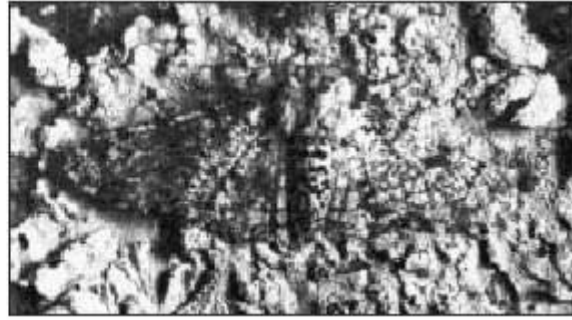


- 1 The photographs show two varieties of moths, **X** and **Y**. The moths belong to the same species. The moths are resting on a tree trunk in open countryside.



Moth X



Moth Y

- (a) Which variety of moth, **X** or **Y**, is more likely to be killed by insect-eating birds? Give a reason for your answer.

Variety of moth: \_\_\_\_\_

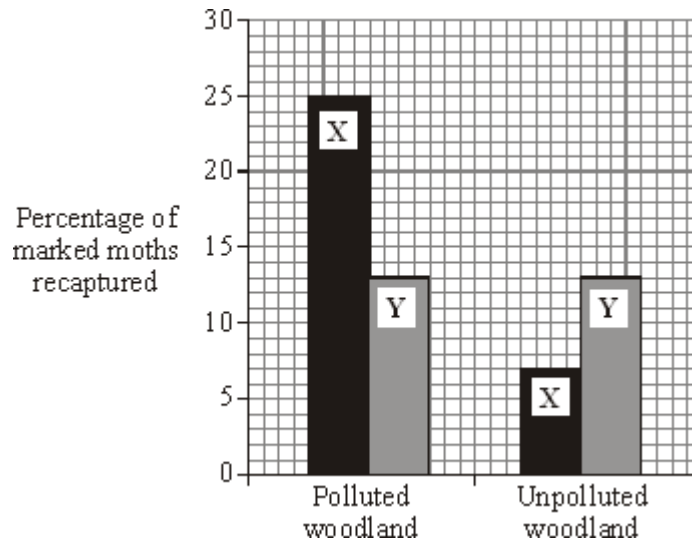
Reason \_\_\_\_\_

\_\_\_\_\_

(1)

- (b) In an experiment, large numbers of each variety of moth were caught in a trap.
- They were marked with a spot of paint on the underside of one wing and then released.
  - A few days later, moths were again trapped and the number of marked moths was counted.
  - The experiment was carried out in a woodland polluted by smoke and soot, and also in an unpolluted woodland.

The results are shown in the bar graph.



- (i) When the moths were being marked, suggest why the paint was put on the underside of the wing and not on the top.

\_\_\_\_\_

(1)

- (ii) What percentage of moths of type **X** was recaptured in:

the polluted woodland; \_\_\_\_\_

the unpolluted woodland? \_\_\_\_\_

(2)

- (iii) In each woodland, only a small number of marked moths of both varieties were recaptured. Suggest **one** reason for this.

\_\_\_\_\_

\_\_\_\_\_

(1)

- (c) (i) The colour of the moths is controlled by a gene. The dark form was first produced by a mutation in the gene.

What chemical, found in a gene, is changed by a mutation? Draw a ring around your answer.

carbohydrate      DNA      fat      protein

(1)

- (ii) Some of the offspring from the original dark moth were also dark. What caused this?

---

---

(1)

(Total 7 marks)

2

Camels can live in hot deserts.



Read the following information.

- A camel has big, flat feet.
- A camel's hump is where fat is stored.
- The fat from a camel's hump can be broken down to form carbon dioxide and water.
- A camel has no layer of fat under the skin.
- A camel can go at least two weeks without water.
- A camel can drink large amounts of water in one go.
- A camel has long eyelashes and long hair around the openings to its ears.

- (a) Give **one** way that the camel is well adapted to living where there is sand.

---

(1)

- (b) Suggest why the camel does **not** need a layer of fat under its skin.

---

(1)

(c) Give **two** reasons why the camel can go at least two weeks without drinking any water.

1. \_\_\_\_\_  
\_\_\_\_\_  
2. \_\_\_\_\_  
\_\_\_\_\_

(2)  
(Total 4 marks)

A selective herbicide (a type of pesticide) can be used to kill weeds growing among crop plants.

The table shows the result of adding different amounts of a selective herbicide to a rice crop.

Herbicide added in kg per hectare	Amount of rice produced in tonnes per hectare	Percentage cover of weeds
0.0	50	85
1.7	70	32
3.4	76	24

(a) As more herbicide is applied, what happens to:

(i) the amount of rice produced;

\_\_\_\_\_

(1)

(ii) the percentage cover of weeds?

\_\_\_\_\_

(1)

(b) Suggest **two** reasons why rice does not grow well when there are a lot of weeds present.

1. \_\_\_\_\_  
\_\_\_\_\_  
2. \_\_\_\_\_  
\_\_\_\_\_

(2)

(c) Suggest **one** possible danger of spraying crops with pesticides.

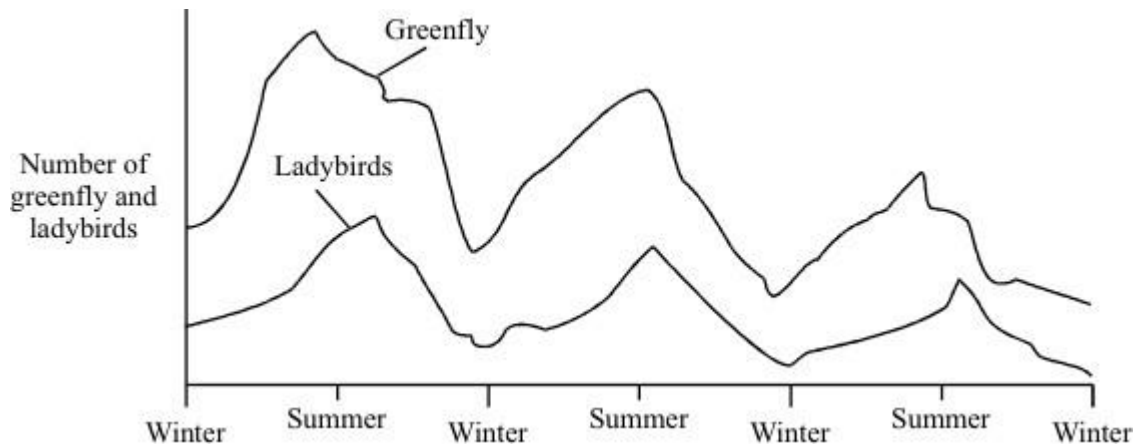
---

---

(1)

(Total 5 marks)

**4** Greenfly feed on rose bushes. Ladybirds (predators) feed on these greenfly. The graph shows how the population of greenfly and ladybirds in a garden change over a period of three years.



(a) *To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

Describe what happened to the population of greenfly over the three years.

---

---

---

---

---

---

---

---

---

---

(3)

(b) Give **one** factor that limits the number of ladybirds.

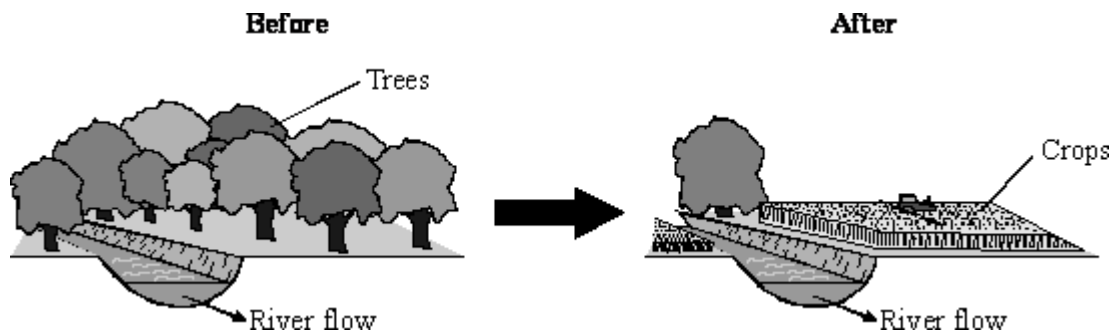
---

---

(1)  
(Total 4 marks)

5

In many countries, trees are removed so that more land can be used to grow crops.



(a) When trees are removed it becomes more difficult for some plants and animals to survive. Give **one** reason why.

---

---

(1)

(b) Farmers often spread chemicals on their fields before growing crops. When the crops are growing, the farmers sometimes spray them with toxic chemicals. These chemicals may be washed from the fields and can pollute the rivers.

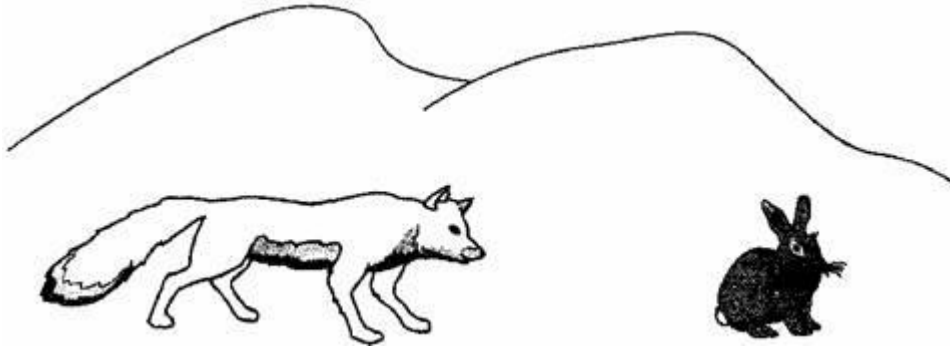
Name **two** types of these chemicals that might pollute rivers.

1. \_\_\_\_\_

2. \_\_\_\_\_

(2)  
(Total 3 marks)

- 6 The Arctic fox is a predator that feeds mainly on small mammals. The Arctic fox is adapted to live in the cold conditions of the snow-covered Arctic.



The Arctic fox has thick, white fur.

Give **two** ways in which the fur helps the Arctic fox to survive.

1. \_\_\_\_\_

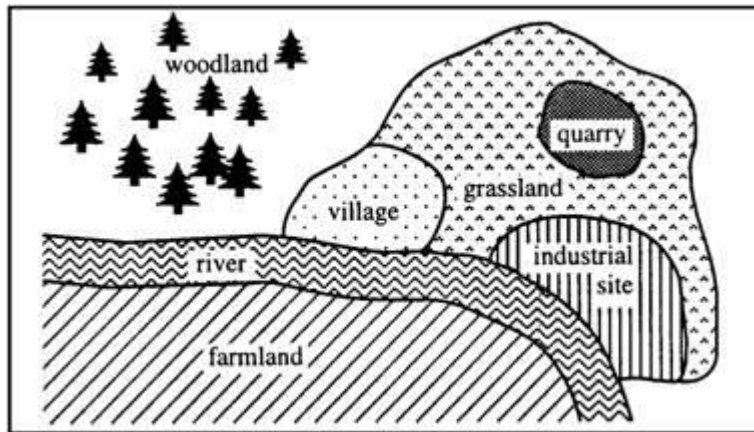
\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(Total 2 marks)

- 7 The diagram shows a village and its surroundings.



- (a) Use words from the list to complete the sentences about pollution.

**oxygen      pesticides      sewage      sulphur dioxide**

The air might be polluted by \_\_\_\_\_ from the industrial site.

The river might be polluted by \_\_\_\_\_ from the village and

by \_\_\_\_\_ from the farmland.

(3)

(b) The owners of the quarry want to make it larger.

Give **one** effect that this might have on wild plants and animals that live near the quarry.

---

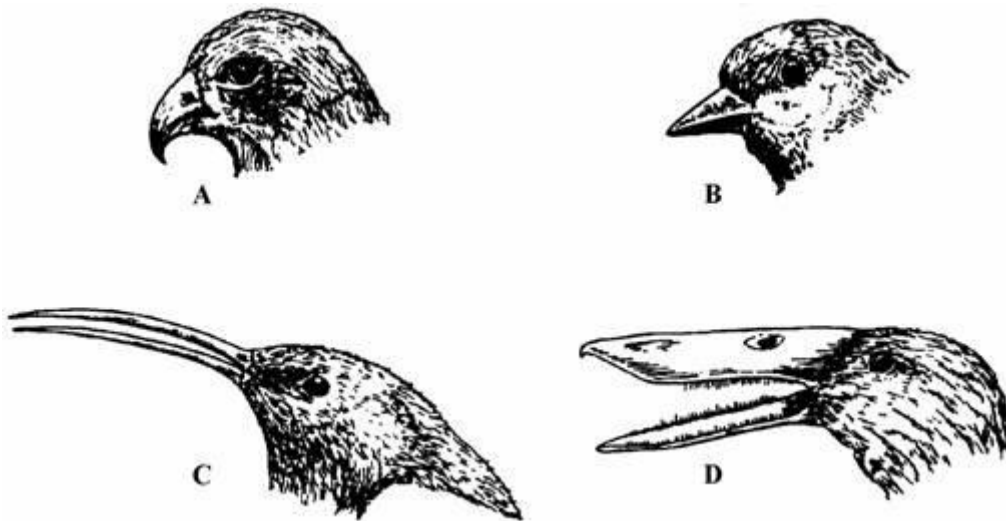
---

(1)

(Total 4 marks)

8

The drawings show the heads of four birds, not drawn to scale. The birds feed in different ways.



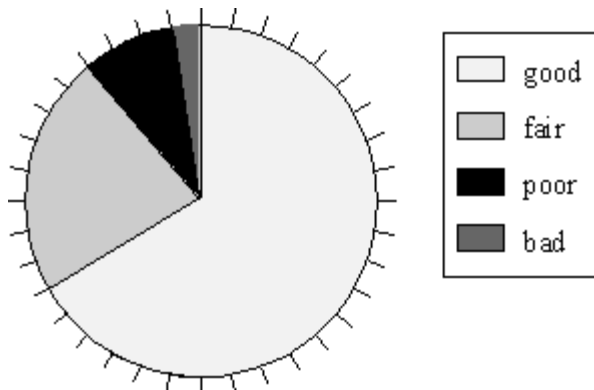
Which of the birds, A, B, C or D, is best adapted for:

- 1. tearing flesh \_\_\_\_\_
- 2. finding insects in cracks in the ground \_\_\_\_\_
- 3. crushing fruit \_\_\_\_\_
- 4. sieving small animals from mud? \_\_\_\_\_

(Total 4 marks)

9

The pie diagram shows the quality of river water in England and Wales in 1985.





(a) What proportion of the rivers had good quality water?

\_\_\_\_\_

(1)

(b) Give **two** ways in which rivers may become polluted.

1. \_\_\_\_\_

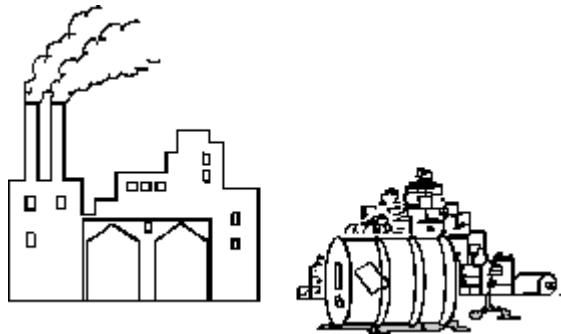
2. \_\_\_\_\_

(2)

(Total 3 marks)

10

The drawings below show some of the effects that human activities have on the environment.



Use information from the drawings to give **two** ways in which these human activities affect other living organisms.

1. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Total 2 marks)

**11**

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)**

**12**

Animals and plants are adapted to live in their environment.

(a) Explain how these adaptations help animals keep warm in cold conditions.

(i) A thick fur coat

\_\_\_\_\_

\_\_\_\_\_

**(2)**

(ii) A thick layer of fat beneath the skin

---

---

(2)

(iii) A large body

---

---

(2)

(b) Lots of animals are *camouflaged*. What does *camouflaged* mean? Give **one** advantage of being *camouflaged*.

---

---

---

(2)

(c) Describe **two** different ways that plants could be adapted to survive in dry conditions like a desert.

---

---

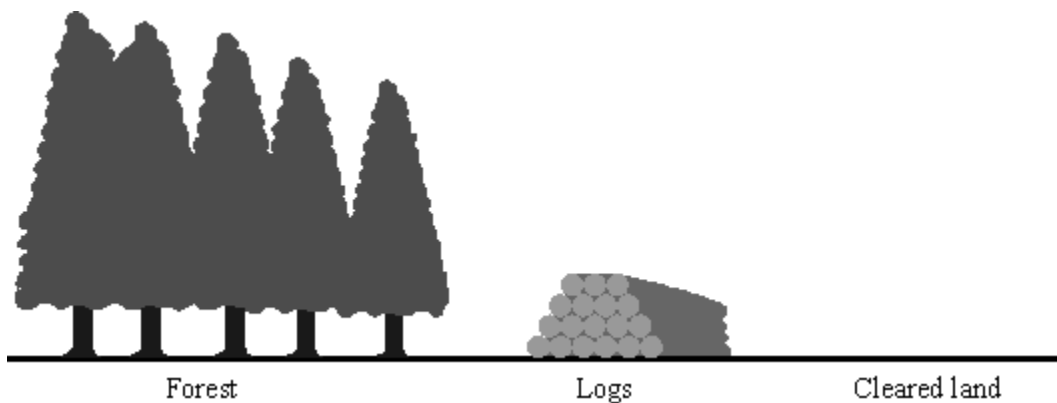
---

---

(2)

(Total 10 marks)

13



Some large forest areas are being destroyed. This changes the amount of carbon dioxide in the atmosphere.

(a) (i) State **one** use for the trees that are cut down.

---

(1)

(ii) State **one** use for the cleared land.

---

(1)

(iii) How has the destruction of forests affected the amount of carbon dioxide in the atmosphere?

---

(1)

(b) (i) How has the destruction of forests caused an increased Greenhouse effect?

---

---

---

---

---

---

---

(4)

(ii) State **one** effect of an increase in the Greenhouse effect.

---

---

(1)

**(Total 8 marks)**

## Mark schemes

- 1** (a) **X** (no mark)  
**X** is more visible **or** **Y** is more camouflaged 1
- (b) (i) so camouflage not changed **or** so not easier to see 1
- (ii) 25 1
- 7 1
- (iii) any **one** from:
- eaten (by birds) / died
  - mixed in with large number of unmarked moths
  - moved away 1
- (c) (i) DNA 1
- (ii) the gene / allele for being dark / dominant 1

[7]

- 2** (a) any **one** from  
big, flat feet  
long eyelashes  
long hair around openings to its ears 1
- (b) (the came) does not need insulation  
*accept can keep warm without the fat* 1
- (c) any two from:
- (the camel) can drink large amounts of water in one go
  - loses little water by urine and/or sweating
  - (the camel) can use fat from its hump to produce water  
*any order for the reasons* 2

[4]

- 3** (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 all*
  - competition for light 2
- (c) kills / harms other / named organisms 1

[5]

- 4** (a) **Quality of Written Communication**  
The answer to this question requires ideas in 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.

*max 2 if ideas not well expressed*

in summer more greenfly

*accept increase in population*

1

in winter less greenfly

*accept decrease in population*

1

over the three years greenfly numbers decrease

*accept fall **or** drop for decrease*

1

- (b) any **one** from

(number of) greenfly

severe **or** cold winters

toxic chemicals

destruction of habitats

disease

predators

weather

temperature

*do not accept food*

1

[4]

- 5 (a) habitats destroyed  
*accept idea that the places to live or food or minerals are reduced or less shelter* 1
- (b) any **two** from  
fertilisers / named fertilisers  
*accept sewage / lime*  
pesticides  
herbicides 2
- 6 camouflage (when hunting)  
*accept the idea that the white coat prevents the prey or predator 'seeing' the Arctic fox* 1
- insulation (from cold)  
*accept an idea that the thick coat retains body heat or traps air or that air in the fur is a poor conductor or keeps it warm*
- NEUTRAL RESPONSES –  
protection, waterproof 1
- 7 (a) sulphur dioxide  
sewage  
pesticides  
*for 1 mark each* 3
- (b) *idea of reduced numbers / loss of habitat (home) / killed or damaged by pollution*  
*for 1 mark* 1
- 8 (1) A  
(2) C  
(3) B  
(4) D  
*for 1 mark each* 4
- 9 (a) two thirds/66%  
*for 1 mark* 1

- (b) 2 of:  
by sewage  
by chemicals fertilizers

*any 2 for 1 mark each*

2

[3]

- 10** e.g.  
waste gases/air pollution harms living organisms  
dumped waste can make land unfit to live on/  
drainage pollutes water/harms organisms

*for 1 mark each*

*(if no marks can allow – pollution harms organisms = 1)*

[2]

- 11** (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]



- 12 (a) (i) traps air  
*note 'keeps warm' isstem* 1
- (increases) insulation effect **or** retains  
body heat or prevents heat loss  
*accept air is a poor (thermal) conductor*  
*do **not** credit acts as a barrier unless qualified by a prevention of*  
*heat loss* 1
- (ii) **increases** insulation  
*do **not** accept keep warm* 1
- retains body heat or prevents heat loss  
*accept:*  
*stored fat can be broken down **or** respired **or** burned (1 mark)*  
*credit 'used for energy'*  
*to release (thermal) energy (1 mark)*  
*do **not** credit create energy* 1
- (iii) less **or** smaller surface area (per unit  
mass or volume)  
*accept uses more glucose **or** respire more*  
*do **not** credit small surface area* 1
- and**
- less heat loss (for its mass)  
or explanation of this idea  
*generates more heat* 1
- (b) (coloured) to match or blend in with  
environment  
*accept this idea in candidate's own words e.g disguised **or** specific*  
*example* 1
- any **one** from:  
prevents predation  
aids hunting  
*accept this idea in own words* 1

(c)

*note: marks are awarded for an indication of enhanced qualities **or** adaptations of xerophytes*

*do **not** credit an unqualified **effect***

*e.g. small surface area **or** they can store water **or** spikes **or** prickly leaves related to protection*

any **two** from:

widespread roots

long roots

spiky leaves or needles

hidden **or** sunken stomata

fleshy leaves **or** stems **or** roots for

water storage

leaves arranged to **funnel** dew to roots

hairy **or** rolled leaves

light colour

*accept no **or** fewer stomata*

*accept no leaves*

*accept crassulacean acid metabolism*

*accept ephemeral (flowering **or***

*leaf loss **or** production)*

*accept reverse diurnal pattern of stomatal opening (stomata open at night)*

2

[10]

13

(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<sub>2</sub>

1

- (b) (i) trees photosynthesise/less photosynthesis takes place (and)  
*accept burning trees (1)* 1
- trees/photosynthesis uses carbon dioxide  
*releases CO<sub>2</sub> (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]