Optical Isomers in Healthcare - Exercise

**3D models to appreciate optical isomers at the molecular level:**

**YOU WILL NEED:**

- a packet of midget gems (1 packet per group)
- cocktail sticks (~50 sticks per group)

**The activity:**

Start by making a tetrahedral chiral compound using cocktail sticks and the midget gems; you need to pick a central gem which will provide your centre of chirality (or stereogenic centre), and attach it to 4 differently coloured midget gems to generate a tetrahedral shape. The outer midget gems, which form the vertices of the tetrahedron should be spaced as far apart from one another as possible:

- Now make another structure that is the mirror image of your structure. Look at the two structures – can you rotate one to make the other? ________

These two structures are optical isomers of one another. Your molecule is chiral because it contains a centre of chirality (the central carbon atom). Many structures that we find in nature contain substituted carbon atoms that are attached to 4 different groups.

Now think about a molecule that contains 2 such carbon atoms, i.e. contains two stereogenic centres, starting off with the following groups that are linked together:

- If we link the white midget gem to the empty stick, there are several different structures that can be formed, in which the atoms are all linked together in the same order, but which form structures that you cannot superimpose with each other, unless you break bonds. A molecule with one ‘stereogenic centre’ has two possible structures. How many possible structures are there with two stereogenic centres? ________

- If a molecule contains 3 stereogenic centres, how many possible structures are there? ________