

Stratigraphic Laws

Younging direction cards

D

Make cards, A4 or A5, with diagrams of unconformities, strata with intrusions, strata with fragments derived from the bed below etc. These are held up to the class at various orientations and they must say where the youngest strata are.

Law of superposition

D

Students are shown a coffee jar with distinct layers of sediment and/or a photo of horizontal strata and asked to imagine if it is possible for the top layer to form first. They are then shown a photo of a large recumbent fold and a thrust fault and are asked in what circumstances does the law not apply.

Layers of felt as sediment

A P 5 min

Students are given 4 pieces of felt 50cm by 10cm of different colours and lay these out horizontally on top of each other pretending they are layers of conglomerate, sandstone, shale etc. This is good for discussing original horizontality, superposition and that each bedding plane represents the sediment surface at one time. Students then compress the felt to make folds including overturned folds to show that in deformed strata the law of superposition does not apply.

Law of original horizontality

D

Layers of felt are laid out one on top the other to show layers of sediment that have been spread out by the waves into thin extensive sheets. Students are asked what type of deposits accumulate on slopes of more than a few degrees (scree and reef talus slopes).

Cross section of England

Pa I F 2 min

Students work out the positions of the major unconformities and work out where the oldest and youngest rocks are on an east-west cross section of England.

Ordering Geological events

Pa I F 15 min

Students are given a series of diagrams and they must put the following events in order: deposition (naming beds), folding, tilting, erosion, intrusion, metamorphism.

Way up cards

D

A4 or A5 cards with diagrams of sedimentary structures that can be used to determine younging direction are shown to the class as if the bed was in a vertical position. Students must decide whether the bed is younging to the left or right.

Way up photos

A I 2 min per photo

Students examine a series of photos to determine the younging direction.

Photos of cross bedded building stone

A I 3 min per photo

Students examine photos of building stones which show cross bedding to determine if they have been laid the right way up or up side down. (Whitby Abbey and Durham are good sources for photos).

Way up samples

A I 3 min per sample

Samples of ripple marks, Mudcracks, grading and cross bedding are laid out and students must determine if the samples are as they were deposited or up side down.

Cleavage as an indicator of overturned beds

D or P F 5 min

To show that if the cleavage has a shallower dip than the bedding and is in the same direction then the beds are overturned. Provide students with a diagram of an upright anticline and syncline with limbs dipping at 60° with vertical axial plain cleavage. Students turn the diagram slightly so that the folds are asymmetric and note the angle of dip of the bedding and cleavage where they are dipping in the same direction. Now turn the diagram further so that the folds are overturned. Now note again the angle of dip of the bedding and of the cleavage on the overturned limbs. This can also be shown using an OHP.

Making a fossil sequence

Pa I F 5 min

Students have sections from several rock faces with fossils represented by letters. They must correlate the letters and thus build a fossil sequence.

Building a stratigraphic column from outcrop data. Pa P F 10 min

Students are given 9 A4 sheets. Each sheet has a diagram representing a cross section of an area of the British Isles where two successive geological systems occur. Each sheet has appropriate fossil diagrams.

Students must match the fossils on the top of one page with those on the bottom of another page and thus get the pages in stratigraphic order from Cambrian to Cretaceous.

Rate of migration of new species

Pa I 5 min

Students work out the rate of spread of the slipper limpet along the coast of the British Isles to show that the time taken to spread around the coasts is insignificant in terms of the time length of a fossil zone.

Good zonal fossils

Pa I 20 min

Students are given a range of fossils and must work out from their knowledge of their mode of life whether they will make good zonal fossils or not.

Age ranges of fossils

Pa I [E](#) 10 min

Students use data given on the sheet to work out the ages of strata containing several fossils.