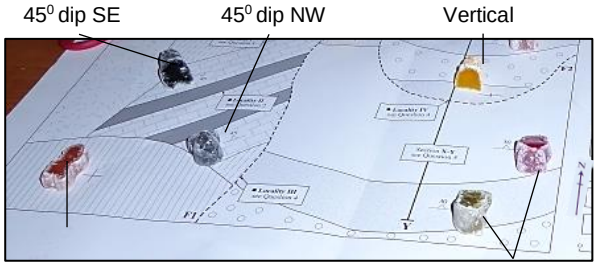
The sliced Jelly Babies™ approach to understanding 3D geological maps

Use Jelly Babies™ cut at the dip angle to highlight structures on geological maps

Geological maps can be very difficult to understand. We should not be surprised by this when we realise that they show in two dimensions, intersections of the variable (three dimensional) land surface with 3D geological surfaces.

The 3D geology can be made clearer if, wherever there is a dip symbol on a map, a Jelly Baby™ (or similar jelly sweet) is cut with a pair of scissors at the angle of dip, and is placed beside the dip symbol, as shown on the problem map below. The method can be used in both classroom and field.

A problem map 'revealed' by Jelly Babies™ and the equipment needed (Jelly Babies™, scissors and glue stick).



Dips shown by Jelly Babies™ on the map above.

The Jelly Babies™ can be stuck on with a glue stick to ensure they are not easily moved.

Plunging fold 'revealed' by sliced Jelly Babies™.

In the example of a plunging fold, measurements taken on bedding planes in the field showed that the sequence on the left was dipping at 35° to the East (red Jelly baby) while the sequence on the right was dipping at 30° towards the SSW (yellow Jelly Baby). The dip directions of the Jelly Babies are not at 180° to each other, showing that these are the limbs of a plunging fold (straight solid lines) and that the fold axis (dashed line bisecting the solid lines) was dipping towards you, towards the SSE.

Sliced Jelly Babies™ 'revealing' a plunging fold in the field.

You can visualise plunging folds using your hands in the '*Visualising plunging folds - with your hands and a piece of paper*' Earthlearningidea activity, https://www.earthlearningidea.com/PDF/296_Plunging_folds_hands.pdf.

The back up

Title: The sliced Jelly Babies™ approach to understanding 3D geological maps.

Subtitle: Use Jelly Babies™ cut at the dip angle to highlight structures on geological maps.

Topic: Showing the dip of fold limbs on a geological map using sliced jelly sweets to show bedding plane dips.

Age range of pupils: 14 years upwards

Time needed to complete activity: 20 minutes

Pupil learning outcomes: Pupils can:

- explain and demonstrate using sliced sweets, the three-dimensional structure of a geological map.

Context:
Three-dimensional geology can be very difficult to visualise and understand, and this is particularly so on geological maps where 3D geology intersects with 3D topography. Many teachers will have experienced pupils with good 3D visualisation skills who 'get it' and others who, despite lots of help, fail to show 3D understanding. Methods like this one and the Earthlearningidea series '*Mapwork from models*' can help these pupils to develop their spatial skills.

Following up the activity:
Ask your pupils to add vertical edges to the map being studied and then draw the geology on these cross sections to give a 3D block diagram 'picture' of the map.

Underlying principles:

- In areas of folded rocks and igneous intrusion, geology varies in three dimensions.
- Land surfaces also have changes in relief resulting in varied topography.
- Geological maps show the intersections between 3D land surfaces and 3D geology.

Thinking skill development:
This exercise aids the development of spatial thinking skills.

Resource list:

- geological map (for example, a field slip showing geological dips recorded in the field or a 'problem map' exercise)
- Jelly Babies™ or similar jelly sweets
- scissors, preferably blunt-ended 'safety' scissors
- glue stick

Useful links:
3D block diagrams that can be manipulated can be found online at such sites as:
http://app.visiblegeology.com/
Try the '*Mapwork from scratch*' Earthlearningidea series beginning with:
https://www.earthlearningidea.com/PDF/101_Mapwork_1.pdf and the '*Mapwork from models*' Earthlearningidea series, beginning with:
https://www.earthlearningidea.com/PDF/106_Mapwork_models_1.pdf .

Source: Chris King of the Earthlearningidea Team – all photos by Chris.