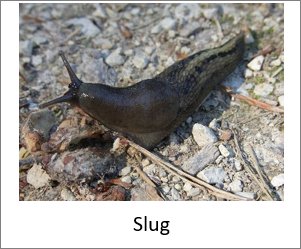
**Garden groups**

All of these animals could be found in a garden:







You are going to work in pairs to sort the animals into groups.

You should include some groups **inside other groups**.

Use the ‘Classification hints’ to help you.

**To talk about in your pair**

1. How many groups will you sort the organisms into?
2. What is the rule you will use to sort organisms into each group?
3. Which label will you give to each group?
4. Which groups will be inside other groups?

**Classification hints**

**Amphibians**

* Have a backbone.
* Have moist skin without scales.

**Annelids**

* Do not have a backbone.
* Have no legs.
* Body is divided into many segments (or ‘rings’).

**Animals**

* Get their food by eating plants or other animals.
* Some have a backbone.
* Some do not have a backbone.

**Arachnids**

* Are arthropods.
* Have two main body sections.
* Have eight legs.

**Arthropods**

* Do not have a backbone.
* Have a hard exoskeleton.

**Crustaceans**

* Are arthropods.
* Have 10-14 legs.
* Do not have wings.

**Insects**

* Are arthropods.
* Have three main body sections.
* Have six legs.

**Invertebrates**

* Are animals.
* Do not have a backbone.

**Molluscs**

* Do not have a backbone.
* Have no legs.
* The whole underside of the animal is one muscular ‘foot’ that can be used to move or grip.

**Myriapods**

* Are arthropods.
* Have tens or hundreds of legs.

**Reptiles**

* Have a backbone.
* Have dry skin with scales.

**Vertebrates**

* Are animals.
* Have a backbone.

*Biology> Big idea BVE: Variation, adaptation and evolution > Topic BVE2: Classification > Key concept BVE2.1: Identifying and classifying organisms*

|  |
| --- |
| **Response activity** |
| **Garden groups** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Organisms can be identified and classified into hierarchical groups based on their characteristics at the macroscopic and cellular levels. |
| Observable learning outcome: | Use the idea that organisms can be classified hierarchically into groups within groups.  Distinguish between everyday names and scientific classifications. |
| Activity type: | Discussion, classifying/sorting |
| Key words: | classification |

This activity can help develop students’ understanding of the idea that organisms can be classified hierarchically into groups within groups, by challenging them to discuss and construct Venn diagram-type depictions to classify organisms. It could be used in response to the following diagnostic questions:

* Diagnostic question: Groups within groups
* Diagnostic question: Bugs

**What does the research say?**

A study by Leach et al. (1992) found that students aged 7 could assign organisms into groups of their own choosing, but the groups were usually mutually exclusive (such that, for example, “birds” and “animals” would be separate groups) and children struggled to cope with more than two groups at a time. By age 13 most students could work with a group included within another group (e.g. “birds” as a sub-group of “animals”) when prompted, and by age 16 most students used hierarchical groups spontaneously.

Students aged 13 have been found to struggle with the meanings and application of various taxonomic classifications such as ‘insects’ where there is interference from everyday use of words such as ‘bugs’. The use of terms such as ‘bugs’, ‘creepy-crawlies’ and ‘minibeasts’ to indiscriminately describe various arthropods can create or reinforce the misunderstanding that arthropods such as arachnids (e.g. spiders), myriapods (e.g. centipedes and millipedes) and crustaceans (e.g. woodlice) are all the same, and perhaps are all insects (Trowbridge and Mintzes, 1985; Schofield et al., 1984; Shepardson, 2002; Allen, 2014). Research has also found that many students need extra help to understand and correctly apply less familiar taxonomic terms such as ‘vertebrate’ and ‘amphibian’ (Schofield et al., 1984; Braund, 1991; Allen and Choudhary, 2012).

Allen (2014) suggests that Venn diagram-type depictions of circles within circles may help students to understand hierarchical classification of groups within groups, and that they may be easier for some students to understand than depictions in the style of a “family tree”.

**Ways to use this activity**

Students should complete this activity in pairs. The focus of the activity should be on group discussion to decide how many groups to sort the organisms into, what rule/criterion/feature to use to sort organisms into each group, which groups to include inside other groups, and what label to assign to each group.

It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each pair will often give you insights into how your students are thinking. The quality of the discussions can be improved with a careful selection of pairs; or by allocating specific roles to students in each pair.

After their discussions, each pair should be prepared to report the key points of their discussion to another pair, or to the class.

**Equipment**

For each pair:

* organisms cards, printed and cut out from the end of this document (unless substituted for cards or photographs of your own)
* various sizes of plastic hoops, elastic bands, loops of string or similar (to enable students to indicate boundaries between grouped cards)

**Expected answers**

For example:

**Animals**

**Vertebrates**

**Reptiles**

**Amphibians**

Frog

**Invertebrates**

Grass snake

**Annelids**

Earthworm

**Arthropods**

**Molluscs**

Slug

Snail

**Crustaceans**

**Arachnids**

Spider

Woodlouse

**Insects**

**Myriapods**

Fly

Centipede

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: centipede – pixabay.com/mildcracked (1672189); earthworm – pixabay.com/Natfot (686593); frog – pixabay.com/Couleur (1505377); fly – pixabay.com/DomenicBlair (307387); grass snake – pixabay.com/JamesCommon (2313147); slug – pixabay.com/7854 (56299); snail – pixabay.com/Pitsch (2204127); spider – pixabay.com/krzysztofniewolny (3991538); woodlouse – Wikimedia Commons/Michael Palmer

**References**

Allen, M. (2014). *Misconceptions in Primary Science, 2nd* ednBerkshire, UK: Open University Press.

Allen, M. and Choudhary, A. (2012). Animal classification by early years children. *United Kingdom Science Education Research Conference.* National Science Learning Centre, University of York, UK.

Braund, M. (1991). Children's ideas in classifying animals. *Journal of Biological Education,* 25(2)**,** 103-110.

Leach, J., et al. (1992). Progression in conceptual understanding of ecological concepts by pupils aged 5-16. University of Leeds, UK: Centre for Studies in Science and Mathematics Education.

Schofield, B., et al. (1984). Science in Schools: Age 13: Research Report No. 2. *Assessment of Performance Unit.* Department of Education and Science, HMSO, London, UK.

Shepardson, D. P. (2002). Bugs, butterflies, and spiders: children's understanding about insects. *International Journal of Science Education,* 24(6)**,** 627-644.

Trowbridge, J. E. and Mintzes, J. J. (1985). Students' alternative conceptions of animals and animal classification. *School Science and Mathematics,* 85(4)**,** 304-316.

**Print and cut out cards for card-sort activity**

✁

|  |  |  |
| --- | --- | --- |
| Centipede | Earthworm | **Annelids** |
| **Arachnids** |
| Fly | Frog | **Arthropods** |
| **Crustaceans** |
| Grass snake | Slug | **Insects** |
| **Invertebrates** |
| Snail | Spider | **Molluscs** |
| **Myriapods** |
| Woodlouse | **Amphibians** | **Reptiles** |
| **Animals** | **Vertebrates** |