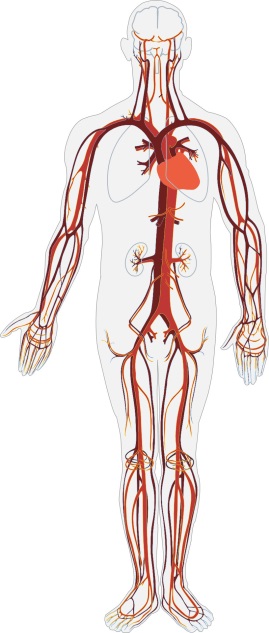
**The human circulatory system**



The boxes below contain the names of some structures in the human body.

Put a tick next to each structure that is **part of the human circulatory system**.

Then draw straight lines to join each **structure** you have ticked to its **function**.

|  |  |  |
| --- | --- | --- |
| **Structure** |  | **Function** |
|  |  | To produce love and feelings. |
|  |  |  |
| Lungs |  | To pump blood around the body. |
|  |  |  |
| Heart |  | To pump air around the body. |
|  |  |  |
| Arteries and veins |  | To carry blood. |
|  |  |  |
| Stomach |  | To store blood. |
|  |  |  |
|  |  | To clean the blood. |

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.2: Supplying cells – the human circulatory, digestive and gas exchange systems*

|  |
| --- |
| **Diagnostic question** |
| **The human circulatory system** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Human life depends upon the tissues and organs of the circulatory, digestive and gas exchange systems working together to support the life processes of the cells from which we are made. |
| Observable learning outcome: | Describe simply the structures and functions of the human circulatory system. |
| Question type: | Linking ideas |
| Key words: | circulatory system |

|  |  |
| --- | --- |
| **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?**

Various authors (e.g. Arnaudin and Mintzes, 1985; Schoon and Boone, 1998; Bartoszeck, Machado and Amann-Gainotti, 2011; Winterbottom, 2011; Özgür, 2013; Allen, 2014) have described misunderstandings about the human circulatory system that are commonly observed in school science classrooms (and can persist in students up to undergraduate level), including that:

* the heart has a cartoon-like or emoji-like shape (♥), and is the centre of feelings;
* the heart produces, stores, filters or cleans the blood;
* the heart pumps air around the body instead of, or in addition to, blood (perhaps because they believe air to be synonymous with oxygen, that muscles need ‘air’ to work, and have observed heart rate and breathing rate increasing when they exercise).

**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**

|  |  |  |
| --- | --- | --- |
| **Structure** |  | **Function** |
|  |  | To produce love and feelings. |
|  |  |  |
| Lungs |  | To pump blood around the body. |
|  |  |  |
| Heart ✓ |  | To pump air around the body. |
|  |  |  |
| Arteries and veins ✓ |  | To carry blood. |
|  |  |  |
| Stomach |  | To store blood. |
|  |  |  |
|  |  | To clean the blood. |

**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 which structures are part of the circulatory system, and what their main functions are, it may be helpful to respond with a small group discussion activity in which students have to work together to stick the structures onto a poster or a T-shirt and explain their functions (Allen, 2014). The focus of the activity should be on group discussion to reach a consensus on where to place the structures and how to explain their functions. It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each group will often give you insights into how your students are thinking. After their discussions, each group should be prepared to report the key points of their discussion to another group, or to the class.

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: pixabay.com/Clker-Free-Vector-Images (311864)

**References**

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

Arnaudin, M. W. and Mintzes, J. J. (1985). Students' alternative conceptions of the human circulatory system: A cross age study. *Science Education,* 69**,** 721-733.

Bartoszeck, A. B., Machado, D. Z. and Amann-Gainotti, M. (2011). Graphic representation of organs and organ systems: psychological view and developmental patterns. *EURASIA Journal of Mathematics, Science & Technology Education,* 7(1)**,** 41-51.

Özgür, S. (2013). The persistence of misconceptions about the human blood circulatory system among students in different grade levels. *International Journal of Environmental and Science Education,* 8(2)**,** 255-268.

Schoon, K. and Boone, W. (1998). Self-efficacy and alternative conceptions of science of preservice elementary teachers. *Science Education,* 82(5)**,** 553-568.

Winterbottom, M. (2011). Transport in organisms. In Reiss, M. (ed.) *ASE Science Practice: Teaching Secondary Biology.* 2nd ed. London, UK: Hodder Education.