Mark schemes

(a) snail or shrew

additional incorrect answer negates correct answer

1

(b) shrew

additional incorrect answer negates correct answer

1

(c) fewer shrews to eat them

1

(d) population

1

(e) C

1

(f) \[(11000 \times 0.1 =)\]

1100 (kJ)

1

(g) the snails do not eat the roots of the lettuces

1

(h) any one from:

- light (intensity)
- temperature
- moisture (levels)
- soil pH
- mineral / ion content (of soil)
- wind intensity / speed

ignore wind direction

- carbon dioxide (levels)
- oxygen (levels)

1 [8]

2

(a) any two from:

- idea of absorption of light / energy
- transfer to chemical energy

allow produce sugars / glucose / starch / carbohydrate / food / biomass

- provides food / energy for animals / caterpillar
- releases oxygen

2
(c) 15(%)  
allow 1 mark for \( \frac{3 \times 100}{20} \) with no answer or incorrect answer  
or  
allow 1 mark for 0.15

(d) (i) any two from:  
• markings look like eyes / face / mouth of much larger animal  
• looks fierce / scary / dangerous  
  allow it looks like a snake  
• to frighten blue tit / bird  
max 1 if reference to camouflage

(ii) any two from:  
• sharp / long / big claws  
  ignore strong  
• sharp / hooked beak  
  ignore strong / big  
• large wings or flies quickly  
  allow streamlined / aerodynamic  
  ignore powerful wings  
• good eyesight

(a) (i) any two from:  
• not all eaten  
  allow eaten by other animals  
• used for respiration  
  ignore used / lost in heat / movement  
• lost as CO\(_2\) / water / urea  
• lost as faeces or not all digested  
  if neither mark awarded allow 1 mark for lost as waste  
  ignore references to energy losses  
do not allow for growth / repair / reproduction
(ii) any one from:
- thrushes eat other things
- thrush numbers likely to vary (considerably)
  allow it is only an estimate (of population size) or only counted thrushes for 5 hours
- thrushes were not present all the time
- thrushes feed on a much bigger area

(b) (i) any one from:
- there are two dependent variables
- there is no independent variable
- to show the association / correlation / pattern (between the two variables)

(ii) (snails in woodlands)
more have dark(er) colour(ed shells) or fewer have light-coloured shells
  allow converse for grassland, if clear

(shells have) no / fewer stripes or have no stripes
  allow converse for grassland, if clear

(iii) less likely to be seen (by predators / birds / thrushes)
  allow camouflaged (from predators / birds / thrushes)
  allow light coloured shells with stripes would be more visible (to predators / birds / thrushes in woodland (than grassland)).

4 (a) limiting their movement
  or
  controlling the temperature of their surroundings

reason:
reduces energy transfer
  if no other marks awarded, allow 1 mark for: ‘fit more chickens in same space’
(b)  
(i)  without oxygen

*ignore ‘without air’*

(ii)  any two from:
- ethanol
  *allow alcohol*
- carbon dioxide
- lactic acid.

*do not accept* energy / ATP (apply list rule)

(c)  enzymes are denatured / change shape

*ignore microbes are killed*

(enzyme) shape is vital for function or won’t work (as efficiently)

(d)  
(i)  200

(ii)  120

*allow ecf from (d)(i)*

*e.g.*

60 x (i)

100

(e)  causes global warming

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*

5

(a)  methane / CH₄

*allow CH₄*

*do not allow CH₄ or ch4 or CH4*
(b) any **two** from:
- didn’t carry out repeats
- only tested four types of manure
- don’t know the mass of manure was the same each time
- inaccuracies in measuring (diameter of) balloon
- bottles might have been different sizes
- temperature of the room may have been different.

(c) The potato contains a lot of carbohydrate

(a) it is impossible to weigh all the fish in the sea

(b) (i) increase / from 50 to 350 / by 300 thousand tonnes

(ii) due to fishing ban / not allowed

(c) (i) fishing quotas / limits

changes to net size

(ii) yes, biomass increases

use of figures from graph eg approx 4- times **or** (was effective at first) but numbers decline again after 2004

*must use two comparative figures for 2nd marking point*

(iii) so that breeding continues

**allow prevent extinction / limit impact of fishing on food chain / web**

(iii) 95%

*correct answer gains 2 marks*

**2000-100=1900 award 1 mark**
(d) any **four** from:

- increase in sea / water temperature
  *accept ref to lower sea / water temp if shift in Gulf Stream is referred to*
- changes in migration patterns / distribution of species
- more eggs may survive (up to 19 °C) and could lead to an increase in herring pop
- reduction in herring pop (because eggs die if > 19 °C)
  *accept change in other populations of fish which are alternative prey for cod*
- (appropriate) change in cod population as a result

(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*

\[
\frac{465}{611.5} \text{ for 1 mark}
\]

(ii) mass of fish declines (until 2008)
*ignore use of numbers*
*allow number of fish decline (until 2008)*

(due to an) increase in fishing / overfishing

and then rises (until 2010)

(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*

(iii) (this is due to) public awareness / demand
*allow legislation / rules*
(b) fishing quotas / bans

(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

(c) (fish) cannot move freely / as much

(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

(there is) more food available / better quality food / fed more often

- accept 'high-protein food (for making cells)'

(so) there is more energy for growth or (more food) is converted to biomass

(a) (i) 1800(g)

(ii) triangular pyramid with four layers

- accept ecf from (a)(i)
- allow inverted pyramid

- correctly labelled in order of food chain
(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*

(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*

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

*allow converse*

*ignore figures*

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

*allow converse*

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*

(b) larger birds spend less time feeding

*accept converse*

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

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