots) have absorbed them (1)
  - temperature (1)  
*allow too cold / cooler*  
 because less thermal energy from the sun is reaching under the tree canopy (1)  
*allow 'heat' for thermal energy*  
*allow pH / acidity (1)*  
*because (some) fallen leaves are acidic (1)*

2

*ignore carbon dioxide*  
 do **not** accept oxygen

[15]

11.

- (a) (placed) randomly  
*allow description of placement*
- sufficient number (of quadrats) used
- count (dandelions) in each quadrat
- 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*
- (b)  $(40 \times 145) / 0.25 = 23\ 200$
- $(0.42 \times 23\ 200 =) 9744$   
*allow 9744 with no working shown for 2 marks*  
*allow ecf from correct attempt at the previous step) × 0.42 for 1 mark*

1

1

1

1

1

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]**