Cathkin High School

National 4 Biology

Unit 3: Life on Earth Homework Booklet

Animals and Plants depend on each other
Homework Exercise 1

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Q.1. Copy and complete the following sentences:

The surroundings or place where an organism lives is known as its _____. A _____ is an area of the planet which is defined by its climate. The distribution of biomes can be influence by temperature and _____. Organisms which eat animal material are known as _____. Organisms which eat plant material are known as _____.

(5)

Q.2. The factors that affect life in a habitat can be grouped as biotic or abiotic. Draw a table (like the one shown) and then sort the list of factors below into the correct column.

Biotic	Abiotic

Factors
Temperature; pH; food; predators; disease; light intensity; competition; moisture

(2)

Q.3. (a) Which of the following groups of organisms could be caught in a pitfall trap?

flying insects, crawling insects; walking insects, plants, small mammals, stationary small animals

(2)

(b) Describe how a pitfall trap is used (you may use a diagram to help you). (1)

Q.4. (a) Which of the following groups of organisms could be sampled using a quadrat?

flying insects, crawling insects; walking insects, plants, small mammals, slow moving or stationary small animals

(2)

(b) Describe how a quadrat is used (you may use a diagram to help you). (1)

Animals and Plants depend on each other
Homework Exercise 2

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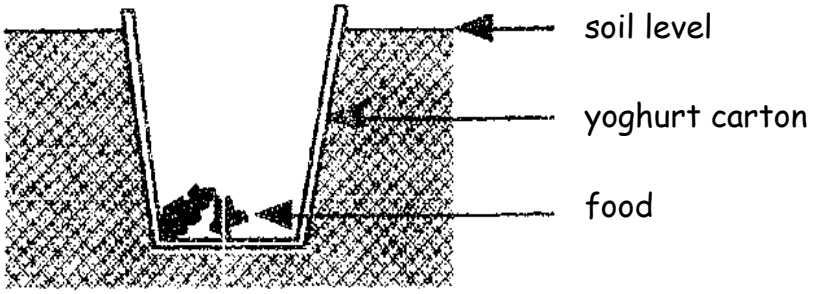
Q.1. (a) Give **three** examples of abiotic factors in an ecosystem. (3)

(b) Name a piece of equipment used to measure **one** of these abiotic factors. (1)

(c) Describe how to use this piece of equipment to measure your chosen abiotic factor. (2)

(d) Describe how a **named** abiotic factor can affect where organisms are found. (1)

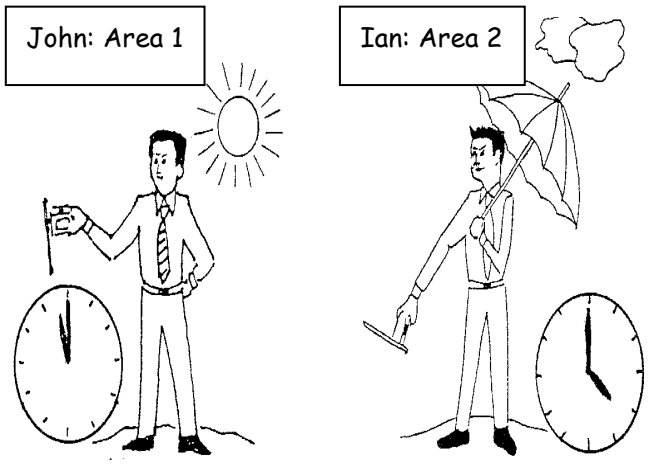
Q.2. (a) The diagram below shows a pitfall trap. Two errors have been made in setting up the trap.



State the **two** errors in this set up of a pitfall trap. (2)

(b) Describe **two** errors which could occur when sampling organisms using a quadrat and say how these could be minimised. (2)

Q.3. John and Ian compared the light intensities in two similarly sized pieces of waste ground. They each measured the light intensity of a piece of waste ground at 20 different points. The diagram shows how the men took the measurements.



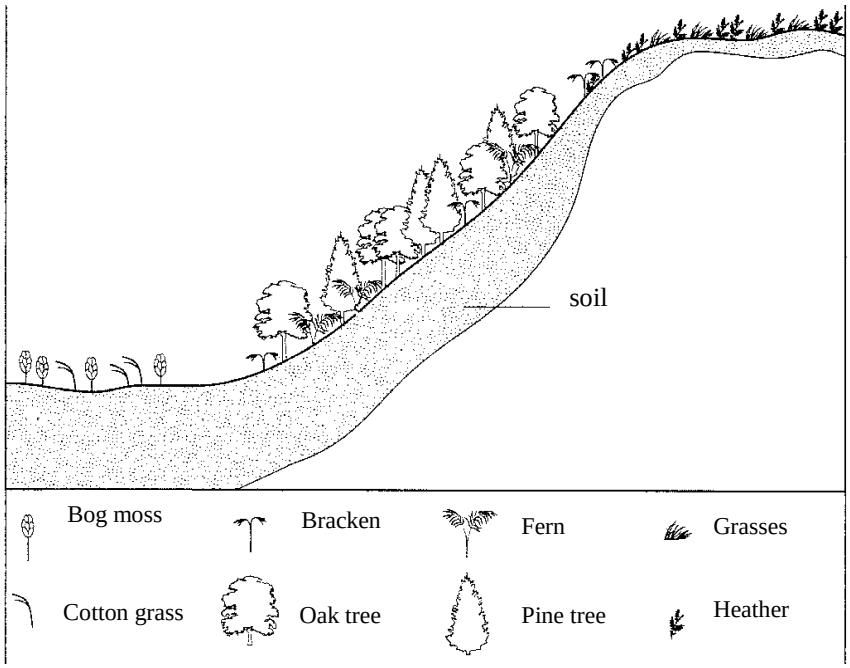
John found the average light intensity in area 1 to be very high. Ian found the average light intensity in area 2 to be very low. The boys concluded that area 1 receives much more light than area 2.

(a) Do you think that the conclusion drawn by the boys is valid? (1)

(b) Give two reasons why the light intensity readings for area 2 will be lower than they should be compared to area 1. (2)

(c) Use your answers to (b) to describe the precautions that should be taken when comparing these two areas for light intensity. (2)

Q.4. The diagram shows the distribution of plants on a Scottish hillside.



(a) Where on the slope is the cotton grass concentration greatest? (1)

(b) Give a possible reason for the restricted distribution of cotton grass. (1)

(c) Suggest **one** reason why there are no trees on the top of the hill. (1)

(d) Suggest one **abiotic** factor which might be needed for heather to grow well. (1)

Animals and Plants depend on each other
Homework Exercise 3

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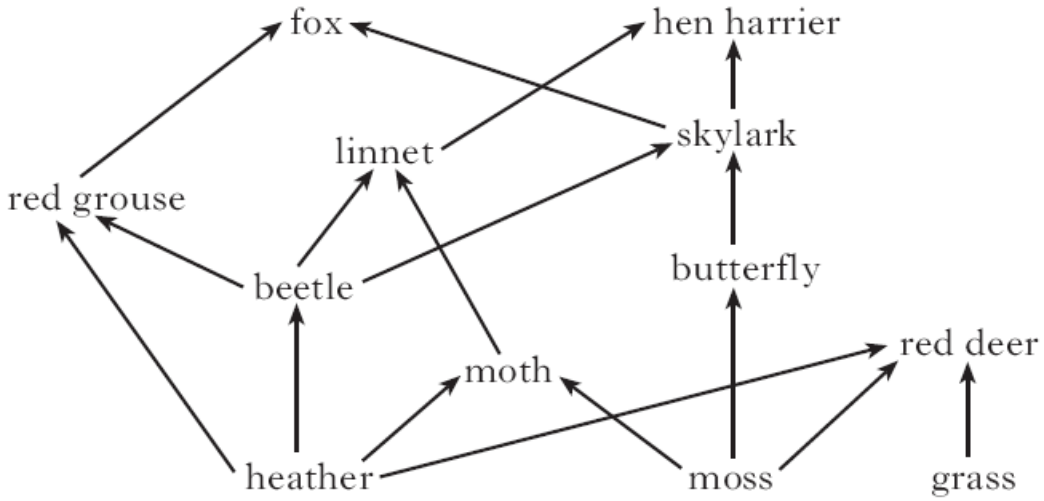
Q.1. The diagram shows a food web from a moorland ecosystem.



(a) Give an example of (i) a producer and (ii) a consumer from this food web. (1)

(b) Which plant provides energy for the greatest number of different species in this food web? (1)

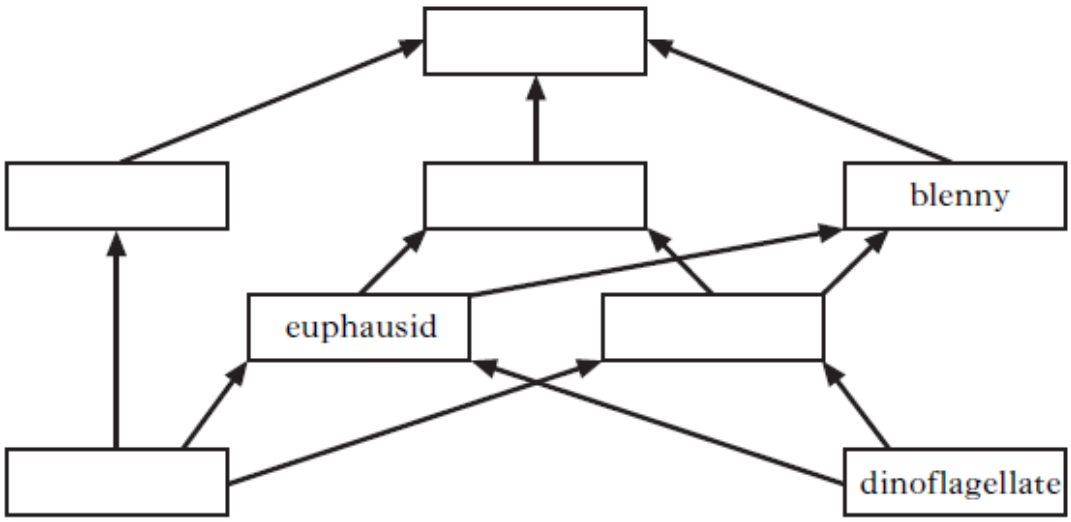
(c) Give a completed food chain consisting of four organisms from the food web. (1)

(d) Using the information in the food web, explain how foxes are dependent on heather. (1)

Q.2. The table below shows information about the feeding relationships in a marine ecosystem.

Organism	*Food eaten*
euphasid	dinoflagellate, diatom
dinoflagellate	none
sweep	diatom
snapper	sweep, pilchard, blenny
pilchard	water flea, euphausid
blenny	water flea, euphausid
diatom	none
water flea	diatom, dinoflagellate

(a) Use the information in the table to **copy and complete** the food web below.



(3)

(b) What do the arrows in a food web represent?

(1)

(c) A pod of dolphins arrived in the area. They feed on snappers. Describe the effect this will have on the blenny population. Give a reason for your answer.

(2)

Animals and Plants depend on each other
Homework Exercise 4

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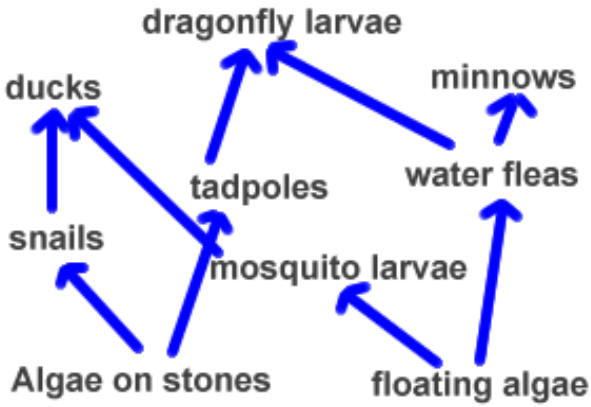
Q.1. Under natural conditions an ecosystem really contains many inter-connecting food chains. This more complex relationship is called a **food web**.



Using the food web above, answer the following questions.

(a) If all the snails died out, what would you expect to happen to the duck population and why? (2)

(b) If all the snails died out, what would you expect to happen to the mosquito larvae population and why? (2)

(c) If the dragonfly larvae population died out, what would you expect to happen to the minnow population and why? (2)

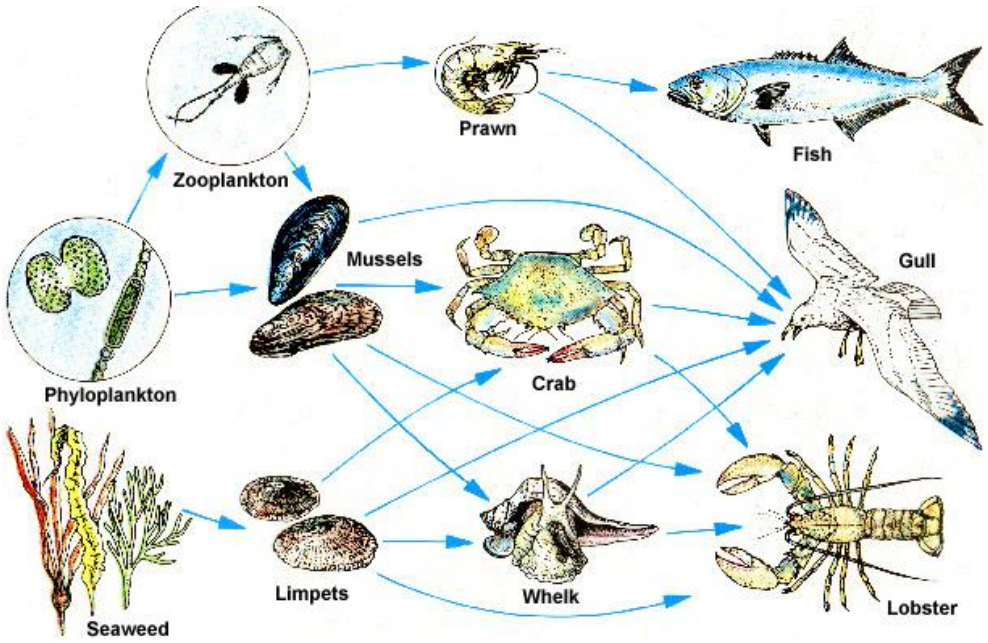
Q.2. Construct a food web using the following information.

In a rainforest there are many producers including trees and flowering plants. Insects and bats feed on the flowering plants, whereas monkeys and parrots mainly feed on the fruits growing on the trees. Many predators are also found in the rainforest. Snakes will hunt bats, parrots and monkeys and frogs will hunt for insects. A jaguar is the top predator found in a rainforest. They will hunt for monkeys, snakes, parrots and frogs. (4)

Q.3. Construct a food web using the following information.

In the Antarctic seas killer whales are commonly found hunting for seals, penguins, squid and large fish species such as cod. Baleen whales are also found in such seas but they feed on krill. Krill consume phytoplankton, the main producer in the seas. Phytoplankton is also eaten by small fish, shrimp and squid. Seals, cod and penguins will in turn consume small fish, shrimp and squid. (4)

Q.4. Using the food web below, answer the following questions.



(a) If all the limpets died out, what would you expect to happen to the lobster population and why? (2)

(b) If all the crabs die out, what would you expect to happen to the prawn population and why? (2)

(c) State a complete food chain which contains 5 organisms. (1)

(d) What do the arrows in a food chain show? (1)

Impact of population growth and natural hazards
Homework Exercise 1

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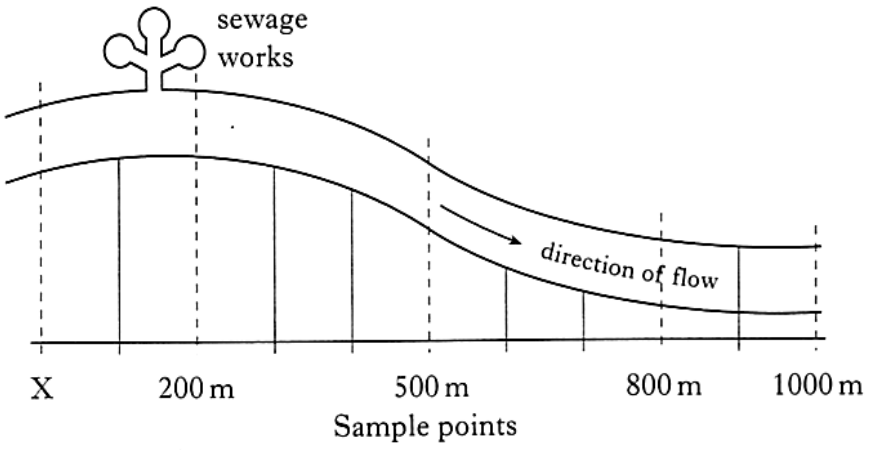
Q.1. The global human population is increasing rapidly, this is having an impact on biodiversity. One example of a human activity which is affecting biodiversity is the release of sewage into water ways. The oxygen concentration at different points in a river was measured as shown in the diagram below. The results are shown in the table.



Distance of sample point from X (m)	*Oxygen content* (units)
0	1·20
200	0·04
500	0·20
800	0·40
1000	1·00

(a) Construct a line graph of these results. (2)

(b) From the table, calculate how many times greater the oxygen content is at 0m than at 200m. (1)

(c) Use information from the table to describe the relationship between oxygen content and distance of the sample points from X. (1)

(d) What effect does an increase in pollution have on biodiversity? (1)

(e) Name **two** other human activities which can affect biodiversity. (2)

(f) Natural hazards can also affect biodiversity. Give two examples of these natural hazards. (2)

Q.2. The table below shows the amount of sulphur dioxide produced by human activities and released into the atmosphere by an industrial European country over a period of sixty years.

Year	*Mass of sulphur dioxide (millions tonnes per year)*
1920	3.8
1930	3.6
1940	4.4
1950	5.1
1960	6.3
1970	6.8
1980	5.0

(a) Calculate the average mass of sulphur dioxide produced per year during the period shown. (1)

(b) Present the information as a line graph. (2)

Q.3. The following information refers to a polluted river. Two readings have been omitted from the table.

	Condition of river water				
River organism	***Very clean***	***Clean***	***Fairly clean***	***Dirty***	***Very Dirty***
Green algae	1	2	3	4	4
Trout	3	1	0		0
waterweeds	1	3		3	1

Key to abundance levels	
Point on scale	***Description of population***
0	Absent
1	Scarce
2	Moderate
3	Plentiful
4	Abundant

(a) Describe the relationship that exists between the number of green algae and the condition of the river water. (1)

(b) Using both tables, give the word that describes (i) the population of trout in clean water and (ii) the population of waterweeds in dirty water. (2)

(c) From the choice given in bracket, select the appropriate number to indicate the most likely abundance of (i) trout in dirty water (0, 1, 2, 3) and (ii) waterweeds in fairly clean water (0, 1, 2, 3). (2)

Nitrogen cycle
Homework Exercise 1

6

Q.1. Decide if each of the following statements is **True** or **False**.
If the statement is **False**, write the correct word in the Correction box to replace the word underlined in the statement.

Statement	True/False	Correction
Organisms need nitrogen to make carbohydrates		
Plants absorb nitrates from the soil		
Farmers can increase the nitrate content of soils by using pesticides		

(3)

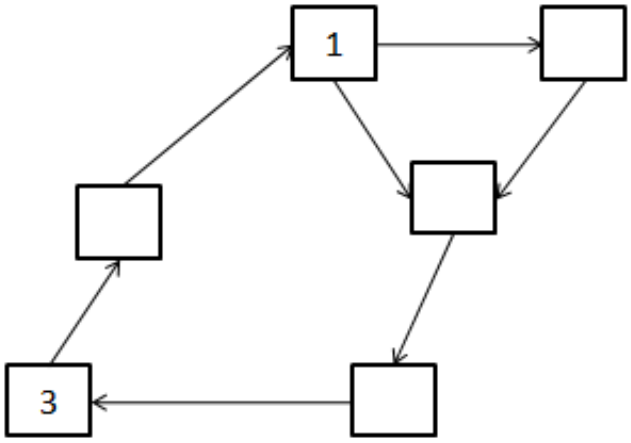
Q.2. The following list gives some of the stages involved in the nitrogen cycle.

List

1. Production of plant protein
2. Absorption of nitrogen compounds into plants
3. Nitrates produced in the soil
4. Decomposers break down nitrogen in dead and waste material
5. Excretion of waste materials and death of organisms
6. Nitrogen in plants passes into animals through feeding

(a) Give the numbers of the stages which involve bacteria. (1)

(b) Use the numbers from the list to copy and complete the diagram below to show the correct sequence of stages.



(2)

Fertiliser design and environmental impact of fertilisers
Homework Exercise 1

8

Q.1. Fertilisers are a source of artificial nutrients.

(a) Give an advantage to farmers for using fertilisers. (1)

(b) Give a disadvantage for using fertilisers. (1)

(c) A brand of fertiliser contains 120g Nitrogen, 180g Phosphorus and 120g Potassium.
Calculate the simplest whole number ratio of nitrogen, phosphorus and potassium in this fertiliser.
Set out your ratio as shown below.

_____ : _____ : _____ (1)
Nitrogen *Phosphorus* *Potassium*

Q.2. Complete the passage below (using the word bank) to show the stages of an algal bloom.

Word bank				
Oxygen	*Algal bloom*	*Nitrates*	*Reduction*	*Light*

- _____ are washed into rivers.
- This causes an _____ to form.
- _____ is prevented from entering the water.
- Less _____ available.
- _____ in biodiversity from death of organisms. (5)

Adaptations for survival
Homework Exercise 1

9

Q.1. Any particular species will have adaptations which help them to survive. What is an adaptation? (1)

Q.2. An organism can change its physical features to increase their chances of survival. Copy and complete the following passage which describes the structural adaptations of cacti and polar bears. Use the word bank to help you.

Word bank

Roots Fat Spines Hairs Desert Grip
Loss Animals Absorption Protect

A cactus is a type of plant which is found in dry areas, such as _____. Cacti have adapted their leaves to _____ which reduces water _____, these also protect the plant from being eaten by _____. Cacti have a very large network of _____ to increase water _____.
Polar bears are adapted to live in very cold areas. The pads on their feet are covered in hairs which _____ their feet from the cold and improve their _____ on ice. They are covered in _____ which provide warmth, and a layer of _____ which also keeps them warm. (5)

Q.3. Copy and complete the passage below which describes the physiological adaptations of camels. Use the word bank to help you.

Word bank

Thorny Water Overheating Fatty Hot Sweat

Camels have adapted their bodies to live in _____, dry areas. They have humps which are made of _____ tissue which prevents them _____. Camels rarely _____ and any water vapour in their breath is trapped in their nostrils, both of these adaptations reduce _____ loss. They can also eat _____ desert plants as they have a thick leathery mouth lining. (3)

Learned Behaviour
Homework Exercise 1

9

Q.1. Desert rats are small, desert living animals which are nocturnal (active at night). Explain why this nocturnal behaviour might increase its chances of survival. (1)

Q.2. Some species will live together in groups as a way of increasing their chances of survival. Explain how this behaviour would be of benefit to (a) zebras and (b) wolves. (2)

Q.3. (a) The table below describes some examples of animal behaviour. Copy and complete the table by adding in the name or description for each type of behaviour.

Behaviour	***Description***
	When animals pass on information to others (e.g. bees waggle dance)
	When animals move annually or seasonally to an area where there is more food.
Imprinting	
	When large groups of animals move together
Huddling	

(5)

(b) Explain how huddling behaviour increases the survival chances of penguins. (1)