1 Fish can be produced in large numbers on fish farms.

Design an investigation to find out if the growth of fish is affected by the temperature of the water in which they are farmed.

(6)

(Total for Question = 6 marks)

2 Frances likes to spend time in her garden. She grows many different types of flowering plants.

(a) Explain how each of the following factors could affect the growth of a flowering plant.

(i) Height of the parent plants

(2)

(ii) Microorganisms in the soil

(2)

(b) Frances says that she likes to keep her grass lawn free of weeds.

(i) Suggest what Frances means by the word **weed**.

(1)

(ii) Explain why removing the weeds from her lawn would improve the quality of the grass plants.

(2)

(iii) How could Frances reduce the number of weeds in her lawn?

(1)

(Total for Question = 8 marks)

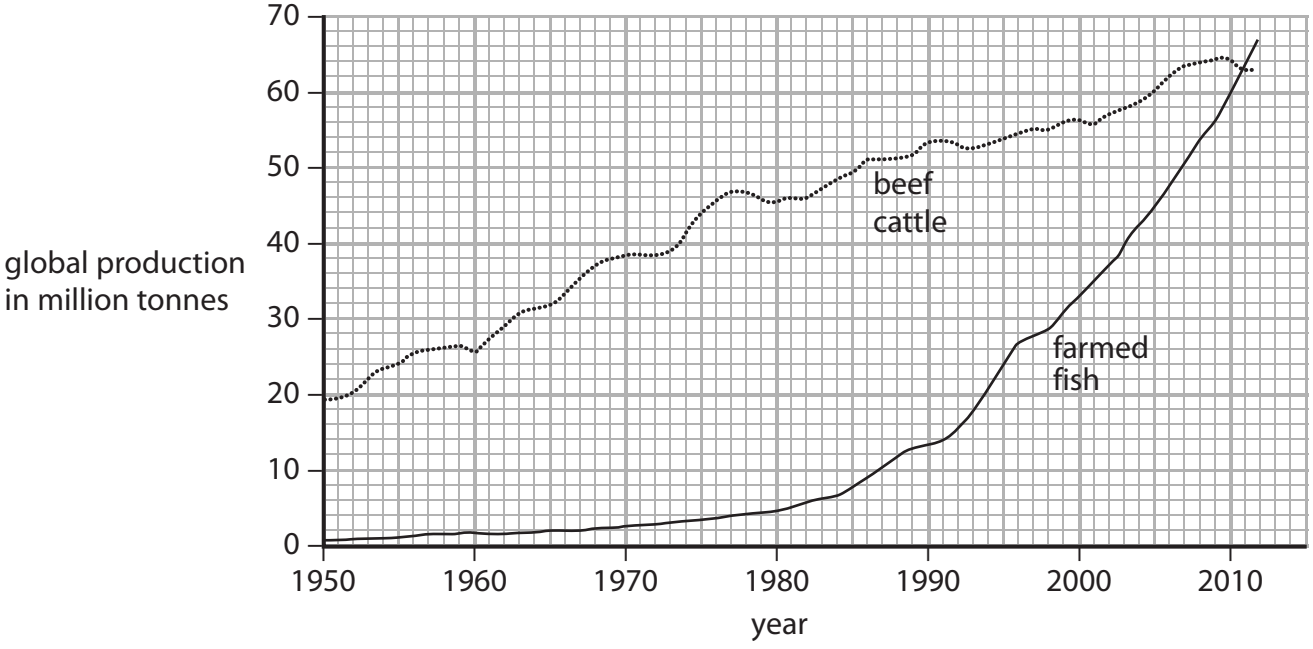
3 Explain the methods used to produce large numbers of fish in a fish farm.

(6)

(Total for Question = 6 marks)

4 Fish and beef cattle are farmed to provide a source of protein for humans.

The graph shows changes in the global production of farmed fish and beef cattle since 1950.



(a) (i) Describe the changes in the global production of farmed fish and beef cattle since 1950.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) By 2020, the production of farmed fish is expected to be six times greater than in 1990. Calculate the mass of farmed fish expected to be produced in 2020. Show your working.

(2)

mass of farmed fish = ... million tonnes

(b) Describe what happens to fish protein in the human stomach.

(4)

(c) Many molecules in the human body are made from protein.

The table lists some protein molecules, the function of each molecule and the place where each molecule is made.

Complete the table by giving the missing information.

(6)

Protein molecule	Function of protein molecule	Place where protein molecule is made
haemoglobin		red blood cells
	digest starch	salivary gland
insulin		
	binds to antigens on pathogens	

(Total for Question = 15 marks)

5 Methods of fish farming have changed as more countries become involved in the industry.

(a) Suggest two reasons why more of our fish are supplied by fish farming rather than from traditional fishing.

(2)

1 .....

.....

2 .....

.....

(b) This photograph shows a new type of fish farm which has been developed in Denmark.

© https://stateofgreen.com

Fish farm in Denmark

This new type of fish farm differs from traditional fish farms because

- it uses water from under the ground instead of from rivers
- it uses fewer antibiotics

(i) Suggest one advantage of using water from under the ground rather than from rivers.

(1)

.....

.....

(ii) Suggest the advantage of using fewer antibiotics in fish farms.

(2)

.....

.....

.....

.....

(c) Another advantage of the new type of fish farm is the reduction in waste discharge.

The figures for a new type of fish farm and a traditional fish farm are shown in the table.

Nutrient waste	Mass of discharge in kg per tonne of fish produced		Discharge from new type of fish farm as a percentage of discharge from traditional farm
	traditional fish farm	new type of fish farm	
total nitrate	31.2	20.0	64.1
total phosphate	2.9	1.1	

(i) Calculate the total phosphate in the waste from the new type of farm as a percentage of the total phosphate in the waste from the traditional farm.

Show your working.

(2)

percentage = ... %

(ii) If waste from fish farms is released into rivers it will cause pollution.

Design an investigation to compare the pollution caused by waste released from the new type of fish farm with waste released from a traditional fish farm.

Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question = 13 marks)