

MARK SCHEME

GCSE

BIOLOGY

AQA - TRIPLE SCIENCE

B 7 - TEST 4

ECOLOGY

Intermediate

Mark schemes

1.

(a) 3-layered triangular pyramid

as blocks or layered triangle, ignore (small) gaps between layers

1

(pyramid) labelled in food chain order

all three labels are required

for 2 marks the pyramid must be fully correct

1

(b) (i) C

1

(ii) shortest **or** fewest stages / transfers / (trophic) levels

allow only if (b)(i) is C or blank

1

less losses in waste / faeces / urine / CO₂ / excretion

allow smaller amount uneaten

1

less loss in respiration / heat / movement

allow less lost keeping warm

*do **not** allow energy for respiration*

*do **not** allow respiration makes energy*

*allow less loss (of biomass / energy) **or** less transfer (of biomass / energy) to surroundings if neither 2nd nor 3rd point given, for 1 mark*

1

[6]

2.

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 apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1 – 2 marks)

There is at least one reason for deforestation

or

an attempt at a description of at least one way deforestation is affecting the atmosphere.

Level 2 (3 – 4 marks)

There is at least one reason for deforestation

and

a description of the way deforestation is affecting one gas in the atmosphere

or

the process that causes an effect.

Level 3 (5 – 6 marks)

There are reasons for deforestation

and

a clear description of the way deforestation is affecting one gas in the atmosphere

and

the process that causes this.

examples of the points made in the response

Reasons for deforestation

- timber for construction / furniture / boat building / paper production
- growing plants for biofuels for motor fuel / aviation / lawnmowers
- use of wood as a fuel
- land for building or agriculture to provide food, such as rice fields and cattle ranching

Effects of deforestation

- increase in carbon dioxide in atmosphere
due to burning
due to activities of microbes
less carbon dioxide taken in / locked up (by trees)
less photosynthesis
- increase in methane in atmosphere
due to rice production / cattle

extra information

ignore references to oxygen

accept explanations of the effect of water (vapour)

[6]

3.

(a) (i) 1800(g)

1

(ii) triangular pyramid with four layers

accept ecf from (a)(i)

allow inverted pyramid

1

correctly labelled in order of food chain

1

(b) any **two** from:

- (lost as) crab faeces / not all digested
*allow waste / excretion for **one** mark if neither faeces nor urine are given*
- (lost as) crab urine / urea
- loss of carbon dioxide by crab
accept (lost via) respiration
- not all the limpet is eaten eg don't eat the shell
- not **all** limpets are eaten (by crabs)
*allow not enough crabs to eat **all** the limpets / the limpet population
ignore energy losses, such as movement*

2

[5]

4.

(a) limiting their movement

or

controlling the temperature of their surroundings

1

reason:

reduces energy transfer

if no other marks awarded, allow 1 mark for: 'fit more chickens in same space'

1

- (b) (i) without oxygen
ignore 'without air' 1
- (ii) any **two** from:
 - ethanol
allow alcohol
 - carbon dioxide
 - lactic acid.**do not accept** energy / ATP (apply list rule) 2
- (c) enzymes are denatured / change shape
ignore microbes are killed 1
- (enzyme) shape is vital for function **or** won't work (as efficiently) 1
- (d) (i) 200 1
- (ii) 120
allow ecf from (d)(i)
e.g.
 $\frac{60}{100} \times (i)$ 1
- (e) causes global warming 1
- one predicted consequence of global warming
eg rising sea levels, climate change, change in migration patterns, change in distribution of species
- or**
methane is flammable
so might cause fire / damage
if no other marks awarded, allow methane is a greenhouse gas for 1 mark 1

[11]

5.

- (a) (i) 76.0 / 76
correct answer with or without working gains 2 marks
allow 76.04 for 2 marks
allow 76.04 with extra decimal places eg 76.042 for 1 mark
- $\frac{465}{611.5}$ for 1 mark 2

- (ii) mass of fish declines (until 2008)
ignore use of numbers
allow number of fish decline (until 2008) 1
- (due to an) increase in fishing / overfishing 1
- and then rises (until 2010) 1
- (which could be due to) quotas / net restrictions working
*allow any reasonable suggestion, such as countries swapping
quotas or restrictions on fishing during breeding seasons*
ignore less fishing
*if no other marks awarded allow 1 mark for a decrease in mass **and**
an increase in mass if answer relates to sustainable fishing* 1
- (iii) (this is due to) public awareness / demand
allow legislation / rules 1
- (b) fishing quotas / bans 1
- (small) net / mesh size
if size of net is stated then it must be smaller
if size of mesh is stated then it must be larger 1
- (c) (fish) cannot move freely / as much 1
- (therefore) less energy loss from the fish
*do **not** allow 'no energy is lost'*
*ignore references to less heat loss through controlling body
temperature*
ignore references to respiration 1
- (there is) more food available / better quality food / fed more often
accept 'high-protein food (for making cells)' 1
- (so) there is more energy for growth **or** (more food) is converted to biomass 1

[13]

6. (a) (i) counts / 12 1
- × 120 × 80 / × 9600
or
× area of field 1
- (ii) (more) quadrats / repeats 1
- placed randomly
ignore method of achieving randomness 1
- (b) (i) any **three** from:
- temperature / warmth / heat
 - water / rain
 - minerals / ions / salts (in soil)
allow nutrients / fertiliser / soil fertility
ignore food
 - pH (of soil)
 - trampling
 - herbivores
ignore predators
 - competition (with other species)
 - pollution qualified e.g. SO₂ / herbicide
 - wind (related to seed dispersal).
ignore space / oxygen / CO₂ / soil unqualified
- 3

- (ii) light needed for photosynthesis 1
- for making food / sugar / etc. 1
- effect on buttercup distribution eg more plants in sunny areas / fewer plants in shady areas 1
- (c) (i) fertiliser / ions / salts cause growth of algae / plants 1
- (algae / plants) block light 1
- (low light) causes algae / plants to die 1
- microorganisms / bacteria feed on / break down / cause decay of organic matter / of dead plants
- do not allow germs / viruses* 1
- (aerobic) respiration (by microbes) uses O₂
- do not allow anaerobic* 1
- (ii) sewage / toxic chemicals / correct named example eg metals / bleach / disinfectant / detergent etc
- allow suitable named examples eg metals such as Pb / Zn / Cr / oil / SO₂ / acid rain / pesticides / litter*
- ignore chemicals unqualified*
- ignore waste unqualified*
- ignore human waste / domestic waste / industrial waste unqualified* 1
- (d) (i) 2 1
- (ii) more food
- allow other sensible suggestion eg more species colonise from tributary streams after forest* 1
- (iii) number of stonefly species decreases (from **A** to **B** / **B** to **C** / **A** to **C**) as more pollution enters river / less oxygen
- allow fewer species in more polluted water*
- ignore none are found at site C* 1
- [19]**
7. (a) (i) increase / higher / faster / quicker 1

numerical comparison eg from 30 to 60 **or** by 30 **or** it is 30 at 15°C *and* 60 at 25°C

award 2 marks for doubles / goes twice as fast or 30 units more

1

(ii) any **two** from:

- oxygen / air (in)
ignore air out
*do **not** accept lets oxygen*
ignore reference to other substances / light passing in or out
- for microorganisms / bacteria / microbes / fungi / decomposers
ignore microorganisms passing in
ignore worms / germs / bugs / other detritivores
- (for aerobic) respiration (of microorganisms)
- let excess heat out
ignore heat in

2

(b) compost contains minerals / nutrients / elements / ions / named

allow improve drainage / moisture

allow contains nitrogen

ignore CO₂ / food / goodness / fertiliser

*do **not** accept vitamins / glucose*

1

[5]

8.

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 in the [Marking guidance](#).

0 marks

No relevant content.

Level 1 (1-2 marks)

For at least one process **either** the organism that carries it out **or** the carbon compound used **or** the carbon compound produced is described **or** for at least one organism **either** the carbon compound it uses **or** the carbon compound it produces is described **or** at least one process is named

Level 2 (3-4 marks)

For some processes (at least one of which is named) **either** the organisms involved **or** the carbon compounds used **or** the carbon compounds produced are described

Level 3 (5-6 marks)

For at least one named process an organism **and** either the carbon compound used for the process **or** the carbon compound produced by the process are described **and** for other processes (at least one of which is named) **either** the organism **or** the carbon compounds used **or** the carbon compounds produced are described (as in Level 2)

Examples of Biology points made in the response:

- (green) plants photosynthesise
- photosynthesis takes in carbon dioxide
- (green) plants use carbon to make carbohydrate / protein / fat / organic compounds / named (e.g. enzymes / cellulose)
- animals eat (green) plants (and other animals)
- (green) plants respire
- animals respire
- respiration releases carbon dioxide
- (green) plants and animals die
- microorganisms decay / decompose / rot / break down / feed on dead organisms
- microorganisms respire

[6]

9.

(i) customers concerned with the environment / green issues (will be attracted) owtte
allow idea of helping the world

1

(ii) reduces transport of food

1

less carbon dioxide / greenhouse gas / emissions / harmful gases / lower carbon footprint (from transport)

allow less fuel used

ignore pollution unqualified

1

[3]