

ARTIFICIAL OUTCROPS

Teacher's Notes

Purpose

To teach students how to make a geological map. It is often useful to teach students these skills before they are taken on field trips. If one happens to teach in Cambridge as I do, real outcrops are many minibus miles away so I developed these artificial outcrops which can be laid out anywhere in the college grounds or, using different "outcrops", in the classroom.

General Notes

Students should already have been taught how to use the compass/clinometers and they should have had practice at converting field maps with just outcrops, dips and strikes into a geological map with boundaries between the rock units.

Checks

It is important to check that they are measuring correctly and that once they have put on their strike lines they have approximately the correct structure.

Method I Outside outcrops

Requirements

45cm square slabs of concrete. You will need 2 each of three different colours. Each slab should then be cut into four 4 equal pieces. They can be cut using a hammer and a bolster chisel or cut with a disc cutter. This gives you 24 outcrops. Coloured concrete slabs can be bought at garden centres. Irregularly shaped outcrops are actually rather better than square ones. If you want irregular shapes hit the centre of the concrete slab with a heavy hammer.

Offcuts of wood about 15cm long and of various thicknesses to support the concrete slabs so that they are dipping. You will probably need about 8 each of 3, 5, 10cm thick.

Black bricks can be used as outcrops of a dolerite dyke and red bricks for granite outcrops.

You will also need: a map showing paths, trees etc for each pair of students: a key relating colours of concrete slabs to rock types.

Compass/clinometers: note books or clipboards.

Layout

The slabs should be laid in a simple pattern. A fold cut by one fault and a dyke is fine. They should be laid out sufficiently far apart so that it is not possible to see the pattern without making a map.

Notes

Beware of grounds men and other students moving your outcrops before your class. To keep the peace it is probably better to tell the grounds man in advance and be sure to collect up all the outcrops after the exercise - long grass, concrete slabs and mowers do not go well together. Irregular shaped slabs are best because if there are straight edges which are parallel to the strike students tend to measure these rather than the actual dip and strike.

Time

About 40 minutes to make a field map for 20 outcrops. Another 20 will be needed to draw on the strike lines and dip directions and to convert that into a geological map.

Cost

Concrete slabs cost about £2 each

Method II Classroom mapping

Requirements

Compass/clinometers

A map of the classroom

Making the outcrops (about 3 hours to make)

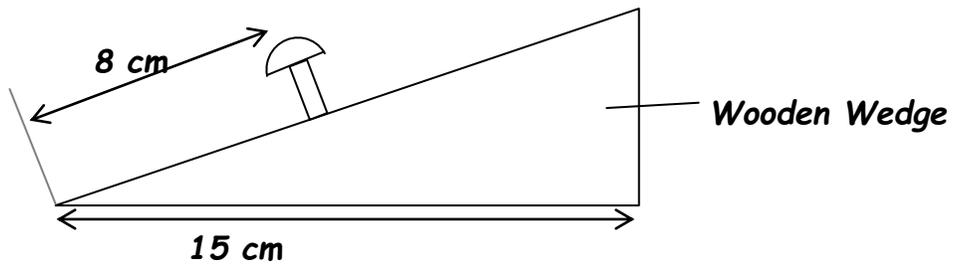
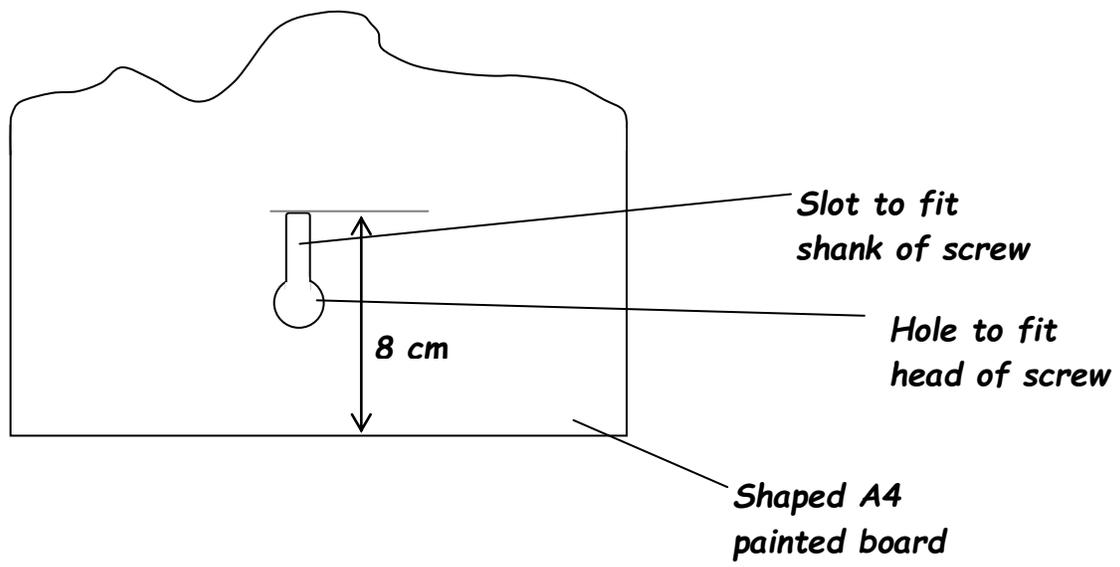
Bedding planes

30 pieces of hardboard each about 30cm by 20cm (A4 size), each cut into an irregular shape but with a flat bottom edge (see diagram). Paint 10 white for limestone, 10 brown for clay and 10 pink for sandstone. Each piece has a key hole shape cut out to allow it to slot onto the wooden wedges. The top of the hole should be 8cm from the bottom of the board.

Black card for outcrops of a dyke, red for granite outcrops.

Supports

You will need 5m of planed 10cm by 5cm timber. This is cut in to a variety of wedge shaped pieces of wood with angles ranging from 10° to 80°. A 2cm round headed screw is screwed into each 8cm from the bottom of the wedge.



Layout

Slot the hardboard pieces onto the wedges to make the outcrops. Use as large a room as possible otherwise students will be able to work out the structure without mapping. Use a simple pattern of an asymmetric fold cut by a fault and a dyke. A chalk line drawn on the table at the base of the board shows where it should be if the outcrop gets moved during measurement.

Notes

Beware that if the "outcrops are on tables with metal frames the compass readings will be effected by the metal.

It is possible to simply support the boards on pieces of wood of various thicknesses but they tend to get moved during measurement. A further refinement is to drill holes in the wedges so that G clamps can be used to hold them to the table.

Time

40 minutes to record the details of 20 outcrops.



An artificial outcrop