**Seaside sorting**

Katie is a marine biologist.

She studies organisms that live in and around the sea.

Katie took photographs of these organisms at the beach:



Sea anemone

Seagull



Fish



Jellyfish

Starfish

Katie wants to sort the organisms into **two** groups.

How should a biologist sort organisms into groups?

|  |  |
| --- | --- |
| **A** | All of the organisms in a group should have a similar name. |
| **B** | All of the organisms in a group should live in the same place. |
| **C** | All of the organisms in a group should have at least one feature in common. |
| **D** | The organisms in a group should not have any features in common with organisms in other groups. |

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

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| --- |
| **Diagnostic question** |
| **Seaside sorting** |

**Overview**

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| Learning focus: | Organisms can be identified and classified into hierarchical groups based on their characteristics at the macroscopic and cellular levels. |
| Observable learning outcome: | Classify organisms into groups according to similarities and differences in their features. |
| Question type: | Simple multiple choice, classifying/sorting |
| Key words: | classification |

|  |  |
| --- | --- |
| **P** | **PRIOR UNDERSTANDING**  This diagnostic question probes understanding of ideas that are usually taught at age 5-11, to aid transition from earlier stages of learning. |

**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.

Research suggests that students sometimes rely upon an organism’s habitat to classify it rather than its physical features; this can lead to misunderstandings and misclassifications, such as that penguins and turtles are amphibians rather than birds and reptiles, respectively (Allen, 2014). Several studies found that students relied upon names rather than features when classifying organisms into groups, such that – for example – jellyfish and starfish would be misclassified as fish (Ryman, 1974; Trowbridge and Mintzes, 1985).

**Ways to use this question**

Students should complete the question individually. This could be a pencil and paper exercise, or you could use the presentation with an electronic voting system or mini white boards.

*Differentiation*

You may choose to read the question to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

**C** – All of the organisms in a group should have at least one feature in common.

**Extension**

As an extension activity, students could be asked to sort the organisms into two groups in a way that a biologist might do it, and to explain the rule they used for putting organisms into each group.

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|  |  |  | Correct  This is a logical division into groups based on **physical features** (e.g. vertebrates and invertebrates, or another physical feature such as “has eyes” and “does not have eyes”). |
|  |  |  |  |
|  |  |  | Incorrect  Student likely to be (incorrectly) thinking that all organisms in a group must have a **similar name**, rather than being classified into groups according to physical features. |
|  |  |  |  |
|  |  |  | Incorrect  Student likely to be classifying the organisms into groups based on **where they live** (or spend most of their time), rather than according to physical features. |

**How to respond - what next?**

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas (meaning making) through dialogue.

If students have misunderstandings about the criteria upon which biologists classify organisms into groups, the following BEST ‘response activity’ enables students to discuss their ideas in small groups, and could be used in follow-up to this diagnostic question:

* Response activity: Classifying into groups

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Images: woman – pixabay.com/nicolagiordano (3368678); fish – pixabay.com/1447441 (1346327); seagull – pixabay.com/Hans (57752); starfish – pixabay.com/Pexels (1851289); jellyfish – pixabay.com/Andrea294 (4064588); sea anemone – pixabay.com/Dieter\_G (3417960)

**References**

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