AQA GCSE BIOLOGY (HIGHER) · 8461

# BIOLOGY



## MARK SCHEME

4.7.3 BIODIVERSITY AND THE EFFECT OF HUMAN INTERACTION ON ECOSYSTEMS (PACK 2)

| SCORE | PERCENTAGE |
| --- | --- |
| /204 | % |

STEMUP

# These questions belong to AQA, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by AQA. They are past assessment materials, reproduced here so that students can revise from them.

## What we do not own

STEMUP is not affiliated with AQA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. AQA has not endorsed, approved or been involved in the production of it. AQA and the qualification titles used here belong to their respective owners and appear for identification only.

## Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports. Always check the current specification at aqa.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

## Q1.

(a) any **two** from:

*ignore $CO_2$ release unqualified*

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

  *do **not** accept $CO_2$ taken in for respiration*

  **or**

  trees take in $CO_2$

  **or**

  less $CO_2$ locked up in wood
- $CO_2$ 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 **one** 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 e.g. food chain effects

  *ignore effect on human food supply*
- loss of environmental indicators

**1**

**[4]**

## Q2.

(a) burning / combustion fossil fuels / burning wood

*accept named fossil fuel*
*accept driving cars / any vehicles*
*do **not** accept burning / combustion unqualified*
*do **not** accept factories*
*ignore factory chimneys unqualified*
*ignore respiration*

**1**

deforestation

**1**



STEMUP.CO.UK

(b) (i) (overall) increase

1

fluctuations

*highs are higher <u>and</u>*

*lows are not as low* = ***2*** *marks*

1

(ii) no – could be due to some other factor **or**
could be coincidence **or** fluctuations ±
same size as the overall rise or large
fluctuations or sometimes when $CO_2$ rises temperature doesn't

1

(c) any **one** biotic **or** abiotic effect eg:

*do **not** credit just "climate / weather change"*
*allow <u>extreme</u> climate / weather change*

changes in rainfall

*accept drought, desert formation*

ice-caps melting / rise in sea level

*accept flooding*

changed pattern of winds

changed pattern of migration

changed species survival

changed growth

1

**[6]**

## Q3.

(a) (i) increases

1

(ii) decreases

1

(b) any **two** from:

- competition for water
- competition for ions / minerals / salts / nutrients

*accept correct named example*
*do **not** accept food*
*do **not** accept <u>all</u>*

- competition for light

2

(c) kills / harms other / named organisms

1

**[5]**



STEMUP.CO.UK

## Q4.

(a) burning fossil fuels / named example

*accept <u>driving</u> cars / lorries etc burning fuels in power stations*
*ignore combustion unqualified*
*do **not** accept catalytic converter on its own **or** emissions from power stations*

**1**

(b) (i) pollutants / smoke <u>breathed in</u>

**1**

(ii) $SO_2$ and deaths rise (and fall) at same times **or**
$SO_2$ and deaths parallel each other / show same pattern

**1**

(iii) no – could be due to some other factor / pollutant / to smoke **or** correlation not precise / described

*explanations must come to a conclusion*
*named examples must be plausible allow 'coincidence'*

**1**

**[4]**

## Q5.

(a) (i) carbon dioxide

*accept other positive indications*

**1**

(ii) methane

**1**

*accept other positive indications*

(b) increase

*accept other positive indications*

**1**

(c) any **three** from:

building

*accept houses / airports / roads / factories*

farming / removing hedgerows / fire

*do **not** accept pesticides, fertilisers etc*

quarrying / mining

industry

*accept release of toxic chemicals / named eg*
*accept acid rain / global warming only if linked to production by human activity do **not** accept just 'pollution'*

drainage of marshland

dam construction / flooding land



STEMUP.CO.UK

dumping waste

*do **not** accept fly tipping, litter*

3

**[6]**

## Q6.

(a) burning fossil fuels / coal / gas / oil

*accept driving <u>vehicles</u> / eg cars*

*accept coal-fired power station*
*accept car emissions*

*ignore combustion unqualified*
*do **not** accept power station unqualified*
*do **not** accept <u>using</u> fossil fuels*

1

(b) (i) ($SO_2$) makes it acidic / makes acid rain / lowers pH

1

(ii) any **one** from:

($SO_2$) kills leaves reduces number of leaves reduces leaf area
**or** smaller leaves causes fewer leaves to grow

*ignore correct extras, eg*
*withered, yellow etc*

1

(c) any **two** from:

(fewer leaves / less leaf S.A) so less photosynthesis

less food / less sugar / less starch supplied (to roots / to stems)

($SO_2$) lowers pH of soil / makes soil acidic

ions (/minerals / salts / nutrients) less available (to plants)

*accept don't get enough nutrients*

2

**[5]**

## Q7.

(a) (i) building
**or**
wood/timber/furniture
**or**
paper
**or**
packaging
**or**
fuel/burning

*do **not** accept 'logs' by itself*

1

(ii) farming/agriculture
**or**



STEMUP.CO.UK

building
**or**
roads

**1**

(iii) increased $CO_2$

**1**

(b) (i) trees photosynthesise/less photosynthesis takes place (and)
*accept burning trees (1)*

**1**

trees/photosynthesis uses carbon dioxide
*releases CO2 (1)*

**1**

lets in heat/energy
*do **not** accept sunshine*

**1**

prevents it escaping (from the atmosphere)
**or**
being reflected/retransmitted into space

**1**

(ii) global warming
*accept increased 'el nino'*

**or**
a named effect of global warming such as polar ice cap melt, climatic change, increased temperature/sea level rising
*accept warmer weather*

**1**

**[8]**

## Q8.

(a) award two marks for correct plotting

deduct 1 mark for each error, minimum mark 0

**2**

(b) 14 − 16
*transfer error allowed*

**1**

(c) lichen **types** increase with distance
*accept converse*

**1**

(d) any two from:

more bicycles used

smoke free zones

out of town shopping

**2**



STEMUP.CO.UK

park and ride/other schemes to keep cars from city centres e.g. pedestrian areas

increased use of public transport

less/improvements in factories/power stations

improved technology in cars

(e) $SO_2/NO_2/CO_2$ (or words)
**or**
oxides of nitrogen dissolves/combines/reacts (in water)
*do **not** accept mixes*
**1**

makes an (weak) acid
*n.b. acid as an adjective not a noun*
**1**

any one from:

acidification of water/soil

damage to trees/plants
**1**

damage/dissolve/erosion of cement **or**
marble/limestone **or** metals **or**
buildings **or** statues
*accept corrodes*

kills fish

loss of leaves
**1**

**[10]**

## Q9.

(a) fuels
**1**

cars
**1**

sulphur
**1**

dissolve
**1**

water
**1**

kill
**1**

plants
**1**



STEMUP.CO.UK

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

acid rain **or** specific effects of acid rain up to a maximum of **2**

global warming **or** consequences of global warming up to a maximum of **2**

increased greenhouse effect

**2**

(ii) deforestation **or** less plants
**or**
volcanoes
**or**
car (internal combustion engines)
**or**
types of domestic fires **or** central heating
**or**
burning rubbish **or** wood

*accept inversion effects in African* ***or*** *volcanic lakes*

**1**

**[10]**

## Q10.

(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**



STEMUP.CO.UK

(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]**

## Q11.

(a) increases in human population;
*gains 1 mark*

2 of:
have led to need for land to be used for housing;
and for industry; farming; transport; leisure
*each for 1 mark*

**3**

(b) 4 of e.g.
reduced number of habitats;
possible reduction in number of species;
more waste/pollution;
examples of pollution;
one effect of this waste;
reference to herbicides/pesticides;
references to excess fertilisers;
reference to food chain effects
*each for 1 mark*

**4**

**[7]**

## Q12.

(a) increased human population
increased standard of living
*each for 1 mark*

**2**



STEMUP.CO.UK

(b) nutrients absorbed by plants not replaced

*each for 1 mark*

**2**

(c) increased release of carbon dioxide into atmosphere when trees are burned
reduced rate of carbon dioxide removal from atmosphere
increased carbon dioxide absorbs more of energy radiated by Earth
global rise in temperature

*each for 1 mark*

**4**

**[8]**

## Q13.

e.g.
waste gases/air pollution harms living organisms
dumped waste can make land unfit to live on/
drainage pollutes water/harms organisms

*for 1 mark each*

*(if no marks can allow – pollution harms organisms = 1)*

**[2]**

## Q14.

Cogently argued based on biological principles, for **and**
against introduction of caterpillar
maximum of 4 pros e.g.
fewer chemicals used therefore less expense
less chemical damage to other plants
consequent benefits to food chains
fewer farm animals poisoned therefore more economic
countryside more varied therefore more attractive to tourists
tourists bring economic advantages
greater variety of habitats therefore greater variety of species

*any 4 for 1 mark each*

**4**

cons e.g.
danger to livelihoods if crops destroyed by caterpillar
relatively low chance of success since only one third of schemes effective world-wide
unlikely to be natural predators therefore ecological balance affected

*any 2 for 1 mark each*

**2**

cogently argued case **gains up to 2 marks**

**2**

**[8]**

## Q15.

(a) two thirds/66%



STEMUP.CO.UK

*for 1 mark*

1

(b) 2 of:
by sewage
by chemicals fertilizers

*any 2 for 1 mark each*

2

**[3]**

## Q16.

(i) fewer hedges
marsh drained
less woodland/trees
more farm buildings

*any 2 for 1 mark each*

2

(ii) fewer
e.g. fewer habitats

*for 1 mark each*

2

**[4]**

## Q17.

(a) 15%

*for 2 marks*

2

(b) combustion,
deforestation

*for 1 mark each*

2

(c) rice fields

*for 1 mark*

1

(d) greenhouse gases absorb energy,
which is radiated by Earth,
keeping the Earth warmer than it would otherwise be

*for 1 mark each*

3

**[8]**

## Q18.

(a) sulphur dioxide
sewage
pesticides

*for 1 mark each*

3



STEMUP.CO.UK

(b) *idea of* reduced numbers / loss of habitat (home) / killed or damaged by pollution

*for 1 mark*

1

**[4]**

## Q19.

(a) e.g.
timber
agriculture
roads / urban development / buildings

*any two for 1 mark each*

2

(b) *ideas that (accept reverse arguments)*
increased carbon dioxide content since less during photosynthesis
and locked-up as wood burning increases carbon dioxide content
increased activity of microbes increases carbon dioxide content
oxygen content reduced water vapour content reduced

*any five for 1 mark each*

5

**[7]**

## Q20.

(a) (i) 200 kJ

*for 1 mark*

1

(ii) 2

*gains 2 marks*
*(if answer incorrect, 20 / 1000 × 100 gains 1 mark)*

2

(b) *ideas that*
energy lost by animal (pig / cattle) / extra stage / extra trophic level
in waste materials e.g.
in muscular activity / movement
in keeping body temperature higher than surroundings / lost as heat

*any three for 1 mark each*
*references to respiration regarded as neutral*

3

(c) *ideas that*
controlling (high) temperature of surroundings / keeping indoors / insulating
reduces energy transferred from animal as heat / animal uses body heat to maintain temperature restricting movement (e.g. caging or keeping in darkness)
reduces muscular contraction / muscular activity

*each for 1 mark*
*accept respiration as explanation once only if neither explanation point has received credit*
*reject give more food / different food*

4

**[10]**



STEMUP.CO.UK

## Q21.

(a) fuels
smoke / sulphur dioxide
smoke / sulphur dioxide
pesticide / fertiliser
pesticide / fertiliser
*for 1 mark each*

**5**

(b) produces acid (rain)
*for 1 mark*

which may damage trees (*reject* plants unqualified)
which may make lakes / rivers too acid for animals or plants
which may affect stonework / metals / paint
*(ozone damage or global warming disqualifies the effect mark)*
*any one for 1 mark*

**2**

**[7]**

## Q22.

pros e.g.:

gum trees survive therefore less soil erosion
therefore food webs not disrupted
if no culling, whole Koala population may die
easier to cull because Koalas are difficult to catch

cons e.g.:

Koala's 'right to life' / ethical issue
better to transfer to reserves on mainland than kill
could use tranquillisers to catch without killing
could allow population to stabilise naturally
*max 4 of the above; max 3 pros or cons.*

**[4]**

## Q23.

(a) habitats destroyed
*accept idea that the places to live **or***
*food **or** minerals are reduced **or** less shelter*

**1**

(b) any **two** from

fertilisers / named fertilisers
*accept sewage / lime*

pesticides

herbicides

**2**



STEMUP.CO.UK

**[3]**

## Q24.

(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** $CH_4$*

**1**

**[5]**

## Q25.

(a) 3060 (kJ)

**1**

(b) (i) 22060 (kJ)

**1**

(ii) photosynthesis

**1**

(c) faeces / undigested food

*reference to movement and respiration are neutral*

urine / urea

**2**

*accept excretion / waste / droppings if <u>both</u> of the mark points are not gained*

(d) any **two** from



STEMUP.CO.UK

- control ripening
- herbicides
- prevent over ripening in transport
- stimulate root growth

  *other growth references are not neutral*
- use in tissue culture to produce large numbers of plantlets

**2**

**[7]**

## Q26.

(a) any **one** from:

herbicide

*accept weedkiller*

pesticide

*accept insect killer*
*do **not** accept fertilisers*

**1**

(b) any two from:

- (fossil) fuels are burned
- sulphur dioxide is released
- (sulphur dioxide) dissolves / reacts (in water)

*accept sulphur oxides are released*

**2**

**[3]**

## Q27.

(a) any two from:

agriculture

*accept land to grow crops **or** graze cattle*

buildings

roads

any 2 <u>different</u> uses for wood for 1 mark each

*accept wood for burning (energy)*
*accept timber for wood*

**2**

(b) (i) (USA has) more wealth / technology / devices / need for <u>electricity</u>

**1**

(ii) damage done

*e.g. pollutant / mining / non-renewable / deforestation*

**1**

linked effect



STEMUP.CO.UK

*e.g. greenhouse effect / visual pollution / run out of resources / flooding*

1

(c) (i) **Problem –** because some people did not want to pay the (landfill) tax

1

Waste dumped elsewhere

1

(ii) named example of

**Reduce –** such as less packaging / repairing

1

**Reuse –** such as glass bottles / shopping bags / ink jet cartridges

1

**Recycle –** such as metals, glass, paper

*Mark as a whole*

1

**[10]**

## Q28.

any **three** from

building

*accept building of houses, roads, power stations*

quarrying

farming

'dumping' waste

**[3]**

## Q29.

(a) any **three** from:

space

*accept land, room*

water

*accept rain*

nutrients

*accept fertilisers, nitrates, minerals*
*do **not** accept food*
*do **not** accept just sun*

light

carbon dioxide

3



STEMUP.CO.UK

(b) herbicides

1

[4]

## Q30.

**Quality of Written Communication**

1 mark for correct sequencing
burning → named gas → correct environmental problem

1

any **three** from:

coal / fossil fuel is <u>burned</u>

(water vapour and carbon dioxide and) sulphur dioxide formed
*accept nitrogen oxides*

(gases) dissolve / react in rain
*accept dissolve / react in water vapour*

make acid rain

damages trees
*accept harms plants **or** animals **or** damage to buildings*

makes rivers /lakes acidic
*accept carbon dioxide is a greenhouse gas / causes global warming for 2 marks*

3

[4]

## Q31.

indication that carbon dioxide emissions contribute to global warming
*accept 'greenhouse effect' for global warming*

1

argument for:
in terms of decreases carbon dioxide emissions because less (fuel / energy used for) transport / imports

1

argument against:
in terms of increases carbon dioxide emissions because of (fuel / energy used for) heating and lighting greenhouses

1

[3]

## Q32.

use less nitrate / fertiliser
*accept use none*



STEMUP.CO.UK

*use a different fertiliser is neutral*
*prevent nitrate fertiliser run off is neutral*

**1**

any **two** from:

explanation that with less or none the crops still grow

make more land available to grow more crops

monitoring of water

legislation

organic farming / manure

genetically modified crops

give babies bottled water

**2**

**[3]**

## Q33.

(a) carbon dioxide

**1**

methane

**1**

greenhouse effect

**1**

(b) coal / oil / gas / peat / petrol / paraffin

**1**

**[4]**

## Q34.

(a) 12 500

*incorrect numerical answer but clear evidence of correct working e.g. 365 million ÷ 365 ÷ 80* ***or*** *3285 million ÷ 365 ÷720 credit with (1)*

**2**

(b) (i) vegetation
→ (farm) animals → humans

*accept any correct variation on this theme*
*e.g. grass → lambs → humans*

**1**

(ii) any **three** linked points from

* less links in the food chain

***or*** *only one link in the food chain*

* energy 'wasted' **or** 'lost' **or**
'used' at each link



STEMUP.CO.UK

* energy 'wasted' **or** 'lost' in (the process of) respiration
* energy 'used' to maintain body temperature
* energy 'used' by the animals in movement

**3**

(c) people will eat more/greater proportion of food from plants

*accept people will eat less/smaller proportion of food from animals*
*do not credit 'everyone will stop eating meat'*

**1**

any **three** linked points from

*these marks are independent of the 'prediction' mark*
*do not credit 'food from plants will become less expensive'*

* meat will become more expensive
* only a limited area of land available on the planet (for food production **or** otherwise)
* more people means less land available for food production because some used for housing etc.
* land will become more expensive
* land will have to be used more efficiently

***or** more people will go hungry*
***or** people will (each) eat less*

* livestock farmers will try to improve efficiency
* (leading to) growth of 'factory farming'
* demand for food will rise (total)

**3**

**[10]**

## Q35.

(a) 1960 **or** 1961

**1**

(b) birth rate

*accept reproductive rate*

**1**

(c) (i) 1963

**1**

(ii) Fin go down
Sei go up

*both are required for the mark to be given*

**1**

(d) any **one** from



STEMUP.CO.UK

there are fewer Fin whales so Sei whales start being caught more

Sei whales are breeding more

*accept population goes up*

there are more Sei whales because there are fewer Fin whales to eat their food to compensate for lower catches of other whales

*accept argument based on predation*

**1**

**[5]**



STEMUP.CO.UK