Questions are for both separate science and combined science students unless indicated in the question

1 When organic material in sewage, manure, silage effluents and waste milk enters a lake or river it causes pollution.

The organic material is broken down by microorganisms. This process removes oxygen from the water.

The amount of oxygen removed from the water is called the Biological Oxygen Demand (BOD).

The table shows data for different pollutants.

Pollutant	BOD in mg of O_2 per litre of pollutant
treated domestic sewage	20 – 60
raw domestic sewage	300 – 400
cattle manure	10 000 – 20 000
pig manure	20 000 – 30 000
silage effluent	30 000 – 80 000
waste milk	140 000

(a) Explain which pollutant is likely to have the most severe effect on the organisms in a river.

(2)

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(b) A quantity of pollutant is released into a river. The effect on the organisms will depend on the BOD value and other factors.

Suggest one of these other factors.

(1)

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(c) Waste milk is one of the pollutants.

Name one of the biological molecules found in milk that the microorganisms could feed on.

(1)

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(d) Suggest a reason for the difference between the BOD of raw domestic sewage and the BOD of treated domestic sewage.

(2)

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(Total for Question = 6 marks)

2 The passage describes water pollution caused by untreated human sewage and by fertiliser.

Complete the passage by writing a suitable word or words in each of the spaces.

(7)

If sewage gets into fresh water it will increase the number of pathogenic

..... in the water. The sewage contains waste organic material in the

form of ..... from humans. Microorganisms break down this material

using a process called aerobic ..... . This process reduces the level of

..... in the water making it less likely for larger organisms to survive.

Fertilisers can get into water by a process called ..... . The minerals

present in the fertiliser such as ..... cause the rapid growth of

..... in the water.

(Total for Question = 7 marks)

3 (a) The table describes stages in the water cycle.

Complete the table by naming or describing each stage.

The first one has been done for you.

(3)

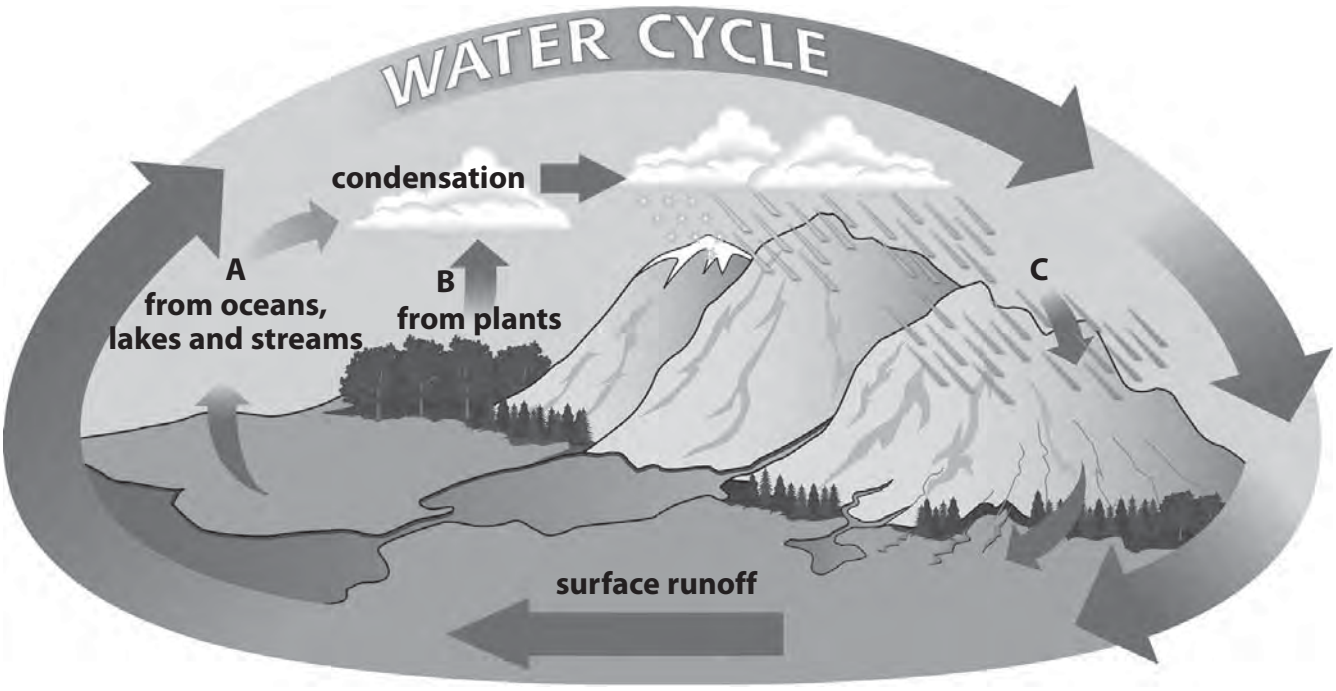
Description of stage	Name of stage
Heat from the sun causes liquid water to change into water vapour.	evaporation
Water vapour in the air changes back into liquid water.	
The liquid water falls to the earth.	
	transpiration

(b) Describe the biological consequences of pollution of water by sewage.

(4)

(Total for Question = 7 marks)

4 The diagram shows the water cycle.



(a) Name the processes A, B and C shown in the diagram.

(3)

A .....

B .....

C .....

(b) (i) Explain the possible consequences of deforestation for the water cycle. **(separate only)**

(2)

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(ii) Deforestation also affects the carbon cycle.
Explain these effects. **(separate only)**

(4)

(Total for Question = 9 marks)

5 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Micropropagation: good or bad?

Plant cells have the ability to produce a genetically identical copy of their parent plant. They can do this because the information is coded in the sequence of bases in their DNA. Micropropagation involves taking small pieces, known as explants, from a plant with the desired characteristics. The explants are sterilised and then put into a growth medium containing sucrose, amino acids and a variety of minerals as well as growth promoting chemicals.

All the young plants produced from the original cell or piece of tissue are clones. The sterile conditions in which they have been grown allow these plants to be disease free. Micropropagation can also produce plants which are free of pathogens such as viruses.

Micropropagation is used to produce commercial quantities of plants. Large quantities of flowers are cloned in this way. The quality and characteristics of the flowers produced can be controlled more easily than when using sexual methods of reproduction. With rare or endangered plant species, micropropagation may be the last chance of reproducing them if more conventional methods have failed.

The process has been used to create large numbers of palm oil plants. The oil extracted from these plants can be used in a wide variety of food and consumer products. It can also be used to make biofuel for use as a sustainable energy source in cars.

The increased demand for the use of palm oil has had serious environmental consequences, with huge areas of rainforest being destroyed to make way for fresh plantations. Today, Malaysia and Indonesia account for 90 per cent of global production. Indonesia already has six million hectares of oil palm plantations, with plans for another four million by 2015 dedicated to biofuel production. This destruction of habitat will result in more rainforests disappearing, pushing several species such as the orangutan towards extinction.

(a) Name one base found in DNA (line 3). **(separate only)**

(1)

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(b) Suggest why explants are sterilised (line 4). **(separate only)**

(2)

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(c) Suggest why amino acids are provided in the growth medium (line 5).

(1)

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(d) What is meant by the term **pathogen** (line 10)?

(1)

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(e) Suggest two reasons why growers prefer to use micropropagation rather than sexual methods of reproduction to produce good quality flowers (lines 11 to 14). **(separate only)**

(2)

1 .....

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2 .....

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(f) Suggest what is meant by the term **sustainable energy source** (lines 19 and 20).

(1)

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(g) The destruction of habitat can lead to extinction of species.

Give three other disadvantages of deforestation. **(separate only)**

(3)

1 .....

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2 .....

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3 .....

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(Total for Question = 11 marks)