MARK SCHEME

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

B 7 - TEST 4

ECOLOGY

Intermediate

Mark schemes

1. any **two** from

swollen stem stores water (for dry periods)

reduced leaves / spines lose less water /less transpiration / less evaporation

idea of long roots absorb water from deeper / more spread out in soil

[2]

2. *ideas that*

- trees hang over the sea / grow close to the sea / on the shore – coconuts drop into the sea. or similar *(not just simply 'spread)*
- wax / fibres (trapped air) – stop the fruit sinking / provide water resistance
- water store – supply water until root reaches a supply
- nutrient store – supply nutrients/salts until root reaches supply
- hard shell – to protect from breakage on landing / to protect the embryo from feeding animals.

[Award maximum of 1 mark for 2 survival / spread features or 1 survival + 1 spread feature]

for 'Fibres stop the fruit sinking'

'Wax provides water resistance'

Award 2 marks

any three for 1 mark each

[3]

3. idea brown colour/plain shell inconspicuous

for 1 mark

less likely to be eaten

gains 1 mark

but

less likely to be eaten before breeding

gains 2 marks

so alleles (genes) passed on

for 1 mark

(N.B accept inverse of any of the above)

[4]

4. (a) carbon dioxide / methane / natural gas / North Sea gas
(credit CO_2 / CH_4)

for 1 mark

1

(b)
- reduce energy / heat radiated by / lost by Earth (into space)
(*not* heat / energy trapped)
- heat / energy radiated back to Earth
(*not* reflected)
- keep the Earth warmer (than it would otherwise be)
or cause of global warming (*not* greenhouse effect)
- causes seawater to expand
- causes ice (caps) / glaciers to melt
- cause a rise in sea level
- cause changes in the Earth's climate

(*credit* named climatic change but not drought)

(NB. Deduct 1 mark for any reference to ozone layer)

any four for 1 mark each

4

[5]

5.
- methane is given off from rice fields
- industry / burning fossil fuels which increases CO_2 in the atmosphere
- deforestation increases CO_2 due to burning / rotting trees
- deforestation means less CO_2 used (in photosynthesis) / less carbon locked up in wood
- methane / carbon dioxide a greenhouse gas
- greenhouse gases increase Earth's temperature / cause global warming
- reduce radiated energy or 'reflect back' radiation

any five for 1 mark each
(do <u>not</u> credit references to cattle producing methane or to effects of global warming)

[NB
- *claims that SO_2 a greenhouse gas and/or referring to acid rain*
- *referring to ozone layer[deduct 1 mark for each]*

[5]

6.

(a) B and D

both required in any order

1

(b) any **two** from:

*do **not** accept compounds restricted to animals*

- carbohydrate / named example

  *allow **2** marks for 2 named examples*

  *do **not** allow a general name and a named example for **2** marks (eg award **1** mark only for carbohydrate and starch)*

- protein / enzyme

  *allow **2** marks for 2 named examples*

- amino acid
- hormone / named plant hormone
- lipid / fat / oil / wax
- chlorophyll
- DNA
- vitamin(s)

2

(c) contains minerals / salts / ions / nutrients / named

ignore 'food'
*do **not** allow vitamins / glucose / energy etc*

1

(needed by plants) for health / better growth

for / help plant growth is insufficient

ignore moisture retention / soil structure

ignore more plants

*allow examples linked to mineral eg contains magnesium to make chlorophyll for **2** marks*

1

[5]

7. 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 the marking guidance (see Reference Material), and apply a 'best-fit' approach to the marking.

0 marks
No relevant information.

Level 1 (1-2 marks)
There is a basic description of either differences or explanations only.

Level 2 (3-4 marks)
There is a clear description of at least **one** difference with a correctly linked attempt at an explanation.

Level 3 (5-6 marks)
There is a clear and detailed description of at least **two** differences explained and correctly linked. Competition explained

Examples of the points made in the response

allow converse statements for trees in forest

description of tree on its own.

- is wider / bushier

  allow (leaves / branches) spread out

- has more leaves

- is shorter

  ignore trunks

- has leaves all over tree

  ignore size of leaves

explanation linked:

- more space
- more light
- more nutrients

allow photosynthesise more

ignore reference to being eaten

is shorter cannot be linked with more nutrients

ignore tree roots unless clearly linked to obtaining nutrients

competition mentioned:

- for light

ignore fight

- for nutrients

ignore water and carbon dioxide

- for space

ignore evolution / natural selection / adapting

[6]

8. (a) 160 000

if incorrect answer / no answer:

allow max. 2 for method:

1 mark for mean = total number ÷ area of ten quadrats

eg $\frac{20}{0.625}$ *or* $\frac{20 \times 8}{5}$ *or* $\frac{160}{5}$ *or 32*

1 mark for final answer = mean × field area

eg mean × 5000

3

(b) Improvement: place quadrats randomly
and
Reason: avoid bias / (more) representative / (more) reliable

allow 1 mark if 2 correct improvements but no reasons / only incorrect reasons

1

Improvement: more quadrats
and
Reason: overcome random variation / (more) typical / (more) representative / (more) reliable / repeatable

1

Improvement: larger quadrats **or** repeat when plants are bigger
and
Reason: less likely to miss plants

ignore accurate, valid, precise and fair

ignore anomalies

1

[6]

9.

Level 3: Relevant adaptations are identified, given in detail and logically linked to form a clear account.	5-6
Level 2: Relevant adaptations are identified, and there are attempts at logical linking. The resulting account is not fully clear	3-4
Level 1: Adaptations 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
Indicative content • a small SA:V ratio • means less thermal energy transferred to surroundings • thick fur **or** hollow hair shafts • traps a layer of air which acts as an insulating layer stopping transfer of thermal energy • a layer of fat or blubber under the skin • acts as an insulating layer **or** as a food store for respiration when food is in short supply • small ears • reduces surface area for thermal energy transfer • white colour • camouflage in the snow so prey do not see them coming and they get more to eat **or** so predators do not see them and they can escape • large feet • to spread weight over snow so they can run faster • hibernate in winter • to conserve energy stores allow 'heat loss' for transfer of thermal energy	

6

[6]

10. (a) 36 (%)

36 (%) gains two marks

accept answers in range 32 (%)–42 (%)

*if answer incorrect give **1** mark for evidence of estimating number of squares as being 8–10.5*

2

(b) (i) Greater plantain most abundant on path / walked area

*for **2** marks a correct statement must be made for each plant.*

1

Ribwort plantain most abundant away from path / on the field / grass / on area not walked on

accept answers in terms of quadrat number / start and finish

*accept for **1** mark where number of one plant high, number of other plant low*

ignore figures

1

(ii) *if no position given max 1 mark*

for Greater plantain numbers higher on path

accept converse statements

Greater plantain grows flatter / lower to ground / is shorter

ignore surface area

1

(so) will be damaged less by trampling /will not be pulled out
or
for Ribwort plantain numbers higher in field

Ribwort plantain has tall leaves or is taller

allow tall stems

to obtain more light
or for photosynthesis

ignore Sun

ignore references to nutrients

ignore competition unless qualified

1

(c) *answers must refer to named plantain(s) to gain credit*

Greater plantain would grow better on football pitch / area 1

accept converse argument

1

(since) more trampling on pitch

*if **no** other marks gained, allow **1** mark for more plantains in area 2 <u>because</u> they will not be affected by human activity / example*

1

[8]

11. (a) evaporates

1

sea

1

sun

accept sun

1

wind

1

condenses

1

rain

1

(b) (i) carbon dioxide

accept CO_2 provided it is correct in every detail

1

(ii) (process) D

1

millions of years

a million years upwards

1

[9]

12. (a) 21 600

no marks for working

1

(b) soil not held in by tree <u>roots</u>

1

water falls on the soil or wind reaches soil
or trees normally intercept
or
soil washed away or soil blown away

1

(c) (i) less carbon dioxide removed
or trees (normal) remove CO_2

ignore reference to O_2

1

more carbon dioxide added by burning (wood)

or (more) CO_2 from decomposition

1

(carbon dioxide) stops (radiant) heat escaping from earth
or less heat escapes

1

(ii) any **two** from:
changed patterns of rainfall **or** wind or causes drought

NOT just 'climate change'

accept increased evaporation

polar ice caps melting **or** sea levels rise
or desert formation **or** loss of habitat

changed plant growth **or** changed distribution of species
or species become extinct

accept named example

accept killing and dying of species

2

(iii) (more) photosynthesis (because more trees)

1

(more) carbon dioxide removed from atmosphere **or** trees remove CO_2

*ignore references to transpiration **or** water vapour*

(as a minimum photosynthesis uses CO_2 = 2 marks)

ignore reference to oxygen

1

[10]