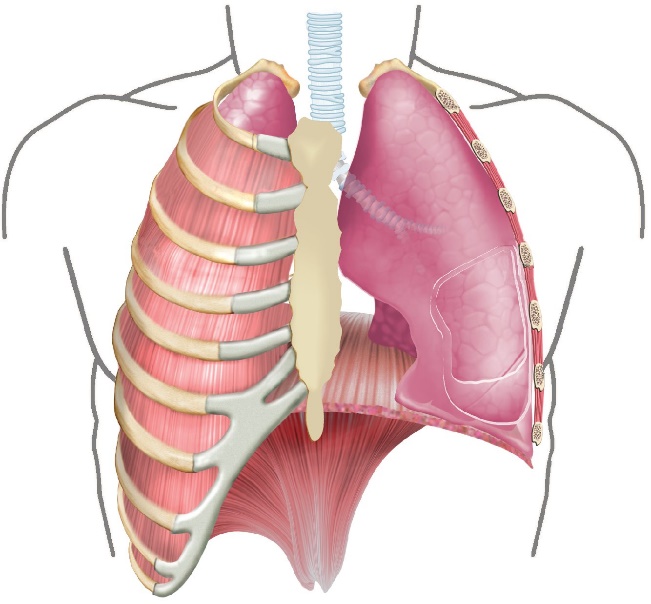
**Breathing**

Bones and muscles in your chest help you to breathe.



diaphragm muscle

lung

intercostal muscles

rib bones

The statements in the boxes describe what happens to make you **breathe in**.

Choose the correct option in each box, and then put the boxes in the correct order.

|  |  |  |
| --- | --- | --- |
| **A**  This **pulls / pushes**  the ribcage upwards and outwards |  | **B**  The volume of space inside the chest  **decreases / increases** |
|  |  |  |
| **C**  The diaphragm muscle  **contracts / relaxes** |  | **D**  The intercostal muscles between the ribs  **contract / relax** |
|  |  |  |
| **E**  Air moves **into / out of**  the lungs |  | **F**  The pressure inside the chest  **decreases / increases** |

*Biology> Big idea BCL: The cellular basis of life > Topic BCL2: From cells to organ systems > Key concept BCL2.3: The human skeleton and muscles*

|  |
| --- |
| **Diagnostic question** |
| **Breathing** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Bones and muscles are tissues that work together with organs in organ systems to support the life processes of cells to keep organisms alive. |
| Observable learning outcome: | Explain the presence and roles of muscles in organs and organ systems. |
| Question type: | Ordering/sequencing |
| Key words: | gas exchange system, lung, muscle |

**What does the research say?**

When children up to age 15 were asked to draw what is inside the human body, most drew organs but very few drew muscles, and when muscles were drawn they were commonly only depicted in the limbs (Reiss et al., 2002; Bartoszeck, Machado and Amann-Gainotti, 2011). Driver’s review of the research literature suggested that there was no evidence that school-age children recognise the involvement of muscles in the digestive, circulatory and respiratory systems (Driver et al., 1994).

**Ways to use this question**

Students should complete the question individually. This could be a pencil and paper exercise, or students could cut out the boxes from the worksheet to be rearranged into the correct order.

*Differentiation*

The options within each box could be removed for some students, so that all they have to do is rearrange the correct statements into the right order.

You may choose to read the question and 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**

**D** – The intercostal muscles between the ribs **contract**

**A** – This **pulls** the ribcage upwards and outwards

**C** –The diaphragm muscle **contracts**

**B** – The volume of space inside the chest **increases**

**F** – The pressure inside the chest **decreases**

**E** – Air moves **into** the lungs

**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 (meaning making) through dialogue.

If students have misunderstandings about the presence and functions of muscles in organ systems such as the gas exchange system, the following BEST ‘response activity’ could be used in follow-up to this diagnostic question to develop understanding:

* Response activity: Muscles in organ systems

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: adapted by UYSEG from Wikimedia Commons/OpenStax College

**References**

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