**Seeing cells**

The picture shows cells from the root of an onion plant.



What would you use to see cells like this in an onion root?

|  |  |
| --- | --- |
| **A** | A magnifying glass |
| **B** | A microscope |
| **C** | A telescope |
| **D** | Just my eyes |

*Biology > Big idea BCL: The cellular basis of life > Topic BCL1: Cells > Key concept BCL1.3: Cell shape and size*

|  |
| --- |
| **Diagnostic question** |
| **Seeing cells** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Cells are usually too small to be seen without a microscope, but have a range of three-dimensional shapes and sizes. |
| Observable learning outcome: | Recall that most (but not all) cells are too small to be seen without a microscope. |
| Question type: | Simple multiple choice |
| Key words: | cell, microscope |

**What does the research say?**

A number of researchers have reported that children aged 11-16 lack an appreciation of size and scale, and that this impacts their understanding of the relative sizes of cells and other biological structures (e.g. Arnold, 1983; Dreyfus and Jungwirth, 1988; Driver et al., 1994).

Dreyfus and Jungwirth (1989) acknowledge that the cell is, when first introduced, an abstract concept. When introducing ideas about cells, several sources advocate starting with hands-on light microscopy of cells from a range of tissues and organisms, to enable students to build their own understanding of the size of cells and what they look like (AAAS Project 2061, 2009; Skinner, 2011).

Some students at age 16 struggle to name appropriate apparatus that could be used to view structures at cellular level, with incorrect responses including magnifying glass, telescope and the eyes (OCR, 2018).

**Ways to use this question**

Students should complete the question 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 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**

**B** A microscope

**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.

If students have misunderstandings about what piece of apparatus would usually be required to observe cells, the following BEST ‘response activity’ provides a context for a small group discussion that could be used in follow-up to this diagnostic question:

* Response activity: Blood analysis

The response activity ‘What is it made of?’ from key concept BCL1.2 *Cells and cell structures* could also be used in response to this diagnostic question, as it guides students through the process of using a light microscope to observe cells from a range of tissues and organisms.

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Images: cellimagelibrary.org/Wellcome Images (B0007563)

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