

**Utilities Puzzle (K<sub>3,3</sub>):** The famous Utilities Puzzle asks if it's possible to draw edges (lines) so that each house is joined up with all three of the utilities it needs (gas, electric and water), **without the edges crossing each other**. It cannot be solved on a flat surface – the graph is non-planar. But it can be solved on the surface of a mug.

**Task: Cut up your label.** Stick the **stickers on your mug**. Have a go with the **dry-wipe pen!**

**Hint:** If you're struggling, start by finding an almost solution below on flat paper, where the edges cross in only one place. Then draw this almost solution on the mug, using the features of the mug to avoid the cross-over. Hopefully that will help you get a handle of the problem.

