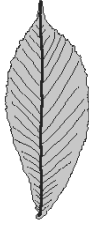

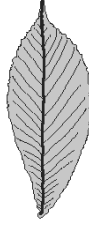



WJEC (Eduqas) Biology GCSE
Topic 6.2 The Principle of
Material Cycling
Questions by Topic

2. Tracy investigated decay using two leaves of the same size from the same tree.

- She made a drawing of each leaf.
- She then buried each leaf in a separate beaker each containing equal volumes of soil.
- She kept one beaker at 5°C and one at 15°C.
- After one month, she removed the leaves from the soil and drew them again.

Her drawings are shown in the table below.

Temperature (°C)	Drawing of leaf	
	start	after one month
5		
15		

(a) State the name of one group of microorganisms that cause decay. [1]

.....

(b) Describe the results of the investigation shown by the drawings. [2]

.....

(c) (i) Give two ways that Tracy's investigation is a fair test. [2]

I.

II.

(ii) Why is it important that an investigation should be a fair test? [1]

.....

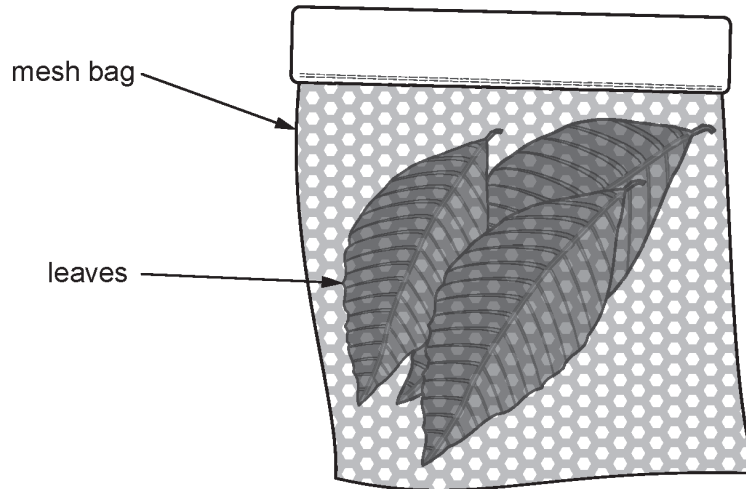
(d) Microorganisms in the soil respire.

State the name of the gas released during respiration. [1]

.....

3.

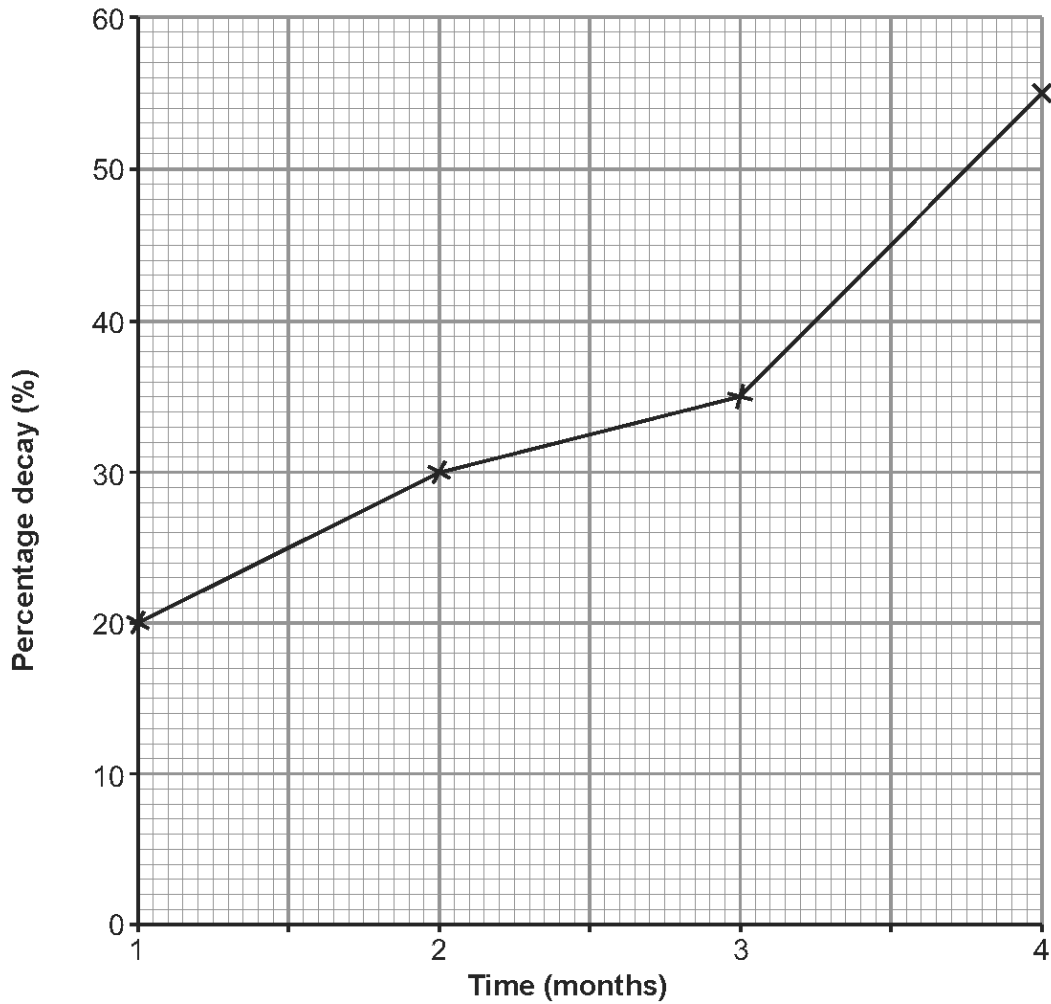
Students investigated the decay of leaves in woodland soil. The students put the leaves in bags of two different mesh sizes. The bags were buried in soil for four months. One of the bags is shown below.



The bags were dug up at the end of each month and the percentage (%) decay was measured. The results are shown in the table.

mesh size (mm)	percentage (%) decay			
	month 1	month 2	month 3	month 4
1.0	20	30	35	55
0.1	13	23	26	42

- (a) (i) Complete a line graph of these results on the grid opposite.
The results for one mesh size have been plotted for you.
- I. plot the points for the other mesh size, [2]
 - II. join the points with a ruler, [1]
 - III. label the **two** lines. [1]



(ii) Describe the effect of mesh size on the percentage decay of the leaves. [1]

.....

(iii) Give two features of the leaves that should be controlled at the start of the investigation. [2]

I.

II.

(iv) The decay is caused by microorganisms. Give the name of one type of decay causing microorganism. [1]

.....

(v) Suggest one reason why the leaves decayed more slowly between months 2 and 3. [1]

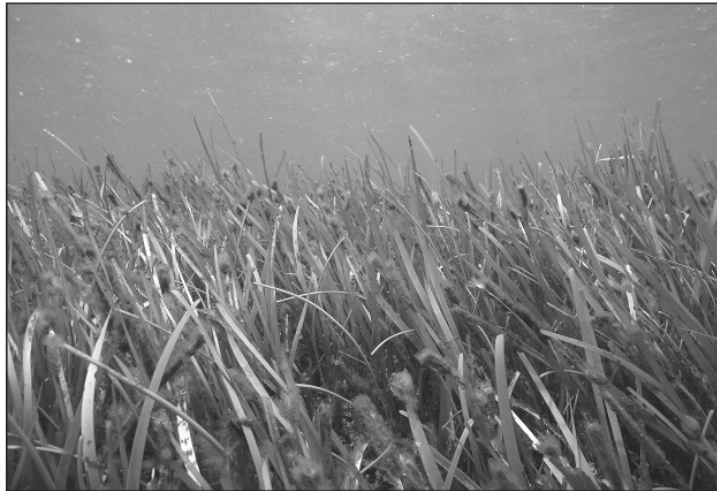
.....

(b) State the importance of decay for plant growth. [1]

.....

4.

Read the information about seagrass and use it to answer the questions.



Seagrass growing on the sea bed

Seagrass is a green plant which lives in the sea. It covers large areas of the sea bed.

Human activities such as dredging, building and industrial development can destroy seagrass. In the 1950s the loss of seagrass was 1.5% per year but since 1990 scientists have calculated the loss to be 7% per year.

Fisheries need sea grass. In the Mediterranean Sea, between 30% and 40% of the fish caught feed on seagrass and in Indonesian seas this is 60%.

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|

- (i) Give **one** reason why areas of seagrass are lost. [1]

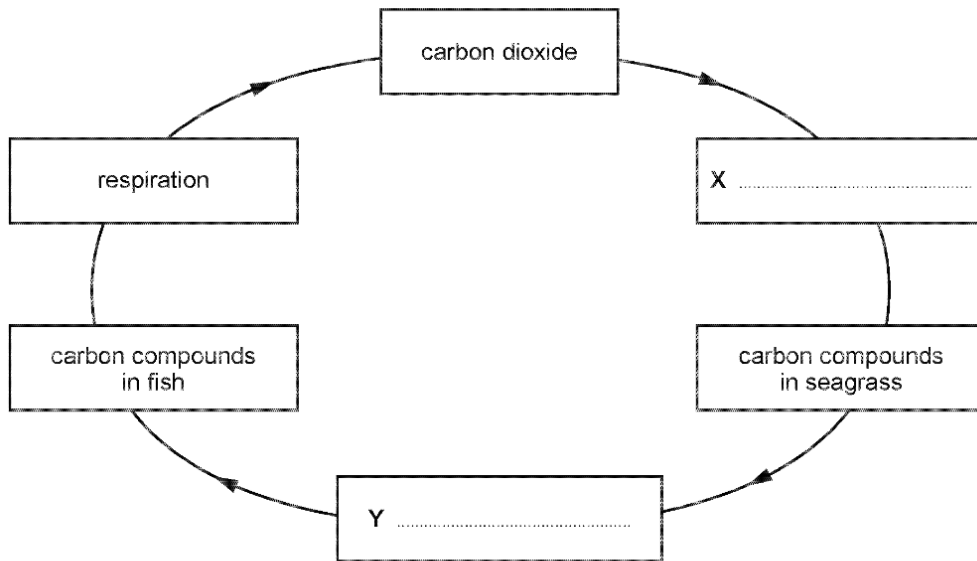
-
(ii) Which of the following statements describes the rate at which seagrass has been lost since 1950? [1]

- A It has been constant every year
- B It has increased
- C It has decreased
- D It has increased in some years and decreased in others.

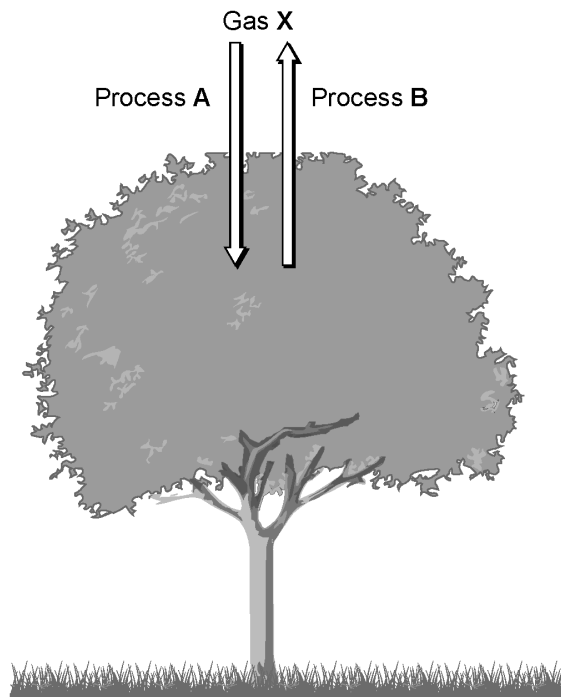
Answer

(c) Answer the following questions using the information given and your own knowledge.

(i) Complete the diagram below which shows part of the carbon cycle, by naming processes X and Y. [2]



5. The diagram shows the role of a tree in part of the carbon cycle.



(a) From the diagram of part of the carbon cycle, state the name of:

(i) process A, which uses gas X to make sugar [1]

(ii) process B, which releases gas X [1]

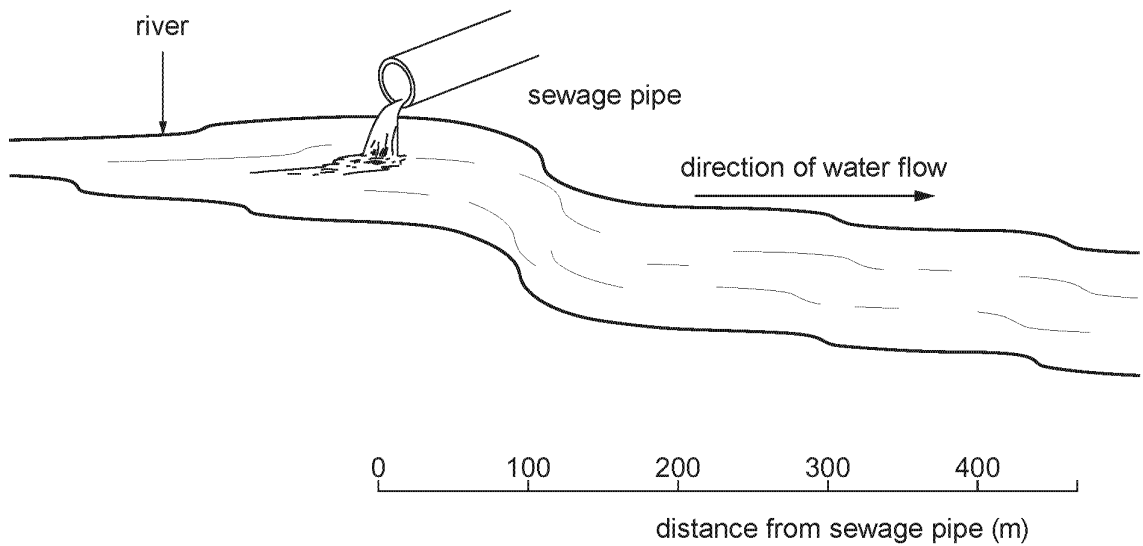
(iii) gas X [1]

(b) The fallen leaves of the tree are collected and burnt.

How does burning (combustion) affect the carbon cycle? [1]

6.

Untreated sewage enters a river from a sewage pipe, as shown in the diagram below.



Dissolved oxygen concentration in the river water at the sewage pipe and at intervals of 100 m from the sewage pipe is shown in the table below.

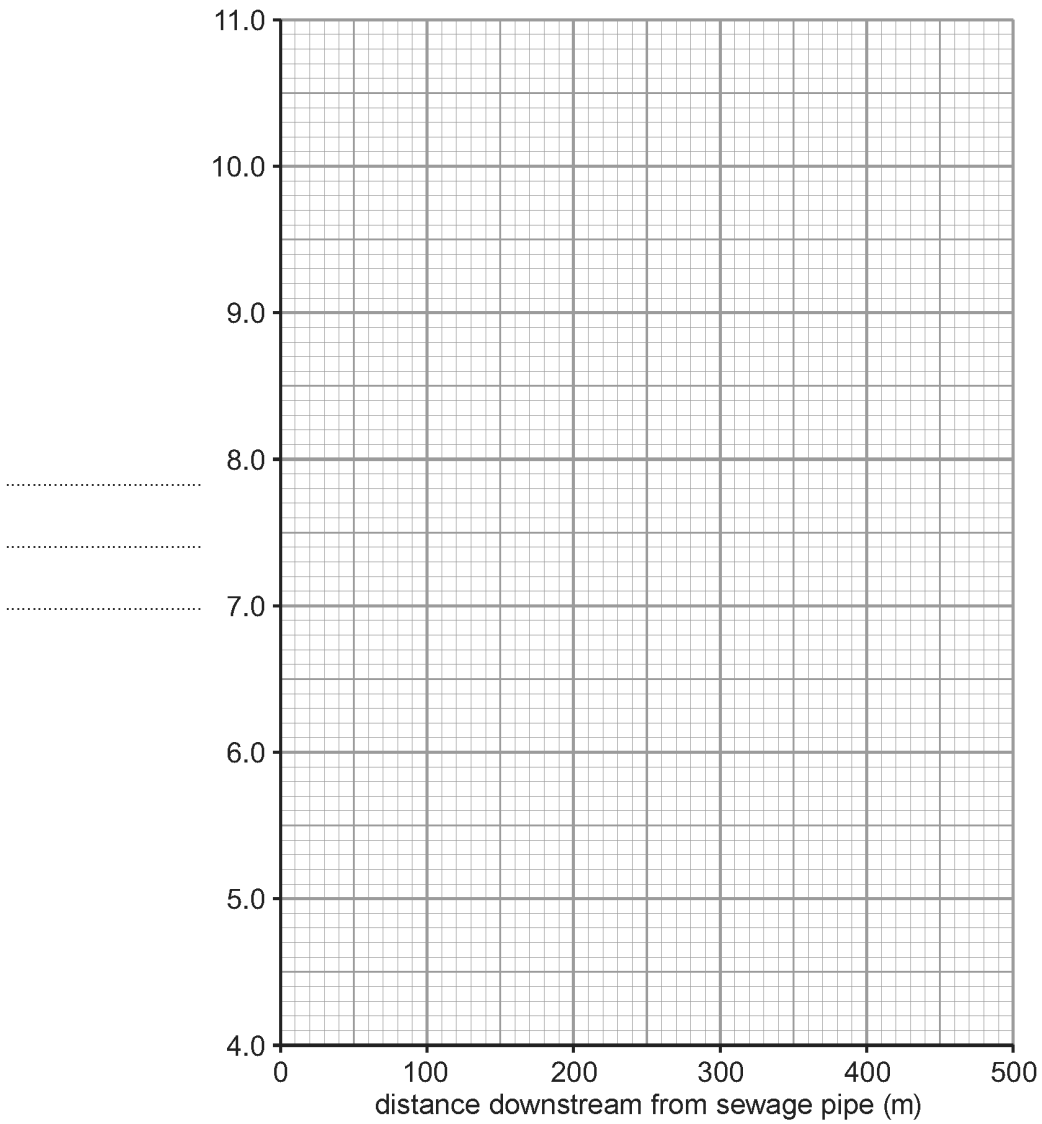
distance downstream from sewage pipe (m)	dissolved oxygen (mg/l)
0	6.0
100	6.2
200	7.5
300	8.5
400	9.4

(a) Draw a graph of the results on the grid opposite by:

(i) labelling the vertical axis [1]

(ii) plotting the points [2]

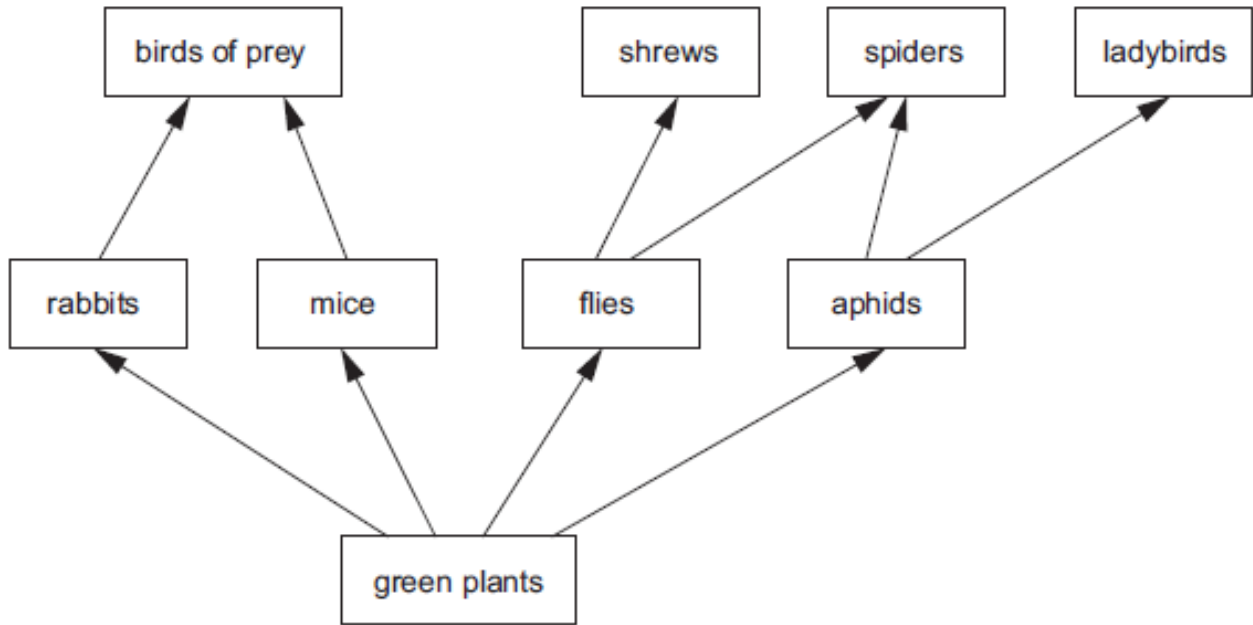
(iii) joining the points with a ruler [1]



(b) Dissolved oxygen concentration in the water before the sewage pipe is 12.0 mg/l. [1]
Complete the following sentence.
 The fall in dissolved oxygen concentration at the sewage pipe is caused by decomposer micro-organisms such as

(c) (i) Water with more than 8.0 mg/l of dissolved oxygen is described as 'acceptable quality'.
 Use your graph, to give the distance along the river from the sewage pipe when the water becomes of 'acceptable quality'. [1]
 Distance from the sewage pipe at which the water quality becomes acceptable
 = m

7. The diagram below shows a food web in an area of grassland.



Farmers were concerned that the rabbit population was increasing and called in a pest control company to destroy the rabbits.

.....

.....

.....

(b) Explain how the levels of mineral nutrients in the soil would be increased if the dead bodies of rabbits were not removed by the pest control company. [2]

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8. The following article appeared on the BBC news website on the 13th of April 2010.

A “perfect storm” of nutrients from sewage effluent and unusual weather conditions has been blamed for a 2009 outbreak of toxic algae in a lake.

1 Llyn Padarn at Llanberis was closed to leisure users for much of last summer.

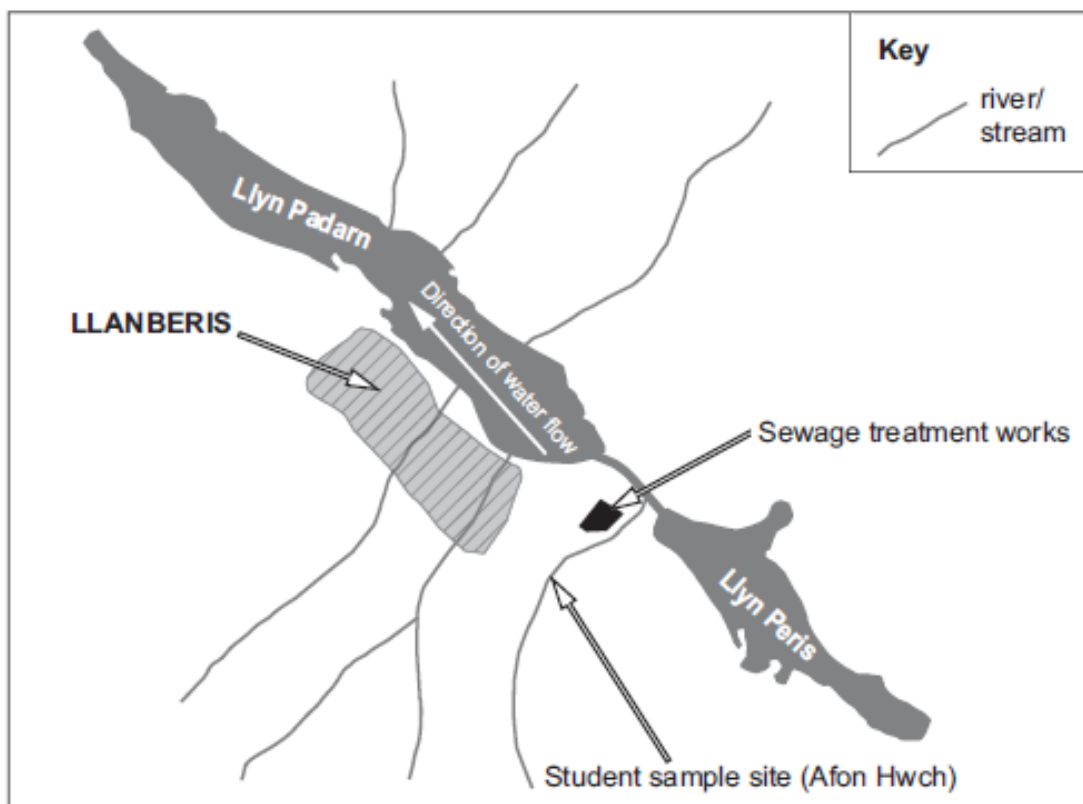
A report commissioned by Environment Agency Wales calls for stricter limits on effluent discharged from the local sewage treatment works.

5 The report by Professor Glen George described the warm spring, followed by a still June and a wet July and August as “the perfect storm”.

He said the weather conditions, combined with nutrients in the lake, not only created the right conditions for the algal bloom to form but also meant it continued through the summer.

10 His report makes a number of recommendations for further scientific studies of the lake and more work to find out how the management of the sewage treatment works in Llanberis is affected by heavy rain.

The map below shows Llyn Padarn and the surrounding area.



Llyn Padarn is also home to a rare breed of fish called the Arctic char fish (*Salvelinus alpinus*). The char feeds on insects found on the water's surface, fish eggs and snails found on the lake bottom.

- (b) Explain why the local fishermen thought that the algal blooms could lead to a decrease in the population of the arctic char. [3]

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9. The diagram below shows a section through a pond on a farm in April 2010.



Students carried out an investigation to see if the types of organism in the pond changed over time. They also measured the pH of the pond water.

Their results are shown in the table below.

Observations	April 2010	July 2012
Plants: algae	✓	✓
pondweed	✓	✓
waterlily	✓	✓
reed	✓	✓
Animals: snail	✓	×
leech	✓	✓
tadpole	✓	×
newt	✓	×
pH of pond water	7	4

- (e) In March 2012, nitrates from fertiliser used on the farm spilled into the pond. By July, many animals in the pond had suffocated.

- (i) Complete the sentences below to show how the nitrates resulted in the death of the animals. **Circle the three** correct answers. [1]

I The numbers of algae in the pond **increased / decreased**.

II The number of decay causing microorganisms **increased / decreased**.

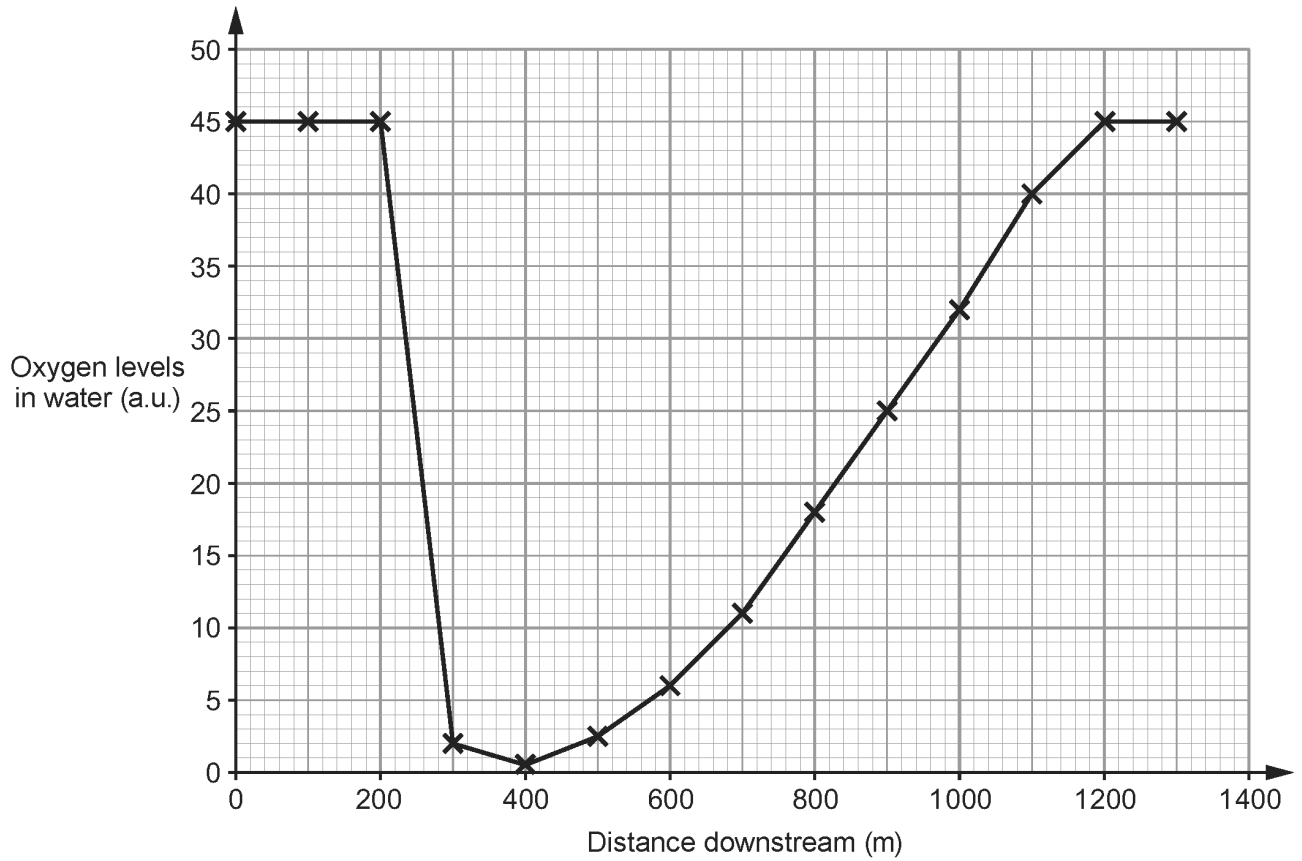
III Oxygen levels in the water **increased / decreased**.

- (ii) Name **one** type of microorganism that causes decay. [1]

.....

10.

The graph shows the oxygen levels in a slow-moving stream into which sewage has leaked.



- (a) (i) **Mark with an arrow** the point on the graph at which sewage leaked into the stream. [1]
- (ii) Explain why the oxygen levels drop sharply between 200m and 300m downstream. [2]

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