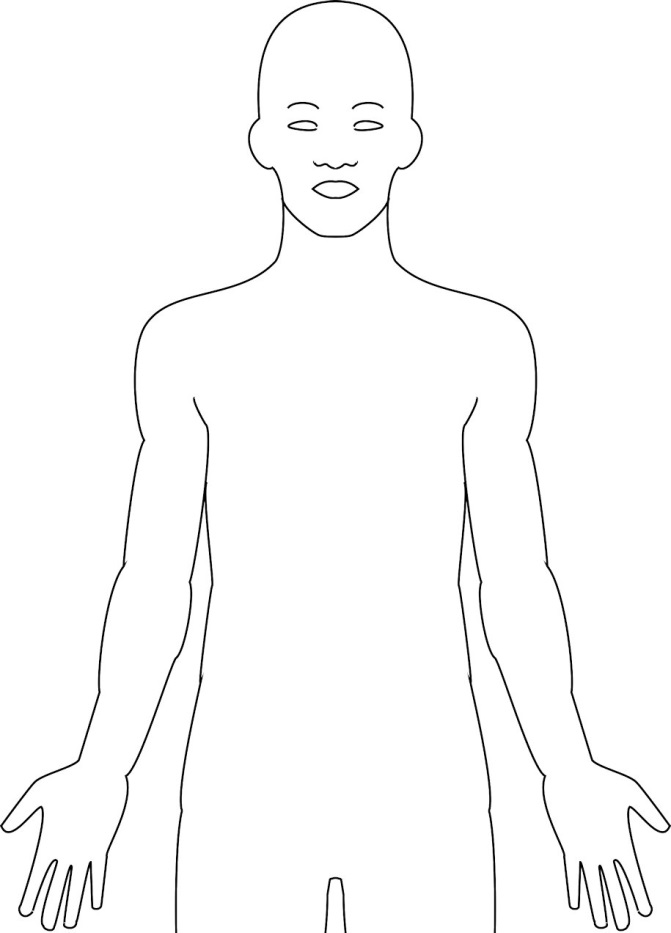
**Where is it?**



**A**

**B**

**C**

**D**

**E**

**F**

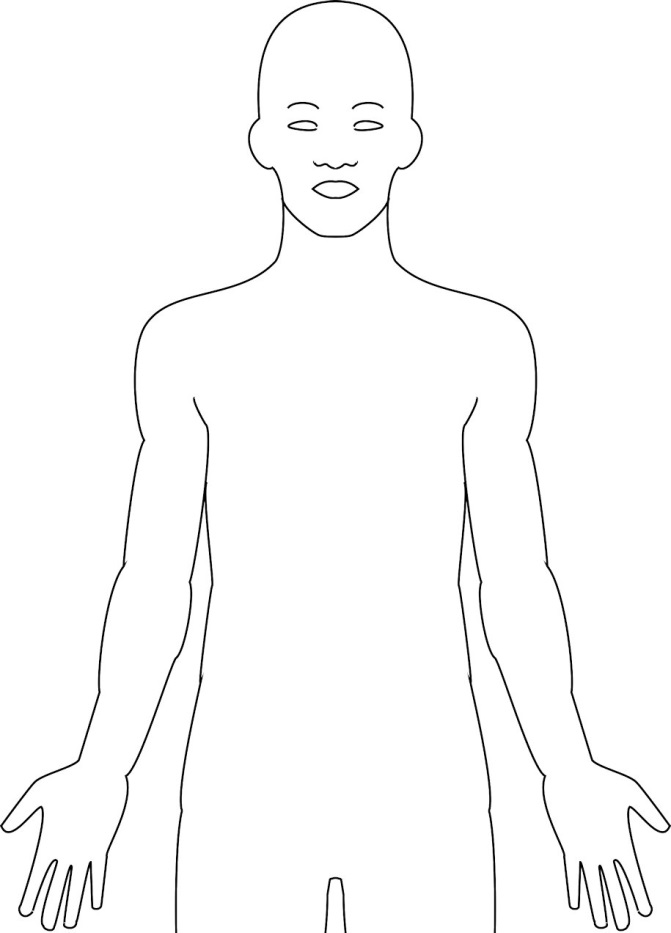
**G**

**H**

**I**

1. In which labelled part of the human body is the heart?

**Where is it?**



**A**

**B**

**C**

**D**

**E**

**F**

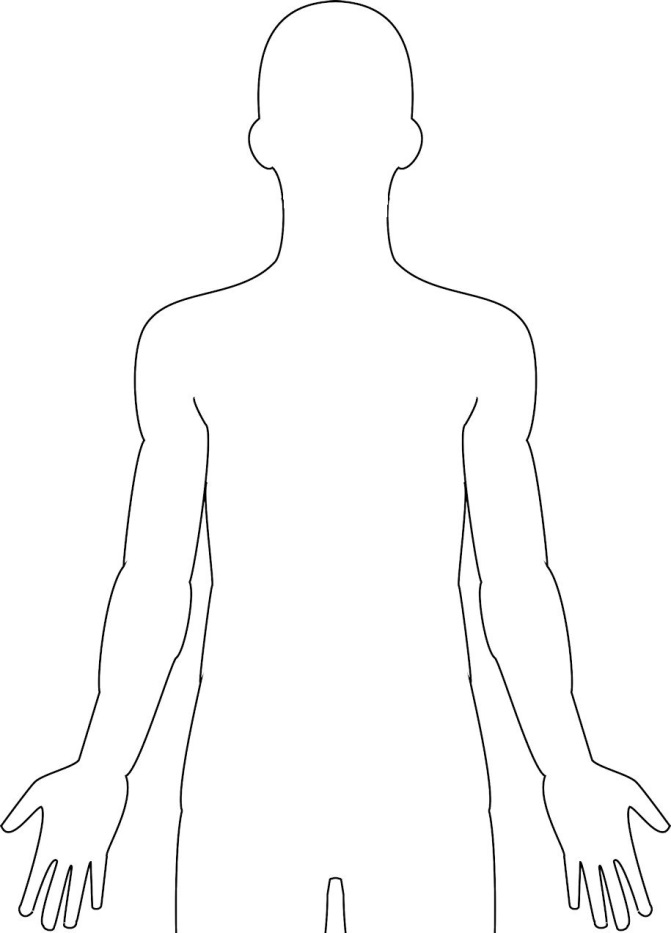
**G**

**H**

**I**

1. In which labelled part of the human body is the stomach?

**Where is it?**



**A**

**B**

**C**

**D**

1. In which labelled part of the human body are the lungs?

*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** |
| **Where is it?** |

**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. |
| Question type: | Simple multiple choice |
| Key words: | organs, organ systems, digestive system, circulatory system, gas exchange 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?**

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 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).

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) (Bartoszeck, Machado and Amann-Gainotti, 2011; Allen, 2014).

Students at age 11 are usually aware that humans have two lungs located in the chest, though a few may think air is simply breathed into the head, circulates there, and then is breathed out again (Bartoszeck et al., 2011; García-Barros, Martínez-Losada and Garrido, 2011; Allen, 2014).

**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 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**

1. E
2. F
3. B

**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.

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 et al., 2011; Sterk and Mertin, 2017; Çakici, 2018). If students have misunderstandings about the positions of human internal organs, the following BEST ‘response activity’ describes a drawing and small group discussion task that could be used in follow-up to this diagnostic question:

* Response activity: Draw what’s inside you

**Acknowledgments**

Developed by Alistair Moore (UYSEG), from depictions presented in a study by Çakici (2018).

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

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