Adaptation to Environment

Pick a small or micro-habitat to look at closely e.g. under rocks, long grass, trees or shrubs.

1. Which habitat have you chosen? How large is the habitat?_____

2. Assess the environmental conditions of your microhabitat. Circle the number you agree closely fits your chosen environment.

						Neutral					
Light	**5**	**4**	**3**	**2**	**1**	**0**	**1**	**2**	**3**	**4**	**5**	**Dark**
Dry	**5**	**4**	**3**	**2**	**1**	**0**	**1**	**2**	**3**	**4**	**5**	**Damp**
Hot	**5**	**4**	**3**	**2**	**1**	**0**	**1**	**2**	**3**	**4**	**5**	**Cold**
Exposed	**5**	**4**	**3**	**2**	**1**	**0**	**1**	**2**	**3**	**4**	**5**	**Sheltered**
Noisy	**5**	**4**	**3**	**2**	**1**	**0**	**1**	**2**	**3**	**4**	**5**	**Quiet**

3. Is there anything else to mention about the habitat you have chosen?

4. What sort of invertebrates might you expect to thrive (do well) in your chosen environment?

Why do you think they live there? _____

The present conditions of your habitat are subject to change. Environmental change can be swift or more gradual. Think about how creatures adapt to change and survive.

5. What might happen to these environments at night or in winter?

6. Can you think of ways that the habitat and the organisms within them survive through these tough conditions? What types of adaptation may plants and animals have to cope with tough conditions?

Environment & Feeding Relationships

Sc1 Scientific Enquiry

Sc2 Life Processes and Living Things

Section	Objective
5	**Living things in their environment**
	Adaptation and competition

Pick a small or micro- habitat to look at closely e.g. under rocks, long grass, trees or shrubs.

1. Which habitat have you chosen? How large is the habitat?

Try to ensure students pick a particular type of habitat and stick to that type. By looking at their habitats outside the students will be able to assess the environment more easily. Sample size is key to National Curriculum Sc1.

2. Assess the environmental conditions of your microhabitat. Circle the number you agree closely fits your chosen environment.

3. Is there anything else to mention about the habitat you have chosen?

4. What sort of invertebrates would you expect to do well in your chosen habitat?

- Dark and damp habitats would be a haven for millipedes, centipedes, woodlice, beetles (certain sorts), spiders (certain sorts), worms, slugs, snails.

- Light and warm habitats would be good habitats for flying insects, harvestmen, spiders, ants.

5. What might happen to these environments at night or in the winter?

Darker, cooler conditions. Long term environmental change may cause adaptation or migration.

6. Can you think of ways that the organisms within the habitat survive through tough conditions?

Night- some flowers close sepals and petals, insects shelter in refugia, animals seek shelter. Some plants and animals become active at night to take advantage of the dark as a camouflage. Some plants attract night time pollinators such as moths, with strong smells and white flowers. Certain species take advantage of the dark for hunting and are specially adapted- owls big eyes, silent flight. Bats use echolocation, an animal sonar system, to catch prey in the dark.

Winter- deciduous trees lose leaves saving food energy, less sunlight through winter months make leaves inefficient and difficult to maintain. Animals hoard food stores of nuts and fatten up on fruits and berries. Lifecycles- hibernation is key to many animals surviving through the winter months, squirrels, newts, and frogs. Many birds migrate to more favourable climates. Many insects survive through the winter by hibernating or as eggs. Plants die back whilst seeds lay dormant and then germinate in spring, bulbs grow back each year, storing their energy for the growth of a flowering body to enable them to be fertilized each year.

Adaptation to Environment

- **You will need - pencil, paper, worksheet, folder, magnifying glass, pot, paintbrushes and invertebrate key.**
- **Conduct an invertebrate hunt in your chosen microhabitat. Carefully look for and collect an invertebrate. Use a paintbrush to gently sweep it into a pot if necessary.**
- **Return the invertebrates to exactly the same habitat after your investigation.**

1. Draw an accurate diagram of the invertebrate you have found in the space below.

2. Make a note of any distinguishing features such as number of legs, or if it has wings.

3. How does the invertebrate move around?

4. How do you think the invertebrate eats?

5. Why might the answers to these two questions be linked?

6. How is the invertebrate adapted to live in the habitat in which you found it?

Environment & Feeding Relationships

Sc1 Scientific Enquiry

Sc2 Life Processes and Living Things

Section	Objective
1	**Living things in their environment**
2	**Adaptation and competition.**

Conduct an invertebrate hunt in your chosen habitat.

If they cannot find any insects in one place than they can search in other places that are a similar habitat. You will need pots, magnifying glasses and the invertebrate key. You may find paintbrushes helpful as a gentle way to sweep animals into pots and ensure they are not damaged.

Be aware of:

- spiky or stinging plants like brambles and nettles.
- Biting or stinging insects like bees, wasps and occasionally ants and beetles.
- Dirt and germs from looking on the ground and touching fungi.
- Dog mess if in an area where people walk their pets. Students should wash their hands thoroughly at the end of the session.
- Litter such as broken glass and sharps.

Setting parameters of search area to avoid students leaving area.

1. Draw an accurate diagram of the invertebrate you have found in the space below.

2. Make a note of any distinguishing features such as number of legs, or if it has wings.

The students draw the insects they have found being careful to label the different parts. This will help them to identify the insects using the key.

3. How does the invertebrate move around?

Can be answered by direct observation of the insects.

4. How do you think the invertebrate eats?

The key shows which insects are carnivores, herbivores and detritivores. This is quite a loosely based classification. For example with the flies, the big blue bottles and green bottles are detritivores. Greenflies, lacewings and other small flies are herbivores. Gnats and mosquitoes are carnivorous parasites.

5. Why might the answers to these two questions be linked?

Often the faster moving animals are predatory, as they have to capture prey that moves, they often have big obvious jaws and may bite people. Where as herbivores and detritivores don't need to chase food, they are slower moving. Observing invertebrates inside the pots may show their reactions to possible danger. Often insects retract legs and antennae to escape detection by other insects, the more ferocious species will explore round the pots and fight with other insects.

6. How is the invertebrate adapted to live in the habitat in which you found it?

Hard exoskeleton for protection, pill millipedes and woodlouse curl up to protect bodies. Movement, flying insects living in shrubs, long grass, fly to collect food. Long legs, fast movement on the ground- catch prey, make webs to trap flying insects. Soft bodies, slugs and snails, make slimy trails to ease movement prone to drying out, choose damp protected habitats.

KEY TO WOODLAND INVERTEBRATES

Use this key to identify invertebrates that you find on a walk through the woods or in leaf litter that you bring back

START HERE - Does your invertebrate have legs?

- NO
  - Does your invertebrate have a shell?
    - YES → **SNAIL** (plant matter)
    - NO
      - Is your invertebrate soft bodied?
        - YES
          - Solid body with saddle → **SLUG** (plant matter)
          - Segmented body → **WORM** (decaying plant matter)
        - NO → Does your invertebrate have wings?
- YES
  - How many legs does your invertebrate have?
    - MANY
      - 2 pairs of legs on each body segment → **MILLIPEDE** (plant matter)
      - 1 pair of legs on each segment → **CENTIPEDE** (insects)
    - 14 → Flat body → **WOODLOUSE** (decaying plants)
    - 8 → Body divided into head and abdomen → **SPIDER** (insects)
    - 6 → Does your invertebrate have wings?
      - YES
        - Are the wings visible when the creature is walking or standing?
          - NO
            - hard wing cases → **BEETLE** (anything organic)
            - Pincers at rear → **EARWIG** (decaying matter)
            - very long black legs
              - long antenna → **CRICKET** (plants)
              - short antenna → **GRASSHOPPER** (plants)
          - YES → 1 pair of wings
            - striped body → **HOVERFLY** (anything organic)
            - metallic, black, hairy legs → **FLY** (liquid & soluble organic matter)
            - long thin legs & body → **CRANFLY** (decaying matter)
            - long thin legs, quickly vibrating antenna → **GNAT** (creatures)
      - NO
        - Red, brown, black with 3 body sections → **ANT** (live plants, creatures & aphid sap)
        - Green or black with 1 body part → **APHID** (plant sap)
      - 2 pairs of wings
        - coloured wings
          - club ended antenna → **BUTTERFLY** (nectar)
          - feathered antenna → **MOTH** (nectar)
        - transparent wings
          - green, 1 body part → **GREENFLY** (plant sap)
          - stripey body
            - furry → **BEE** (nectar)
            - smooth → **WASP** (creatures)
          - long, delicate, thin, green → **LACEWING** (creatures)
          - long, thin, coloured → **DRAGONFLY DAMSEFLY** (creatures)
    - 1 body part
      - short legs → **MITE** (blood)
      - long legs → **HARVETSMAN** (living & dead insects)

Food Chains and Trophic Levels

1. Write the names of the invertebrates you have found on your search into the correct boxes below. Making sure they are placed under the right headings.

Producers- organisms that convert the suns energy into food

Primary consumers- herbivorous organisms

Secondary consumers- carnivorous organisms

Tertiary consumers – larger carnivorous organisms that eat other carnivores and herbivores, or smaller organisms like parasites

Detritivores- waste recycling organisms that eat faeces, dead plant and animal matter

Producers	Primary Consumers	Secondary Consumers	Tertiary Consumers	Detritivores

Use the key to help discover what invertebrates eat and where they fit in the food chains

2. Add arrows between the organisms to show food links between them. The arrows should go in the direction of the energy from the food that is being transferred.
E.g. fly → spider. Add other food links between the chains you have already found. Your table should be showing all the links between organisms. This is called a **food web**.

3. Why do you think the role of **detritivores** is important in the food web?

_____

_____

_____

4. What happens to the **energy** as it passes through the food web?

_____

_____

_____

Environment & Feeding Relationships

Sc1 Scientific Enquiry

Sc2 Life Processes and Living Things

Section	Objective
5	**Feeding Relationships**

1. Write the names of the invertebrates you have found on your search into the correct boxes below. Making sure they are placed under the right headings.

- Producers- organisms that convert the sun's energy into food
- Primary consumers - herbivorous organisms
- Secondary consumers - carnivorous organisms
- Tertiary consumers - larger carnivorous organisms that eat other carnivores and herbivores, or smaller organisms like parasites
- Detritivores - waste recycling organisms that eat faeces, dead plant and animal matter

Use the key to help discover what invertebrates eat and where they fit in the food chains.

2. Add arrows between the organisms to show food links between them. The arrows should go in the direction of the energy from the food that is being transferred. E.g. fly → spider . Add other food links between the chains you have already found. Your table should be showing all the links between organisms. This is called a food web.

If students fill in three or four food chains in lines across the table, it should be easy to think of links between the organisms in different chains and then those links can be added to the table as arrows.

3. Why do you think the role of detritivores is important in the food web?

4. What happens to the energy as it passes through the food web?

Energy is lost through a range of processors, movement, growth, reproduction, digestion.

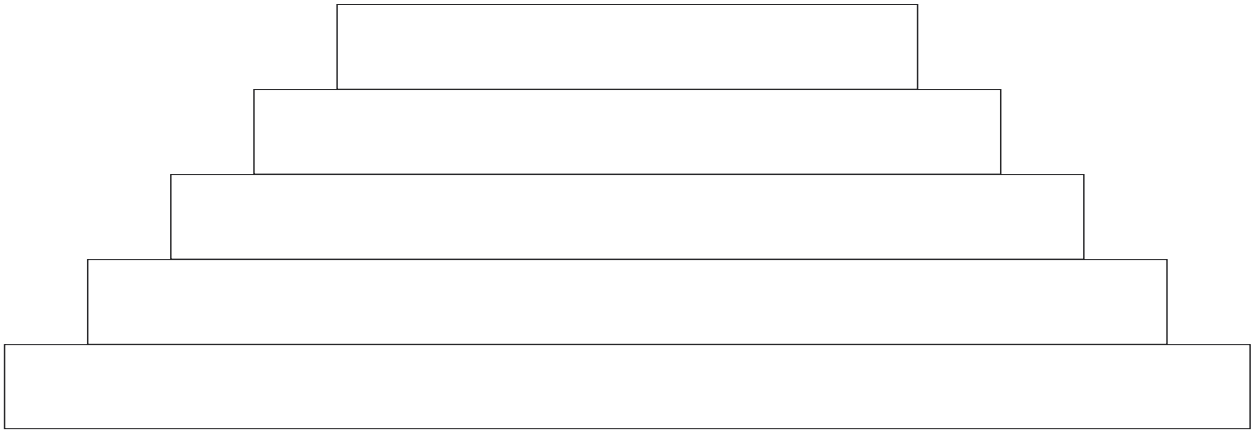
5. Where do the waste products from all the trophic levels find their way back into the foodweb?

Detritivores like woodlice and worms breaking down particles into smaller sizes where they can be easily absorbed into the soil.

Fungi are also an important detritivore breaking down plant and animal matter and recycling it back into the systems.

Food Chains and Trophic Levels

1. Take your table showing the **food web** and copy the information into the spaces in the **pyramid** below. **Put the producers at the bottom.**



2. If there are still empty spaces in your pyramid, try to think of some organisms that could fit into the spaces. Add them to your pyramid.

Each stage of the pyramid is known as a **'trophic level'.**

Your diagram should now show that all the living things in a habitat are closely linked together, and depend on each other for survival.

Much of the energy from the sun is lost as it passes through the food chain. The energy is used for movement, heat, reproduction, digestion and lost as waste by the organisms as it passes through each stage of the chain. The higher up the food chain you are, the more difficult you are to support and the more processed sunlight energy you need to consume to survive.

Because of this, the organisms at the top of the food chain are often few in number, while the organisms at the bottom of the food chain are very numerous.

Describe the possible effects of these different scenarios on your food web.

- People adding slug and snail pellets to their gardens.

_____
_____
_____

- An increase in the local bird population.

_____
_____
_____

- Adding weed killer or herbicides to an area.

_____
_____
_____

Sc1 Scientific Enquiry

Sc2 Life Processes and Living Things

Unit 7c

Section	Objective
5	Feeding Relationships

1. Take your table showing the food web and copy the information into the spaces in the pyramid below. Put the producers at the bottom.

2. If there are still empty spaces in your pyramid, try to think of some organisms that could fit into the spaces. Add them to your pyramid.

Describe the possible effects of these different scenarios on your food web.

People adding slug and snail pellets to their gardens.

Can cause poisons moving up through the food chain. Each animal consumes a portion of poisoned pellets. A bird or hedgehog that eats ten of the poisoned slugs consumes enough poison to make them seriously ill leading to death. Higher up the food chain, hawks or foxes who eat the poisoned animals then also stand to suffer potential illness and death. This may also cause an increase in producers, as the slugs would normally eat the plants.

An increase in the local bird population.

Increased competition for food and space between the birds leads to competition and fighting for space and food. A lack of food and territory for each bird would lead to migration of birds to other areas in search of habitat space and food.

Adding weed killer or herbicides to an area.

Reduces species variation therefore reducing available habitats and food sources from the different plants for insects and animals that feed and live on them. Poisons in a system can affect insects and be passed up through the food chain to affect animals at higher trophic levels, including small mammals and bird populations.