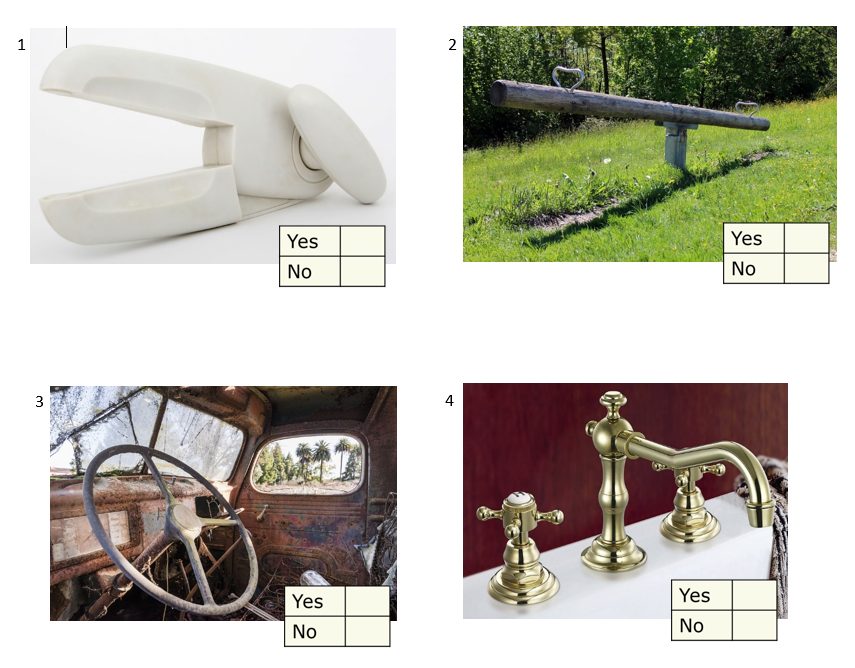
**What’s a lever?**

Sometimes it is easy to spot a lever.

Some levers are difficult to spot.

Is there a lever in each picture?

For each lever you see, draw a cross on its pivot.



*Physics > Big idea PFM: Forces and motion > Topic PFM3: More about force > Key concept PFM3.3: Turning effects*

|  |
| --- |
| **Diagnostic question** |
| **Open door** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | If a force acts on a pivoted object, the object turns about its pivot: the size of the turning effect depends on the size of the force and on its (perpendicular) distance from the pivot. |
| Observable learning outcome: | Identify levers, and their pivots, and describe what they do. |
| Question type: | Simple multiple choice |
| Key words: | Force, turning effect |

**What does the research say?**

When teaching, it may be helpful not to use the term ‘moment’ to describe turning effects because students often associate the term with ‘time’, or confuse it with ‘movement’. Using ‘turning effect’ can be less problematic (Driver et al., 1994).

Students often find it challenging to identify less obvious forms of lever. Text books often use examples that they are not familiar with, such as handles on car-jacks or bottle openers. It is better to elicit examples familiar to the students. It can help to set them the task or identifying levers in their own home (taps, doors, tin-openers) and giving them the opportunity to describe the levers involved and explain how they work (Institute of Physics; Effrosyni, Archer and King, 2017).

**Ways to use this question**

Students should complete the question individually. This could be a pencil and paper exercise, or you could use an electronic ‘voting system’ or mini white boards and the PowerPoint presentation.

When using the PowerPoint version of this question, each time students identify a lever, ask them to identify where its pivot is.

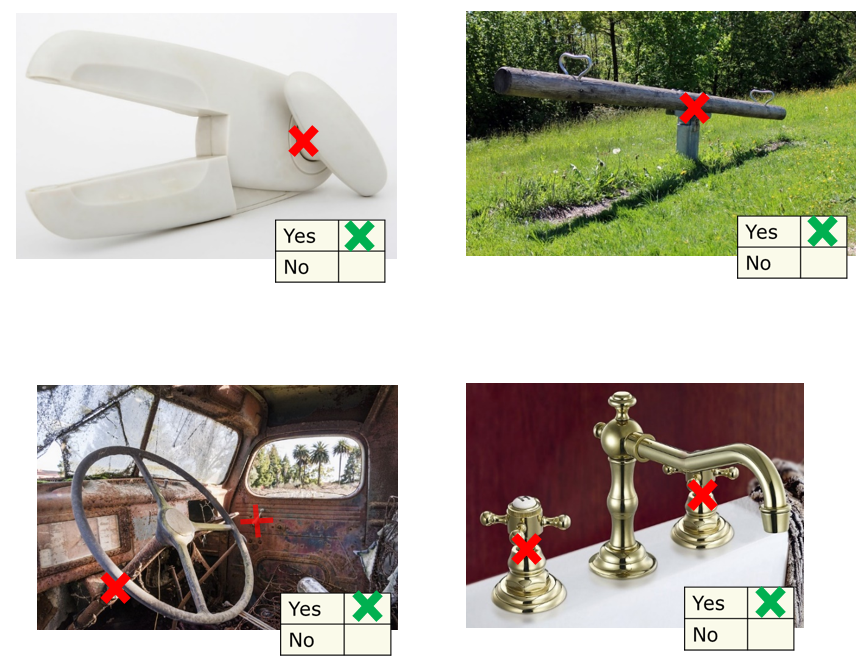
The answers to the question will show you whether students understood the concept sufficiently well to apply it correctly.

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 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**



For the tin-opener, there are two levers both pivoting at the same point (the handles and the turning knob).

The pivot on the steering wheel, and on the taps can be marked anywhere along the length of the rotating central column. On the door next to the steering wheel is a window winding handle, and there is a gear stick behind the steering wheel.

The central tap may be thought of as a lever if it pivots.

**How to respond - what next?**

Most students will recognise the lever in the tin opener and on the see-saw, because they conform to the image of a lever.

The steering wheel and taps are also levers because they allow a force to be applied at a distance from a pivot.

If students have difficulty in identifying levers and labelling pivots, it can help to use this question as a set of examples and to set students the task of identifying more levers and their pivots. Students could draw or photograph levers at home and bring their examples to the next lesson. Asking students to describe the levers they have found and to explain to each other how each one works can help to clarify thinking and consolidate understanding.

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG).

Images: tin opener: <https://pixabay.com/photos/accessory-aluminum-appliance-1238757/>, see-saw <https://pixabay.com/photos/see-saw-swing-swing-device-bar-339506/>, steering wheel: <https://pixabay.com/photos/truck-transport-vehicle-traffic-1655615/>, tap: <https://pixabay.com/photos/bathroom-faucet-bath-4841/>, Peter Fairhurst (UYSEG).

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