Visualising plunging folds - with your hands and a piece of paper

Using your hands and folded/torn paper to show the patterns made by plunging folds

Folds can have horizontal axes or axes that are not horizontal but dipping.

Folds with dipping fold axes are called plunging folds.

Plunging antiform at Cocklawburn, near Berwick, UK. *(Alison Tymon).*

Plunging synform in Silurian sandstones, Peel Castle, Isle of Man, UK. *(Alison Tymon).*

Antiform, plunging downwards. towards you.

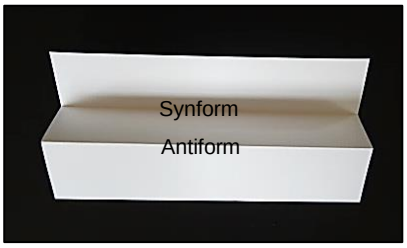
Antiform, plunging more steeply towards you.

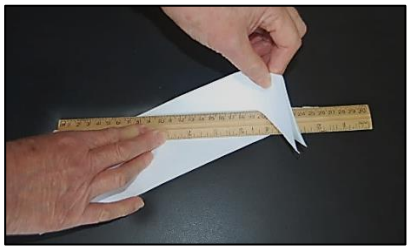
Synform, plunging away from you.

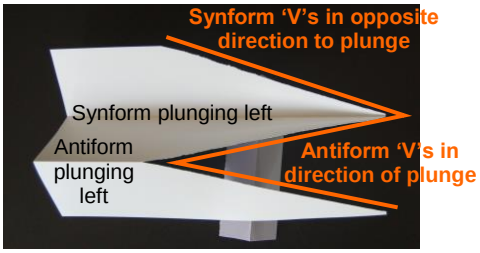
Synform, plunging more steeply away from you.

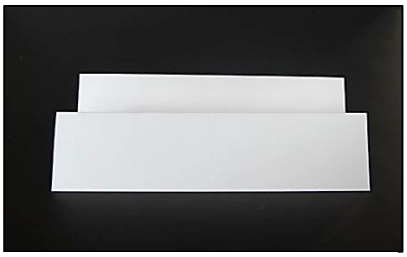
When plunging folds are eroded to fairly horizontal surfaces they form fold patterns on the ground or on geological maps.

To show the shapes of these patterns follow the photos and instructions below:

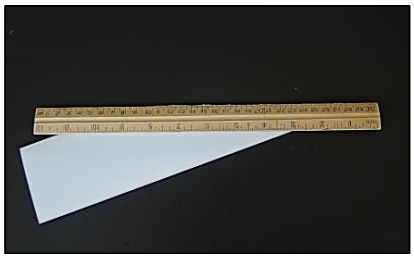








Take a piece of A4 paper or thin card and fold it twice to form a synform and antiform, as in this top view (above) and side view (below).



Lay the folded paper flat, tilt one side down by around 15° and then 'erode' the top off the folds horizontally, by either tearing along a ruler, or cutting with scissors.

Prop up the end of your eroded synform/antiform so that the 'erosion surface' is near horizontal and then look down from above (top photo) to see the pattern formed by the plunging folds on a flat surface.

The back up

Title: Visualising plunging folds - with your hands and a piece of paper.

Subtitle: Using your hands and folded/torn paper to show the patterns made by plunging folds.

Topic: A class activity using hands and torn or cut papers to visualise the patterns formed by plunging folds.

Age range of pupils: 14 years+

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:
- describe the shapes of plunging antiforms and synforms;
- describe the patterns formed on eroded surfaces cut near-horizontally across these folds;
- model these with paper or card.

Context:
This activity helps pupils to see how plunging folds produce fold patterns on near-horizontal surfaces or maps.

The pattern on a coastal wave-cut platform made by a synform (left) and an antiform plunging away from you. Back Skerrs, Snipe Point on Lindisfarne Island, UK. (*Ian Kille*).

The educational advantages of using your hands to model geoscience features and processes have been explained in the Earthlearningidea, *Rock cycle at your fingertips.*

Following up the activity:
Pupils could be asked to model plunging folds and their effects in other materials, such as modelling clay.

Underlying principles:
- Flattish surfaces cut across plunging antiforms show a 'V'-shape in the direction of plunge.
- Similar surfaces cut across plunging synforms show 'V'-shapes in the opposite direction to the plunge.

Thinking skill development:
The pattern-seeking element of these activities is construction, which can then be bridged to geological folding patterns.

Resource list:
- your hands
- A4 paper or thin card
- a ruler to tear the paper/card along or scissors to cut the paper/card

Source: Devised by Chris King; folded paper photos by Chris King; hand photos by Peter Kennett, of the Earthlearningidea Team.

The Earthlearningidea hand-modelling activities	
Modelling Earth processes	The rock cycle at your fingertips: modelling the rock cycle with your fingers
	Plate margins by hand: modelling plate margins and plate movement with your hands
	Modelling by hand 'when the youngest rock is not on top': illustrating how rock sequences can have older rocks on top of younger ones
	Modelling unconformity – by hand: using your hands to demonstrate how unconformities form
Modelling structural geology nomenclature	Modelling Earth stresses: hand modelling of compression, tension and shear in the Earth
	Modelling folding – by hand: using your hands to demonstrate different fold features
	Right way up or upside down? - modelling anti- and synforms by hand: use your hands to show how folds can be the right way up or inverted
	Visualising plunging folds - with a piece of paper and your hands: using your hands and folded and torn paper to show the patterns made by plunging folds
	Modelling faulting – by hand: using your hands to demonstrate different fault features
Climate change activities	The Earth and Milankovitch cycles – by hand: modelling the Earth's squashed orbit, tilt and wobble using your hands
	Modelling tipping points – by hands: demonstrating tipping points in the Earth's system with the hands of three pupils