AQA GCSE BIOLOGY (HIGHER) · 8461

# BIOLOGY



## MARK SCHEME

### 4.7.2 ORGANISATION OF AN ECOSYSTEM (PACK 4)

| SCORE | PERCENTAGE |
| --- | --- |
| /153 | % |

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.

Mark schemes

## Q1.

decay

1

warm (*)

1

moist (*)

1

grow

*(*) these words can be either order*

1

**[4]**

## Q2.

(a) **Quality of Written Communication**
The answer to this question requires ideas in good English, in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

*max 2 if ideas not well expressed*

in summer more greenfly

*accept increase in population*

1

in winter less greenfly

*accept decrease in population*

1

over the three years greenfly numbers decrease

*accept fall **or** drop for decrease*

1

(b) any **one** from

(number of) greenfly

severe **or** cold winters
toxic chemicals
destruction of habitats
disease
predators
weather
temperature

*do not accept food*

1

**[4]**

## Q3.



STEMUP.CO.UK

Quality of written communication: One mark for using correct scientific terms microorganisms and respiration

1

(air contains) oxygen

1

(microorganisms break down human waste) by respiration (which releases carbon dioxide)

1

**[3]**

## Q4.

any **five** from:

- the amount of energy (in the biomass of organisms) is reduced at each successive stage in a food chain
- all of prey organism is not consumed
- energy is 'lost' as the organisms' waste materials
- energy is transferred / lost during respiration
- energy is transferred / lost as movement (kinetic energy)
- energy is transferred / lost as heat (thermal energy)
- energy is transferred / lost to the surroundings
- the only energy transferred to a higher level is that which the organisms have used in growing

*statements about energy flow the wrong way are neutral*

**[5]**

## Q5.

(a) all bars correct for greenfly, ladybird (± one square) and blackbird (less than one square)

1

bars are centred

*do not accept pyramid shape if **all** to left or right of centre*

1

bars are labelled (in correct sequence)

1

(b) $\frac{1}{12}$ **or** 8.3% **or** 1:12

*if answer is incorrect accept correct working out (eg* $\frac{50}{600}$ *) for 1 mark*
*accept 12 or 12:1 for 1 mark*
*accept 8.3 for 1 mark (without %)*

2



STEMUP.CO.UK

**[5]**

## Q6.

(a) 115

**1**

(b) any **four** from

less energy lost / used

as heat lost to the atmosphere

since warm indoors

*accept temperature controlled*

(less energy lost) in movement

since movement restricted

more growth / eggs

*accept prevents loss of body mass **or** gets fatter / weight gain*

**4**

**[5]**

## Q7.

(a) any **three** from

*different factors are required for each mark*

hares breeding

(amount) of food **or** plants available

eaten by lynx **or** predators **or** reference to size of lynx / predator population

hares dying **or** reference to being killed by humans

disease (spreads through the population)

(competition) for space **or** (lack of) space)

*alternative to either of these points but not both change in environment **or** habitat*

temperature **or** weather **or** climate

**3**

(b) any **two** from

more food **or** hares for lynx encourages more breeding (in lynx)

*accept less food, less breeding*

more food **or** hares allows greater survival rate of cubs **or** adult lynx

*accept less food, less survival*



STEMUP.CO.UK

idea of time lag for breeding **or** time lag for dying

2

**[5]**

## Q8.

(a) (i) photosynthesis

1

(ii) respiration

*do not credit combustion*

*do not credit decay*

1

(iii) dry

*accept hot **or** windy **or** drought*

1

(b) any **three** from

* evaporation (of water)

***or** loss of water vapour*

* (mostly) from the leaf / leaves

*do not credit incorrect reference to leaves*

* through the stomata

*accept through each stoma*

*accept through the stomas(sic)*

* causing a pull

***or** causing an increase in osmotic potential (at the top of the plant)*

***or** causing an increase in water potential (at the top of the plant) **or** causing a decrease in osmotic pressure (at the top of the plant)*

* (so that) water moves up (through the plant)

*do not credit water vapour moves up through the plant*

* as the transpiration stream

* water enters through roots (and goes up plants)

3

**[6]**

## Q9.

(a) evaporates

1

sea

1

sun

*accept sun*



STEMUP.CO.UK

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]**

## Q10.

(a) diatoms photosynthesise **or** are producers

1

the amount of growth depends upon the energy **or** light they get

*accept more light means more growth*
***or** they multiply more in more light*
*do not accept they need light*

1

(b) (i) eaten by small fish

*do not accept eaten by fish*

1

minerals **or** nitrate **or** phosphates
**or** nutrients **or** food supply used up
**or** reduced

1

(ii) any **two** from

gets colder
light decreases
end of their life span **or** die

*accept more being eaten than being formed*

eaten by small fish

*do not accept a decrease in nitrates*
***or** phosphates*

1

(c) increased minerals **or** nitrates **or** phosphates

1



STEMUP.CO.UK

any **one** from

due to death **or** decay of diatoms **or** fish

*do not accept death of large fish*

1

influx of minerals in an ocean current

*do not accept extraneous pollution* ***or*** *dumping by a ship*

1

**[8]**

## Q11.

(a) more oxygen/microbes more active

1

(b) plenty of microbes
moisture/not too wet
warmth food for microbes

*any 2 for 1 mark each*

2

**[3]**

## Q12.

(a) (i) predator (allow carnivore)

(ii) prey

*each for 1 mark*

2

(b) fewer ladybirds; because less food/ladybirds starve
**or**
no change; because alternative food supply

*each for 1 mark*

2

(c) any two suitable environmental effects e.g.
food;
diseases;
other predators;
space;
insecticides

*any two for 1 mark each*

2

**[6]**

## Q13.



STEMUP.CO.UK

(a) warmth/heat
oxygen/air
moisture
microbes/micro-organisms/fungi/moulds/bacteria

*any three for 1 mark each*

**3**

(b) do not rot

*for 1 mark*

**1**

**[4]**

## Q14.

(a) *idea:*
wood goodness recycled/crops goodness removed

*gains 1 mark*

**1**

**but**
wood minerals/nutrients recycled/crops remove nutrients/minerals

*gains 2 marks*

wood and crops compared

*for 1 mark*

**2**

(b) (add) fertiliser/nutrients/minerals
(add) manure/animal waste/compost

*any two for 1 mark each*

*(accept move to new area for 1 mark)*
rotation

*max marks 2*

**2**

**[5]**

## Q15.

(a) (i) carbohydrate*/fat/protein in cell
(or example e.g. glucose/starch)

*for 1 mark*

**1**

(ii) $\frac{21500}{1050000} \times 100$ or 2.(05)%

*for 1 mark*

**1**

(b) *ideas that:*
little energy used for growth/most wasted/lost

*gains 1 mark*

**but**
only 4% used for new growth



STEMUP.CO.UK

*gains 2 marks*

evidence/idea that this is repeated at each stage
idea of diminishing return/less energy at each stage

*for 1 mark each*
*(maximum of 3)*

**3**

(c) *idea:*
plants at the start of all food chains
shorter food chain
more efficient/less energy lost/more food
cheaper/more economic
(must bear consequence of at least one of earlier marks)

*any three for 1 mark each*

**3**

**[8]**

## Q16.

(a) microbes/worms/bacteria/fungi/moulds/
micro-organisms/decomposers
(not germs/bugs/slugs/organisms - ignore these)

*any one for 1 mark*

**1**

(b) idea warm/hot/heat (not sun)
oxygen/air
moist/water/wet/rain (not 'turn the compost' unless qualified)
If no answer given in (a), one e.g. could be credited in (b)

*any two in any order for 1 mark each*

**2**

**[3]**

## Q17.

(a) (i) methane/biogas/natural gas

*(accept formula) for 1 mark*

**1**

(ii) cooking/heating/burning/fuel/vehicle fuel/lighting

*for 1 mark*

**1**

(b) *idea that* it is a soil improver/fertiliser/provides nutrients or makes soil richer or improves plant growth/makes plants grow better
(not "plants" alone/gardens/spreading on land)

*for 1 mark*

**1**

**[3]**

## Q18.

(a) predator/carnivore

*(not consumer/hunter)*



STEMUP.CO.UK

*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 = O maths but 1 mark for possible reason can be awarded - more (small mites) eaten

*each for 1 mark*

2

**[6]**

## Q19.

(a) *idea:*
soil wetter
soil less aerated
less food for moles/voles/foxes/badgers/birds
soil less fertile (less leaves in soil not enough on its own)
less food grown
earthworms die out/fewer earthworms
(not just "earthworms get eaten")

*any 4 for 1 mark each*

4

(b) method
advantage
disadvantage
*e.g.**

- chemical
- kills worm/affects reproduction/maintains earthworm population
- persistent/food chain/kill earthworm

**or**

- import biological central/predator/disease/parasite
- kills worm/affects reproduction/maintains earthworm population
- may attack other animals/cause same sort of problems as New Zealand worms

(* credit other plausible suggestions for method/advantage/disadvantage)

*for 1 mark each*

3

**[7]**



STEMUP.CO.UK

## Q20.

*idea that*

microbes/bacteria/fungi/moulds/micro-organisms/decomposers.
NOT germs/worms/bugs/organisms

*gains 1 mark*

**but** microbes etc. need/grow/cause decay/decompose in

*gains 2 marks*

**but** microbes etc. need/grow/caused decay/decompose
faster in warm/moist conditions

*gains 3 marks*

(Allow reverse arguments)

**[3]**

## Q21.

(a) predator
prey

*no alternatives*
*for 1 mark each*

**2**

(b) *idea that*
(wasps) increase OR decrease

*gains 1 mark*

**but**
(wasps) increase then decrease/peaks at

*gains 2 marks*
*answers must match*

*idea of change in food supply/whiteflies*
more food/whiteflies OR less food/ whiteflies

*gains 1 mark*

**but**
more food/whiteflies then less food/whiteflies

*gains 2 marks*

**or**
wasps follow trend in whiteflies

*for 2 marks*

**or**
linked to increase/decrease other environmental effects
e.g. more/less food for wasps, use of insecticide
e.g. temperature change, other predator
If increase/decrease not given then second part (reason) gains no marks

*for 1 mark each*

**4**



STEMUP.CO.UK

(c) *idea that*
wasps die out/die off/fly away/migrate/leave greenhouse but NOT 'die' alone
*for 1 mark*

1

**[7]**

## Q22.

Factor and effect needed.
*idea*

- killed by poachers (for tusks/ivory)
- not enough food for elephants because humans cut down trees
- not enough space because more used by people/agriculture
- food/space destroyed by humans
- killed for food

*any three for 1 mark each*

**[3]**

## Q23.

(a) (i) (tiny green) plants / phytoplankton
*for 1 mark*

1

(ii)
- penguin
- shrimp
- cod
- squid

*any two for 1 mark*

1

(b) Decrease: seals will eat more squid and penguins
*for 1 mark*

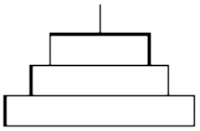
1

Stay the same:

- more shrimp for squid and penguins
- squid and penguins increase balances the extra eaten by seals
- seals find other prey [allow shrimps]

*any two for 1 mark each*

2

(c) 

*credit*  *for seal*



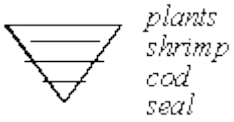
STEMUP.CO.UK

*allow* 

- correct / shape (designs need to be to scale)
- correctly labelled with organisms

(if wholly correct but inverted then credit 1 mark)

*each for 1 mark*




**2**

**[7]**

## Q24.

(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]**

## Q25.

(a) Decrease: seals will eat more squid and penguins

*for 1 mark*

**1**

Stay the same:
- more shrimp/food for squid and penguins

*ideas that*

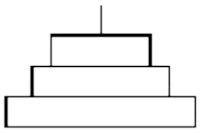
- increase in squid and penguins balances the extra eaten by seals
- seals find other prey (allow start to eat shrimps)

*any two for one mark each*

**2**



STEMUP.CO.UK

(b) 

*credit*  *for seal*

*allow*



- correct shape (doesn‘t need to be to scale)
- correctly with organisms

*(if wholly correct but inverted then credit 1 mark)*

*each for 1 mark*

**2**

(c)
- seals are mammals
- *idea that* seals have (to maintain) a constant body temperature
  *[allow warm blooded]*
- heat losses to cold seas
- more of food eaten used to replace heat loss

*(credit <u>use</u> of figures* i.e. 95% loss compared to 90%
or 5% efficient compared to 10%
or 20 : 1 conversion ratio compared to 10 : 1
*with 1 mark)*

*any three for 1 mark each*

**3**

(d) (i) *ideas that*

- reduce number of fishing boats allowed
- breed in captivity and then release
- agree quotas [not an unqualified ‘ban’]
- avoid breeding areas
- avoid breeding seasons
- increase size of net mesh/don’t catch small fish
- limit catches of shrimps
- cull seals

*any two for 1 mark each*
*[allow any other reasonable answer]*

**2**



STEMUP.CO.UK

(ii)
- breeding areas closer to some countries than others
- difficult to police/easy to cheat/'poach'
- difficult to agree quotas
- some countries eat more fish than others
- best weather for fishing maybe in breeding seasons
- fisherman/trawlers need employment
- big demand for cod

*any one for 1 mark*
*[allow any other sensible response]*

**1**

**[11]**

## Q26.

(a) (i) (too) cold / all moisture / <u>water</u> frozen / no moisture / no warmth / conditions for decay are absent.

*for 1 mark*

(*No* oxygen is neutral)
(*Do not accept* frozen or ice has preserved them)

**1**

(ii)
- (bacteria have) no oxygen / air (because dead fish covered in mud)

(No moisture x)

(No moisture and no oxygen or warmth x)

- bones / hard parts do not decay easily

*idea that*

- material of fish replaced by minerals

*any two for 1 mark each*

**2**

(b) *ideas that*

- mammoths lived at the same time as humans / there was man in these times
- mammoths lived in the same place as humans
- humans hunted mammoths / ate mammoths / were carnivorous / for fur etc
- reference to later use of more advanced weapons
- humans needed to protect themselves from mammoths
- humans used flints / weapons / tools



STEMUP.CO.UK

*any two for 1 mark each*

**2**

(c) *idea that*

- environment changed / became too cold / became too warm / vegetation changed / humans destroyed environment
- (new) predator / humans killed them
- new disease
- new competitor / type of elephant
- shortage of food / no food / ran out of prey
- mammoths reproduced too slowly
- mammoths didn't adapt to changes

*any two for 1 mark each*

**2**

**[7]**

## Q27.

(a)
- warmth / heat / hot / not cold  if refer to weather or
- moisture / water  conditions outside the compost heap, *do not allow*
- air / oxygen (*allow idea that* not squashed down)

*in any order for 1 mark each*

**3**

(b) *idea that* nutrients / minerals / nitrates are recycled / fertilise the soil (*do not allow* food / goodness)

*for 1 mark*

**1**

**[4]**

## Q28.

(a) idea that

- light doesn't reach deeper parts
- plants need / absorb light
- to make food

*gain 1 mark each to maximum of 2*

**but**
so they can photosynthesise

*gains 2 marks*

**2**



STEMUP.CO.UK

(b) herring will be on the bottom
herring follow / will be feeding on the copepods

independent marking points

*for 1 mark each*

**2**

**[4]**

## Q29.

(a) prey

*for 1 mark*

**1**

(b)
- disease
- eaten (by predators) / predators
- (over)fished / caught by fishermen
- competition for food / not enough food (for all the baby fish) / no food

(*do not allow* they migrate or move elsewhere)

*any three for 1 mark each*

**3**

**[4]**



STEMUP.CO.UK