**Types of energy store**

Energy can be stored in different ways.

Each type of energy store has a special name.

* Join each object to the energy store that it has.
* And join each energy store to the reason you know the object has it.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object(s)** |  | **Store of energy** |  | **Reason** |
| Car |  | an elastic store |  | it is moving |
|  |  |  |  |  |
| Burger |  | a gravitational store |  | it has chemicals that can react |
|  |  |  |  |  |
| Book |  | a kinetic store |  | it is high up |
|  |  |  |  |  |
| Balloon |  | a chemical store |  | it is warmer than the coldest thing |
|  |  |  |  |  |
| Magnets |  | a heat store |  | it is squashed and springy |
|  |  |  |  |  |
| Iron |  | an electromagnetic store |  | the magnets will spring apart |

*Physics > Big idea PFM: Forces and motion > Topic PFM1: Forces > Key concept PFM1.5: Energy stores and transfers*

|  |
| --- |
| **Diagnostic question** |
| **Types of energy store** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | An energy store of some kind is necessary for something to happen, and something happens when energy transfers between energy stores. |
| Observable learning outcome: | * Identify the energy stores that a range of different objects have |
| Question type: | Diagnostic, linking ideas |
| Key words: | Energy store, chemical, elastic, electromagnetic, heat, gravitational, kinetic |

**What does the research say?**

In teaching energy the BEST resources have adopted a framework based on ‘energy stores’ and ‘energy pathways’ which is advocated by, amongst others, (Boohan, 2014), (Millar, 2014) and (Tracy, 2014). As Millar (2014) says, this approach “is not perfect - but it is adequate and significantly better than [approaches] based on lists of ‘forms of energy’.” A clear guide to this approach can be found on the Institute of Physics’ website (Institute of Physics).

When talking about energy, language is important (Rogers, 2018). This question introduces the names of the most common energy stores and ways of talking about them. For example: ‘the car has a *kinetic store of energy*’ and **not** ‘the car has kinetic energy’.

Using the very precise language of energy stores can feel quite clunky and cumbersome, and for this reason it is unlikely that it will become a common way of talking about energy. At the early stages of thinking about energy however, consistent use of this language supports students in developing a clear scientific understanding of energy.

A summary of the BEST approach to teaching energy can be found on the Best Evidence Science Teaching home page which is on the STEM Learning website (Fairhurst, 2018).

**Ways to use this question**

This task is intended for discussion in pairs or small groups. It is best done as a pencil and paper exercise.

Students should read the statements and follow the instructions on the worksheet. Listening in to the conversations of each group will often give you insights into how your students are thinking. Each member of a group should be able to report back to the class.

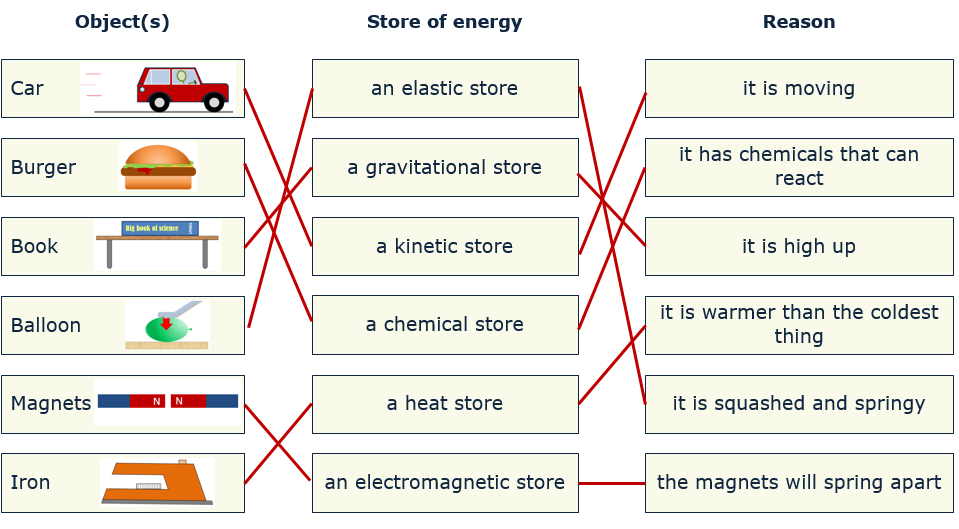
Feedback from each group can be used, with careful teacher questioning, to bring out a clear description or explanation of the science.

*Differentiation*

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 the 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.

NB in any class, small group discussions typically improve over time and a persistence with this strategy is often very successful in the medium to long term.

**Expected answers**

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**How to respond - what next?**

Students need to be able to confidently identify a store of energy from their observations.

The burger has a chemical store of energy because it contains chemicals that can react with oxygen to transfer energy into different energy stores, for example during respiration.

Everything around us, including the iron, has a heat store of energy because it is warmer than absolute zero (-273oC).

If students have difficulty in identifying the different stores of energy, then it can be helpful to give them the opportunity to explain why different objects have a particular store of energy, and to do so using their own language. This is best done in pairs or small groups to encourage social construction of new ideas through dialogue.

The following BEST ‘response activity’ could be used in follow-up to this diagnostic question:

* Response activity: Energy stores circus

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Images: UYSEG

**References**

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