A box of puzzle pieces

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How does this relate to crystals??

Turn over to discover more…

These jigsaws help represent **nucleation**!

## Nucleation is the first step in forming a crystal (crystallisation).

Remember, crystals have **well-defined** connections.

## Think about different ways this jigsaw can be built.

Whatever method you use to make this jigsaw, the outcome will be the same picture!

Atoms and molecules in a crystal can be put together in almost any order. As long as the final structure is the same (like with our final jigsaw pictures), it is the same crystal.

## What is a crystal nucleus?

A **crystal nucleus** is the smallest building block that can be made that looks like the final big crystal structure. After this, more atoms and molecules will add to the nucleus to make the final large crystal, known as **crystal growth**.

## What happens if you lose a piece?

Sometimes jigsaws don’t have all the pieces, similar to crystals! Most crystals will have **defects** like this where they have some atoms or molecules missing from its repetitive structure, known as **vacancies**. These defects can change the properties of the crystal but don’t change the structure.

## Can I try this with any jigsaw puzzle?

Yes! The aim of this activity is to think about how easy different methods of making a nucleus is. Some methods take more time as you must sort through lots of pieces to find the exact right one whereas other methods, like putting all the edges together first, are quicker to do since these pieces are more distinctive and therefore easier to locate.

# Did you know?

There are crystals all around us, from metals and rocks to plastics and plants, even your teeth and bones and parts of insects are made from crystals!

The pieces of this crystal are about 109 × (a thousand million times) larger than the atoms and molecules that make up crystals around us, such as table salt, sugar and quartz.

A qr code with a few black squares

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Research at the University of Birmingham is investigating the nucleation of materials known as ‘metal-organic frameworks’, for which the ‘pieces’ are metal ions and small molecules and the links between them are coordination bonds. Scan the QR code to find out more!

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