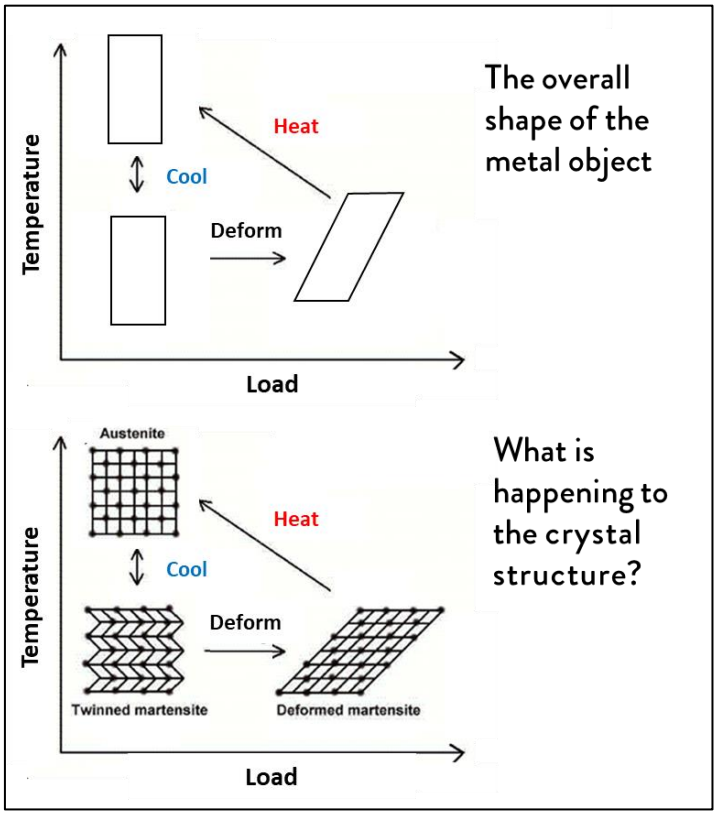
Discover Smart Materials:

Shape memory alloys (Nitinol)

In a metal the atoms are arranged in regular long-range patterns called **crystals** and there are lots of different arrangements of these (called **crystal structures**).

Alloys are mixtures of metals and careful control the amount of each metal is in the alloy can have huge effect on the behaviour of the alloy.



Shape memory is a cool property that some materials have which allows them to be deformed and then return to their original shape in response to a stimulus (e.g. heat).

Nitinol is an alloy (a mixture of two or more metals) made from nickel (Ni) and titanium (Ti), in roughly equal amounts, and, as a shape memory alloy, can return to its original shape by heating it up.

Shape memory alloys can be used to make **stents** to help keep arteries open as they can be rolled up (deformed state) and then the heat of the body can then help the alloy to return to its original shape.

Video

- A link to a video showing a nitinol paperclip restoring its shape: https://youtu.be/k00Ehir2xjk

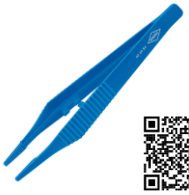
In class demonstration

You will need

- **Nitinol paperclips** (from ~£5 each): https://tinyurl.com/5yn9et88

- **Nitinol springs** (from ~£6 each): https://tinyurl.com/ytvcns35

- **You will also need a pair of tweezers (e.g. https://tinyurl.com/yu5xk8dd for ~£2), near boiling water and a mug**



What to do

1. Boil some water and put it in a container.
2. Take your object (made from shape memory alloy) and bend it out of shape .
3. Hold the mishapen object with the tweezers and immerse it in the hot water.

Safety info: Very hot water causes burns so take care when carrying out the demonstration!

Homework idea

- Design a poster showing what shape memory alloy could be used for and why.

The future is what you make it, but it is also what you make it out of

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