**What happens next?**



A dead tree is lying on the ground.

**Part 1**

Which statement **best** describes what will happen to the dead tree if people leave it alone?

|  |  |
| --- | --- |
| **A** | It will disappear. |
| **B** | It will break down naturally. |
| **C** | It will be broken down by insects crawling through it. |
| **D** | It will be broken down by microorganisms. |
| **E** | It will be broken down by fungi and bacteria. |

**What happens next?**



The dead tree is broken down by organisms called decomposers.

Some fungi and bacteria are decomposers.

**Part 2**

Which statement **best** describes what will happen to the biological material that made up the tree?

|  |  |
| --- | --- |
| **A** | Decomposers use it all up and it disappears. |
| **B** | Decomposers use it to enrich the soil. |
| **C** | Decomposers use it to make new soil. |
| **D** | Decomposers break it down into useful substances that are reused in the ecosystem. |
| **E** | Decomposers recycle it. |

*Biology> Big idea BOE: Organisms and their environments > Topic BOE1: Interdependence of organisms > Key concept BOE1.2: Interdependence within ecosystems*

|  |
| --- |
| **Diagnostic question** |
| **What happens next?** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | An ecosystem is made up of interdependent populations of organisms interacting with each other and the environment in which they live. |
| Observable learning outcome: | Recognise that all living organisms depend upon decomposers that can break down dead organic matter. |
| Question type: | Simple multiple choice |
| Key words: | ecosystem, interdependence, decomposition, decomposers |

**What does the research say?**

It is important for students to appreciate that the interdependence of organisms within an ecosystem arises from more than just feeding relationships (Driver et al., 1994; Allen, 2014).

All living organisms depend upon decomposers that can break down dead organic matter and make essential elements available for reuse. Research has found that school children generally do not appreciate the important roles of microorganisms in decomposition and the recycling of carbon, nitrogen and other elements, with many associating microorganisms only with disease and associating decay only with rotting food (Brinkman and Boschhuizen, 1989; Leach et al., 1992).

Research in the UK, USA, Portugal and Sweden has suggested that students’ ideas about what happens to dead organic matter generally follow a progression from age 5-6, as follows (Sequeira and Freitas, 1986; Smith and Anderson, 1986; Helden, 1992; Leach et al., 1992):

|  |  |  |  |
| --- | --- | --- | --- |
| **Age (years)** | **Thinking on what happens to dead organic matter** | **Thinking on the products of decomposition** | **Category of thinking about conservation** |
| 5 | No ideas. | There are no products, or products not considered. | Non-conservation |
|  | It simply disappears. |
| It breaks down over time by undefined ‘natural processes’. |
| It breaks down (or ‘rots’) of its own accord, and birds/rodents/insects/’bugs’ eat it. | Enriches/fertilises the soil/ground. | Partial conservation |
| Unspecified ‘microorganisms’ cause it to break down. | ‘Forms soil’ (and thus the Earth is continually getting bigger). |
| It is decomposed by bacteria and fungi. | Produces soil minerals. | Conservation |
| 16 | Decomposers use it as food. | Produces soil minerals, carbon dioxide and water. |

**Ways to use this question**

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

*Differentiation*

You may choose to read the questions and answers 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**

*Part 1*

Answer **E** (“It will be broken down by fungi and bacteria”) is the **best** answer. However, only answer **A** (“It will disappear”) is scientifically incorrect, while answers B-E show increasing levels of scientific understanding of the process of decomposition. Students’ answers will provide evidence of where they are in their conceptual progression in relation to the table on page 3.

*Part 2*

Answer **D** (“Decomposers break it down into useful substances that are reused in the ecosystem”) is the best **answer**. Students who pick answer **B** (“Decomposers use it to enrich the soil”) or answer **E** (“Decomposers recycle it”) have probably grasped the idea that decomposers cycle substances through ecosystems, but may lack scientific understanding of how.

**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 important role of microorganisms in decomposition, the following BEST ‘response activity’ enables students to explore their ideas through small group discussion, and could be used in follow-up to this diagnostic question:

* Response activity: Bacteria be gone

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Images: pixabay.com/DonAramco (1150429)

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