

Ecology 6

Name: _____

Class: _____

Date: _____

Time: **82 minutes**

Marks: **82 marks**

Comments:

1.

Fruits contain seeds. Most plants produce fruits that are adapted for dispersing seeds. Seeds are dispersed so that young plants do not grow near their parents.

(a) Explain the advantage to plants of dispersing their seeds.

(2)

(b) The photograph shows cocklebur fruits.



Photograph by Robert H. Mohlenbrock. Image in the public domain as a work of the U.S. federal government. Courtesy of USDA NRCS Wetland Science Institute.

The photograph is magnified.

Suggest how cocklebur fruits are adapted for dispersing their seeds.

(2)
(Total 4 marks)

2.

Scientists have discovered that curry spices affect sheep and cattle. Curry spices can reduce the amount of methane that grazing animals give off.

'Bad' bacteria in the animal's stomach produce methane. About 12% of the animal's food is changed into methane.

The curry spice coriander works like an antibiotic. Adding coriander to animal food reduces methane production by about 40%.

(a) (i) Why does adding coriander to an animal's food reduce methane production?

(1)

(ii) Explain **one** advantage to a farmer of adding coriander to the animal's food.

(2)

(b) Farm animals give off large amounts of methane.

Explain the effects of adding large amounts of methane to the atmosphere.

(3)

(Total 6 marks)

3.

In a woodland, bluebells grow well every year.

Bluebells growing well in woodland



Mick Garratt [CC-BY-SA-2.0], via Wikimedia Commons

Each year the dead flowers and leaves of the bluebells and leaves from the trees fall onto the ground.

The bluebells do not run out of mineral ions.

Explain why the bluebells do **not** run out of mineral ions.

The words in the box may help you.

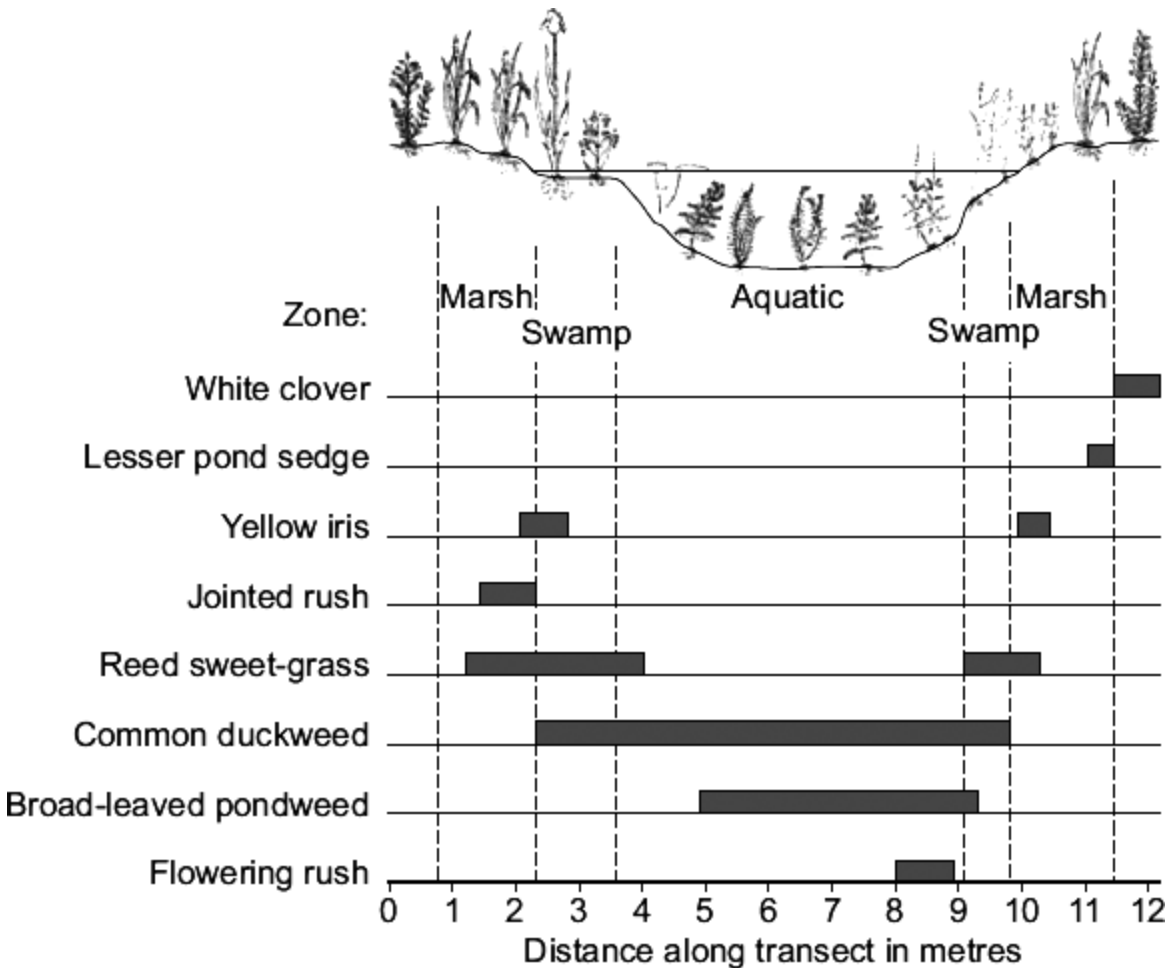
roots	dead leaves	mineral ions
	microorganisms	decay

(Total 3 marks)

4.

Some students investigated the distribution of some of the plants growing in and around a shallow stream. They sampled along a transect line.

The diagram shows their results.



(a) (i) Name the **one** species that grew only in the driest conditions.

(1)

(ii) Only **one** species grew in the marsh, the swamp and in the aquatic zones.

Which species?

(1)

(iii) Duckweed grows floating in water. What evidence is there for this in the students' results?

(1)

5.

The photograph shows a lionfish. Lionfish are normally found in the Pacific Ocean.



By Albert Kok at nl.wikipedia [Public domain], from Wikimedia Commons

In 1992 six lionfish escaped from an aquarium into the Atlantic Ocean.

Now there are thousands of lionfish in the Atlantic Ocean. Numbers of the native Atlantic fish have gone down because the lionfish have eaten many native Atlantic fish.

Suggest explanations for the large increase in the number of lionfish in the Atlantic Ocean.

(Total 3 marks)

6.

In the winter wild birds cannot find food easily.

A student carried out an investigation to find the best kind of food to put out for wild birds in winter.

- She nailed six black dishes to a piece of wood.
- She put 100 g of a different type of seed into each dish.
- She placed the piece of wood in her garden.
- She observed the birds that visited each of the dishes before school, after school and at weekends.
- At the end of the investigation, she weighed the amount of each type of seed remaining.
- She also calculated the percentage of each type of seed that was eaten by the birds.

(a) Name **two** control variables in this investigation.

1. _____

2. _____

(2)

(b) **Table 1** shows the number of bird visits to each dish of seeds that she recorded.

Table 1

Bird species	Number of visits to each dish of seeds					
	Corn	Niger	Safflower	Sunflower	Peanut	Millet
Morning Dove	12	10	6	13	2	10
Red-bellied Woodpecker	1	0	0	1	4	0
Dark-eyed Junco	3	6	1	4	0	3
Northern Cardinal	0	0	1	1	2	0
American Goldfinch	0	31	5	18	0	0
House Finch	1	5	23	19	1	3
House Sparrow	16	1	0	4	0	11
Total visits	33	53	36	60	9	27

Which type of seed had visits from the greatest number of **different** bird species?

(1)

- (c) **Table 2** shows:
- the percentage of each type of seed eaten
 - the percentage of fat in each type of seed.

Table 2

Type of seed	Percentage eaten	Percentage of fat
Corn	68	2
Niger	77	40
Safflower	86	3
Sunflower	91	35
Peanut	4	48
Millet	99	2

- (i) The girl concluded that the most popular seeds for the birds were the seeds with the highest percentage of fat.

Was her conclusion justified by the data in **Table 2**?

Draw a ring round your answer. **Yes / No**

Give a reason for your answer.

(1)

- (ii) Most winter bird food for sale in shops contains niger and sunflower seeds. Use the information in **Table 1** and **Table 2** to suggest **two** reasons why.

1. _____

2. _____

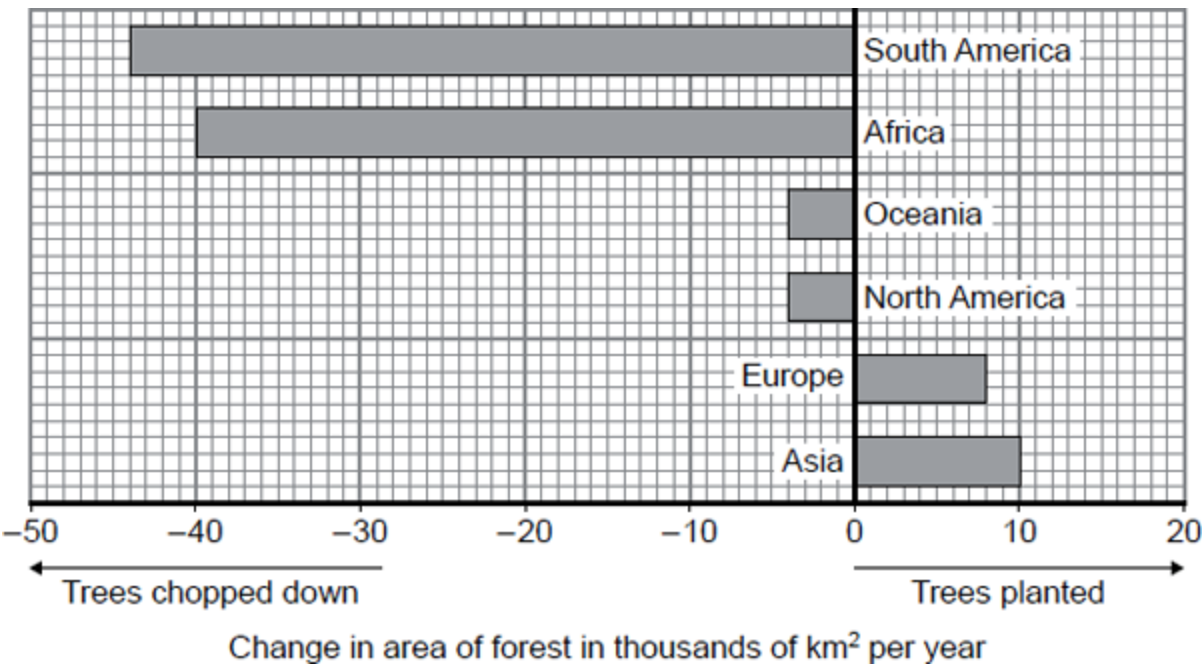
(2)

(Total 6 marks)

7.

In many parts of the world, forests are being chopped down (deforestation) so that the land can be used to grow food crops. In other parts, trees are planted to produce new forests.

The graph shows how the area of forest in each of the continents is changing each year.



(a) (i) What area of forest is being lost in Africa each year?

Area = _____ thousand km²

(1)

(ii) Use **Steps 1, 2** and **3** to calculate the total change to the area of forest each year.

Step 1 Calculate the total area of trees chopped down.

Total area chopped down = _____ thousand km²

Step 2 Calculate the total area of trees planted.

Total area planted = _____ thousand km²

Step 3 Use your answers from **Steps 1** and **2** to calculate the total change in the area of forest.

Total change in area of forest _____ thousand km²

(3)

(b) Draw a ring around the correct answer to complete each sentence.

(i) Large scale deforestation reduces the number of

species of

- plants only.
- animals only.
- both animals and plants.

(1)

(ii) The remains of the trees are broken down into carbon dioxide by

- lichens.
- microorganisms.
- plants.

(1)

(iii) The gas released into the atmosphere when trees are burned is

- carbon dioxide.
- methane.
- oxygen.

(1)

(Total 7 marks)

8.

Deforestation affects the environment in many ways.

(a) Deforestation increases the amount of carbon dioxide in the atmosphere.

Give **two** reasons why.

1. _____

2. _____

(2)

(b) Deforestation also results in a loss of *biodiversity*.

(i) What is meant by *biodiversity*?

(1)

- (ii) Give **one** reason why it is important to prevent organisms from becoming extinct.

(1)

(Total 4 marks)

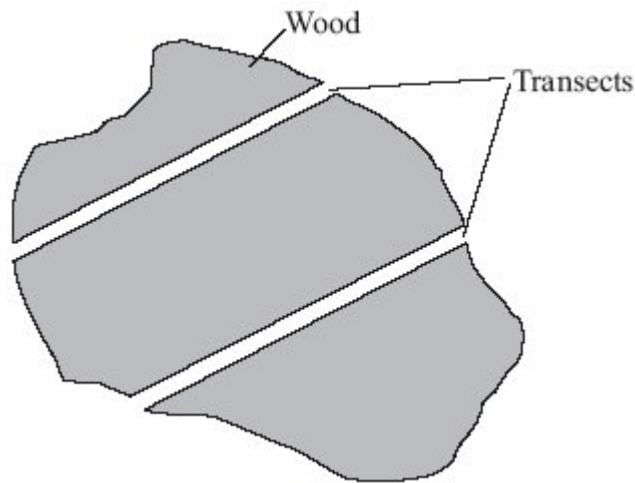
9.

Red squirrels live in trees. They eat seeds from the cones of conifer trees. Squirrels store cones in 'larders' on the ground. These larders provide food through the winter. Each red squirrel makes and defends one larder.

Scientists monitor squirrel numbers to find the best habitats for the squirrel's survival. In one investigation, scientists estimated the numbers of squirrels in different types of woodland. Each woodland contains a different species of conifer tree.

Here is their method.

- Ten woods of each type of woodland were surveyed.
- In each wood scientists measured out two transects (strips), each 600 m long and 10 m wide.
- A scientist walked slowly down the centre of each transect, recording the number of squirrel larders he could see.



- (a) (i) How many transects all together did the scientists survey in each **type** of woodland?

Number of transects _____

(1)

- (ii) What was the total area surveyed in **one** wood?

Area _____ m²

(1)

(b) Name **one** variable that was controlled in this investigation.

(1)

(c) (i) The scientists recorded the number of ladders instead of the number of squirrels they saw.

Explain how this could have increased the accuracy of the investigation.

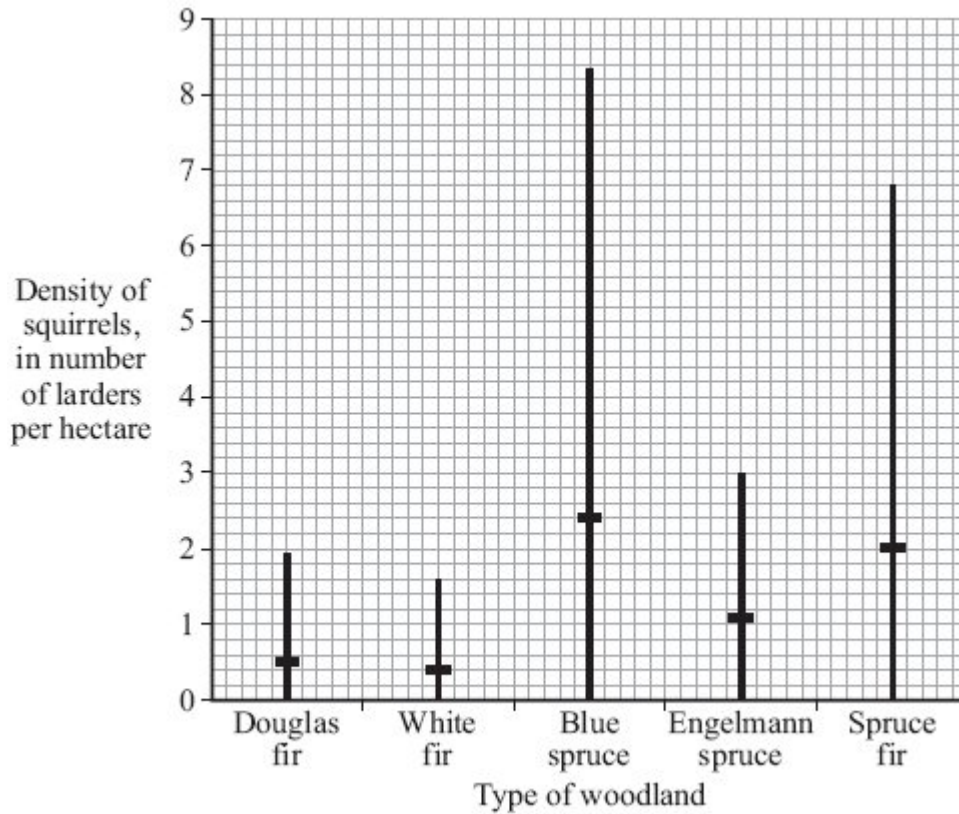
(1)

(ii) This method of counting the number of ladders could have led to an inaccurate estimate of the number of squirrels.

Explain how.

(2)

(d) The results of the investigation are shown in the graph.



The horizontal mark on each bar represents the mean number of ladders per hectare of woodland.

The range of the number of ladders observed for Douglas fir woodland was 0 to 1.9 per hectare.

(i) What was the range of the number of ladders per hectare in the Spruce fir woodland?

(1)

(ii) The highest mean number of ladders per hectare was found in Blue spruce woodland.

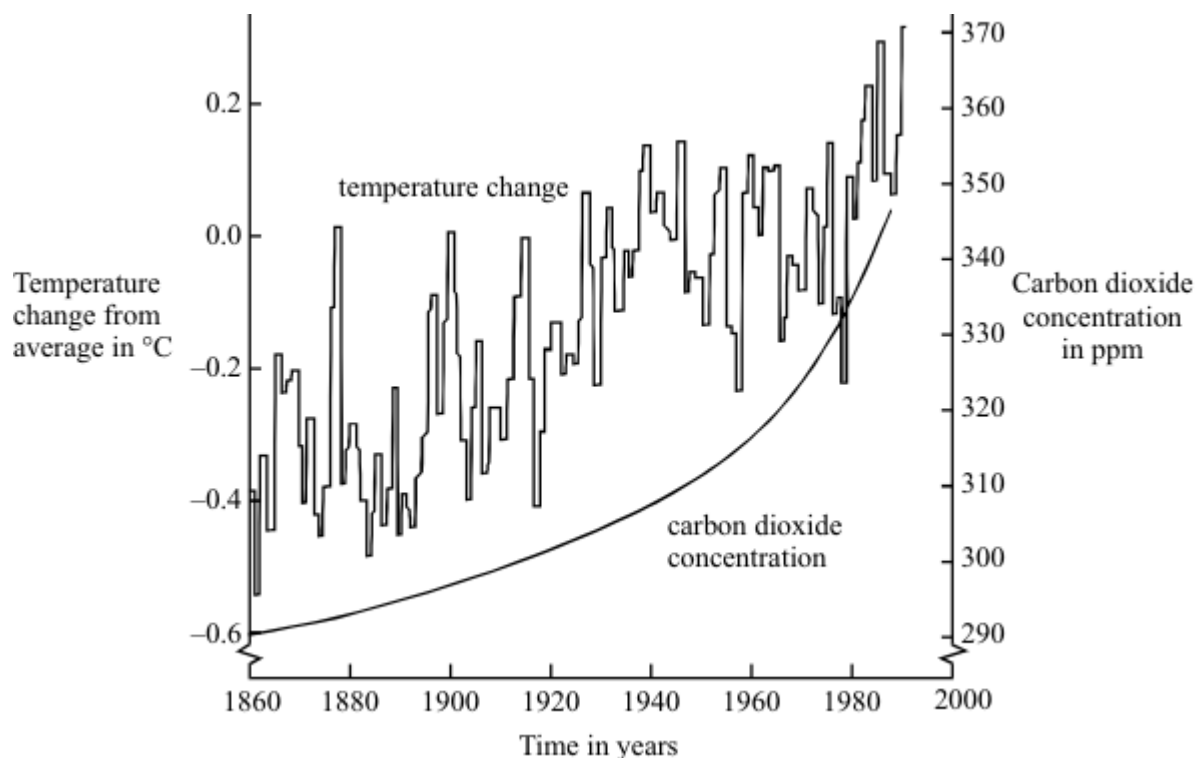
Suggest **one** explanation for this.

(1)

(Total 8 marks)

10.

The graph shows changes in temperature and in carbon dioxide concentration in the earth's atmosphere between 1860 and 1990.



(a) Give **two** human activities which may have helped to increase the concentration of carbon dioxide in the atmosphere.

- 1 _____
- 2 _____

(2)

(b) (i) Describe the changes in temperature shown by the graph between 1860 and 1990.

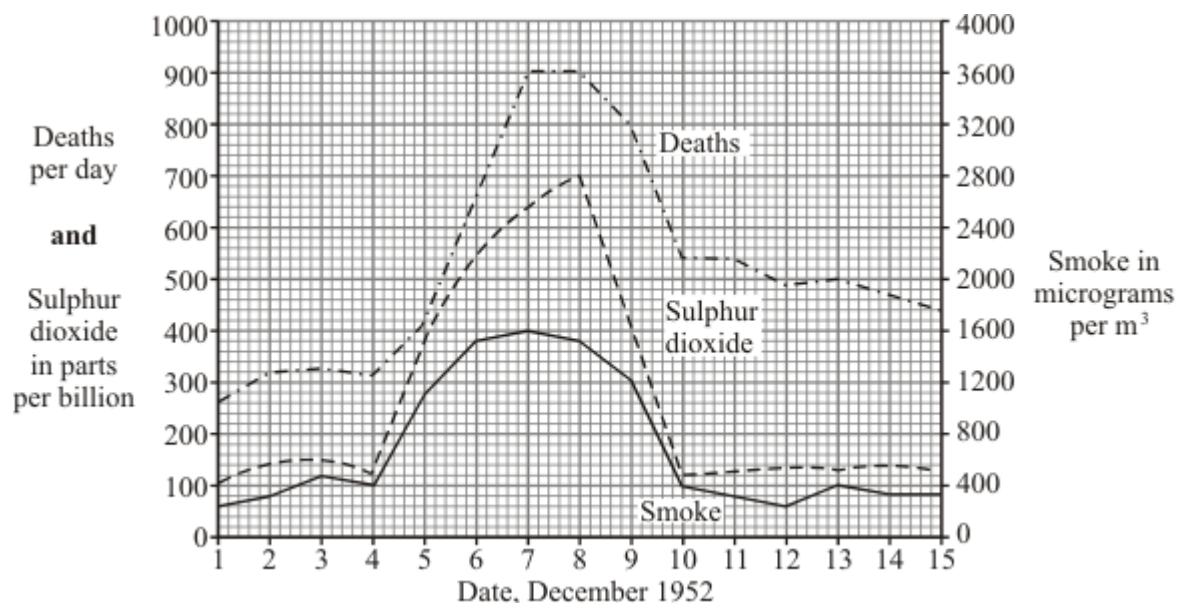
(2)

(ii) Do the data in the graph prove that increased carbon dioxide concentrations in the atmosphere caused the changes in temperature you described in part (b)(i)? Give a reason for your answer.

(1)

12.

In December 1952, there was a thick fog in London. The graph shows changes in the amounts of sulphur dioxide and smoke in the air and the number of people dying during this period.



(a) Describe **one** human activity which releases sulphur dioxide into the air.

(1)

(b) Human deaths during this period were caused mainly by lung diseases.

(i) Why were the lungs particularly affected?

(1)

(ii) Give evidence from the graph which suggests that sulphur dioxide might have caused these deaths.

(1)

(iii) Does the graph prove that sulphur dioxide caused these deaths? Explain your answer.

(1)

(Total 4 marks)

13.

In recent years, trees have been cut down to create more farm land. More cattle are kept and more rice is grown.

- (a) (i) Which gas has increased in the air as a result of trees being cut down?

Draw a ring around **one** answer.

carbon dioxide

oxygen

sulphur dioxide

(1)

- (ii) Which gas has increased in the air as a result of keeping more cattle and growing more rice?

Draw a ring around **one** answer.

carbon monoxide

hydrogen

methane

(1)

- (b) What effect may increases in these gases have on global temperatures?

Draw a ring around **one** answer.

decrease

increase

stay the same

(1)

- (c) List **three** ways in which humans have destroyed the habitats of other animals. Do **not** include cutting down trees in your answer.

1. _____

2. _____

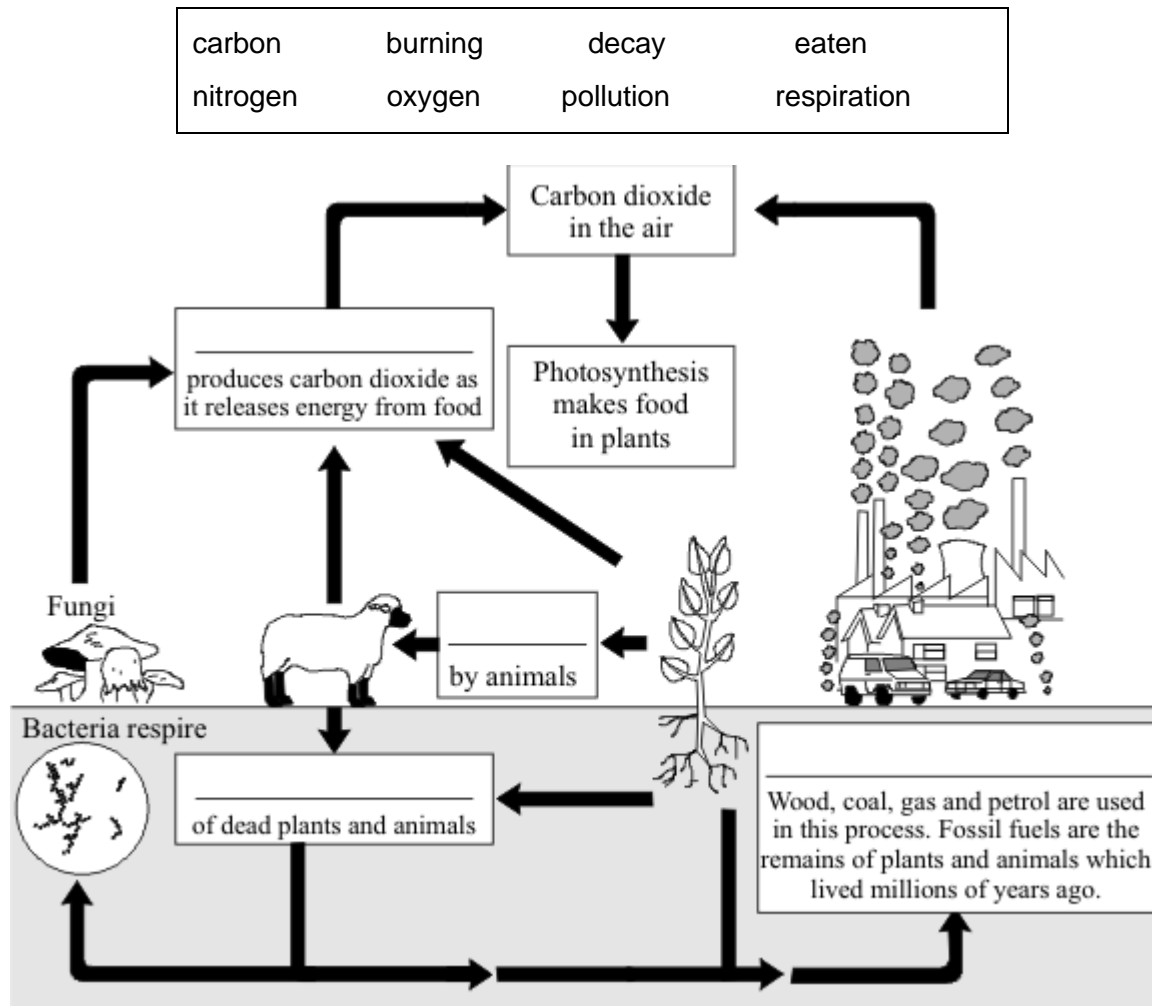
3. _____

(3)

(Total 6 marks)

14.

(a) Use the words in the box to fill in the gaps in the diagram. You may use each word once or not at all.



(4)

(b) (i) Why are fungi called decomposers?

(1)

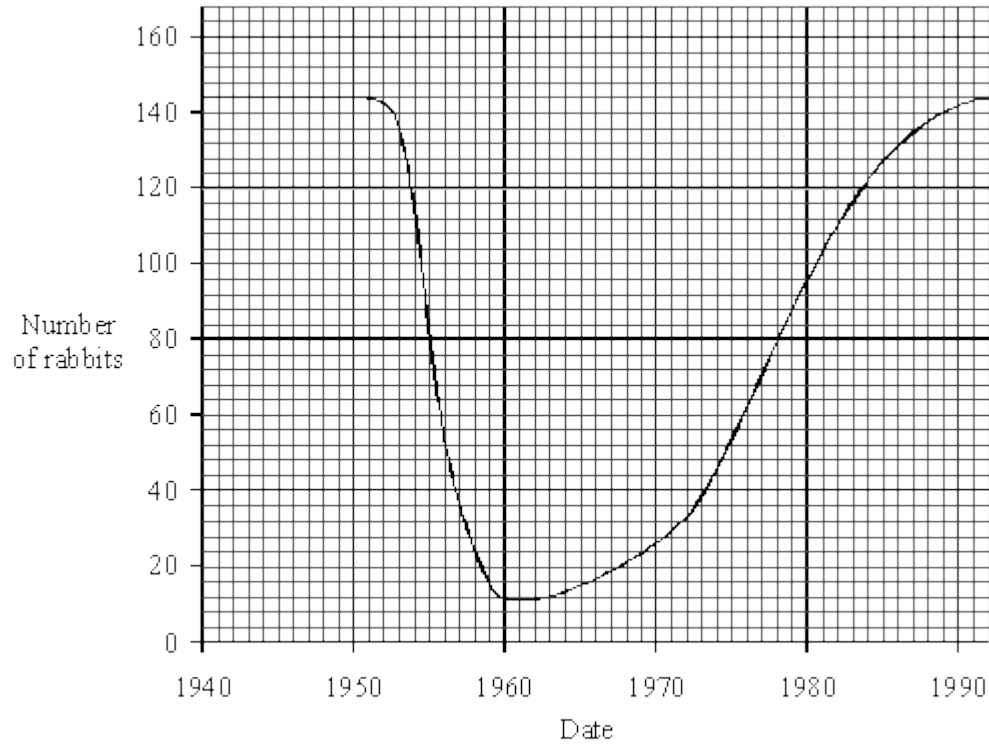
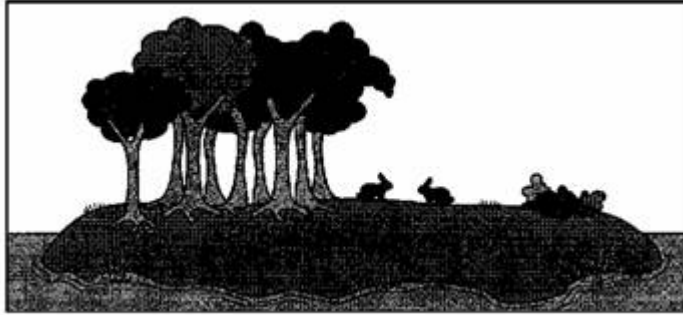
(ii) Give **one** other type of decomposer.

(1)

(Total 6 marks)

15.

A population of rabbits lived on a small island. The graph shows their population over the last 50 years.



(a) (i) How many rabbits were there on the island in 1950?

(1)

(ii) Give **one** year when there were 88 rabbits on the island.

(1)

(b) (i) Calculate the decrease in rabbit population between 1950 and 1960.

(1)

(ii) Suggest a reason why the rabbit population fell in these years.

(1)

(c) The most rabbits on the island is always about 140. Suggest a reason for this.

(1)

(Total 5 marks)

Mark schemes

1.

(a) (reduced) competition

ignore fighting

1

for any **one** from:

- light

ignore Sun

- water

- nutrients / ions / salts / minerals

ignore food

- space

allow less overcrowding

- colonise new areas

1

(b) hooks

allow spines

1

attach to animals / human clothing / animals carry fruits long distances

ignore wind dispersal

1

[4]

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. 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]

- 4.** (a) (i) (white) clover 1
- (ii) reed sweet-grass
allow reed
allow grass 1
- (iii) (only) found in swamp and aquatic zones **or** only 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

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]

5.

there are no / few predators of the lionfish
or spines protect lionfish from predation

allow warning colouration / poisonous

or no / fewer disease organisms

1

predators / prey in Atlantic do not recognise lionfish
or not fished by humans

allow high reproduction

1

also there is abundant food in Atlantic
or there is no / less competition in Atlantic

ignore adaptation to new environment

1

[3]

6.

(a) any **two** from:

ignore size of dish

- colour of dish **or** all dishes black
- (same) amount of each seed
- position of dishes **or** all dishes in same place / garden
ignore wood
- time observed / visited / left

2

(b) sunflower

1

(c) (i) (No)

named seed does not fit pattern

or

millet / safflower / corn eaten a lot but have little fat

or

the seed with the highest percentage eaten has least fat

accept converse

1

(ii) *allow separate references to sunflower and niger*

table 1 mark

- highest number of visitors **or** large range of visitors
allow most popular

1

table 2 mark

- high percentage eaten

or

contain high fat for energy / insulation

allow most eaten

1

[6]

- 7.** (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]

- 8.** (a) any **two** from:
ignore CO₂ release unqualified
- burning
 - activity of microbes / microbial respiration
 - less photosynthesis
*do **not** accept CO₂ taken in for respiration*
- or**
- trees take in CO₂
- or**
- less CO₂ locked up in wood
- CO₂ 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]

9. (a) (i) 20

1

(ii) 12000

1

(b) area of strips

or

length / width / size of transect

or

number of transects

1

(c) (i) since squirrels mobile
or
squirrels could be counted twice
or
squirrels hide

1

(ii) any **two** from:

- numbers of larders observed likely to be lower than actual
*do **not** accept squirrels share larders
or squirrels have more than one larder*
- since unlikely that all could be spotted if 5 m away
- old larder
- squirrels moved on / died
- young squirrels
- haven't made a larder

2

(d) (i) 0 to 6.8

1

(ii) any **one** from:

*do **not** accept squirrels prefer blue spruce*

- squirrels prefer blue spruce cones / seeds / nuts as food
- more cones / food
- more nesting sites
- fewer predators / competitors

1

[8]

10.

(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 and*
- 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 CO₂ rises temperature doesn't 1
- (c) any **one** biotic **or** abiotic effect eg:
- do **not** credit just “climate / weather change”*
- allow extreme 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]

11.

The answer to this question requires good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

maximum of 4 marks if ideas not well expressed

Polar bear has

- white fur - camouflage **or** not seen by prey
- accept converse points re sun bear* 1

thick(er) fur - insulation **or** keeps heat in
number must be comparative
numbers given must be explained
*do **not** accept keeps warm / keeps out the cold*

1

thicker fat - insulation **or** keeps heat in

energy reserve **or** can release heat

1

1

lower S.A - slower / less heat loss
(re body size)

1

[5]

12.

(a) burning fossil fuels / named example
accept driving 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) SO₂ and deaths rise (and fall) at same times **or**
SO₂ 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]

13.

(a) (i) carbon dioxide
accept other positive indications

1

(ii) methane

accept other positive indications

1

(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]

14.

(a) 1 mark for each

respiration

eaten

decay

burning

4

(b) (i) digests **or** breaks down **or** decays
dead (organic) material

accept rots for digests

accept plants for dead organic material

do not accept 'live on' or 'decompose'

1

(ii) bacteria **or** worms **or** maggots

accept microbes but not germs or viruses

1

[6]

15.

(a) (i) 144

1

(ii) 1955 **or** 1979

1

- (b) (i) $144 - 12 = 132$
allow 130, 134
allow a transfer error from part (a) 1
- (ii) disease **or** predators **or** sterility **or**
starvation **or** migration **or** climatic **or**
weather change
*award **one** mark for an awareness that any of the following factors
could reduce the rabbit population*
accept words to the effect of e.g. vegetation decreased = starvation
e.g. humans named as predators
*do **not** accept gender bias of offspring **or** 'too crowded' unless
qualified* 1
- (c) there's only enough food **or** water **or**
space for about 140
*do **not** accept statements equating births and deaths or increase or
decrease in predators* 1

[5]