**Cell needs**

The cells of humans and other animals need particular things to stay alive.

Draw straight lines to join the boxes to explain what animal cells need and what they do with it.

|  |  |  |
| --- | --- | --- |
| **What animal cells need** |  | **What animal cells do with it** |
| Oxygen |  | React it with glucose to provide energy. |
|  |  |  |
| Glucose |  | React it with oxygen to provide energy. |
|  |  |  |
| Water |  | Use it to store and transport dissolved substances. |

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.1: Working together – cells, tissues and organ systems*

|  |
| --- |
| **Diagnostic question** |
| **Cell needs** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The cells of multicellular organisms are organised into tissues, organs and organ systems that work together to keep the cells alive. |
| Observable learning outcome: | Explain what cells must be supplied with in order to stay alive. |
| Question type: | Linking ideas |
| Key words: | cell, requirements, life, living, respiration, nutrition, growth |

**What does the research say?**

At age 5-11 children are likely to learn that living things depend on their environment to survive; that animals need a plentiful supply of air, water, and nutrients from food to keep them alive; and that plants need air, water and light (to make their own food), plus nutrients from soil (Department for Education, 2013).

Children’s understanding of the concept of what is alive is linked to their growing understanding of biological processes (Carey, 1985).

It is still common for science teaching up to around age 11 to define life using a set of characteristic processes of living organisms: movement, growth, nutrition, excretion, respiration, reproduction, sensitivity and sometimes also control (maintaining a constant internal environment). Rote learning and recall of these can lead to superficial learning without understanding (Brumby, 1982). From the age of 11 this model of life (which comprises criteria based only on processes) can be supplemented with the idea that organisms are made of cells, as a further criterion (and in this case a structural one) for deciding what is or once was alive (Skinner, 2011).

**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 boxes 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**

|  |  |  |
| --- | --- | --- |
| **What animal cells need** |  | **What animal cells do with it** |
| Oxygen |  | React it with glucose to provide energy. |
|  |  |  |
| Glucose |  | React it with oxygen to provide energy. |
|  |  |  |
| Water |  | Use it to store and transport dissolved substances. |

**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 through dialogue.

If students have misunderstandings about what cells must be supplied with in order to stay alive, the following BEST ‘response activity’ provides a small group discussion and card sort task that could help to build understanding in response to this diagnostic question:

* Response activity: What do cells need?

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

**References**

Brumby, M. N. (1982). Students' perceptions of the concept of life. *Science Education,* 66(4)**,** 613-622.

Carey, S. (1985). *Conceptual change in childhood,* Cambridge, Massachusetts: Massachusetts Institute of Technology Press.

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Skinner, N. (2011). Cells and life processes. In Reiss, M. (ed.) *ASE Science Practice: Teaching Secondary Biology.* London, UK: Hodder Education.