




## Learning Scientific Skills Outside the Classroom

### Scientific Skills

Observing	Identifying and Classifying	Concluding Specific skill - identifying patterns
Country of Origin	Suggested Age Range	Suggested Theme
 UK	9 - 11	Habitats

Location outside the classroom	Benefits of using this location
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Contrasting locations around the school grounds	Children can collect living invertebrates from a range of different habitats and observe them through first-hand observations
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Learning Objectives – Scientific Skills	Learning Objectives – Knowledge
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To make careful observations of invertebrates To identify characteristics of invertebrates To classify invertebrates using identification keys To use their findings to identify patterns found in a natural environment and present these findings appropriately	To give reasons for classifying animals based on specific characteristics
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Key Vocabulary
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Scientific skills vocabulary - observe, see, identify, classify, classification, key, data, pattern, conclude, conclusion Knowledge vocabulary – organism, external observable characteristics, invertebrate, arachnid, arthropod, centipede, crustacean, insect, millipede, mollusc, worm, exoskeleton, habitat, microhabitat
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Resources / Equipment
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<ul style="list-style-type: none"> <li>Equipment to collect invertebrates in different microhabitats - clear dishes, bucket or large container, water, plastic bags, sieves, fishing nets, white sheet, wooden spoons, plastic spoons, paintbrushes</li> <li>Equipment to make pitfall traps - trowels, yoghurt pots or small plastic cups, card, small stones</li> <li>Resources to entice invertebrates – cheese, fruit, meat such as cat food</li> <li>Equipment for identification – identification keys, magnifying collector pots, magnifying glasses</li> </ul>
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Teaching Activities
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*This lesson will need to be taught over a consecutive 2-day period because the pitfall traps will need setting up the day before.*

**Discuss** – What is an invertebrate and what different groups do they belong to? Recap their knowledge of the different invertebrate groups, the differences between the groups and how we can identify what group a living organism belongs to (e.g. by observing its external characteristics). Discuss whether they think invertebrate groups always live in one particular microhabitat? What is the difference between a habitat and a microhabitat? What types of microhabitat do we have in our local environment?

**Explain** - They are going outside to collect living invertebrates from the different microhabitats within their local environment and make careful observations of these organisms using magnifying glasses and magnifying collector pots. They will identify the invertebrates using classification keys and classify them into one of the different invertebrate groups - arachnid, arthropod, centipede, crustacean, insect, millipede, mollusc and worm. They will record their findings and use their data to identify any patterns in the micro-habitats of invertebrates within their local natural environment.

*N.B. They might find other organisms which are not invertebrates and although these will be a good point for discussion they are not the focus of the lesson.*

**Demonstrate** – Show children different methods outside which can be used to collect invertebrates from the microhabitats within their environment and demonstrate how to carefully collect them using either a plastic spoon or a small paintbrush, taking care not to damage or harm the organism in any way. Use images to demonstrate what a pitfall trap should look like and explain how to set one up. Only demonstrate the methods which are applicable to their local environment.

- Pitfall traps – These need to be set up on the first day so that invertebrates are collected overnight. To make the trap they will need to dig a small hole in the ground and place an empty yoghurt pot or small cup in the hole so that the



rim is level with the soil surface. A small amount of food bait should be placed inside the container, to entice the invertebrates into the trap, along with some leaves, grass or small stones for hiding under. The trap is then covered with a piece of card or thin piece of wood raised a little by small stones so that invertebrates can crawl underneath and into the trap. Finally, the card/wood is secured with small stones on top. The traps are left overnight and examined the next day for invertebrates.

Pitfall traps can be set up on the floor in different microhabitats e.g. in flowerbeds, on the woodland floor, amongst leaf litter, alongside footpaths, in open grass, in vegetable plots, under bushes.



- Trees – Place a white sheet on the floor under the canopy of a tree (it is best to use a tree with low hanging branches). Shake or hit the tree and branches carefully (once or twice at most) with a large wooden spoon or stick and collect the invertebrates which fall out.
- Bushes/Hedges – Use the same method as shown above for trees.
- Under logs or stones – Carefully turn over logs and stones on the floor and identify the invertebrates they find.
- Pond – Half-fill a bucket and collecting dishes/pots with water. Use a net to dip into the pond and sweep the water in a figure of eight pattern (near the edge of the pond will probably collect the most invertebrates). Gently turn the net into the bucket and collect any invertebrates found.

*N.B. Explain the importance of not damaging the microhabitats and returning the organisms to where they found them when they have finished identifying and classifying them. Invertebrates should be identified in situ if possible without the need to collect them. Logs and stones which have been moved must be returned to their original location.*



**Activity** - Children work in small groups outside to collect invertebrates from the different microhabitats using the methods discussed. They make careful observations of the invertebrates' characteristics using the magnifying glass or magnifying container and then identify them using a classification key. Children must return all invertebrates back to their microhabitat after identification. Children will record the invertebrates they have identified in a table – name of microhabitat, name of invertebrate, numbers found and invertebrate group. Can they see any patterns in their data? Children write a conclusion which explains how they think the external characteristics and microhabitat are related and explain any patterns they found in their data.

*Differentiation – provide a table for the low attainers to record their data in and write a conclusion collaboratively as a small group.*

**Discuss** – Children share their findings. Think back to the original question and discuss - do invertebrate groups always live in one particular microhabitat? Discuss any patterns they identified in their data. What conclusions did they make? Children offer reasons for any differences they found about which invertebrates live in which microhabitats.

**Conclusion** – Pupils edit and finalise their conclusions based on their findings and the class discussion.

Note – pupils will only complete this activity once but it could be repeated at different times throughout the year or at various intervals throughout a season to identify further patterns, similarities and differences.

Examples of children's work and teacher comments from country of origin

This activity provided excellent observational opportunities for the children to identify a variety of invertebrates.



Micro-habitat	Invertebrate	number found	Invertebrate group
Woods	Stumpy louse	2	Mayfly
hedge	Spider	1	Arachnids
Tree	carabid	2	Insect
Flowerbed	ants	12	Arachnids
hedge	insect larvae	1	Insect
Pond	Water bug	52	Insect

Micro-habitat	Invertebrate Name	Number found	Invertebrate Group
Tree	Ant	13	Arachnids
Tree	Ground Squirrel	2	Insect
Tree	Ant	57	Arachnids
Tree	Small Lizard	3	Arachnids
Tree	Small Spider	20	Arachnids
Tree	Small Lizard	173	Arachnids
Tree	Ground	2	Arachnids
Tree	Mayfly Larvae	1	Arachnids
Tree	Small Spider	1	Arachnids
Tree	Small Spider	1	Arachnids
Tree	Small Spider	2	Insect
Tree	Small Lizard	3	Insect
Tree	Small Spider	3	Insect
Tree	Small Spider	52	Insect