Science@School | Book 4B

Habitats

Teacher's Guide

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Teacher's sheet: comprehension

See **pages 4 and 5** of *Habitats*

Answers

1. **Plants and animals.**
2. **Plants – A, E. Animals – B, C, D, F.**
3. **Rock, computer, etc.**
4. **Lichens.**
5. **Feed, grow, move, give off waste, affected by changes in the environment, adapted to the environment, make more living things (breed).**
6. **Micro-organisms or microbes.**

Complementary work

(a) Make a collection of large photographs or specimens of the following: moss, ferns, broad leaved tree, conifer, flowering plants, including weeds and garden flowers, beetle, spider, snail, slug, fish, frog, large photographs of reptiles, birds and mammals. Ask the children to sort them into plants and animals. Ask the children to sort the plants into woody and non-woody plants, then into flowering and non-flowering plants. Discuss the presence of skeletons and backbones in some animals, then ask the children to sort the animals into animals with backbones (vertebrates) and animals without backbones (invertebrates).

Teaching notes

There are seven characteristics of living things but all of them do not need to be considered at this level. They are feeding, moving, respiring, excreting, growing, reproducing and sensing changes in their surroundings.

Plants are distinguished from animals in the following ways: Plants move as they grow while animals can move the whole of their bodies from place to place. Plants make their own food from air, water and sunlight, animals have to feed on plants or other animals. Plants have a green substance (chlorophyll) to trap energy in sunlight, animals do not have this substance. Plants use a substance called cellulose to give them support (think of crunchy celery), animals support their bodies with bones or hard outer skeletons (as in insects).

Living things adapt to changes over many generations through evolution.

Fungi used to be considered a plant, but today they are put in a separate kingdom. Seaweeds belong to the algae group. They are sometimes classified with plants for simplicity but are really part of another kingdom, which includes many micro-organisms.

Horsetails may be found growing in waste places. They are non-flowering plants related to the ferns.

Animals which do not have a skeleton and backbone inside their bodies to support them may have a skeleton on the outside of the body (insects and spiders) or a lack of skeleton altogether. These animals, which include earthworms and slugs, have fluid-filled body cavities that help them maintain their shape.

Teacher's sheet: activity

Based on **pages 4 and 5** of *Habitats*

Introducing the activity

(a) Ask the children if they have seen any living things on their way to school today. Write their answers on the board. Tell the children they are going to look for living things in their surroundings a little more scientifically. They are going to look in different parts of their surroundings and make a survey.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form then go through task 1 (see note (i)).

(c) Go through tasks 2 and 3.

(d) Let the children try tasks 1 to 3.

(e) When the children have returned to the classroom, go through tasks 4 and 5, then let the children try them.

Completing the activity

(f) Let the children compare their results.

(g) You may let the children write up their activity. They could write about the route they took, or draw a map of their walk and write, on the map, the names of the living things they found and the positions of features such as the walls, paths and flower beds (see note (ii)).

Conclusion

The variety of life around the school depends on whether it is surrounded just by playgrounds or whether it has some lawns and gardens. Even in a school playground, it is possible to find lichen, moss and grass. There are also woodlice, spiders and flies. Grass is one of the most widely spread plants, and flies are one of the most widely spread animals.

Teaching notes

(i) Make sure that the children's work outside is in accordance with school policies. Show the children how to fill in the table by giving an example, such as putting a tick in a box which shows that a lichen has been seen on a wall. The children only put a tick to show the presence of the living thing in a particular place. They do not have to put a tick for each lichen or butterfly they see.

(ii) You could provide the children with a map of the school grounds on which they could write their observations.

Teacher's sheet: comprehension

See **pages 6 and 7** of *Habitats*

Answers

1. **The amoeba divides up, so any drawing showing division into two smaller parts would be correct.**
2. **Sunlight, water, air and substances in the soil.**
3. **From plants and other animals.**
4. **They close up.**
5. **Cells.**
6. **Change over time to best suit the environment.**

Complementary work

(a) If the children have kept their sprouting broad bean from the introduction to Unit 1, they could keep it growing, measure its growth and note the development of its leaves. If space provides, the beans could be grown to produce flowers.

(b) The children could observe how their pets move and feed, and make a report or a display of their observations.

Teaching notes

It is believed that life on Earth began over two billion years ago. The first forms of life were cell-like and developed from chemicals in the oceans. These cells grew and reproduced by simple division. At first they probably just formed colonies of single cells. Later some cells formed groups and became multicellular organisms, with different cells doing different 'jobs'. All plants and animals developed from these early, simple life forms.

The Venus fly trap and other carnivorous plants have developed this way of feeding because they live in habitats where the soil provides them with insufficient minerals for growth. The plants get the minerals they need from the insects that they trap.

When plants, such as sensitive plants and the Venus fly trap, move suddenly, the movement is not caused by muscles, as in animals. It is brought about by changes in the amount of water in the plant cells. The rapid change in water content, as water moves between groups of cells, causes the movement.

You may like to link the practical activity in this unit with the practical activity in Unit 7, to compare a land and freshwater habitat.

Teacher's sheet: activity

Based on **pages 6 and 7** of *Habitats*

Introducing the activity

(a) Tell the children that they are going to set up a home for a group of living things and observe them for a while (see note (i)).

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through tasks 1 to 3 (see note (ii)).

(c) Let the children carry out tasks 1 to 3.

(d) Go through tasks 4 and 5, then let the children try them.

(e) Let the children try task 6.

(f) Let the children try task 7 by putting cabbage leaves and lettuce leaves into the container (see note (iii)).

(g) Let the children try out task 8 over a few weeks (see note (iv)).

Completing the activity

(h) Let the children present a report of their observations to the whole class. Let them compare and discuss their observations.

Conclusion

Snails can be kept in containers of moist soil. They will eat cabbage, lettuce, mashed potato, rolled oats crushed in chalk, and flour paste. A snail has a muscular part of its body called the foot with which it holds onto the ground. It makes ripple like movements on the surface of the foot to help it move along. A snail also moves on a trail of slime. Snails may make a paper-like door to their shells when they are inside them (see note (v)).

Note: After the investigation, the snails should be released back into their habitat.

Teaching notes

(i) You may wish to show the children some snails and ask them how the snails could be cared for. You could steer the children's answers towards the setting up of a snail container or 'snailery'.

(ii) The containers should be made of plastic. They could be a plastic sweet jar covered with a polythene sheet held in place with an elastic band. The sheet should have some small holes in it. If the container is a tank, it could be covered by a clear plastic sheet held in place with Plasticine. There should be a gap between the sheet and the top of the container to let air in.

(iii) Snails will eat cabbage, lettuce, mashed potato, oats rolled in crushed chalk, and flour paste smeared on the side of the container. The children could try other vegetables, such as carrots and the leaves of some garden plants.

(iv) The containers should be sprayed with water to keep them from drying out. The food should be changed before it decays, snail droppings may need removing by you, from time to time. You may find snail eggs in the soil. A snail egg is about 4mm long and white. If the snail eggs are put in a moist container they may hatch in 20 to 30 days. The children could then try to rear and measure the young snails.

(v) If the conditions become dry in the container the snails will make a covering called an epiphragm over the opening in their shells.

Teacher's sheet: comprehension

See **pages 8 and 9** of *Habitats*

Answers

1. **(i) A = ivy, B = fern, C = bramble, D = buttercups and daisies (and dandelions), E = water lily. (ii) The area under the tree should be shaded in (up to midway through the brambles).**
2. **Woodland.**
3. **Sea, pond, river, coral reef, etc.**
4. **(i) Playing field, garden, park. (ii) They are open places with lots of sunshine.**
5. **(i) They let the leaves bob up and down in the water. (ii) They would collapse because they do not have the strength to hold the plant up.**

Complementary work

(a) The children can look at their tables from Unit 1 and see if the wall, path, edge of the path, lawn, flower bed, etc, are habitats for plants. They could then write down the habitats of lichens, moss, ferns and grass.

Teaching notes

The work in the previous units served to establish the concept of living things and to show that each living thing has certain needs. These needs are met by the surroundings of the living thing.

Another name for surroundings is habitat. If a living thing is in its habitat, it has a chance to grow and to breed so that its species may survive. This does not mean that all individuals will survive, but enough of them will breed to allow the species to continue.

As plants cannot move about, they must get everything they need from the environment around them. Their most important needs are air, water, sunlight and minerals from the soil. If a plant is healthy, then its habitat is supplying all its needs.

It is important for the children to understand that a large habitat is made up from a collection of smaller habitats. For example, in a wood there are also clearings, and rotten logs, which are smaller habitats within the woodland habitat.

Habitats can change naturally. For example, the trees at the edge of a wood grow out into a field, they change the open, sunlit habitat of the field to one of shade. In time this affects the plants that grow there. Plants needing a large amount of light fail to survive, while shade-loving plants from deeper in the wood spread out into the edge of the field. This type of slow change is happening all the time.

The decision tree key used in the practical activity is a simple introduction to keys. When the children have mastered using this key, they can easily move to the slightly more complex key in *6A Adapting and surviving*.

3 Teacher's sheet: activity

Based on **pages 8 and 9** of *Habitats*

Introducing the activity

(a) You may wish to begin by asking the children how they can tell a buttercup from a daisy. When they answer, make a decision tree key on the board. The first line could be: 'Is the flower yellow?' Under this, write 'Yes' and 'No'. Under 'Yes', you could write 'Buttercup' and under 'No' you could write 'Daisy'. Tell the children that this way of identifying living things is called a key and that large keys can be built up to identify more plants.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (i)).

(c) Go through tasks 2 and 3, then let the children try them (see note (ii)).

(d) When the children are back in the classroom go through tasks 4 and 5.

(e) Let the children try tasks 4 and 5.

Completing the activity

(f) Let the children compare their results.

Conclusion

The buttercup, daisy, clover and dandelion may be found together on lawns. Buttercups may be found at the edges of lawns. Daisy, dandelion and clover may be found at any point on a lawn. Pineapple weed is found in waste places. Chickweed may be found in damp, shady places (see note (iii)).

Teaching notes

(i) Compare the start of the key with the one you made on the board. Show that this key starts with 'Are the flowers yellow?'. Show that at the first decision, no plants are identified and more decisions have to be taken. Follow the key through to identify a buttercup or daisy, and any of the other four plants, so the children can see how they follow the key to identify a plant. Tell the children that the key does not cover all the plants that they are likely to meet, so if they find a flower with three small yellow petals, the key could not be used to identify it. This does not matter because in this study only the six plants are needed.

(ii) Make sure that the children's work outside is in accordance with school policies.

(iii) Buttercup, daisy, dandelion and clover are very well known and you can probably identify them from their leaves, too. The pineapple weed is less well known and is similar to groundsel, although it has a much larger and rounder head of small flowers. If the head is squashed a pineapple scent is released. Chickweed is common in damp places. The white flowers are tiny and may sometimes be closed. The plant has a weak stem which straggles over the ground. You may think that its leaves and stems look a little like water-cress but they are not related.

4 Teacher's sheet: comprehension

See **pages 10 and 11** of *Habitats*

Answers

1. **(i) A bee; (ii) It is finding food for itself and the nest.**
2. **Piece of rotting wood.**
3. **Wet and dark.**
4. **The ground beetle.**
5. **The woodlice would gather under the damp wood. They prefer dark, damp conditions.**
6. **The flowers that the bee feeds on grow in open ground.**

Complementary work

(a) The children could try the following after they have done the activity on pages 32 to 33. The children can carry out an investigation to discover how light affects where woodlice choose to live. You may want the children to use their experience in the practical activity to help them plan and carry out the investigation.

The investigation should feature a tray covered in damp paper towels. A black card should cover one half of the tray and a clear plastic sheet should cover the other half. Place the woodlice in the centre, and after ten minutes their positions are noted. They should all be in the dark half of the tray.

(b) The children could set up pitfall traps. They should make a little cardboard shelter to rest on pebbles above the trap to keep out rain. The traps can be set up in an afternoon and checked the following morning.

Teaching notes

Woodlice are invertebrates. They are in the group called the Crustacea. This includes crabs and lobsters. A feature of crustaceans is that they do not have an outer skin that prevents water from escaping. Insects and spiders have this outer skin, which allows them to live in dry habitats. Woodlice must stay in damp surroundings so that they do not lose too much water, by evaporation, from their body. If the children have made some studies on evaporation, you may like to add this example to their work. At night, when dew falls, the air close to the ground becomes humid and the woodlice can venture out to search for food. In the morning, when it becomes light, the woodlice return to living under logs and stones.

Earthworms, centipedes and millipedes also require damp surroundings because their skins also allow water to evaporate. If you find a dead earthworm on a path during the day, it may have been killed by long exposure to sunlight.

It is important to make sure that all the animals that have taken part in investigations and demonstrations are returned safely to their habitats. Pitfall traps should be emptied within about 18 hours of being set up, and the captured animals should be recorded and released.

Teacher's sheet: activity

Based on **pages 10 and 11** of *Habitats*

Introducing the activity

(a) Use this activity after the children have read about, or tried, the activity on page 11 about where woodlice choose to live. Explain that, in science, the results of each investigation are checked by performing other investigations, and the children can check what they have read with this investigation.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form then go through task 1 (see note (i)).

(c) Let the children perform task 1.

(d) Go through task 2, then let the children try it (see note (ii)).

(e) Go through tasks 3 to 5, then let the children try them (see note iii)).

(f) Go through task 6, then let the children try it.

(g) Go through task 7, then let the children try it (see note (iv)).

(h) Go through task 8, then let the children try it (see note (v)).

Completing the activity

(i) Let the children complete tasks 9 and 10.

(j) Let the children compare their results (see note (vi)).

Conclusion

When woodlice are placed in a position where they can choose between damp and dry surroundings they choose to move into damp surroundings.

Teaching notes

(i) The children should take care not to get the damp cotton wool too wet!

(ii) You may need to read the parts about woodlice in the pupil's book with the children to help them make a prediction.

(iii) You may need to remind the children to treat the woodlice with great care and not harm them.

(iv) The children should realise that they are repeating the experiment twice.

(v) The table should have three columns. The heading of column 1 is 'Trial'. The heading of column 2 is 'Number in dry cotton wool'. The heading of column 3 is 'Number in damp cotton wool'. The numbers 1, 2 and 3 should be in the 'Trial' column.

(vi) You may want the children to plan an investigation to test the effect of light. See complementary activity (a) on page 31.

Trial	No. in dry cotton wool	No. in damp cotton wool
1		
2		
3		

5 Teacher's sheet: comprehension

See **pages 12 and 13** of *Habitats*

Answers

1. **A = earthworms, B = mole, C = snail, D = centipede, E = millipede.**
2. **Plant roots, dead leaves, seeds, dead animals. Also, moles eat worms.**
3. **By eating the soil.**
4. **(i) The topsoil. (ii) There is more food there.**
5. **(i) A tiny, wingless insect. (ii) In moist, dead leaves. The soft, moist leaves are easier to eat than dry leaves.**

Complementary work

(a) The children could set up a wormery as suggested in the pupil's book. They should cover the top with a sheet of polythene with holes in it, and secure it with an elastic band. The surface of the soil should have some damp leaves in it. The children can put pieces of carrot, potato and other vegetables on the surface and find out which ones the earthworms nibble. You may ask the children to predict what will happen to the layer of sand as the earthworms burrow (it will become wavy and eventually mix in with the soil).

Teaching notes

Earthworms belong to a group of worms called Annelids. They have a segmented body. Each segment contains more or less identical parts of the main internal organs, which join up through the internal walls separating the segments. The earthworm has four pairs of hairs, or bristles, on the underside of its body which help it to move. The earthworm moves by extending some of its segments while contracting others. The earthworm sticks out its bristle in these segments so they grip the sides of its burrow while the extended parts move forwards. These parts then contract while the others then elongate and catch up. Inside each segment is a cavity of water which supports the muscles as they move the earthworm. The earthworm also has a reflex action. This works when the earthworm is attacked and makes the earthworm shoot backwards in its burrow.

Springtails are wingless insects. They are very numerous in the soil. Under one square metre of fertile grassland there may be as many as 45,000 springtails. The spring is a forklike structure under the tail of the insect. When it feels threatened, it releases the fork so that it pushes down strongly and throws the insect into the air. The springtail is not related to the flea, a more well-known jumping insect. The flea does not have a spring, but leaps by using its long back legs.

Centipedes and millipedes also have segmented bodies. They do not have a hundred legs or a thousand legs. You can tell them apart because centipedes have only one pair of legs on their body segments and are fast movers; while millipedes have two pairs of legs on their body segments and move more slowly.

The decision tree key used in the practical activity is similar to the key used on page 28. When the children have mastered using this key they can easily move to the slightly more complex key in *6A Adapting and surviving*.

Teacher's sheet: activity

Based on **pages 12 and 13** of *Habitats*

Introducing the activity

(a) You should introduce this activity after the children have used the key on page 28 to identify plants.

Remind the children of how some of them squirmed when they looked at soil life. In this activity they are going to use a key to identify different kinds of soil life and find out which animals are most common and least common (see note (i)).

Using the sheet

(b) Give out the sheet, let the children fill in their names and form. Go though task 1 then let the children try it (see note (ii)).

(c) Let the children try tasks 2 and 3 (see note (iii)).

(d) Let the children try tasks 4 and 5.

Completing the activity

(e) Let the children compare their results and conclusions.

Conclusion

The numbers of each animal depends on the soil. The least numerous are probably centipedes and spiders. The most numerous may be earthworms or insects. Large numbers of different soil animals shelter under stones. These include beetles, millipedes and slugs. As the stones are lifted up, earthworms may be seen withdrawing into their burrows (see note iv)).

Teaching notes

(i) The worksheet for this activity is designed to work in a variety of scenarios, according to the availability of the resources and the attitude of the children. It may be used outside, where they could turn over stones and bricks on the ground to find the soil animals resting underneath. You could let them dig in the ground, or you could provide them with bags of soil you have collected and do the entire activity in the classroom.

(ii) If the children have used the plant key in Unit 3 you could ask them how they would design a very simple key to identify an insect and a slug. The key could begin with the question 'Does the animal have legs?' In the 'Yes' arm of the key would be 'Insect', and in the 'No' arm of the key would be 'Slug'.

(iii) If the children are working outside make sure that it is in accordance with your school policies. If working inside, make sure the children have white trays or newspaper, jars and a paint brush to gently collect animals that wander off.

(iv) Centipedes and spiders are active carnivores and are probably present only in small numbers. When a centipede is disturbed, it runs away quickly and may not be caught. Millipedes usually sleep coiled up during the day and may be more easily handled. You must stress that the children handle the animals with care and not harm them.

6 Teacher's sheet: comprehension

See **pages 14 and 15** of *Habitats*

Answers

1. **A = earwig, B = ladybird, C = greenfly (aphid), D = weevil, E = leaf bug.**
2. **They are similar in colour to the leaves.**
3. **Aphid.**
4. **(i) A gall; (ii) a small wasp; (iii) egg and larva of the wasp.**
5. **Ladybird, spider, bird.**
6. **It is sheltered. There is a source of food.**

Complementary work

(a) The children can try the activity suggested on page 15 of the pupil's book. Make sure they are supervised in accordance with school policies. You could let them capture the animals that fall from the branch and put them in collecting jars while they make drawings of them. They may find that they have discovered animals which are not featured on the page.

The children should keep their work because when they study *6A Adapting and surviving* in this series they make a more detailed study of life on branches which also features a key. They could use the key with their drawings to see if they can identify the animals.

Teaching notes

The insect group is divided up into many smaller groups. On a branch you may find members of the beetle group. They have two pairs of wings, but one pair is made into wing cases which fold across the back and protect the more delicate wings underneath. The ladybird is easily seen because of its red and black wing cases. The weevil is a member of the beetle group.

Although the earwig looks a little like a beetle, it is in a group of its own. The sex of an earwig can be told by looking at the pincers on its tail. The male earwig has curved pincers and the female has straight pincers. Earwigs tend to fly at night.

The bug group (also called the Hemiptera group) is huge and contains small insects like bedbugs, and large insects like cicadas, which live in warmer climates and which the children may have seen on holiday. Aphids also belong to the bug group. Bugs have two pairs of wings that fold across the back. The wings may be clear and used for flying, or the upper pair may have harder parts that offer protection.

Moths and moth caterpillars may be found on branches.

Each type of caterpillar can only survive on a very small number of plants. Many caterpillars have died because they have been collected and given the wrong food plant, or even just grass! If caterpillars are to be kept and reared it is important to note the plant they are feeding on and to provide a constant supply of suitable leaves.

6 Teacher's sheet: activity

Based on **pages 14 and 15** of *Habitats*

Introducing the activity

(a) You may introduce this activity by asking the children about the parts of the plant. Look for answers about the root, stem, leaves and flowers. Show the children some large photographs of woodland and countryside habitats and ask them what parts of the plants make up most of the pictures. Look for an answer about leaves. Remind the children that these are the food-making organs of the plant, and so they are often the parts attacked by animals in need of a meal. Tell the children they are going to have a look at leaves to see what is feeding on them.

Using the sheet

(b) Give the children the sheet, let them write their name and form on it, then go through task 1 and let the children try it (see note (i)).

(c) Let the children carry out task 2 (see note (ii)).

(d) Go through tasks 3 to 6 with the children, then let them try it.

Completing the activity

(e) Let the children compare their results.

(f) You could let some children do a longer activity in which they make a table for fifty leaves, and record leaves both with and without animals. By trying this exercise they will gain a picture of how much a plant or a hedge is being attacked by animals for food.

Conclusion

This will depend on the plants surveyed but may show that aphids were the most frequently found animals. The colour most frequently found was probably the green aphid. A leaf may have aphids, caterpillars and a miner or roller (see note (iii)).

Teaching notes

(i) After a short time, ask the children to turn over their sheets and tell you how they could distinguish between the different animals. Some flies, weevils and moths are leaf miners. Some mites, aphids and weevils are leaf rollers.

(ii) The children could look at trees or bushes in a hedge. Make sure their outdoor activity is in accordance with school policies. In this activity the children should only record a leaf when they find something on it.

(iii) Some plants may have an infestation of feeding caterpillars.

7 Teacher's sheet: comprehension

See **pages 16 and 17** of *Habitats*

Answers

1. **A = bulrush, B = water lily, C = perch, D = newt, E = sticklebacks.**
2. **Algae and water fleas.**
3. **A species.**
4. **(i) It is like a tortoise because it has a shell, four legs, and a long neck. It is cold-blooded and warms up by lying in a sunny place. (ii) Fish.**
5. **Sunlight, water, nourishment in the soil.**
6. **(i) All the living things in an area; (ii) water, air and sunlight; (iii) a habitat.**

Complementary work

(a) The children could use secondary sources to find out about the communities of animals in other parts of the world (for example, the grassland community of the African plains).

Teaching notes

Terrapins are not found naturally in Britain. They live in warmer climates. The terrapins in the photograph live in Belize. You may wish to raise the issue of people keeping pet terrapins until they feel they are too large (for example, when they attain the size of a dinner plate), then releasing them in ponds and lakes. These animals are not part of the natural communities, and although they may find plenty to eat, they damage natural food chains in the community.

The living things in a community are not just linked by food chains, but in many other ways as well. Some plants may rely on trees for shade. Many plants may rely on insects for pollination, and some plants may rely on animals to disperse their seeds. Animals may use holes in trees as nest sites, and use the stems and leaves of other plants as nest materials. Plants can provide animals with shelter from the weather and from predators.

There are many natural history programmes on television which feature natural communities. Probably one of the best communities for children at this age to study is the grassland community of Africa, because the animals are large and the feeding relationships and the ways the animals hide from each other are very easily seen.

You may like to link the practical activity in this unit with the practical activity in Unit 2, to compare a freshwater habitat with a land habitat.

7 Teacher's sheet: activity

Based on **pages 16 and 17** of *Habitats*

Introducing the activity

(a) Use this activity after you have studied the unit in the pupil's book. Tell the children that they are going to make their own community of living things, and when it is set up all it will need is sunlight and air to keep the plants and animals alive.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (i)).

(c) Let the children try task 1.

(d) Go through task 2, then let the children try it.

(e) Go through task 3, then let the children try it (see note (ii)).

(f) Go through task 4, then let the children try it (see note (iii)).

(g) Let the children try tasks 5 to 7.

(h) Go through task 8, then let the children try it (see note (iv)).

(i) Go through task 9, then let the children try it (see note (v)).

Completing the activity

(f) Let the children compare their notes (see note (vi)).

Conclusion

When water plants and snails are kept together in a jar they can both survive. As they live together, the plants may grow and the snails may breed.

Teaching notes

(i) You may use plastic aquarium tanks or large, plastic, sweet jars. The gravel should be washed before it is given to the children.

(ii) The water should be pond water.

(iii) Remind the children to treat living things with great care.

(iv) You may let the children keep making notes regularly for three weeks or more. Keep a check on the water to make sure that it does not smell. If it does, return the plants and snails to the pond.

(v) The children may have found that the snails have laid eggs on the side of the container and that the young snails can be seen developing inside them. The snails may seem to lick the side of the container as they feed. The water may have turned green due to algae on the water plants breeding rapidly.

(vi) Remind the children that the plants and snails formed a simple community. The snails ate the plants and algae but provided wastes for them to use as nutrients to help them grow. If appropriate to the work of the children, you can tell them that the plants gave out oxygen which the snails used, and the snails gave out carbon dioxide which the plants used to make food.

Teacher's sheet: comprehension

See **pages 18 and 19** of *Habitats*

Answers

1. **(i) A = pond weed, B = tadpole, C = perch, D = pike. (ii) The arrows point towards the right – from the food to the feeder.**
2. **Plants.**
3. **To carry pollen and to carry seeds.**
4. **Plant eating animals and meat eating animals.**
5. **Meat, other animals.**
6. **Predators hunt other animals while prey are hunted by predators.**

Complementary work

(a) The children can select ten foods that they eat, and work out the food chain that connects them to each food. This may require secondary sources on how food is produced.

Teaching notes

Almost all the food chains on the planet begin with green plants. This is because green plants have the ability to trap energy from the Sun and use it to make food. Plants make enough food for themselves and for plant eating animals. The Earth is at just the right distance from the Sun to be able to use the Sun's energy. If it was much closer, the Earth would receive too much heat energy so life could not survive. If the Earth was much further away, it would receive too little heat for life to survive. When scientists look for other planets on which life may have formed, they look for planets which are just the right distance from their star so that alien plants could trap energy and make food. This could then form the basis of food chains for alien animals.

Humans are omnivores. This means that they can eat food from both plants and animals. This can sometimes confuse children into thinking that all animals can feed in this way. It is important to point out that most animals have only a small range of foods which they can eat. If the foods are not present in the habitat they will starve. The caterpillars mentioned in the previous unit provide a good example. A caterpillar of one species will starve if given the wrong leaves – even if the leaves may be eaten by another species of caterpillar.

In 1977, communities of animals which did not rely on energy from the Sun to start the food chain were discovered at the bottom of the ocean. These animals form communities around hot-water springs called black smokers. The chemicals released in this water contain energy that certain bacteria can use, just as plants use energy from the Sun. The bacteria are, in turn, eaten by crabs and worms.

Note that the worm in the diagram on page 19 feeds on plant food. You may like to trace this back to the illustration on page 12.

8 Teacher's sheet: activity

Based on **pages 18 and 19** of *Habitats*

Introducing the activity

(a) Use this activity after the children have studied food chains in the pupil's book. Tell the children that they are going to look at the first link in the food chain in more detail. This is the link between plants and animals.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (i)).

(c) Let the children try task 1.

(d) Go through tasks 2 and 3, then let the children try them.

(e) Go through tasks 4 and 5, then let the children try them (see note (ii)).

(f) Go through task 6, then let the children try it (see note (iii)).

(g) Go through task 7, then let the children try it (see note (iv)).

Completing the activity

(h) Let the children compare their results (see note (v)).

Conclusion

The amount of food that animals eat can be measured. A simple calculation can be made to estimate how much food a single animal eats (see note (vi)).

Note: After the investigation, the animals should be released back into their habitat. If the animals are caterpillars, make sure they are placed back on the same type of tree they were taken from.

Teaching notes

(i) This worksheet is designed for use with a range of resources. You may like to use plastic aquarium tanks with tops, or large plastic sweet jars. You may like to use either stick insects or caterpillars. If you use the common stick insect, it feeds on privet leaves. Each type of caterpillar eats only a small number of food plants. Make sure that you can provide enough leaves from that food plant during the investigation. Do not use hairy caterpillars. Some of them are poisonous.

To prevent the privet or leaves from drying out, use small plastic containers. Punch small holes in the lids, and fill the containers with water. Put the lids back on and stick the branches through the holes in the lids. You should also spray the tank with a little water each day.

(ii) You may ask the children to count the leaves on a sprig of privet before and after the stick insects have fed. Similarly, you may like the children to count the number of leaves given to caterpillars, and then examine the leaves after a day or two. Alternatively, if you are using large quantities of privet and leaves you may like to weigh them before and after you have presented them to the animals. Keep in mind that if the leaves are allowed to dry out, they will lose weight this way. Also, the insects will not eat dry leaves.

(iii) The children could subtract the numbers of leaves or the weights given in their answers to tasks 4 and 5.

(iv) The children should divide their answer to task 6 by the number of animals in the container. In a colony of stick insects some animals may be larger than others, so will eat more. You may wish to point this out so the children can review their calculation. The caterpillars are probably all at the same stage of development and therefore the same size.

(v) If weighing has been done there may be some variation due to lack of accurate weighing technique.

(vi) This knowledge is useful in estimating whether a habitat can provide enough food for a colony of animals.

Teacher's sheet: comprehension

See **pages 20 and 21** of *Habitats*

Answers

1. **(i) A = otter, B = kingfisher, C = vole. (ii) Rushes and reeds. (iii) The vole is digging a shelter in the river bank.**
2. **To stop floods, to use the river for boats, to use fertile land nearby for farming.**
3. **Straighten them, dredge them.**
4. **The shelter and the variety of places to live is reduced. There are fewer plants and animals of all kinds. Some plants and animals are lost completely. Missing links in the food chain can cause the food chain to collapse.**

Complementary work

(a) The children could use secondary sources to find out how habitats have been changed by volcanoes, fires, pollution and large human populations.

Teaching notes

When introducing the concept of a food chain, we usually start by saying that a plant is linked to a plant eater, and that this plant eater is linked to a meat eater, or hunter. This is fine, as it establishes that the living things are linked. Later, at an appropriate time it should be noted that a population of plants is linked to a population of plant eaters, and they are linked to a population of meat eaters. Generally, the population of the plant is much larger than the population of the plant eater, and the population of the plant eater is much larger than the population of the meat eater.

When a habitat, such as a river, is changed, the plant population may be greatly reduced. This smaller plant population can then sustain only a very small population of plant eaters, and this population may, in turn, be too small to sustain a population of meat eaters, so the meat eaters die out.

Although at this level the children only really need to know about food chains, in most communities the chains are linked together to form food webs. This means that an animal may have several foods instead of just one. If the population of one of the foods that an animal eats goes down, that animal can sometimes switch to another supply of food. If the population of the food fails to return to normal, this could have serious 'knock on' effects as other food populations start to suffer by the animal's change in feeding habits. This example serves to show that the way living things are linked together in a habitat can be very complex.

9 Teacher's sheet: activity

Based on **pages 20 and 21** of *Habitats*

Introducing the activity

(a) Use this activity after the children have studied Unit 9 in the pupil's book. Remind the children of how the river was changed when it was straightened for human purposes. Tell the children that the main habitat in most of Britain before humans arrived was woodland. When humans arrived they cut down the woodlands to make space for farms and towns. In time they made parks and gardens with flower beds. Tell the children they are going to compare soil from a woodland with soil from a flower bed, and think about how the woodland habitat has been changed.

Using the sheet

(b) Give out the sheet and let the children write their names and form, then go through tasks 1 and 2 (see note (i)).

(c) Let the children try tasks 1 and 2.

(d) Go through task 3, then let the children try it (see note (ii)).

(e) Let the children try task 4.

(f) Go through task 5 then let the children try it.

Completing the activity

(g) Let the children compare their results.

(h) Let the children compare their plans (see note (iii)).

(i) The animals running across the ground in both habitats may be compared by setting pitfall traps.

Conclusion

The leaf litter and soil from the woodland contains a wider variety of animals than the leaf litter and soil from the flower bed. There may also be more animals in the woodland soil and leaf litter than in that from the flower bed.

The animal life on the leaves may be compared by examining the leaves.

Teaching notes

(i) You may provide the soil for the children or let them collect it themselves. If the children are to work outside make sure that it is in accordance with your school policies.

(ii) This should take place back in the classroom. The children can study their samples in white trays or on newspaper.

Make sure the children have the means to collect and contain the animals, such as paint brushes, specimen jars and pooters (optional).

(iii) If the plans are suitable, and time and resources are available, you may let the children try some of their plans.

Teacher's sheet: comprehension

See **pages 22 and 23** of *Habitats*

Answers

1. **(i) A = wilderness lake, B = fishing lake, C = boating lake.**
   (ii) A = wilderness lake.
2. **Old factory sites, old coal mines, old gravel pits.**
3. **Reclaimed land.**
4. **To create different types of land for different species to thrive.**
5. **Hills.**
6. **People visiting the park keep to the paths and leave much of the land undisturbed so shy creatures can live there.**

Complementary work

(a) The children can use secondary sources to find out how waste lands have been changed into country parks.

(b) The children could visit a country park to see how the habitats have been constructed, and to survey the plants and animals.

Teaching notes

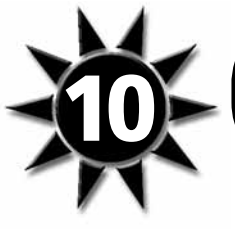
Probably the most noticeable animals in a habitat are birds. People often make an effort to improve the habitat for their garden birds by putting out food, and perhaps also putting up a nest box. These points could be mentioned when studying this topic.

If conditions around the school allow, you may wish to set up a feeding station. This could be a bird table, or just a nut cage. You could also set up a bird bath using a large, upturned lid.

You could extend this very visible way of helping wildlife by providing plants such as the buddleia for butterflies, and a wide range of flowering plants for bees.

If space permits a wild area, perhaps having a large rotting, moss-covered log as its focus, could be set up. Rocks could be arranged so as to provide shelter for passing frogs and toads. Tussocks of grass could be planted to provide extra shelter and food for animals that live on or just below the ground.

If changing part of the school grounds is impossible, perhaps the children could become involved with a larger-scale conservation exercise, either in Britain or overseas via the Internet.



Teacher's sheet: activity

Based on **pages 22 and 23** of *Habitats*

Introducing the activity

(a) Use this activity after the children have studied Unit 10 in the pupil's book. Ask the children about the habitats that exist around the school. They may like to refer back to their work in activity 1. Tell the children that you want them to think about how they could improve these habitats for the benefit of certain animals.

Using the sheet

(b) Give out the sheet and let the children fill in their names and form, then go through task 1 (see note (i)).

(c) Let the children try task 1.

(d) Go through task 2, then let the children try it.

Completing the activity

(e) Let the children compare their suggestions (see note (ii)).

Conclusion

The habitat could be improved for woodlice by adding more rotting logs and stones. Perhaps making damp places with moss.

The habitat for spiders may be improved by planting more bushes in which they could spin their webs to catch food.

The habitat for bees could be improved by planting more plants which produce flowers they like to feed on.

The habitat for butterflies could be improved by planting more plants which the caterpillars can feed on, and by planting more plants which produce flowers that the adult butterflies like to feed on.

The habitat for frogs could be improved by making a pond in which they can breed, and a damp area with moss and stones where the frogs can hide and feed.

Teaching notes

(i) Remind the children that they can look back at all the work they have done in their lessons on habitats and use it to help them. You may also like to provide secondary sources.

(ii) You may find that some children disagree with the ideas of others. You can use this to organise a debate, or more simply to point out to children that when new habitat sites are being considered, or people are trying to preserve old habitats, similar disagreements develop between the people involved. They may be developers, scientists, councillors and ordinary people.