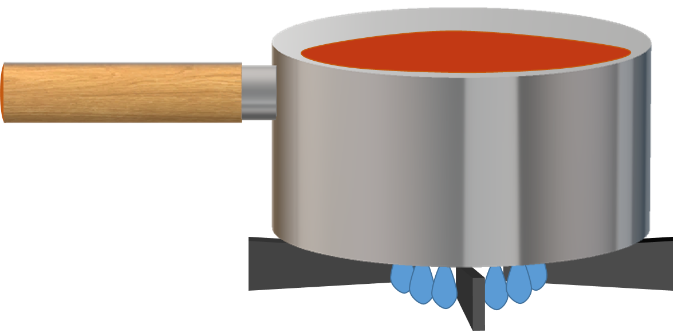
**Hot soup**

Lily is heating up some tomato soup for her lunch.



*Fill in the gaps in this passage about heating soup.*

*You should only use the words* ***conductor*** *and* ***insulator***.

**Tomato soup**

Lily is heating some soup in a pan. The pan is made from metal which is a good \_\_\_\_\_\_\_\_\_\_\_\_. All of the pan gets hot quickly.

When she holds the handle of the pan she doesn’t burn herself because the handle is a good \_\_\_\_\_\_\_\_\_\_\_\_.

Lily notices that the end of the wooden spoon she is stirring with does not get hot. Wood is not a good \_\_\_\_\_\_\_\_\_\_\_\_.

Lily eats the soup in a bowl on her knee. She rests it on a newspaper which is a good \_\_\_\_\_\_\_\_\_\_\_\_.

When Lily leaves her spoon in the soup for too long she finds out it is a good \_\_\_\_\_\_\_\_\_\_\_\_.

*Physics > Big idea PMA: Matter > Topic PMA1: Heating and cooling > Key concept PMA1.3: Thermal conduction*

|  |
| --- |
| **Diagnostic question** |
| **Hot soup** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Heating makes the particles in a material move more quickly. Heating raises the temperature quickly throughout a good thermal conductor, and very slowly through a good thermal insulator. |
| Observable learning outcome: | Describe the speed at which the temperature increases along a thermal conductor compared to a thermal insulator |
| Question type: | Focused cloze |
| Key words: | Conductor, insulator |

**What does the research say?**

Students are typically very good at identifying materials that are thermal conductors or insulators, and recognise in particular that metals are good conductors. However, this does not mean that students have a clear understanding of conduction and insulation. It is fairly common for students to describe good conductors as materials that heat or cool quickly (Erickson and Tiberghien, 1985). This is subtly different to understanding that energy is quickly transferred through a conductor by heating.

This question explores whether students can use the terms insulator and conductor correctly in the context of transferring energy by heating.

**Ways to use this question**

Students should complete the activity individually as a pencil and paper exercise. The large text on the worksheet allows it to be copied A5 size, which fits a standard exercise book.

How students fill in the gaps will show you whether they understood the concept sufficiently well to apply it correctly.

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.

*Differentiation*

You may choose to read the sentences 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**

Lily is heating some soup in a pan. The pan is made from metal which is a good **conductor**. All of the pan gets hot quickly.

When she holds the handle of the pan she doesn’t burn herself because the handle is a good **insulator**.

Lily notices that the end of the wooden spoon she is stirring with does not get hot. Wood is not a good **conductor**.

Lily eats the soup in a bowl on her knee. She rests it on a newspaper which is a good **insulator**.

When Lily leaves her spoon in the soup for too long she finds out it is a good **conductor**.

**How to respond - what next?**

The first two answers link conductor and insulator to the material and the final three answers link the terms to how easily energy passes through a material by heating.

If students have misunderstandings about how quickly the temperature increases along a thermal conductor compared to a thermal insulator, it can help students to both experience and describe this.

A simple method might be for students to place one end of a metal rod into a beaker of hot water and describe how quickly they can feel the temperature increase along a thermal conductor. They can then repeat the same exercise with a plastic rod to describe how quickly the temperature increases along an insulator.

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG).

Images: Peter Fairhurst (UYSEG).

**References**

Erickson, G. and Tiberghien, A. (1985). Heat and Temperature. In Driver, R., Guesne, E. & Tiberghien, A. (eds.) *Children's Ideas In Science.* Milton Keynes and Philadelphia: Open University Press.