

# MARK SCHEME

# GCSE

## BIOLOGY

## AQA - TRIPLE SCIENCE

---

B 7 - TEST 6

ECOLOGY

Advanced

## Mark schemes

1.

(a) 0.18

*award both marks for correct answer irrespective of working  
if no answer or incorrect answer  
allow 1 mark for  $45 \times 100 / 25000$*

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

3

[8]

2.

(a) (i) kills / gets rid of / reduces methane bacteria

*allow kills / gets rid of / reduces bad bacteria*

*ignore acts like antibiotic*

1

(ii) less food converted to methane  
*allow can keep more cattle without further environmental damage*  
*ignore energy* 1

more growth / meat / muscle / milk produced / more profit / fatter animals  
*ignore references to bacteria and disease* 1

(b) absorbs energy / heat radiated by Earth  
*allow absorbs / traps energy / heat / from Earth*  
*do **not** allow absorbs energy / heat from Sun* 1

some energy / heat reradiated  
*ignore reflected*  
*do **not** allow reradiates energy / heat from Sun* 1

leading to global warming / enhanced greenhouse effect  
*accept effects of global warming eg melting ice caps*  
*accept methane is a greenhouse gas*  
*ignore references to ozone* 1

[6]

3.

(a) there is an uneven distribution of dandelions  
**or**  
(more) representative / valid  
**or**  
avoid bias  
**or**  
more accurate / precise mean  
*ignore accurate / precise unqualified*  
*ignore repeatability / reproducibility / reliability / fair test* 1

(b) (correct mean per m <sup>2</sup> =) 6 or 6.0	1
(correct field area =) 55 000 (m <sup>2</sup> )	1
mean × area – e.g. 6(.0) × 55 000 <i>allow incorrect calculated values for mean and / or field area</i>	1
330 000 <i>allow correct calculation from previous calculation</i>	1
3.3 × 10 <sup>5</sup> <i>allow calculated value in standard form</i>  <i>an answer of 3.3 × 10<sup>5</sup> scores 5 marks</i> <i>an answer of 330 000 scores 4 marks</i>	1

(c) <b>Level 3:</b> The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6
<b>Level 2:</b> The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4
<b>Level 1:</b> The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2
<b>No relevant content</b>	0

**Indicative content**

- placing of quadrat
- large number of quadrats used
- how randomness achieved – e.g. table of random numbers **or** random number button on calculator **or** along transect
- quadrats placed at coordinates **or** regular intervals along transect
- in each of two areas of different light intensities **or** transect running through areas of different light intensity
- for each quadrat count number of dandelions
- for each quadrat measure light intensity
- compare data from different light intensity

to access **level 3** the key ideas of using a large number of quadrats randomly, or along a transect, and counting the number of dandelions in areas of differing light intensity need to be given to produce a valid outcome

- (d) any **two** from:
- temperature  
*allow heat*
  - water  
*allow moisture / rain*
  - (soil) pH  
*allow acidity*
  - minerals / ions  
*allow e.g. magnesium ions **or** nitrate*  
*allow salts / nutrients*
  - winds
  - herbivores  
*allow trampling*  
*ignore carbon dioxide*  
*ignore space*  
*ignore competition unqualified*  
*do **not** accept oxygen*

2

[14]

4.

- (a) (i) vole/small bird/beetle  
*gains 1 mark*
- (ii) oak trees are large organisms;  
therefore their biomass is large; but their numbers are small  
*each for 1 mark*

1

3

- (b) 8 of:  
 energy stored in chemicals in cells/tissues/growth;  
 passed up food chain;  
 less energy stored at each stage in food chain/pyramid level;  
 because only part of energy taken in used for growth;  
 some lost in waste;  
 some used for repair;  
 used to main body systems;  
 some lost in respiration;  
 some converted into other forms of energy;  
 e.g. movement;  
 much lost as heat;  
 by time detritus feeders have used remains;  
 all returned to environment

*each for 1 mark*

8

c1 → animals

c2 → decomposers

*2 marks for sequencing and organising the information*

2

[14]

5.

- (a) (i) (initially there is) oxygen

*accept:*

*oxygen hasn't been used up yet (so not anaerobic conditions yet)*

1

- (so) aerobic respiration (by microorganisms)

*accept (because) methane is produced in anaerobic (fermentation)*

1

- producing CO<sub>2</sub> (which does not burn)

*accept there is no methane*

*ignore inflammable*

1

- (ii) (peelings had) the most carbohydrate / organic material

*answer must be comparative*

*accept contained more microorganisms / decomposers / bacteria*

*ignore water*

*do **not** allow fat or protein*

1

- (b) (i) 0.22 / 0.221

*correct answer with or without working gains 2 marks*

*allow 0.2 for 1 mark*

*allow 22.1 for 1 mark*

*allow 0.34 × 65 / 0.65 for 1 mark*

2

- (ii) (sheep manure) produces a higher volume of biogas / almost double **or** produces 0.27 (m<sup>3</sup> per kg) more

*accept 0.408(7) / 0.41 / 0.409 (m<sup>3</sup>) from sheep for 2 marks*

*accept 0.1877 / 0.188 / 0.19 (m<sup>3</sup>) more than cow's manure for 2 marks*

1

- (sheep manure) produces biogas with a higher percentage methane **or** produces 2% more methane

*allow correct difference in volume calculated using 0.408(7) / 0.41 / 0.409 minus answer given in (i) for 2 marks*

1

[8]

6.

- (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 both of the mark points are not gained*

- (d) any **two** from

- 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]

7.

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

*for correct answer*

*if no / incorrect answer  $\frac{2.4 \times 10^4}{4 \times 10^8} \times 100$*

**or**

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

2

(ii) any **two** from:

- reflected  
*ignore some of light is green*
- not absorbed **or** misses chloroplasts / chlorophyll  
*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 but all / most / more of insect is eaten

1

**[7]**