

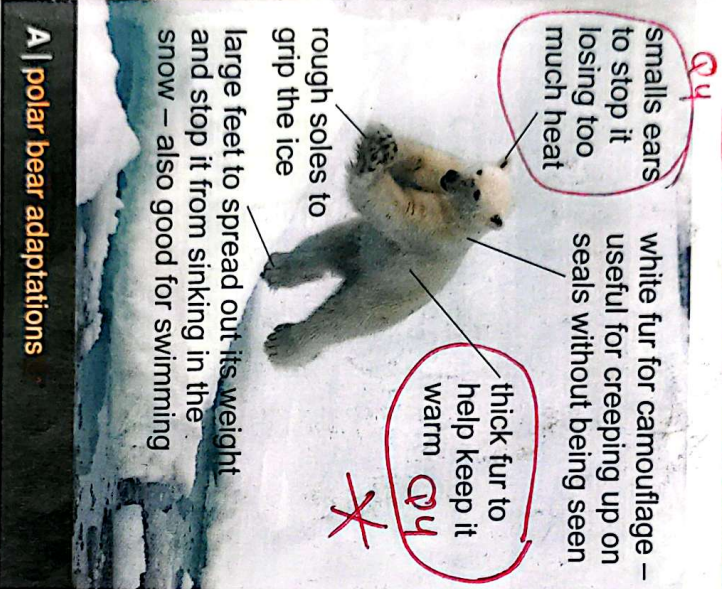
7DB ADAPTATIONS

WHY IS THERE VARIATION BETWEEN AND WITHIN SPECIES?

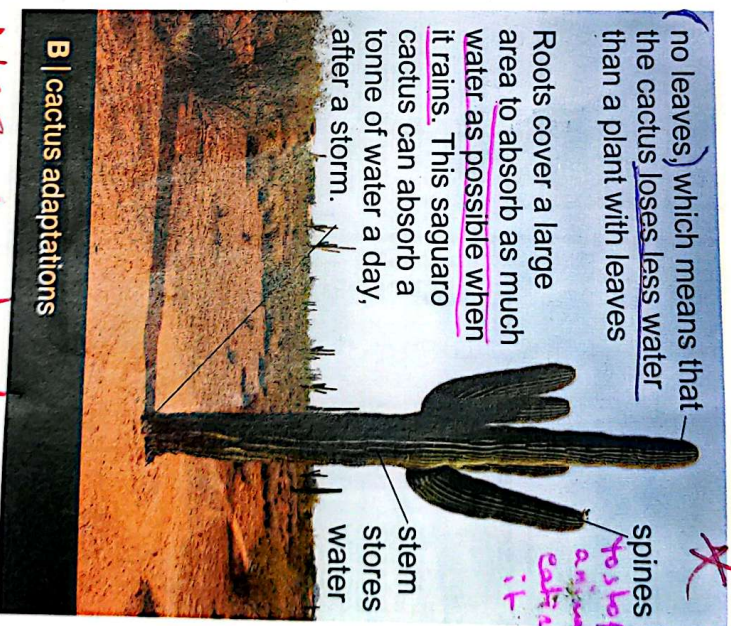
The conditions in a habitat are its environment. The conditions are mainly caused by physical environmental factors, such as the amount of light, how wet it is, how windy it is and the temperature. The factors are described as 'physical' because they are not alive.

Organisms have features that let them survive in the environments where they live. We say that organisms are adapted for their habitats. For example, fish have gills and fins, which are adaptations for living in water. Their fins will not let them walk on land and their gills will not let them breathe air. Fish are adapted to living in watery habitats but not on land.

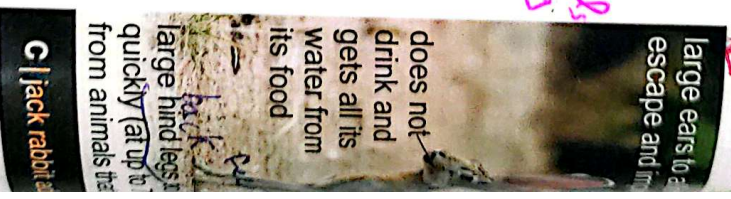
- Which of the following are environmental factors:
ant bird
light temperature
frog tree
- Describe the environment in habitat in photos A, B and C. page 56.
- Describe your environment at moment.



A | polar bear adaptations



B | cactus adaptations



C | jack rabbit adaptations

- How are polar bears adapted to the cold? *figure A*
- A cactus has spines on its stem. Why do you think these are useful? *to stop animals from taking water*
- Suggest the names of the habitats in which polar bears, cacti and jack rabbits live. *poles desert*
- Look back at page 56. How do you think the length of hair on meerkats and wolverines helps them survive in their habitats?

Very important

FACT

Many organisms are adapted to their habitats by both their features and their behaviour (what they do). Vultures in deserts urinate on their legs! The urine evaporates, which cools the birds down.

All the animals and plants that live in a habitat make up a **community**. Members of communities may have similar adaptations to cope with the problems of living in a particular habitat. For example, many organisms that live in fast-flowing rivers have suckers to allow them to attach to rocks and stop them being swept away.

The community of organisms and all the physical environmental factors in a habitat form an **ecosystem**.

8 Draw a design for a plant that could live in the same habitat as a hogsucker fish.

9 Describe the Arctic ecosystem.

Inherited variation



D || Hogsucker fish live in fast-flowing water.

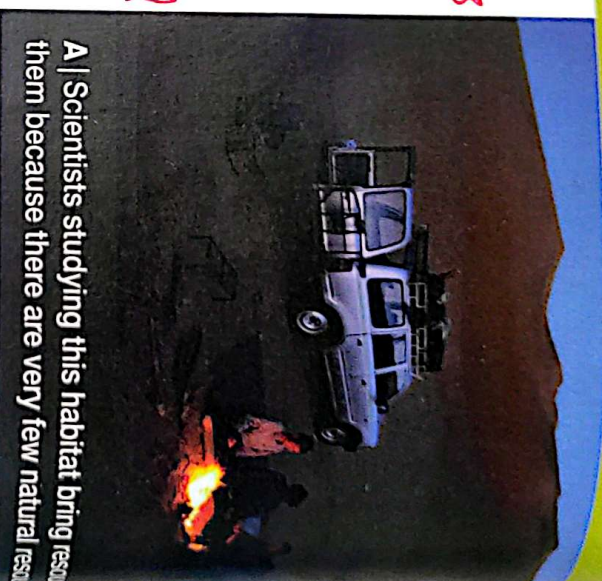
flexible, streamlined body
sucker to attach to rocks

EFFECTS ON THE ENVIRONMENT

HOW DO ORGANISMS AFFECT THEIR HABITATS?

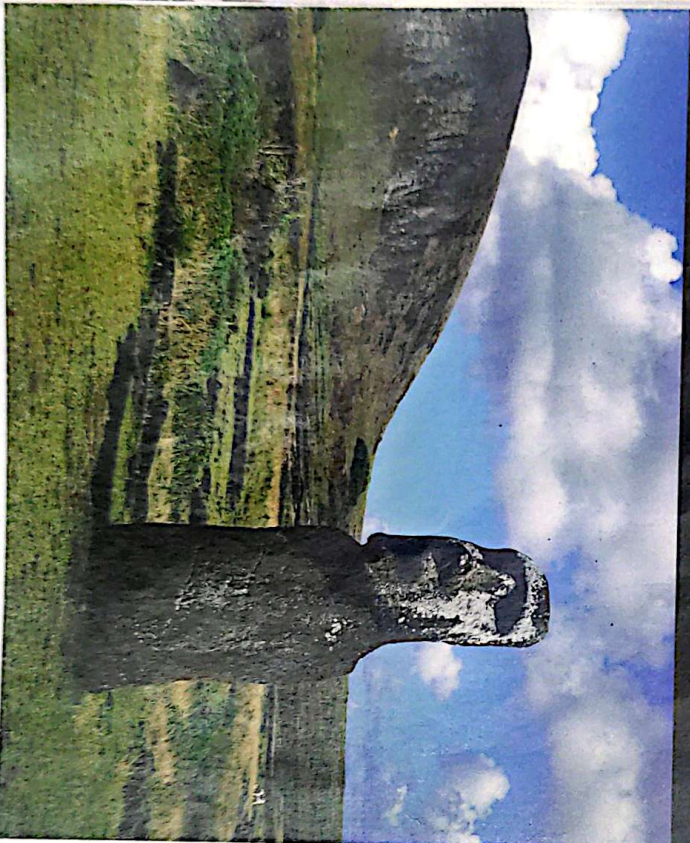
To survive and grow, organisms need **resources** from a habitat. Animals need resources such as **oxygen**, space, shelter, food, water and mates. Plants need light, air, water, warmth, mineral salts and space to grow. If any of these are missing, the numbers of an organism (its **population**) will go down.

- 1 a | State three resources scientists would need to take into the habitat in photo A. *water, food, shelter*
- b | Suggest why the landscape in photo A looks the way it does.



A | Scientists studying this habitat bring resources with them because there are very few natural resources.

B | Easter Island



Island problem

Easter Island in the Pacific Ocean was named Dutch explorer Jacob Roggeveen, who came to it on Easter Sunday 1722. He described it as a island with huge standing statues but no trees.

Scientists have found evidence that the island was once covered in trees. Over hundreds of years, people cut down trees for building materials, fires and to build fishing boats. By about 1600, trees were gone and the people started to starve. Birds also disappeared from the island at this time. The islanders affected their habitat, which caused many populations to decrease. The Easter Island palm tree died out altogether – it became extinct.

Competition

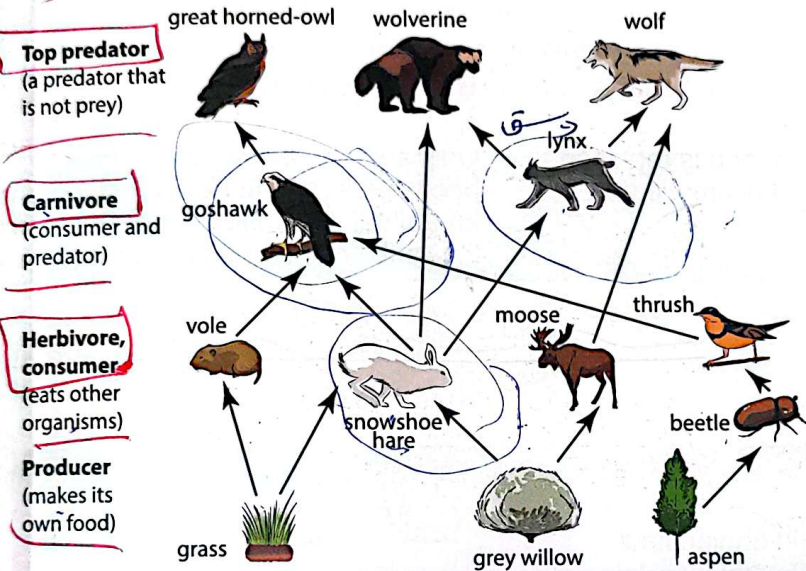
We can see what eats what in a habitat by looking at a **food chain** like this:

grass → hare → lynx

Organisms are in **competition** with one another for resources. The organisms with the best adaptations to get the resources are more likely to survive and reproduce. The others may move away or die.

definition

Food chains can be added together to form **food webs**, which will show how some animals compete with each other for the same food. In food web C, you can see that goshawks compete with lynxes for hares. If the goshawks get a disease and die, there will be more hares. The population of lynxes may then increase.



C | a food web in northern Canada

The organisms in an ecosystem all depend on one another for many things, not just food. We say that they are **interdependent**. For example, birds use trees for shelter and plants use animal waste to help them grow (the waste contains mineral salts).

4 a) Write out the longest food chain in food web C.

b) Choose one or more of these words for each organism in your food chain: carnivore, consumer, herbivore, omnivore, producer, top predator. Explain your choices.

5 Why are goshawks and wolverines in competition with each other? *both eat snowshoe hare*

6 Use food web C to predict what would happen to the vole population if:

- a) the snowshoe hares all died *eat more food*
 b) there was no rain for a long time. *goshawk eats them*

no grass it will die



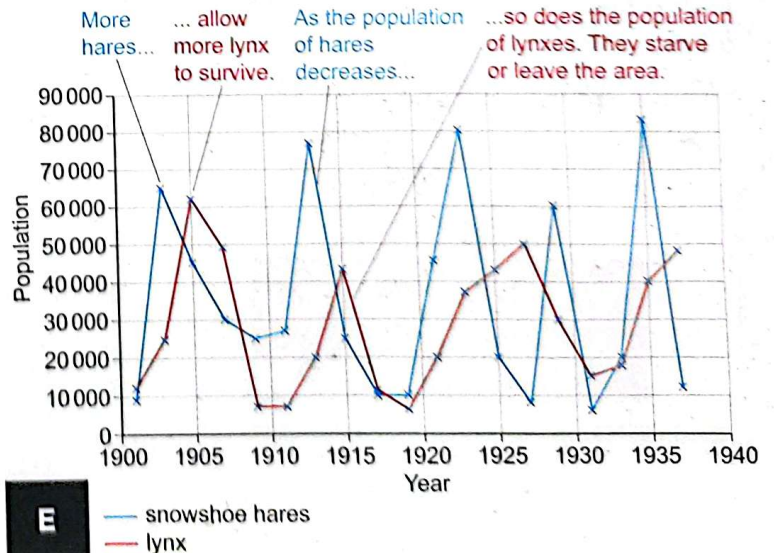
Population changes

Populations change depending on how much food is available. In northern Canada, the lynx is a **predator**. Its **main prey** is the snowshoe hare. When there are a lot of hares, the lynxes have lots to eat. They **reproduce successfully** and their population goes up. When there are fewer hares, the lynx population decreases – some starve (including newborn offspring) and others move to a different area.

7 Look at graph E.

- Which animal is the predator and which is the prey?
- Suggest one reason why the hare population might increase.
- Suggest three reasons for lynx population decrease.

How snowshoe hare and lynx populations changed with time



I can ...

- describe ways in which organisms affect their habitats and communities
- describe how organisms compete
- use a food web to make predictions.

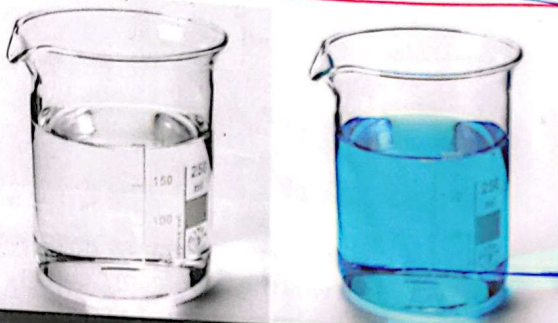
7E^b SOLUTIONS

WHY DO SOME PEOPLE USE FILTERS FOR TAP WATER?

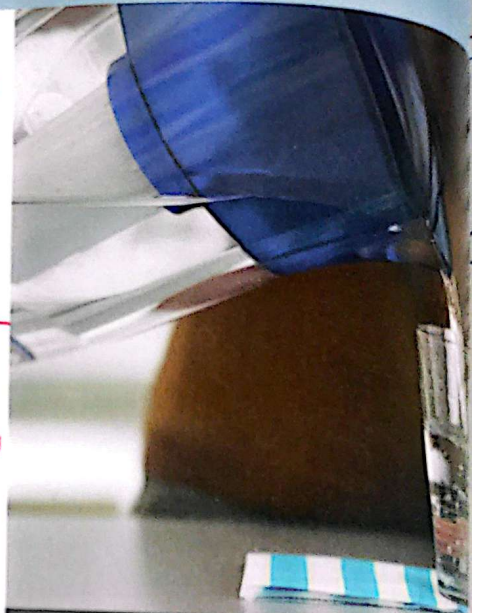
properties of tap water

Tap water has been filtered and treated to make it safe for drinking but it doesn't contain only water. It is still a mixture with many other substances dissolved in the water.

Some substances dissolve in a liquid to make a solution. In a solution, the dissolved substance breaks up into pieces so small that light passes straight through the mixture. Because of this, solutions are transparent. A solution may be coloured or colourless, depending on the substances in it.



B | Solutions, such as these, are transparent.



A | A water filter, like the one in the jug, removes some substances that are dissolved in drinking water.

properties of solutions

The liquid in a solution is called the **solvent**. The substance that is dissolved is called the **solute**. Water is a good solvent because it dissolves many solids, some gases and even some other liquids.

components of solution

1 What is meant when we say tap water is a solution?

FACT



Water dissolves substances from the rocks and soil it passes through or over. Different types of rock contain different substances, so the taste of tap water changes throughout the UK. Water tasting tests often show that people prefer the taste of tap water to bottled water.



C | This axolotl uses its gills to absorb oxygen dissolved in water.

2 Write down the names of two solids and one gas that dissolve in water.

3 Suggest two ways you could tell that a liquid was a solution.

salt sugar

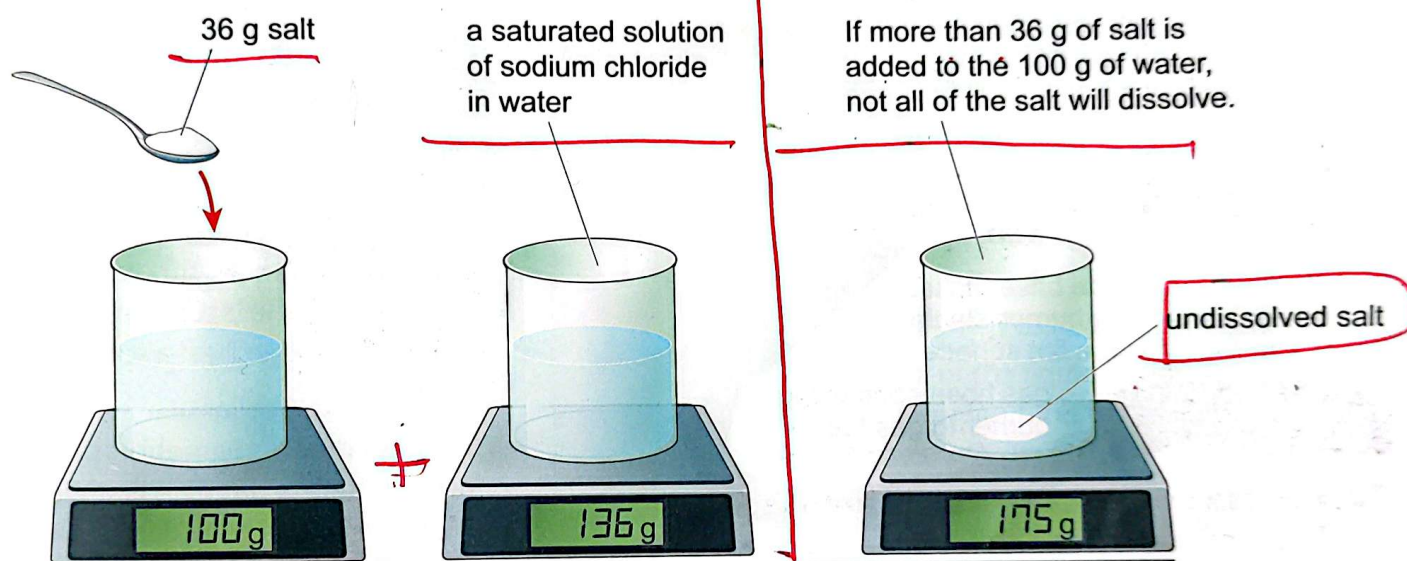
oxygen

A substance that dissolves in a solvent is said to be soluble. Substances that don't dissolve are insoluble. Nail varnish is insoluble in water but is soluble in a liquid called propanone, used in nail varnish remover.

When a solution is formed, there is **conservation of mass**. This means that the **mass** of the solution is the same as the mass of the dissolved substance plus the mass of the liquid at the start.

Why you cannot dissolve any amount of solute in a solvent?
(There is a limit to how much solute you can dissolve in a particular volume of solvent. If you add more solute than this, the extra will sink to the bottom and stay undissolved. This type of solution is **saturated**.)

- 4** When propanone is used to remove nail varnish, which substance is the solvent and which is the solute?
- 5** 20 g of sugar is stirred into 150 g of tea. What is the mass of the solution formed?
- $20\text{ g} + 150\text{ g} = 170\text{ g}$



E | A saturated solution is formed when 36 g of table salt is dissolved in 100 g of water.

6 Copper sulfate forms blue crystals. The solubility of blue copper sulfate is 32 g per 100 g of water at 20 °C.

a) Which has the higher solubility in water, blue copper sulfate or sodium chloride?

b) What is the largest amount of blue copper sulfate that could be dissolved in 500 g of water at 20 °C?

$5 \times 32 = 160\text{ g}$

c) A saturated solution of blue copper sulfate at 20 °C is cooled to 5 °C. Describe what you would see as the solution cools. Explain your answer.

some salt deposited.

solubility of NaCl
in water 36 g at 20 °C
in ethanol 0.1 g
in water 37 g at 60 °C

The **solubility** of a solute is the mass that will dissolve in 100 g of a solvent. The solubility depends on the solvent. For example, 36 g of sodium chloride will dissolve in water at 20 °C but only 0.1 g will dissolve in ethanol at the same temperature. The solubility also depends on the temperature, usually increasing with temperature: 37 g of sodium chloride dissolves in 100 g of water at 60 °C.

solute	solvent	temp
NaCl	water	20
	"	60
	ethanol	20

I can ...

- describe how soluble substances can form solutions
- identify the solute and solvent in a solution
- describe the effects of different variables on solubility.