20. Human influences on ecosystems

20.3 Pollution

Paper 3 and 4

Question Paper

Paper 3

Questions are applicable for both core and extended candidates

1 **(b)** Carbon dioxide is one gas that causes climate change.

State the name of **one other** gas that causes climate change.

..... [1]

(c) Suggest **one** way that humans can increase the rate of removal of carbon dioxide from the atmosphere.

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..... [1]

2 **(c)** Sometimes untreated sewage enters water ecosystems.

Describe the effects of untreated sewage on river ecosystems.

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..... [3]

3 **(a)** Fig. 6.1 is a graph that shows the concentration of dissolved oxygen in the water at increasing distances along a river.

Untreated sewage is released into the river. This is marked on the graph in Fig. 6.1.

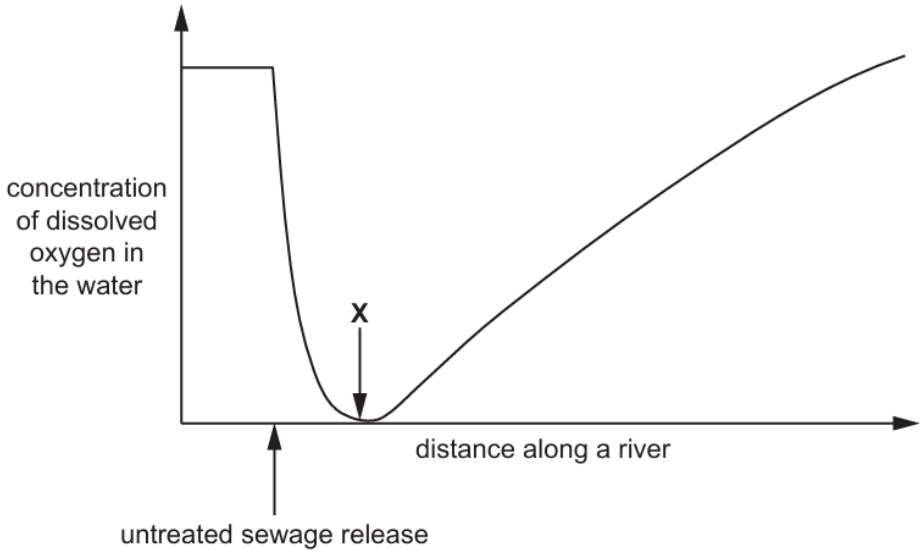

Fig. 6.1

(i) Describe the results shown in Fig. 6.1.

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..... [3]

(ii) Predict **and** explain the effect on the organisms in the river of the dissolved oxygen concentration at **X** in Fig. 6.1.

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..... [2]

4 **(b)** One reason for the decrease in population numbers of leatherback turtles is pollution by discarded rubbish such as plastics.

State **two** ways in which the amount of plastic pollution can be reduced.

1 .....

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2 .....

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[2]

(c) Suggest other factors, apart from pollution, that can lead to a decrease in the population of leatherback turtles.

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..... [3]

5 **(b)** Some animals can only live in clean water that has a high concentration of dissolved oxygen.

Some animals can live in polluted water.

A student investigated which animal species lived in different locations in a river.

Fig. 2.2 is a diagram of the river. The numbers are the locations of where the student counted how many of each animal species were present.

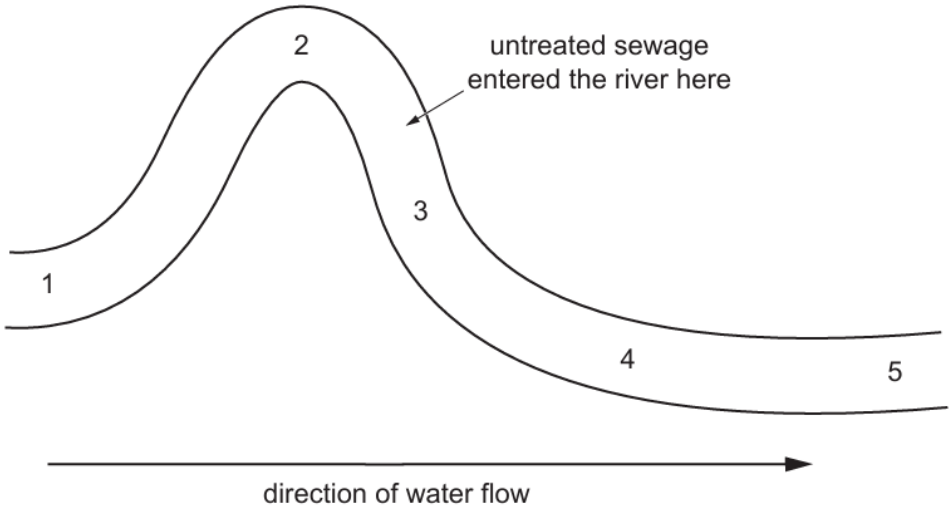

Fig. 2.2

The number of each animal species present is shown in Table 2.1.

Table 2.1

animal species	total number of each animal species found				
	location 1	location 2	location 3	location 4	location 5
mayfly nymph	76	78	0	0	0
freshwater shrimp	70	73	9	17	35
bloodworm	2	1	65	45	16
sludge worm	0	0	111	77	34

(i) State which location has the most animals present.

..... [1]

(ii) Using the information in Fig. 2.2 and Table 2.1, suggest which animal species is unable to survive in polluted water. Give reasons for your choice.

species .....

reasons .....

.....

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[3]

(iii) Suggest which animal species in Table 2.1 indicates that the water is polluted when it is present.

..... [1]

(iv) Calculate the percentage change in the freshwater shrimp numbers between location **2** and location **3**.

Give your answer to **one** decimal place.

Space for working.

..... %

[3]

6 **(b)** State the names of **two** greenhouse gases that are produced as a consequence of farming.

1 .....

2 .....

[2]

7 **(c)** Fig. 7.3 shows pollution in a marine environment and Fig. 7.4 shows pollution in a land environment.

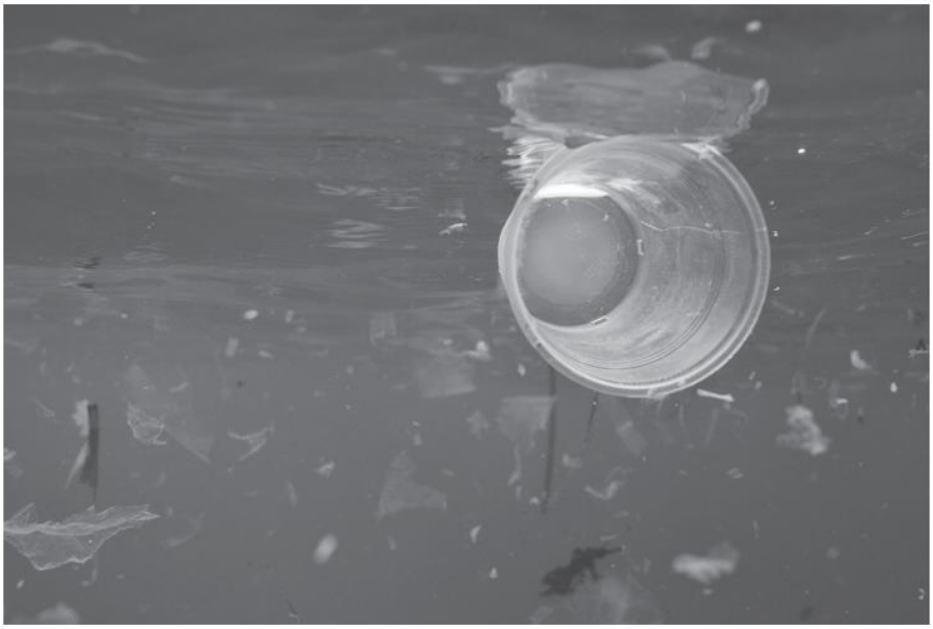

Fig. 7.3

Fig. 7.4

State the name of **one** source of pollution for each of the environments shown in Fig. 7.3 and Fig. 7.4.

marine .....

land .....

[2]

8 Fig. 4.1 shows some of the processes involved in the treatment of sewage.

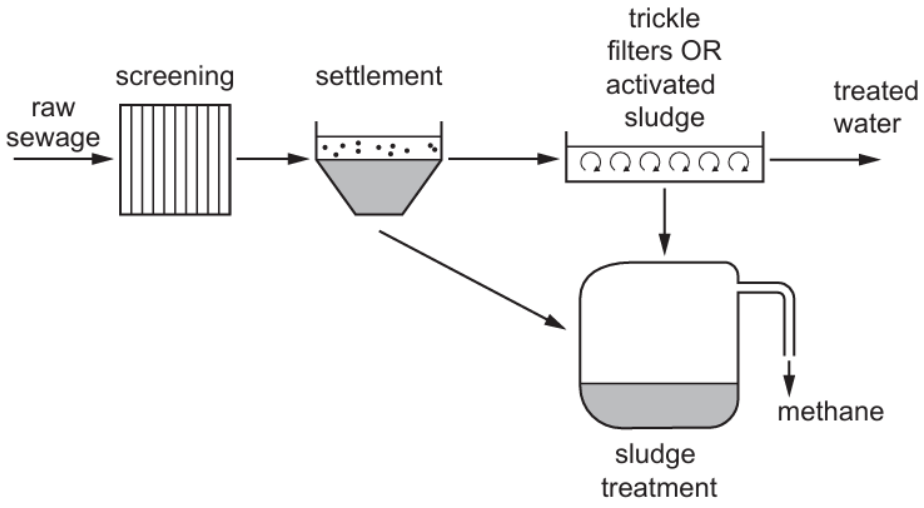

Fig. 4.1

(a) Complete Table 4.1 by placing ticks (✓) in the correct boxes to show what is involved in each process during the treatment of sewage.

The first row has been completed for you.

Table 4.1

process	process involves:			
	aeration	removal of large solids	separating liquid waste from solid waste	the use of microorganisms
production of methane				✓
screening				
settlement				
sludge treatment				
trickle filters OR activated sludge				

[4]

(b) Describe **two** reasons why it is necessary to treat sewage before returning the water to the environment.

1 .....

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2 .....

.....

[2]

[Total: 6]

9 **(a)** Table 8.1 shows the mass of different materials recycled in one country in 2012 and 2017.

Table 8.1

year	material recycled / tonnes			
	cardboard	paper	metal	plastic
2012	193 091	222 455	41 488	44 262
2017	245 345	144 416	24 874	23 498

(i) Describe the data in Table 8.1.

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..... [3]

(ii) Calculate the percentage change in mass of plastic recycled between 2012 and 2017.

..... %
[2]

(b) Discarded rubbish is one source of pollution.

Adding excess fertiliser to soil is another source of pollution.

(i) State **two** other types of substances used in agriculture that can pollute land and water.

1 .....

2 .....
[2]

(ii) State the names of **two** gases that pollute air and are linked to climate change.

1 .....

2 .....
[2]

[Total: 9]

10 **(d)** Describe the effects on the environment of increasing carbon dioxide concentration in the atmosphere.

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.....[2]

11 **(c)** Fertilisers, herbicides and insecticides can all pollute water.

List **two** other sources of water pollution.

1 .....

2 .....
[2]

12 **(b)** Carbon dioxide is a greenhouse gas.

State the name of **one other** greenhouse gas.

.....[1]

Paper 4

Questions are applicable for both core and extended candidates unless indicated in the question

13 **(b)** A scientist obtained a sample of the bacterial decomposers and grew them in a flask. The resources available for bacterial growth in the flask became limiting.

The size of the bacterial population was estimated during the investigation and these data were plotted on a graph.

(i) State the name of the expected shape of the population growth curve that would be drawn on the graph.

..... [1]

(ii) State the name of the initial phase of bacterial growth.

..... [1]

(iii) State **one** factor, other than a lack of resources, that would cause bacteria to die during the death phase.

..... [1]

14 Large quantities of plastic waste are polluting the oceans.

(a) A survey published in March 2018 showed the increase in plastic waste in the Pacific Ocean. One area of the Pacific Ocean is known as the Great Pacific Garbage Patch (GPGP).

Data were collected from areas inside and outside the GPGP between 1965 and 2015 to estimate the quantity of plastic waste.

The results are shown in Fig. 2.1.

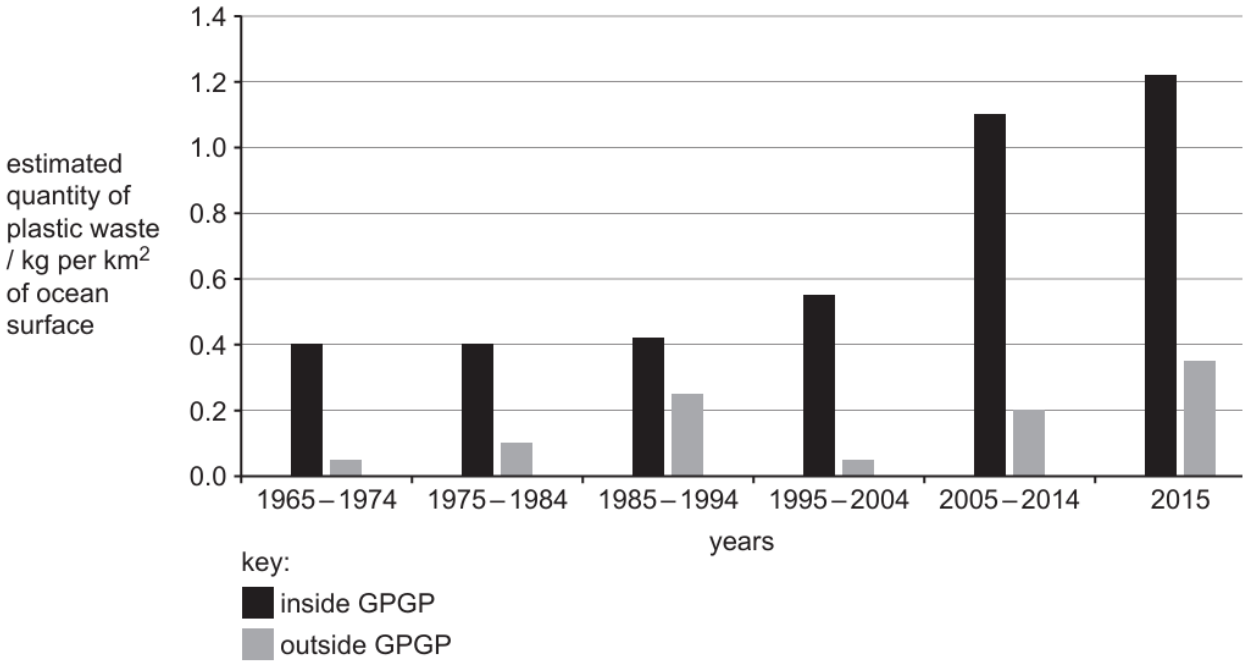

Fig. 2.1

Describe the results of the survey shown in Fig. 2.1.

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..... [4]

(b) The green turtle, *Chelonia mydas*, is a species of marine animal that is harmed by plastic waste.

Fig. 2.2 shows a green turtle swimming past a plastic bag in the Pacific Ocean.

Fig. 2.2

(i) Turtles are classified as reptiles.

State **one** feature shown by all reptiles that is **not** found in amphibians.

..... [1]

(ii) Outline the dangers of non-biodegradable plastic waste to marine animals, such as green turtles.

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..... [4]

15 **(c)** Waste from livestock farms often pollutes water courses, such as streams and rivers, leading to a reduction in biodiversity.

Explain how the pollution of water courses by animal waste leads to a reduction in biodiversity.

(extended only)

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..... [6]

16 **(b)** Fields of crop plants were sprayed with two herbicides. A farmer measured the concentration of the two herbicides, **A** and **B**, in a lake near the fields.

The water in the lake was sampled at intervals for two weeks.

Fig. 4.2 shows the results.

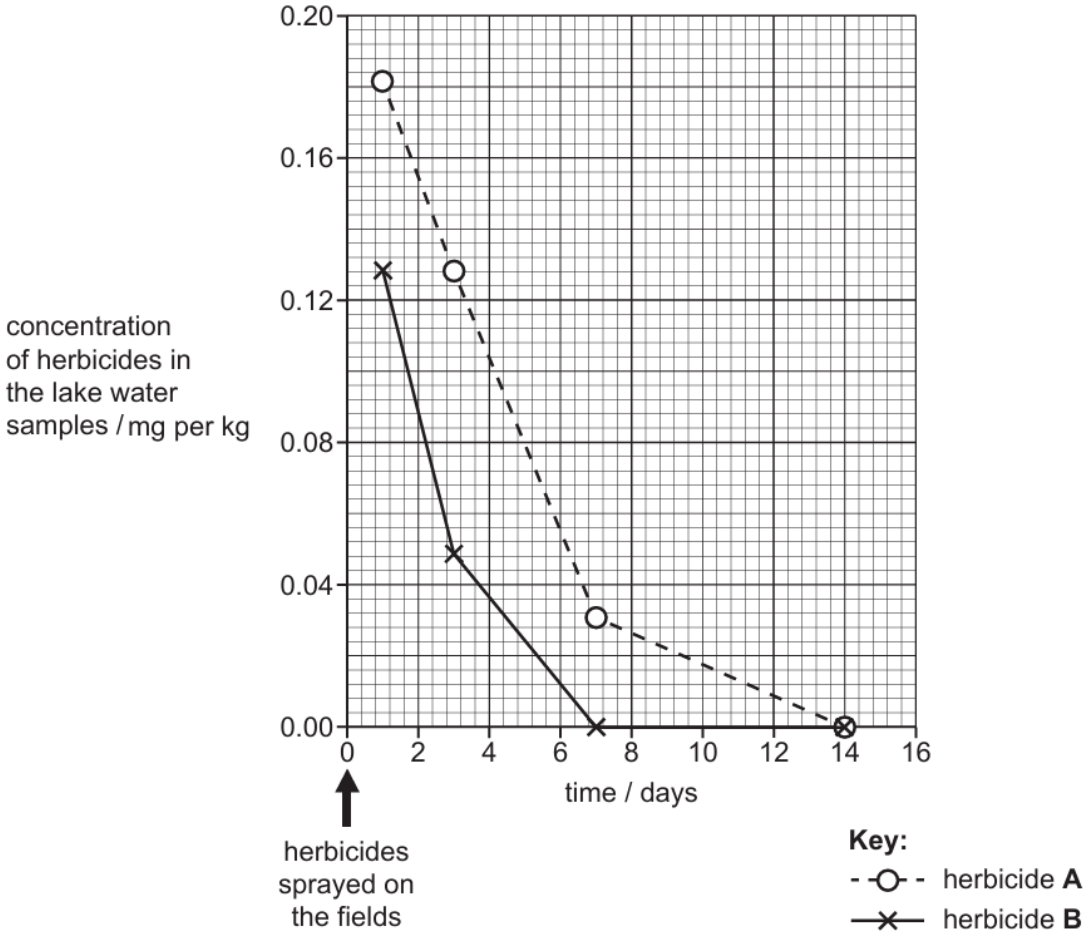

Fig. 4.2

(i) Compare the concentrations of herbicide **A** and herbicide **B** in the lake.

Use the information in Fig. 4.2 to support your answer.

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..... [3]

(ii) Suggest how herbicides damage ecosystems in a lake. **(extended only)**

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..... [4]

17 The concentration of atmospheric carbon dioxide has increased considerably in recent years.

(a) Describe the possible causes of increased atmospheric carbon dioxide.

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..... [3]

18 **(d)** Non-biodegradable plastics are also harmful to terrestrial ecosystems.

Discuss the effects of non-biodegradable plastics on terrestrial ecosystems.

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..... [5]

19 **(b)** Complete the sentences by writing the missing words in the spaces.

Carbon dioxide is a greenhouse gas. Greenhouse gases trap ..... in the atmosphere. Water vapour is the most common greenhouse gas in the atmosphere. Another greenhouse gas is methane which is released from ..... and ..... . Carbon dioxide and methane released from human activities over the past 200 years have contributed to the ..... greenhouse effect.

Other atmospheric pollutants can cause acid rain. One of these is ..... which is a waste gas from some power stations.

One source of pollution in both aquatic and terrestrial ecosystems is ..... plastics. [6]

20 **(c)** Describe how human activities are affecting the carbon cycle.

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.....[5]