AQA GCSE BIOLOGY (HIGHER) · 8461

# BIOLOGY



## MARK SCHEME

### 4.7.2 ORGANISATION OF AN ECOSYSTEM (PACK 2)

| SCORE | PERCENTAGE |
| --- | --- |
| /239 | % |

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## Q1.

(a) (i) 5.2

*award **2** marks for correct answer, irrespective of working or lack of it*

*award **1** mark for 62.4 ÷ 12 only with incorrect or no answer*

**2**

(ii) the smaller the (mass of the) bird the more energy is needed (per gram of body mass)

*allow converse*

*ignore figures*

**1**

(iii) smaller bird has larger surface area : volume / mass ratio

*allow converse*

**1**

so heat / energy lost more quickly

*allow lose more heat / energy*

*if (a)(ii) describes a trend of more energy with increasing body mass allow **one** mark for idea of more energy needed for flight*

**1**

(b) larger birds spend less time feeding

*accept converse*

*allow the less energy they need per day the longer they spend feeding*

**1**

since they need less food per gram of body mass (to satisfy energy needs)

**1**

**[7]**

## Q2.

(a) place all the quadrats randomly on the lawn

**1**

(b) (i) 1 4

2 2

3 2

4 0

*all 4 counts correct*

**1**

Total = 15

*total correct for their figures*

**1**



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(ii) 1.5

*allow ecf from (b)(i)*

**1**

(iii) 180

*correct answer with or without working*

*if answer incorrect, allow **1** mark for* $\frac{15}{10}$ *x 120* ***or*** *15 x 20*

***or*** $\frac{15}{10}$ *x 12 x 10*

***or*** *1.5 x 12 x 10* ***or*** *1.5 x 120*

*allow ecf from (b)(ii)*

*allow **1** mark if only 1 error*

**2**

(c) use a larger sample size / more quadrats

*ignore repeats but allow repeat in different places*

*ignore 'count them all'*

**or**

use bigger quadrats

**1**

**[7]**

## Q3.

(a) use of quadrat / point frame

*allow description*

**1**

randomly placed / random sampling

*ignore reference to transects*

**1**

(b) (i) 6

**1**

(ii) more light in A / in field / where sunny

*ignore sun*

**1**

more / better / faster photosynthesis in A / with more light

*allow converse*

**1**

(iii) use light meter / measure light intensity in both habitats

**1**

take many measurements at same time of the day

**1**

**or**

laboratory / field investigation with 2 batches high light and low light (1)

count or number of flowers in each (1)



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*counting point is dependent on investigation point*

(c) more glucose / energy available

*allow other named product eg protein*
*allow if more energy produced*

**1**

for growth

*dependent on 1st mark*

**1**

**[9]**

## Q4.

(a) microorganisms / microbes / bacteria / fungi / decomposers

*allow named example **or** mould*
*ignore germs / worms / other detritivores*

**1**

(b) (weather / it is) warm(er) / hot(ter)

*accept optimum conditions for enzymes*
*allow cold(er) <u>in winter</u>*
*ignore wet(ter) / light(er) / sun*
*do **not** accept heat dries the leaves out*

**1**

(c) oxygen

*no mark if more than one box is ticked*

**1**

**[3]**

## Q5.

(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 <u>more</u>*

**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)



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- let excess heat out
  *ignore heat in*

**2**

(b) compost contains minerals / nutrients / elements / ions / named
*allow improve drainage / moisture*
*allow contains nitrogen*
*ignore $CO_2$ / food / goodness / fertiliser*
*do **not** accept vitamins / glucose*

**1**

**[5]**

## Q6.

(a) a higher concentration would be difficult to stir

**1**

(b) (i) methane

**1**

(ii) 60
*100 - (5 + 35) but incorrect answer allow 1 mark*

**2**

(c) (i) aerobic respiration

**1**

(ii) oxygen

**1**

**[6]**

## Q7.

(a) 40 – 60 hours

**1**

(b) (i) decrease

**1**

1st slowly then faster / appropriate detail from the graph – e.g. from 7.8 to 0 / faster after 4 – 10h

**1**

(ii) oxygen after glucose
*extra box ticked cancels 1 mark*

**1**

oxygen less than glucose

**1**

(iii) respiration

**1**

**[6]**

## Q8.

(a) (i) without <u>oxygen</u>



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*ignore reference to 'air'*

1

(ii) otherwise difficult to stir / to pump / to transfer

*allow prevent 'clogging' owtte*

1

(iii) need to stir / pump / heat

1

(b) (i) rises then falls

1

then levels / slight rise

1

quantitative descriptor
- e.g. to 80% / max. on day
4 / min. on day 16

*accept other valid quantitative descriptor*

*allow accuracy ± ½ small square*

1

(ii) 16 (15.5 to 16.4)

1

(c) any **two** from:

- oxygen present
- ($CO_2$ produced) by <u>aerobic</u> respiration

  **or** not much anaerobic respiration
- **not** much methane / $CH_4$ produced

2

**[9]**

## Q9.

(a) any **two** from:
- (microorganisms) produce enzyme / amylase / carbohydrase
- to break down / digest starch / carbohydrate (in potato)
- into sugars / glucose
- which diffuse back into microorganism

*accept decomposer / fungus / bacterium / cell*

2

(b) (i) (microorganisms)

*(accept bacteria / fungi / decomposers)*

digest the potato (starch)

*allow breakdown / feed on / consume / decompose*

*do **not** accept eat*

1

use starch / glucose / carbohydrate for <u>respiration</u>

1



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which releases carbon dioxide / $CO_2$ (into the atmosphere)

1

(ii) up to 40 °C the potato took less time to decay / the rate is faster

*ignore yes / no*

*answers must be comparative*

1

but at 50 °C it took longer / the rate is slower

**or**

at 50 °C / a high(er) temperature the enzymes have denatured

*accept at a higher temperature / above 40 °C*

1

**[7]**

## Q10.

(a) any **two** from:

- fewer trees to take in carbon dioxide for photosynthesis
- decomposers / microorganisms respire (as they decay debris) releasing carbon dioxide
- burning of wood releases carbon dioxide

*allow carbon dioxide released by burning fossil fuels in vehicles / factories*

2

(b) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best − fit' approach to the marking.

**0 marks**
No relevant content.

**Level 1 (1 − 2 marks)**
There is a brief description of some steps in the process but the order is not clear with little biological vocabulary used.

**Level 2 (3 − 4 marks)**
There is a reasonably clear description of the process involving many of the steps and using some biological vocabulary.

**Level 3 (5 − 6 marks)**
There is a clear, logical and detailed scientific description of the process using appropriate biological vocabulary.

**examples of biology points made in the response:**

- this contains mineral ions (and organic matter)
- this increases growth of algae / water plants
- the plants / algae (underneath) die
- due to lack of light / photosynthesis / space
- decomposers / microorganisms feed on decaying matter **or** multiply rapidly
- the respiration of decomposers uses up all the oxygen



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- so invertebrates die due to lack of oxygen
- this is called eutrophication

6

[8]

## Q11.

(a) estimate / count number of squares covered

*do **not** allow number of squares containing algae*

1

divide by total number of squares and multiply by 100 / multiply by 4

1

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

- more / most in North east facing
- followed by the North facing
- the South facing had no green alga / least

2

(ii) 40 (%)

1

two directions had this value (rest of directions had only one)

*accept this is the most common percentage / value*

*2nd mark only if 40(%)*

1

(iii) any **three** from:

- light / sunlight

  *ignore Sun / carbon dioxide*
- temperature

  *do **not** accept oxygen*
- availability of water / humidity
- availability of nutrients
- wind
- pollution qualified eg $SO_2$, acid rain, soot
- grazing by animals eg slugs
- competition with other species
- pH

3

(iv) eg (*for light*)

*allow overlap between factors*

light intensity *least* on north / north east facing parts of tree (1)

1

green algae adapted for photosynthesis in low light intensities (1)

*allow, since less light from Sun, cooler so less evaporation*

1

negative effect of high light intensity on green algal chlorophyll / photosynthetic pigments (1)

*allow green algae unable to withstand desiccation*

1



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**or** (*for temperature*)

temperature highest on south (and west) facing parts of tree

(causing) more water to evaporate from this side of tree

green algae unable to withstand desiccation

**or** (*for moisture / rainfall*)

rainfall highest on north / north east facing parts of tree (1)

(giving) more moisture on this part of tree (1)

green algae less likely to desiccate (1)

**or** (*for wind*)

wind speed / duration greatest on south (and west) facing parts of tree (1)

(causing) more water to evaporate from this side of tree (1)

*allow wind carries pollutants*

*allow pollutants toxic to algae*

green algae unable to withstand desiccation (1)

**or** (*from pollution*)

from south / south west (1)

wind carries pollutants (1)

pollutants toxic to / kill algae (1)

(c) (i) as the concentration of ammonia increases so does the % abundance of nitrophyte lichens

*allow positive correlation / proportional*

*allow directly proportional*

**1**

scattered results / wide spread

*allow use of approximate numbers to demonstrate scattering*

**or**

for any value of one parameter there is a wide range of the other

*allow not a strong relationship / correlation*

**1**

(ii) not very useful / unreliable

*accept only gives a rough idea / only a general indication*

**1**

for any value of one parameter there is a wide range of the other

*allow correlation rather than direct relationship*



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**or**

scattered results

1

**[16]**

## Q12.

(a) 8.05 / 8.1 / 8

*correct answer with or without working gains **2** marks*
*allow **1** mark for 8.0 **or** 8.10*
*allow 35/100 x 23 (million) for **1** mark if no answer or incorrect answer*
*allow **1** mark for 805 **or** 8 050 000*

2

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

- less landfill sites used
- less cost (of landfill sites) / saves money
- less effort / cost to collect
  *allow less to collect*

1

(ii) compost can be used on garden

*allow idea of compost can be used to help plant growth **or** compost provides minerals / named **or** compost improves the soil*

1

**[4]**

## Q13.

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



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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)

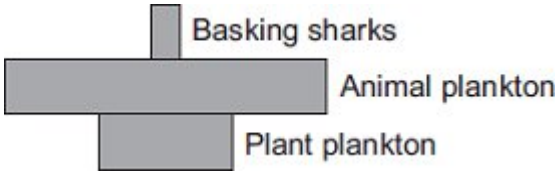
**Examples of Biology points made in the response:**

- (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]**

## Q14.

(a)




*if more than one box is ticked award no mark*

**1**

(b) increasing / higher light / temperature

*ignore references to months other than February – April*

*do **not** accept mineral / ions increase*

**1**

more / increased photosynthesis

*for both marks there must be a reference to 'more' at least once (e.g. 'more light for photosynthesis' gains **2** marks)*

*allow **1** mark for reference to light **and** photosynthesis without an idea of 'more'*

**1**

(c) increase due to increase in plant plankton / food

*ignore references to months other than April – July*

**1**

decrease due to fall in plant plankton / food **or** decrease as eaten by (basking) sharks

*allow decrease as eaten by predators / animals / fish*



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1

(d) fall due to use / intake by plant (plankton)

*ignore ref to no change section of graph*

*for fall allow March / April*

*ignore May / February*

1

increase due to decay / decomposition / breakdown

*for increase allow any month in range August to November*

*ignore December*

1

of dead (plant / animal) plankton

*allow of dead organisms / waste*

1

**[8]**

## Q15.

(a) chose places randomly

1

method of obtaining randomness, e.g. (grid and) random numbers

*allow thrown qualified e.g. over shoulder, eyes shut*

*allow max 1 for mention of a transect with sampling at regular or random intervals*

1

(b) (i) 7 **or** 8

*allow fractions / decimals between 7 and 8*

1

(ii) count number of whole squares and add estimate of area covered by part squares

*allow reference to counting squares with ½ cover or more*

*allow clear working on diagram and / or (b)(i)*

1

(iii) 28 – 32 (in range)

*allow ecf*

*if answer incorrect allow **1** mark for reasonable reference to divided by 25 or multiplied by 4*

2

(c) nutrients / minerals / ions / fertiliser / water

*allow light / pH / trampling / soil texture / grazing / mowing / weed killer / where seeds originally fell*

*ignore pollution / soil / competition if unqualified*

*ignore temperature / wind*

1

**[7]**

## Q16.



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(a) (i) (compost produced) quicker / faster / takes less time

*it = tumbler bin*

*answers should be comparative eg **only** 6 weeks = 1 mark*

*6 weeks = 0 marks*

**1**

(ii) any **two** from:

- takes less space
- cheaper (to buy)
- don't need to turn / rotate it

*it = fixed bin*

*references to space and cost should be comparative*

*do **not** accept unqualified data*

**2**

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

- faster rise (in tumbler)
- higher (in tumbler) **or** 2 correct number readings
- levels off (in tumbler) **or** continues to rise in fixed

*it = tumbler bin*

*ignore eg faster compost*

**2**

(ii) microorganisms / microbes / decomposers

*allow bacteria / fungi / detritus feeders / worms / other named examples of detritus feeders / mould*

**1**

aerobic

*allow air(y)*

*allow oxygen(ated)*

**1**

(iii) faster respiration / decay / **or** microorganisms / microbes / decomposers work faster (in tumbler)

*allow converse*

*allow bacteria / fungi / mould*

**1**

so more heat produced (in tumbler)

*ignore heat produced by friction*

**OR**

more air / more oxygen(ation) (in tumbler) (1)

so more respiration / faster decay / bacteria work faster (in tumbler) (1)

**1**

**[9]**



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## Q17.

(a) (i) triangular pyramid with 3 layers

*may be as blocks or as triangle*

*ignore food chains and arrows*

**1**

layers appropriately labelled:
bean / plant

aphid,

ladybird

*labelled in food chain order must **not** contradict correct pyramid*

*allow correctly labelled inverted pyramid for **2** marks*

**1**

(ii) any **two** from:
(for aphid / ladybird)

*ignore energy*

- not all digested / faeces
- loss in urine
- loss of $CO_2$

  *ignore loss of $CO_{2\ from\ bean\ plant}$*
- not all eaten

  *if none of first 3 points given then allow waste (materials) / excretion for **1** mark*

**2**

(b) microorganisms / microbes / bacteria / fungi / decomposers / detritivores /named

*do **not** accept germs*

*allow mould*

*ignore aphids*

**1**

decay / breakdown / digest / decompose / rot (bean plant)

*ignore eat*

**1**

respiration (of microorganisms etc / aphids)

*allow burning / combustion*

**1**

carbon dioxide released (from respiration of microorganisms etc / aphids)

*allow carbon dioxide released / produced (from burning / combustion)*

*ignore other parts of the carbon cycle*
*ignore formation of fossil fuels*

**1**

**[8]**



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## Q18.

any **three** from:

*ignore references to carbon cycle*

*accept digested / decomposed / broken down / rotted for decay throughout*

*ignore eating*

- dead leaves / flowers / bluebells are decayed
- idea that microorganisms do the decaying

  *accept microbes / bacteria / fungi / mould / decomposers for microorganisms*
- minerals / ions / nutrients / named released (by decay / microorganisms)

  ***not** mineral ions unqualified*
- (released) into soil **or** minerals / ions / nutrients taken up / in by (bluebell) roots (next year)

  *look for idea that minerals / ions / nutrients are in soil (eg released into soil or taken up from soil)*

**3**

**[3]**

## Q19.

(a) 0.18

*award both marks for correct answer irrespective of working*

*if no answer or incorrect answer*

*allow **1** mark for 45 × 100 / 25000*

**2**

(b) heat / thermal

*allow heat from respiration*

**1**

(c) energy / mass / biomass lost / not passed on **or** energy / mass / biomass is used **or** not enough energy / mass / biomass left

*ignore reference to losses via eg respiration / excretion / movement / heat*

**1**

a sensible / appropriate use of figures including heron

*eg only **2** from frog / to heron*

*ignore units*

**1**

(d) any **three** from:

*accept marking points if candidate uses other terms for microorganisms*

- (microorganisms) decay / decompose / digest / breakdown / rot

  *ignore eat*
- (breakdown) releases minerals / nutrients / ions / salts / named



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*ignore food*

- (microorganisms) respiration
  *ignore other organisms respiring*
- (microorganisms / respiration) release of carbon dioxide

**3**

**[8]**

## Q20.

(a) (i) anaerobic respiration

**or**

fermentation

**1**

(ii) oxygen is present
*accept $O_2$*
*do **not** accept O, $O^2$ or $O^2$*

**1**

aerobic respiration occurs
*ignore anaerobic*

**1**

$CO_2$ from respiration
*allow from fermentation*

**1**

(b) high methane after this time
*ignore $CO_2$*

**1**

(c) organic matter / food / nutrients / named eg used up / reactants
*allow too hot / accumulation of toxins / named*
*do **not** allow products*
*ignore energy*

**1**

**[6]**

## Q21.

(a) (i) sun
*ignore light*
*apply list principle*

**1**

(ii) photosynthesis
*apply list principle*
*allow approximate spelling*
*do **not** accept phototropism*

**1**



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(b) (i) chemical

1

(ii) carbon dioxide

1

(iii) carbohydrates

1

(c) As carbon dioxide from the caterpillar

*if more than 2 boxes ticked deduct one mark for each additional incorrect box*

1

As faeces (droppings) from the blue-tit

1

**[7]**

## Q22.

(a) too cold / very cold **or** oxygen / microbes cannot reach it

*allow not enough energy / heat / warmth*
*ignore frozen*

1

for microorganisms / microbes / bacteria / fungi / enzyme / reaction (to work)

*ignore other consumers*

1

(b) no longer exist
**or** no more left
**or** died out / all died

*ignore died unqualified*

1

(c) (i) egg cell

1

(ii) nucleus

1

(iii) given an electric shock

1

(iv) womb

1

(d) has mammoth genes / chromosomes

*accept genetic information / DNA / alleles / nucleus*
*accept converse*

1

**[8]**

## Q23.

(a) **X** respiration



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*correct order only*
*allow decay / decomposition / rotting*
*ignore breakdown / disintegrate*

**1**

**Y** combustion / burning

**1**

(b) any **three** from:

- photosynthesise / absorb carbon dioxide
  *accept are producers **or** produce / make biomass / glucose / other named*
  *do **not** accept photosynthesis releases $CO_2$*
- release carbon dioxide / respire
- eaten by animals
- fed on / decayed by microorganisms
  *ignore eaten by microorganisms*

**3**

(c) any **two** from:

(in tropical rainforest conditions are)

- warm(er) / hot
- damp / moist / wet / humid
  *ignore rain*
- a lot of microorganisms
- a lot of material to decay
  *allow warm(er) so enzymes work faster for **2** marks*

**2**

**[7]**

## Q24.

(a) (i) 0.6 **or** $6 \times 10^{-1}$

*for correct answer*

*if no / incorrect answer* $\frac{2.4 \times 10^4}{4 \times 10^6} \times 100$

***or***

*0.006 **or** 6 x $10^{-3}$ gains 1 mark*

**2**

(ii) any **two** from:

- reflected
  *ignore some of light is green*
- not absorbed **or** misses chloroplasts / chlorophyll



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*allow transmitted **or** passes through leaves*
*allow hits other plant parts*

- wrong wavelength
- photosynthesis inefficient
  *accept other limiting factors / named*
- allow some lost through respiration / as heat (from respiration)

**2**

(b) energy lost via faeces / not digested / waste / excreted (of insect-eating birds)

**1**

energy loss via respiration / movement / muscle contraction / heat (by insect-eating bird)
*accept examples of muscle contraction*
*do **not** accept energy used for respiration*

**1**

some of (insect eating) bird not eaten <u>but</u> all / most / more of insect is eaten

**1**

**[7]**

## Q25.

(a) (i) (white) clover

**1**

(ii) reed sweet-grass
*allow reed*
*allow grass*

**1**

(iii) (only) found in swamp and aquatic zones **or** <u>only</u> found in water
**or** doesn't grow in marsh
*ignore wet conditions*

**1**

(b) 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 a basic description which describes how a quadrat **or** a metre tape could be used to collect data

**Level 2 (3-4 marks)**
There is a clear description of how a quadrat **and** a metre tape could be used to collect data along a line



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**Level 3 (5-6 marks)**
There is a clear, logical and detailed description of a method that will produce valid, repeatable results across / at intervals along the stream.

**examples of procedural points made in the response:**

- use of tape measure to produce transect
- placing of quadrats
- transect placed across stream
- score presence of each plant species
- use quadrat at regular intervals along tape
- repeat transect several times (≥ 3)
- along stream
- at random **or** regular intervals

**6**

**[9]**

## Q26.

(a) (biogas / methane is made) by fermentation / anaerobic respiration

*accept reverse argument*

*accept for **1** mark so no oxygen in jar **or** so oxygen can't enter **or** makes conditions anaerobic*

*ignore references to keeping other microbes out*

*ignore air*

**2**

(b) (i) carbon dioxide

*accept $CO_2$ / CO2*

*do **not** accept $CO^2$*

**1**

(ii) 0.62 look for answer in table

*correct answer with or without working gains **2** marks*

*allow 62% for **2** marks but 62 for **1** mark if incorrect / no answer*

$\frac{426}{686}$ *gains **1** mark*

**2**

(iii) (more fat → much) more biogas / methane

*allow more implied by giving two numbers or a subtraction / division*

**1**

(more fat →) only <u>small</u> increase in proportion / concentration / percentage of methane



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*allow increases only from 0.60 to 0.63* ***or*** *<u>only</u> changes by 0.03*

**or** approximately constant

**or** no change above 5%

**1**

(iv) fat (too) expensive **or** fat (too) expensive to transport (from coast to farm)

*accept any suitable reference to extra cost / effect on environment eg more pollution from transport*

**1**

**[8]**

## Q27.

(a) (i) 70

*award **2** marks for correct answer irrespective of working*

*allow **1** mark for 30 + 10 + 24 + 6 (with wrong answer or no answer), do **not** award this sum if other figure(s) are included in the addition*

**2**

(ii) 6

*award **2** marks for correct answer irrespective of working*

*award **2** marks for correct answer to (a)(i) – 64 (ecf)*

*award **1** mark either for 70 – 64 or answer to (a)(i) – 64 with no answer or incorrect answer*

**2**

(b) photosynthesis.

**1**

**[5]**

## Q28.

(a) any **two** from:

- food / feeding
  *ignore water*
- mates / mating
- territory / space / land / shelter / nesting sites
  *ignore homes / place to live / habitat / resources*
- status (within group)

**2**

(b) (i) rises to 1480 to 1500
**or** rises by 880 to 900
**or** rises until 1993

*ignore incorrect figures if 1993 given*

**1**

falls to 400 to 440 **or** falls by 1040 to 1100



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*if neither mark gained then allow **1** mark for rise followed by fall **or** fell by 160 to 200*

**1**

(ii) rises because: -
less competition from mule deer
**or** mule deer population falling
**or** fewer mule deer

*ignore reference to food / breeding*

*ignore reference to predation / disease*

**1**

falls because: -
more competition from mule deer
**or** mule deer population rising
**or** more mule deer

*ignore more / less suited to environment*

*if neither mark gained then correct reference to competition gains **1** mark*

**1**

**[6]**

## Q29.

(a) 16

*accept correct answer for **2** marks, irrespective of working*

*if no answer **or** answer incorrect accept 0.64 x 100 / 4 (.0) **or** 0.16 for **1** mark*

**2**

(b) insect cold-blooded / not warm blooded **or** does not control body temperature

*accept mammal warm-blooded / constant (high) body temperature / controls body temperature*

**1**

reference to insect 0.96 (kJ) **and** mammal 12.25 (kJ) transferred by respiration **or** relevant calculation of this transfer

*ignore references to other data*

**1**

(less respiration) so more energy / biomass / food available (for growth of insect)

*(more respiration) so less energy / biomass / food available (for growth of mammal)*

**1**

**[5]**

## Q30.

(a) three layer triangular pyramid

*either way up (as blocks or triangle)*

**1**

(soya / beans / food – trout / fish – people / human (in sequence)

*ignore reference to producers /herbivores / consumers*



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*award **1** mark only for a correct food chain with 2 correct arrows showing energy flow*

**1**

(b) the trout release energy when they respire

**1**

some energy will be lost in waste from the trout

**1**

(c) any **one** from eg

- easy / easier to catch / more caught
  *allow easy / easier to monitor*
- easy / easier to feed
  *allow control food*
- no / less predation
  *allow less fishing / poaching*
- less energy loss
  *allow grow faster*
- less movement
  *ignore less space to move*
  *do **not** allow easier to farm*

**1**

(d) any **two** from:

- microorganisms / bacteria /decomposers / microbes / fungi /detritus feeders
- decay / rot / decompose / digest /break down
  *ignore biodegrade*
- (microorganisms) respire
  *do **not** award this mark if response implies the trout respire*
- turned into fossil fuels / named fossil fuels
- carbon dioxide / $CO_{2\ released}$

**2**

**[7]**

## Q31.

(a) very little of the biogas generator will be seen
*cancel **1** mark for each extra box ticked*

**1**

the temperature inside will not change much

**1**

(b) (i) methane

**1**



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(ii) 60

*correct answer with or without working*

*100 – (35 + 1.5 + 1.5 + 2) but incorrect answer allow **1** mark*

**2**

**[5]**

## Q32.

(a) methane / $CH_4$

*allow $CH^4$ / CH4 / H4C*

**1**

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

*ignore reference to smell*

- less visual impact
- less heat loss

**or**
(better) insulated

**or**
temperature will be less variable /keeps warm / keeps cool **or** easier to maintain optimum temperature

- withstand pressure build-up
- ease of adding material / slurry

**2**

(ii) any **one** from:

- to keep anaerobic
- to prevent oxygen / air entering
- to prevent biogas escaping
- to maintain pressure / to allow removal of biogas

**1**

(c) any **two** from:

*ignore to keep warm*

- to maintain optimum temperature

  *if reference to specific temperature accept any value in range 26 – 40 °C as optimum*

- to speed up production of biogas

  **or**

  reference to faster microbial action / named microbial process

- UK temperature is low/below 25 °C

  *UK temperature is below optimum = **2** marks*



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- self sufficient / sustainable

2

**[6]**

## Q33.

(a) (i) quadrat / grid

*allow suitable description in a(i) or a(ii)*

*allow quadrant*

1

(ii) any **two** from:

- use a transect / description
  *allow measure distance of the test or sample site from road*
- sample every metre
  *ignore random placing of quadrat*
- count plants (in quadrat)

2

(iii) the nearer to the road, the more (plantain) plants

*accept the more dead nettles the less plantains*

1

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

- grow better / survive away from road
- sensitive to pollutant / named pollutant / dust / fumes
  *ignore carbon dioxide as pollutant*
- (roadside) weedkillers
- trampling /damage / turbulence
- grass cutting
- competition
- aspect eg hillier

**or**

give **one** mark for a factor and **one** mark for its effect eg

dust (from road) (1)

reduces photosynthesis (1)

**or**

'loses' in competition (1)

for light / water / nutrients / minerals / ions / space / soil (1)

*ignore food for plants*



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2

(ii) any **two** factors eg

*ignore distribution*

- can withstand pollution
  *allow grows better in polluted air*
  *ignore □prefer' pollution*
- competition
- aspect eg flat

**or**

give **one** mark for a factor and

**one** mark for its effect eg

use carbon dioxide (from traffic) (1)

enhances photosynthesis (1)

**or**

'wins' in competition (1)

*ignore food for plants*

for light / water / nutrients / minerals / ions / space (1)

2

**[8]**

## Q34.

(a) microorganisms

1

(b) moist

1

(c) respiration

1

(d) roots

1

**[4]**

## Q35.

(a) B and D

*both required in any order*

1

(b) any **two** from:

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

- carbohydrate / named example



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*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]**



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