Questions for any rock face 4: rock group (sedimentary or igneous)

What questions about the type of rock might be asked at any rock exposure?

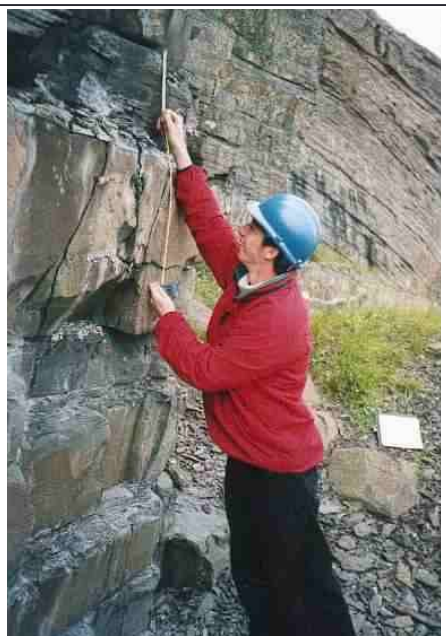
The ELI* series of 'Questions for any rock face' helps teachers to plan investigative fieldwork at any rock exposure**. In each case some possible questions are given, with some likely answers, to help you to decide whether the questions might work well at your site, or whether they would be asked better elsewhere. Answering the questions will provide basic understanding of the evidence preserved in rocks of the processes that formed them.

Rock group

Pupils are asked to use their observations to distinguish between exposures of sedimentary and igneous rocks using simple criteria. (For simplicity, we are leaving metamorphic rocks until later in this 'Questions for any rock face' series).

Take your pupils to a place where the rock characteristics, either in the rock face itself or in debris at the foot of the face, are clear and obvious – then ask these questions:

Possible questions	Possible answers
Can layers be clearly seen in these rocks? (Most sedimentary rocks are clearly layered; most igneous rocks are not)	Layering is clear (= sedimentary bedding) or no layering can be seen (= igneous). Don't confuse parallel cracking (= joints) with layering – in sedimentary bedding, beds often differ in grain size, colour, etc.
Does a drop of water sink in or run off the surface? (Most sedimentary rocks have gaps between the grains so that water sinks in. Most igneous rocks have interlocking grains making them waterproof)	Porous = sedimentary (unless the rock is very well cemented or has undergone metamorphism). Non-porous = igneous (unless the rock is well weathered)
Can you scrape grains off the surface with a coin? (Grains can be scraped off the surface of most sedimentary rocks, but are much harder to remove from most igneous rocks)	The interlocking nature of igneous crystals make them much harder to remove
Does one drop of dilute acid react with the rock? (Some sedimentary rocks react with acid, but most igneous rocks do not)	Limestones react with acid; some sandstones have lime cement that reacts with acid (metamorphosed limestone (= marble) also reacts with acid). No common igneous rocks react with acid
Can you spot any fossils? (Sedimentary rocks can contain fossils, igneous rocks never do)	Fossils can be found in some sedimentary rocks as well as in some low-grade metamorphic rocks
Is this rock an igneous or sedimentary rock? How do you know?	This question encourages pupils to assemble all the evidence for their answer



Measuring layered (bedded) sedimentary rocks. *(Peter Kennett).*

Near horizontal bedded rocks, Southerndown, Glamorgan, Wales, UK. *(Peter Kennett).*

Un-layered igneous rock, Kitagi stone quarry, Japan.

* ELI = Earthlearningidea

** An exposure is where rocks can be seen at the Earth's surface, exposed by natural or artificial means; anywhere where a rock reaches the surface, even if it is covered by soil, etc. is an outcrop, so an exposure is also part of an outcrop.

The back up

Title: Questions for any rock face 4: rock group (sedimentary or igneous)

Subtitle: What questions about the type of rock might be asked at any rock exposure?

Topic: A field activity to help teachers to ask basic questions to help pupils distinguish between sedimentary and igneous rocks.

Age range of pupils: 9-16 years

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:

- distinguish between sedimentary and igneous rocks using simple criteria;
- describe the evidence used to tell sedimentary from igneous rocks.

Context:
For simplicity, this field activity focusses on two of the three main rock types, sedimentary and igneous, using key characteristics to distinguish one group from the other; metamorphic rocks are ignored for this exercise, so this activity is not appropriate for metamorphic rock areas.

Remember to carry out a risk assessment before taking anybody to any rock exposure.

Following up the activity:
Continue with other 'Questions for any rock face' Earthlearningideas

Underlying principles:

- Sedimentary rocks are normally layered, porous (unless well-cemented) and grains can usually be removed from the surface with a coin, showing they have relatively low resistance to erosion. This is because sedimentary rocks are made of cemented grains laid down in beds, with relatively weak cement and pore spaces.
- Igneous rocks are normally not layered (although some lava flows form thick layers), but often have parallel cracks called joints. They are formed of interlocking crystals, making them impermeable (non-porous) and resistant to erosion (unless they are well-weathered).

Thinking skill development:
The criteria used to distinguish sedimentary from igneous rocks form a pattern, which can then be applied to unknown rocks, through bridging skills.

Resource list:

- the resources needed for pupil fieldwork listed in the Earthlearningidea, '*Planning for fieldwork: preparing your pupils before setting out to "ask questions for any rock face"*'

Useful links:
Use the Virtual Rock Kit on the Earth Science Education Unit website at:
http://www.earthscienceeducation.com/virtual_rock_kit/DOUBLE%20CLICK%20TO%20START.htm
to explore more details of common sedimentary and igneous rocks.

Source: Devised by Chris King of the Earthlearningidea Team.The 'Questions for any rock face' series of Earthlearningideas

The 'Questions for any rock face' series of Earthlearningideas and the sites where they may be applicable

'Questions for any rock face' Earthlearningidea	Site
Planning for fieldwork	Preparation in school beforehand
1: weathering	Any exposure (cliff, coastal exposure, quarry, cutting) or weathered constructions (wall, gravestone, monument)
2: erosion	Any exposure and many walls
3: soil	Some exposures have a useful soil profile at the top (but many do not)
4: rock group (igneous or sedimentary)	Any exposure of igneous or sedimentary rock or both; also applicable to sedimentary and igneous building stones, gravestones or monuments
5: sedimentary grains	Any exposure of sedimentary rock and also building stones, gravestones or monuments
6: fossils	Any exposure containing readily found and obvious fossils, including some building stones, gravestones or monuments
7: tilted or folded rocks	Any exposure of clearly tilted or folded rocks
8: faults	An exposure where rocks are clearly faulted, preferably where beds can be matched up on either side of the fault
9: metamorphism	An exposure where metamorphic features are clearly visible and preferably, where there is also evidence of the former rock type
10: sequencing	An exposure where a sequence of geological events can be relatively dated using 'Stratigraphic Principles'
11. tectonic plates	An exposure of sedimentary rocks containing evidence of deposition in different climates and altitude/depths from today, with further evidence of plate margin processes
12. quarry/ cutting potential	An exposure in any quarry or cutting
13: quarry economics	An abandoned (or working) quarry
14: recording	Any exposure