Mark schemes

1

(a) (140 + 240 + 380 + 450 =) 1210

1

(b) the local people decided to farm cattle

1

a company starts growing plants for biofuels

1

(c) carbon dioxide

in this order only

1

photosynthesis

1

(d) animals and birds migrate because there is less food

1

more habitats are destroyed

1

(e) any **one** from:

- breeding programmes (for endangered species)
- regeneration (programmes)
- reintroduction of field margins / hedgerows
- awareness raising with politicians / public
- recycling

1

[8]

2

(a) methane is produced

ignore bad smell

1

which is a greenhouse gas / causes global warming

1

(b) (9.80 / 0.20 = 49 therefore) 49:1

1

(c) horse (manure)

*allow ecf from **11.2***

closest to 25:1 (ratio)

1

(d) **Level 3 (5–6 marks):**
A detailed and coherent explanation is given, which logically links how carbon is released from dead leaves and how carbon is taken up by a plant then used in growth.

Level 2 (3–4 marks):
A description of how carbon is released from dead leaves and how carbon is taken up by a plant, with attempts at relevant explanation, but linking is not clear.

Level 1 (1–2 marks):
Simple statements are made, but no attempt to link to explanations.

0 marks:
No relevant content.

Indicative content

statements:
- (carbon compounds in) dead leaves are broken down by microorganisms / decomposers / bacteria / fungi
- photosynthesis uses carbon dioxide

explanations:
- (microorganisms) respire
- (and) release the carbon from the leaves as carbon dioxide
- plants take in the carbon dioxide released to use in photosynthesis to produce glucose

use of carbon in growth:
- glucose produced in photosynthesis is used to make amino acids / proteins / cellulose
- (which are) required for the growth of new leaves

6

(e) any **three** from:
(storage conditions)
- (at) higher temperature / hotter
- (had) more oxygen
- (had) more water / moisture
- (contained) more microorganisms (that cause decay)

allow reference to bacteria / fungi / mould

3

[13]

3 (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. SO_2 / herbicide
- wind (related to seed dispersal).

ignore space / oxygen / CO_2 / 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 O_2

*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 / SO_2 / 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]

4 (a) any **one** from:
- increased pollution
- dumping waste

allow described consequence e.g. vermin

accept (increased) landfill

accept (increased) fly tipping.

1

(b) (i) (mass of SO_2) decreases

1

and then levels off / plateaus

1

(ii) 2008

clear evidence of calculating 700 (000) = 1 mark

2

(iii) any **one** from:
- acid rain
- erosion of statues / buildings
- destruction of habitats
- reduction in biodiversity
- damage to lichen
- breathing problems

ignore reference to ozone layer

allow damage to plants.

1

(c) Carbon dioxide being absorbed in oceans and lakes

1

Photosynthesis by trees

1

[8]

5 (a) any **two** from:
- (volume of) peat compost has been steady and then declined **or** volume of peat compost has declined since 2005

allow 2007 instead of 2005
- (volume of) peat-free compost has increased (since 1999)
- (volume of) peat is higher than peat-free until 2005, then peat-free compost is higher (than peat)

allow 2007
- total volume of peat and peat-free compost has increased.

2

(b) increases carbon dioxide (in the atmosphere)

ignore methane

1

(c) any **one** from:

- reduces biodiversity
- destruction of habitats
- disruption of food chains.

1

[4]

6 (a) (rapid) growth in population (size)

1

increase in the standard of living

accept description of increased standard of living, eg more packaging, more food thrown away or overbuying resources

1

(b) (i) 41.5

allow 1 mark for 9733 ÷ 23454

or

allow 1 mark for 0.415

or

allow 1 mark for 41.49 ***or*** *41* ***or*** *41.4*

2

(ii) any **four** from

arguments for:

- there has been a reduction in total waste
- there has been an increase in (total mass of) recycling
- there has been an increase in the percentage of waste recycled
- it (may) not be possible to achieve zero waste.

arguments against:

- there is still a lot of waste (not recycled)
- there has only been a small reduction in total waste
- there was one year (2006) where total waste went up
- the rate of increase of percentage recycled is slowing down
- no information on materials reused
- no information on waste from factories / industry

max 3 marks for a one sided argument

allow as reason against if clear

allow still more than half or 56.8% of waste (not recycled).

4

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

- reduce biodiversity **or** extinction
- change in migration patterns
- change in species distribution
- change in climate

ignore rise in sea levels

ignore temperature change

accept correct examples of climate change e.g. storms, flooding, drought

references to weather changing is insufficient

allow ice caps melting or habitat destruction.

2

(ii) any **one** from:

- absorbed by oceans / ponds / lakes
- peat bogs

allow used for skeletons / shells of sea creatures

allow in fossil fuels / limestone.

1

[11]

7 (a) (i) correct bar heights

*three correct **2** marks*

*two correct **1** mark*

*one or none correct **0** marks*

ignore width

2

(ii) (Stream Y)

has many sludge worms / bloodworms

or

has no mayflies / caddis or few shrimp

*allow **1** mark if invertebrate not named but correct association given*

1

which indicate medium or high pollution

1

(b) (i) suspended solids increase (as a result of sewage overflow)

1

then decrease downstream / return to original levels

1

oxygen levels decrease (after sewage overflow)

1

and then rise again

1

(ii) any **three** from:

- mayflies decrease (to zero) near overflow
  accept 'have died out'
- because oxygen is low **or** mayflies have high oxygen demand
- mayflies repopulate / increase as oxygen increases again
- can't be sure if dissolved oxygen or suspended solids is the cause

3

(c) they respire / respiration

*aerobic respiration gains **2** marks*

1

this requires / uses up the oxygen

1

[13]

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

1

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

1

(ii) due to fishing ban / not allowed

1

(c) (i) fishing quotas / limits

1

changes to net size

1

(ii) yes, biomass increases

1

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

1

(iii) so that breeding continues

alllow prevent extinction / limit impact of fishing on food chain / web

1

(iii) 95%

*correct answer gains **2** marks*

*2000-100=1900 award **1** mark*

2

(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

4

[14]

9

(a) (i) 10

1

(ii) any **three** from:

- both increase with distance
- more spp on walls than on trees
- no lichen spp on trees for first 1 km from city
- more steady / less erratic increase on trees than walls (or converse)
- rate of increase increases with distance

3

(b) SO_2 decreases with distance from centre

accept converse

Ignore pollution

1

high SO_2 reduces survival or kills lichen

accept converse

1

(c) (i) any **three** from:

- (line) transect
- quadrat / reference to specific area
- count number of lichens or coverage on trees
- at regular intervals / set distances

3

(ii) (more) Xanthoria nearest road

allow 'nitrogen-loving' for Xanthoria

1

(more) Usnea further from the road

allow 'nitrogen-sensitive' for Usnea

1

because most nitrogen oxide from vehicles (near road)

or

because nitrogen oxide levels will be falling / less further away (from road)

accept converse

1

[12]

10 (a) decrease in photosynthesis (as fewer trees) causes less removal of CO_2

accept forest cleared for livestock which respire and give out CO_2

ignore 'Carbon sink'

1

burning / combustion releases CO_2

1

decay of wood (by microorganisms) releases CO_2

1

(b) any **two** from:

- loss of habitat / shelter
- loss of food source
- smaller populations more vulnerable / less likely to survive
- fewer plant species due to clearing

2

(c) (i) removing carbon dioxide from the air

1

(ii) any **one** from:

- growth of plants (to trap CO_2 in photosynthesis)

  allow afforestation
- CCS (carbon capture and storage)
- separate / store CO_2 from waste gases in industry
- make new peat bogs
- absorbed / dissolved in oceans / lakes / ponds
- used as calcium carbonate to form shells / bones

1

[7]

11 (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 <u>energy</u> 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]

12 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]

13 (a) genes

1

chromosomes

1

(b) (i) higher yield

1

less use of pesticides

1

(ii) any **two** from:

- uncertain about effects on health
- fewer bees
- might breed with wild plant
- seeds only from one manufacturer

2

[6]

14 (a) any **two** from:

ignore CO_2 release unqualified

- burning
- activity of microbes / microbial respiration
- less photosynthesis

or

trees take in CO_2

*do **not** accept CO_2 taken in for respiration*

or

less CO_2 locked up in wood

- CO_2 given off by clearing machinery

2

(b) (i) range of different species

accept idea of variety of organisms or plants or animals

1

(ii) any **two** from:

- organisms may produce substances useful to humans
  *do **not** accept if food is only example*
- duty to preserve for future generations
- effect on other organisms, eg food chain effects
  ignore effect on human food supply
- loss of environmental indicators

2

[5]

15 (a) circulating / mixing / described **or** temperature maintenance

1

supply oxygen
or for <u>aerobic</u> conditions
or for <u>faster</u> respiration
*do **not** allow oxygen for anaerobic respiration*

1

(b) energy supply / fuel / use in respiration
*do **not** allow just food / growth*
ignore reference to aerobic / anaerobic

or <u>material</u> for growth / to <u>make</u> mycoprotein

1

(c) <u>respiration</u>
allow exothermic reaction
allow catabolism
ignore metabolism
ignore aerobic / anaerobic

1

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

- compete (with *Fusarium*) for food / oxygen **or** reduce yield of *Fusarium*
- make toxic waste products or they might cause disease / pathogenic **or** harmful to people / to *Fusarium*
  *do **not** allow harmful unqualified*

1

(ii) steam / heat treat / sterilise fermenter (before use)

not *just clean*

or
steam / heat treat / sterilise
glucose / minerals / nutrients / water (before use)
or
filter / sterilise air intake
or
check there are no leaks

allow sterilisation unqualified ***not*** *just use pure glucose*

1

(e) any **three** from:

- beef is best or beef is better than mycoprotein
- mycoprotein <u>mainly</u> better than wheat
- more phenylalanine in wheat than in mycoprotein

  allow equivalent numerical statements
- but no information given on other amino acids / costs / foods

3

<u>overall conclusion:</u>

statement is incorrect because
either
it would be the best source for vegetarians
or
for given amino acids, beef is the best source
or
three foods provide insufficient data to draw a valid conclusion

1

[10]

16 (a) any **two** from:

- <u>fewer</u> 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.

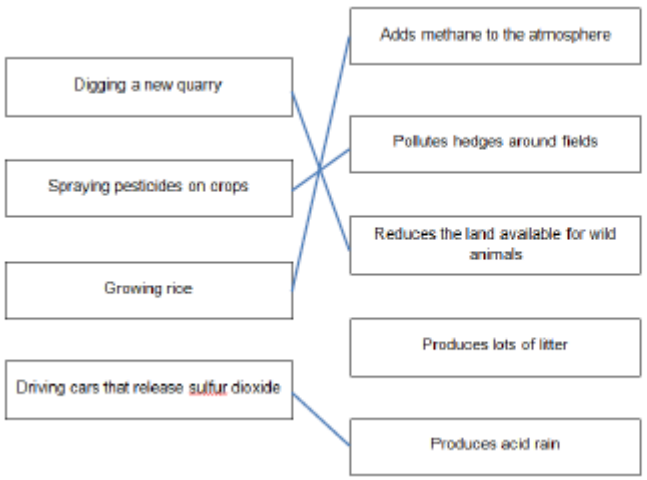
examples of biology points made in the response:

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

6

[8]

17 (a)



1 mark for each correct line

extra line from box in left hand column cancels mark

4

(b) any **two** from:

- climate change
  ignore 'Earth warmer'
- more extreme weather / changes to weather (patterns) / described
- rise in sea level
- melting of ice caps
- reduced biodiversity
- changes to migration patterns
- changes in distribution of species
  accept faster plant growth / tropical species can be grown in UK
  accept tropical diseases / example spread to temperate regions

2

[6]

18 (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]

19 (a) 60

*correct answer gains **2** marks*

*if answer incorrect evidence of using 40 gains **1** mark*

2

(b) any **two** from

ignore temperature rise / global warming

- climate change / described e.g. hotter summers / drought / seasons change
- rise in sea levels / flooding

  allow other environmental effects
- glacier melting / ice caps melting
- forest fires
- habitat destruction
- effect on organisms
- eg extinction / migration

2

[4]

20 (a) 860

*correct answer gains **2** marks*

if answer incorrect evidence of (6100 - 1800) ÷ 5

***or** 4300 ÷ 5*

***or** (900 + 600 + 1000 + 700 + 1100) ÷ 5 gains **1** mark*

allow ecf from 1 incorrect graph reading

2

(b) *ignore references to oxygen / sulfur dioxide / nitrogen oxides / acid rain*
ignore global warming

Effects of deforestation

deforestation increases the amount of carbon dioxide in the atmosphere
award this point only if linked to deforestation

1

any **two** from:

- due to less photosynthesis **or** less carbon dioxide taken in **or** carbon dioxide not locked up in (forest) trees
- due to burning of forest / from machinery
- due to activity of microorganisms / decay

2

Effects of growing palm for fuel

carbon dioxide released when palm oil used as fuel

1

(eventually) CO_2 intake and output might balance out **or** burning palm oil carbon neutral
accept less carbon dioxide than from burning fossil fuels

1

[7]

21 (a) (i) carbon dioxide

1

(ii) sulfur dioxide

1

(b) (i) reduces land available for animals and plants

1

(ii) metals

1

(c) (i) pesticide

1

(ii) kill other animals

1

[6]

22 (a) warmer / dryer

allow greenhouse effect / global warming

ignore wind

1

(b) (i) genes / alleles / chromosomes / DNA / genetic material / genetics

allow inheritance

allow nutrition / food / metabolism / growth rate

ignore environment

1

(ii) natural selection / evolution

allow survival of the fittest

1

[3]

23 (a) any **two** from:

- shorter distance between samples

  ignore repeat investigation /measurements

- sample to greater height
- specify the size of each site

  ignore longer transect

1

(b) (i) Parmelia

1

(ii) Evernia

1

(c) any **two** from:

- Lecanora does not extend over whole range of transect / does not grow everywhere /does not grow in town centre / does not grow in countryside
- Lecanora grows in a range of sulfur dioxide concentrations ***or*** Lecanora only grows in limited range of sulfur dioxide concentrations **or** Lecanora lives over large range of sulfur dioxide concentrations
- other factors eg different pollutant might also influence growth of Lecanora
- sulfur dioxide / pollutant concentration was not measured

  ignore Lecanora does not give accurate measure of sulfur dioxide concentration
- amount of Lecanora not measured

2

[5]

24 (a) 5

1

(b) any **one** from:

allow in either section

- more light

  allow more sun / sunnier
- warm(er) / hot
- more water / lot of rain

1

increased / more photosynthesis

allow in either section
allow more biomass / carbohydrate / named (made)
*do **not** allow food*
allow enzymes / metabolism faster
***NB** for **2** marks this must be linked to heat*
*to gain **2** marks more / increased must be mentioned at least once*

1

(c) less pollution / named pollutant eg carbon dioxide / 'fumes' / emissions

allow examples of effect of less pollution
eg less global warming / less acid rain
allow any relevant environmental effect
eg imported diseases

1

less fuel used / less transport / named transport

ignore 'less distance' / importing

allow 'less distance travelled' / 'less travel'

allow smaller carbon footprint once only for either mark

1

[5]

25 (a) (i) 40

accept -40 or +40

1

(ii) **Step 1** 92

1

Step 2 18

1

Step 3 74

*correct subtraction of answer in **step 2** from answer in **step 1** gains **1** mark*

*correct answer 74 with no working gains **3** marks*

ignore sign

1

(b) (i) both animals and plants

1

(ii) microorganisms

1

(iii) carbon dioxide

1

[7]

26 (a) fuel / houses / paper

allow any object made from wood

1

farming / agriculture / replanting

allow roads / homes / factories

1

carbon dioxide / greenhouse gas / pollution **or** relative named pollutant

1

warming / temperature increase

1

(b) (i) none of species left / died out

1

(ii) may have products useful to humans / examples

allow preserve for future generations ***or*** *'still there to look at'*

allow affect food chains / cycles ***or*** *extinction of other species*

allow non human reasons eg loss of habitat

ignore environmental effects

1

[6]

27 (a) any **one** from:

- increase / give light
- increase temperature / make warmer

award marks if the method by which these could be done is given
eg leave lights on all night **or** use a heater

- increase / give CO_2
- add fertiliser / nutrients / minerals / named

allow nitrogen

ignore 'food'

1

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

- cheaper

allow grow faster / more grown

- better quality / flavour

ignore size

- available all year

accept converse if clear that answer refers to use of British tomatoes

allow 'Fair Trade'

2

(ii) any **two** from:

- greater distance **or** more food miles **or** more transport

idea of more needed only once

- transport needs (more) energy / fuel
- reference to eg greenhouse effect / global warming / pollution / CO_2 release / carbon footprint

ignore ozone

2

[5]

28 (a) (i) (more) habitats / (greater) variety of habitats / range of food

*allow (more) places / trees for homes **or** different places to live*
allow no pesticides /herbicides / chemicals sprayed
allow more food
allow safer / can hide
allow effects of machinery

1

(ii) any **two** from:

- building /houses / factories / etc
  ignore timber / uses of wood
- roads
- quarrying
- waste dumps / landfill
- grazing

2

(b) (i) fertilisers

1

(ii) pesticides

1

(iii) pesticide / herbicide / chemicals / sprays

allow river (through farmland) polluted
allow correct effect of fertilisers on river organisms

1

(c) any **two** from

- pollution / named pollutant / combustion / cars
- dumping waste / litter
  allow 'not recycling'
- raw materials used up **or** reference to quarries / mines
- chopping down trees
- building / houses / etc
- global warming

2

[8]

29

(a) any **two** from: eg

- same volume of solution
  *do **not** allow same size of container*
- left for same length of time
- same temperature
- same oxygen
- same pH
- same number of invertebrates / animals
  *do **not** allow same number of species*
- same age / stage of invertebrates / animals

2

(b) line of best fit / curve / point to point drawn going through 240-260 and 25

1

correct interpolation to X axis
if no work on graph allow 250

1

(c) (i) (C)

50% killed at lowest / low copper concentration
ignore least survivors

1

(ii) any **two** from:

- involves counting
  *easy to count gains **2** marks*
- easy to do
- invertebrates more sensitive
- needs less / no apparatus
  ignore more reliable / accurate

2

[7]

30 (a) 3.2

*award **both** marks for correct answer irrespective of working*
if answer incorrect
(55 + 55 + 1.2 +5) – (110 + 3)
or
116.2 – 113
or
*(55 + 55 + 1.2 + 5 + 90) – (110 + 93) gains **1** mark*

2

(b) any **one** from:

- less carbon dioxide taken in by trees
  *ignore carbon dioxide released by trees **or** trees store carbon dioxide*
- less photosynthesis
- burning trees releases carbon dioxide
- decay releases carbon dioxide

1

[3]

31 (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]

32 (a) any **two** from:

ignore CO_2 release unqualified

- burning
- activity of microbes / microbial respiration
- less photosynthesis

*do **not** accept CO_2 taken in for respiration*

or

trees take in CO_2

or

less CO_2 locked up in wood

- CO_2 given off by clearing machinery

2

(b) (i) range of different species

accept idea of variety of organisms or plants or animals

1

(ii) any **one** from:

- organisms may produce substances useful to humans

  *do **not** accept if food is only example*

- duty to preserve for future generations

- effect on other organisms e.g. food chain effects

  ignore effect on human food supply

- loss of environmental indicators

1

[4]

33 (a) burning / combustion fossil fuels / burning wood

accept named fossil fuel
accept driving cars / any vehicles
*do **not** accept burning / combustion unqualified*
*do **not** accept factories*
ignore factory chimneys unqualified
ignore respiration

1

deforestation

1

(b) (i) (overall) increase

1

fluctuations

highs are higher <u>and</u>
*lows are not as low = **2** marks*

1

(ii) no – could be due to some other factor **or**
could be coincidence **or** fluctuations ±
same size as the overall rise or large
fluctuations or sometimes when CO_2 rises temperature doesn't

1

(c) any **one** biotic **or** abiotic effect eg:

*do **not** credit just "climate / weather change"*
allow <u>extreme</u> climate / weather change

changes in rainfall

accept drought, desert formation

ice-caps melting / rise in sea level

accept flooding

changed pattern of winds

changed pattern of migration

changed species survival

changed growth

1

[6]

34 (a) (i) increases

1

(ii) decreases

1

(b) any **two** from:

- competition for water
- competition for ions / minerals / salts / nutrients

accept correct named example
*do **not** accept food*
*do **not** accept <u>all</u>*

- competition for light

2

(c) kills / harms other / named organisms

1

[5]

35 (a) burning fossil fuels / named example

accept <u>driving</u> cars / lorries etc burning fuels in power stations
ignore combustion unqualified
*do **not** accept catalytic converter on its own **or** emissions from power stations*

1

(b) (i) pollutants / smoke breathed in

1

(ii) SO_2 and deaths rise (and fall) at same times **or**
SO_2 and deaths parallel each other / show same pattern

1

(iii) no – could be due to some other factor / pollutant /
to smoke **or** correlation not precise / described

explanations must come to a conclusion
named examples must be plausible allow 'coincidence'

1

[4]

36 (a) (i) carbon dioxide

accept other positive indications

1

(ii) methane

1

accept other positive indications

(b) increase

accept other positive indications

1

(c) any **three** from:

building

accept houses / airports / roads / factories

farming / removing hedgerows / fire

*do **not** accept pesticides, fertilisers etc*

quarrying / mining

industry

accept release of toxic chemicals / named eg
*accept acid rain / global warming only if linked to production by human activity do **not** accept just 'pollution'*

drainage of marshland

dam construction / flooding land

dumping waste

*do **not** accept fly tipping, litter*

3

[6]

37 (a) burning fossil fuels / coal / gas / oil

accept driving <u>vehicles</u> / eg cars
accept coal-fired power station
accept car emissions
ignore combustion unqualified
*do **not** accept power station unqualified*
*do **not** accept <u>using</u> fossil fuels*

1

(b) (i) (SO_2) makes it acidic / makes acid rain / lowers pH

1

(ii) any **one** from:

(SO_2) kills leaves reduces number of leaves reduces leaf area
or smaller leaves causes fewer leaves to grow

ignore correct extras, eg
withered, yellow etc

1

(c) any **two** from:

(fewer leaves / less leaf S.A) so less photosynthesis

less food / less sugar / less starch supplied (to roots / to stems)

(SO_2) lowers pH of soil / makes soil acidic

ions (/minerals / salts / nutrients) less available (to plants)

accept don't get enough nutrients

2

[5]

38

(a) (i) building
or
wood/timber/furniture
or
paper
or
packaging
or
fuel/burning

*do **not** accept 'logs' by itself*

1

(ii) farming/agriculture
or
building
or
roads

1

(iii) increased CO_2

1

(b) (i) trees photosynthesise/less photosynthesis takes place (and)

accept burning trees (1)

1

trees/photosynthesis uses carbon dioxide

releases CO2 (1)

1

lets in heat/energy

*do **not** accept sunshine*

1

prevents it escaping (from the atmosphere)

or

being reflected/retransmitted into space

1

(ii) global warming

accept increased 'el nino'

or

a named effect of global warming such as polar ice cap melt, climatic change, increased temperature/sea level rising

accept warmer weather

1

[8]

39 (a) award two marks for correct plotting

deduct 1 mark for each error, minimum mark 0

2

(b) 14 − 16

transfer error allowed

1

(c) lichen **types** increase with distance

accept converse

1

(d) any two from:

more bicycles used

smoke free zones

out of town shopping

2

park and ride/other schemes to keep cars from city centres e.g. pedestrian areas

increased use of public transport

less/improvements in factories/power stations

improved technology in cars

(e) $SO_2/NO_2/CO_2$ (or words)
or
oxides of nitrogen dissolves/combines/reacts (in water)
*do **not** accept mixes*
1

makes an (weak) acid
n.b. acid as an adjective not a noun
1

any one from:

acidification of water/soil

damage to trees/plants
1

damage/dissolve/erosion of cement **or**
marble/limestone **or** metals **or**
buildings **or** statues
accept corrodes

kills fish

loss of leaves
1
[10]