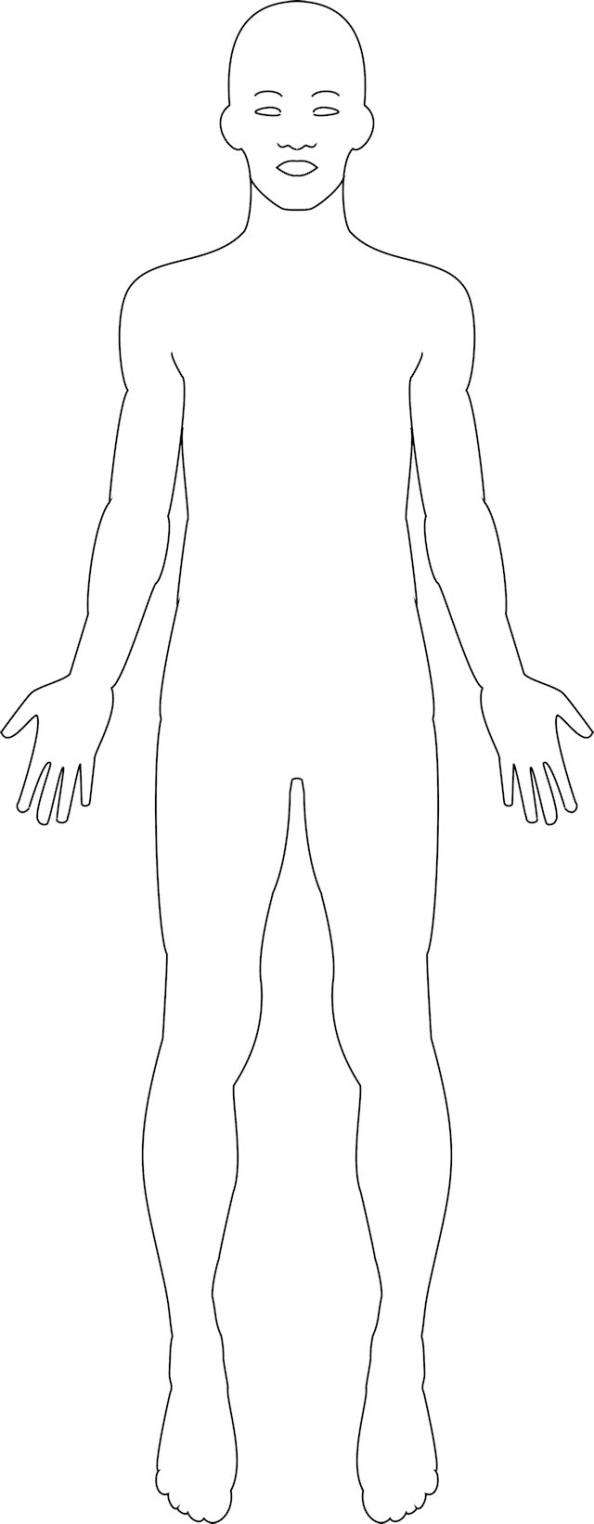
**Draw what’s inside you**

The human body contains many different organs.

**To talk about in your group**

Which organs could you draw inside the outline of the human body?

Where would you draw each organ?



*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*

|  |
| --- |
| **Response activity** |
| **Draw what’s inside you** |

**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: | Recall that multicellular organisms have different parts with different functions. |
| Activity type: | Discussion |
| Key words: | organs, organ systems, digestive system, circulatory system, gas exchange system |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic questions:

* Diagnostic question: Body parts
* Diagnostic question: Where is it?

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

**What does the research say?**

By age 11, students should know from science lessons that the bodies of humans have different parts with specific functions (AAAS Project 2061, 2009; Department for Education, 2013). Young children may think of the human body holistically as a single entity, but by age 10 they more commonly understand that it has different functional parts that work together to maintain life (Carey, 1985; Driver et al., 1994). A number of studies have used drawings to probe and develop understanding of what is inside the human body (e.g. Reiss et al., 2002; Bartoszeck, Machado and Amann-Gainotti, 2011; Sterk and Mertin, 2017; Çakici, 2018).

A common misconception is that the stomach is larger and lower in the body than it really is; specifically that it takes up most of the abdomen, with the centre of the stomach roughly where the navel is (perhaps because in everyday language this entire area can be referred to as the ‘stomach’ with the ‘belly button’ at its centre) (Mintzes, 1984; Allen, 2014). The stomach is perhaps the best known part of the digestive tract, but its role is often misunderstood; food is stored and churned in the stomach, but most of the digestion and absorption takes place in the intestines (Millar, 2011).

Various authors have described misunderstandings about the human circulatory system that are commonly observed in school science classrooms, including that the heart is located on the left side of the chest (rather than in the centre), and that it has a cartoon-like or emoji-like shape (♥) (Bartoszeck et al., 2011; Allen, 2014). Students at age 11 are usually aware that ‘air tubes’ link the mouth to the lungs, and that humans have two lungs located in the chest (Bartoszeck et al., 2011; Allen, 2014).

**Ways to use this activity**

Students should complete this activity in pairs or small groups. The focus of the activity should be on group discussion to reach a consensus on which organs to draw, where to draw them, and what shape and size they should be. 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.

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in the each group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each group should be prepared to report the key points of their discussion to another group, or to the class.

*Differentiation*

Students could be prompted to talk about and draw some or all of the following organs and structures: windpipe (trachea), lungs, heart, oesophagus, stomach, large intestine, small intestine, liver, kidneys, bladder.

**Equipment**

For each pair/group:

* coloured pencils, pens or crayons
* paper (if not drawing on the worksheet)

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: body outline – adapted by UYSEG from pixabay.com/stern\_in\_nudelsuppe (1859518)

**References**

AAAS Project 2061. (2009). *Benchmarks for Science Literacy* [Online]. Available at: <http://www.project2061.org/publications/bsl/online/index.php>.

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

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.

Çakici, Y. (2018). An investigation of primary student teachers' drawings of the human internal organs. *International Journal of Higher Education,* 7(3)**,** 107-123.

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

Department for Education (2013). *Science programmes of study: key stages 1 and 2 - National curriculum in England (DFE-00182-2013),* London, UK.

Driver, R., et al. (1994). *Making Sense of Secondary Science: Research into Children's Ideas,* London, UK: Routledge.

Millar, N. (2011). Nutrition, diet and photosynthesis. In Reiss, M. (ed.) *ASE Science Practice: Teaching Secondary Biology.* 2nd ed. London, UK: Hodder Education.

Mintzes, J. J. (1984). Naive theories in biology: children's concepts of the human body. *School Science and Mathematics,* 84(7)**,** 548-555.

Reiss, M. J., et al. (2002). An international study of young peoples' drawings of what is inside themselves. *Journal of Biological Education,* 36(2)**,** 58-64.

Sterk, J. and Mertin, P. (2017). Developmental trends in children's internal body knowledge. *Children Australia,* 42(1)**,** 66-72.