Picturing igneous rocks – 1
Visualise and draw igneous rocks from a verbal description

Encourage pupils to look carefully at igneous rocks and to describe them verbally so that another person can visualise them from the description.

Seat pupils in pairs, with each person holding half of the photograph cards showing igneous rocks, or scenes of igneous activity printed off from those shown below. They should NOT show each other what cards they have in their hands.

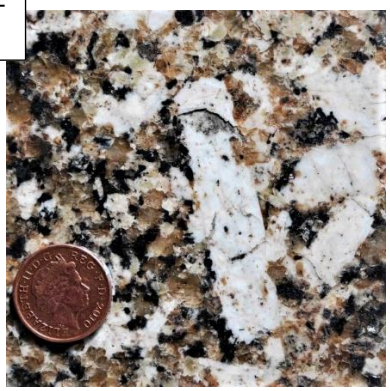
Pupil A then examines one photograph and describes it as fully as possible to Pupil B, who listens carefully and then tries to draw it. Pupil B must listen in silence and not ask any questions. Pupil B then takes a turn with another card, with Pupil A doing the drawing, also in silence. Neither person should use any technical terms which describe the rock or scene, e.g. 'porphyritic', but they may use more general words, such as 'crystals', 'alignment', 'grain size'. They may tell their partner whether they are looking at a landscape scale photograph, a hand specimen or a thin section (all of which are in plane polarised light). Pupils should then compare their hand-drawn efforts with the photographs.

This first round should be tried without any guidance. Then give each participant the Prompt Card, to encourage them to be more specific in further descriptions, and ask them to work through the remaining photographs, comparing their drawings with the photographs after each round. Note that some rocks may be repeated on different photographs.

When all have finished, give out the descriptive cards and ask pupils to match the descriptions to the photographs which they have been using.

A.

B. Coin = 2cm

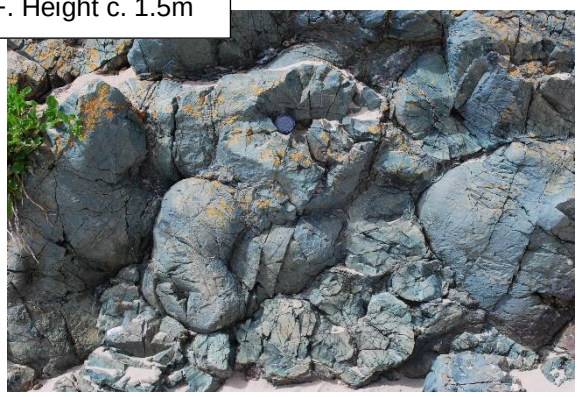


C.

D. Rucksack c. 30cm

E

F. Height c. 1.5m



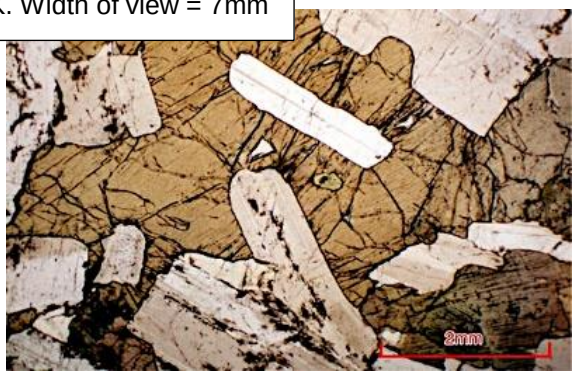
G.

H.

I.

J.

K. Width of view = 7mm



L.

Prompt Card

Use this card as a check list to aid your verbal description of your photographs to your partner

Does the photo show a hand specimen, a thin section, a rock exposure or a larger scale landscape?

For a hand specimen or thin section:

- What is the grain size of the rock?
- Does the grain size vary across the rock in the photograph?
- What is the shape of the grains and the relationship between them?

For a landscape feature:

- How does the igneous feature relate to surrounding rocks, e.g. cross-cutting?
- Does the colour give any clues?
- Are there clues about the cooling history of the rock?

Descriptions of the photographs

1. Volcanic agglomerate (source unknown), showing graded bedding, ranging from 1cm fragments near the base to 1mm or so at the top. The fragments are of varied composition and were produced by one phase of explosive volcanic activity, but they settled in water from one act of deposition, so there are no bedding planes within the specimen.	7. Ailsa Craig, Firth of Clyde, Scotland. This island is formed from the "plug" of an ancient volcano, which has resisted erosion better than the rest of the volcanic structure. It is composed of a distinctive microgranite with a blueish mineral, riebeckite, and most of the stones used in the sport of curling, a Scottish ice sport, have been made from this rock.
2. Thin section of gabbro, composed of a pyroxene mineral, probably augite (brown) and plagioclase feldspar (grey-white). Some feldspar crystals are enclosed within the pyroxene: this is called ophitic intergrowth.	8. Pillow lavas at Llanddwyn, Anglesey, Wales Pillow structures are formed when mafic (magnesium/iron rich) lava is erupted into a body of water such as the sea. The outside cools rapidly, often with a glassy texture, while the still mobile lava inside is free to move, until the whole, roughly spherical structure breaks free and settles down on the sea bed.
3. Hesta, Orkney Islands, Scotland. A vertical dolerite dyke runs across the photo, cutting through sedimentary rocks. It is more resistant to erosion than the sedimentary rocks, so stands out as a wall-like feature.	9. Carnmenellis Granite from Cornwall, now facing a London shop front. The granite is strongly porphyritic with large potassium-rich feldspars set in a ground mass of feldspars, quartz and mica. The large crystals (phenocrysts), either grew more slowly at an early stage in the cooling of the granitic magma, compared to the groundmass, or were formed by later processes involving volatile elements.
4. Xenolith of dark rock enclosed in a gravestone made of Peterhead Granite. Xenolith means "foreign rock" in Greek and it shows where a piece of the country rock through which the granitic magma rose was broken off and highly metamorphosed by the heat. However, many of these are now thought to be blobs of mafic magma that were immiscible (could not mix) with the silicic magma.	10. Rhyolite, Location unknown. Rhyolite crystallised from a felsic (silica rich) magma, which was very viscous, so it set as fine-grained rock as it flowed, retaining flow banding as it did so.
5. Porphyritic andesite, Los Andes, Chile. Andesite is an igneous rock of intermediate composition and usually grey in colour, named after the Andes Mountains. Porphyritic texture is the name applied to igneous rocks with some crystals which are much larger than the groundmass, probably through slower cooling at an early stage in the crystallisation of the rock.	11. Whin Sill, Cullernose Point, Northumberland, England. The cliff in the background (with seabird nests) exhibits columnar jointing. The foreground shows the base of the sill, where it has intruded into impure limestone and has metamorphosed it into marble.
6. Zavodovski Island, South Sandwich Islands. An active volcano emitting sulphurous steam from a vent on the right side of the ash cone. The cliffs in the foreground are composed of lava, so this is a composite volcano of mixed lava and ash.	12. Columnar joints in a basalt lava flow, Giant's Causeway, Antrim Coast, Northern Ireland. The polygonal joints were formed by contraction as a thick, uniform sheet of mobile basalt lava crystallised. They are usually hexagonal or pentagonal when seen from the top, rather like the sections of a football.

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The back up

Title: Picturing igneous rocks - 1

Subtitle: Visualise and draw igneous rocks from a verbal description

Topic: Enhancing pupils' skills of description and interpretation using photographs of igneous rocks and scenery
Age range of pupils: 16 years upwards

Time needed to complete activity: About 30 minutes, depending on depth of discussion

Pupil learning outcomes: Pupils can:
- examine photographs of igneous rocks carefully and describe them intelligibly;
- listen carefully to a verbal description and interpret it in a drawing;
- demonstrate their understanding of the nature and origin of igneous rocks;
- enhance their observational skills as a prelude to field work.

Context: This could form a useful revision activity, once pupils have studied igneous rocks. Answers to the matching exercise are:

A6	B9	C12	D11	E4	F8
G10	H3	I5	J1	K2	L7

Following up the activity:
- Adopt the same approach to real specimens, if you have them, or to photographs of other items of geological significance.
- Ensure that pupils use the same careful description and interpretation approach to geology in the field.

Underlying principles:
- Igneous rocks contain essential clues to their mode of origin.
- This strategy provides training in careful observation and interpretation of all relevant features.
- Being obliged to give a verbal description encourages careful observation, to ensure that clues are not missed.

Thinking skill development:
Verbal dexterity and metacognition are encouraged by the need to give intelligible verbal descriptions and to interpret from them**.** Mental patterns are constructed of the relationship between igneous rocks and their origins. Applying the activity to real specimens or to the field situation is a bridging activity.

Resource list:
- card sets of Photographs, Prompt Cards and Description Cards, cut out from those shown above.
- if real specimens are available these may be used instead, with appropriate matching descriptions drawn up by the teacher (although it is harder to hide real specimens from each other).
- a ruler and protractor per pair might encourage accurate observation and description.

Useful links:
https://www.earthlearningidea.com/PDF/396_Picturing_igneous_rocks_2.pdf
https://www.earthlearningidea.com/PDF/137_Building_stones_igneous.pdf
See the table below for other Earthlearningidea activities in the "Picturing" series.

Source: Written by Peter Kennett of the Earthlearningidea Team. Photos A to J by P. Kennett, K from the Virtual Rock Kit © Earth Science Education Unit, L by Wikimedia.

Picturing……

Earthlearningidea has compiled a series of activities involving examination of photographs of geological interest and their careful verbal description to others. This table will be updated as fresh activities are added. All titles begin with: “Picturing……”

Title	Sub-title
Puzzle structures	Visualise and draw sedimentary structures from a verbal description
Trace fossils and other strange shapes	Visualise and draw trace fossils and sedimentary structures from a verbal description
Igneous rocks – 1	Visualise and draw igneous rocks from a verbal description
Igneous rocks – 2	Visualise and draw igneous rocks from a verbal description
Metamorphic rocks	Visualise and draw metamorphic rocks from a verbal description
Tectonic structures – 1 faulting	Visualise and draw fault structures from a verbal description
Tectonic structures – 2 folding	Visualise and draw fold structures from a verbal description
Minerals -1	Visualise and draw minerals from a verbal description
Minerals -2	Visualise and draw minerals from a verbal description
Fossils -1	Visualise and draw fossils from a verbal description
Fossils -2	Visualise and draw fossils from a verbal description
Landforms 1	Visualise and draw landforms from a verbal description
Landforms 2	Visualise and draw landforms from a verbal description