Picturing igneous rocks – 2
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.

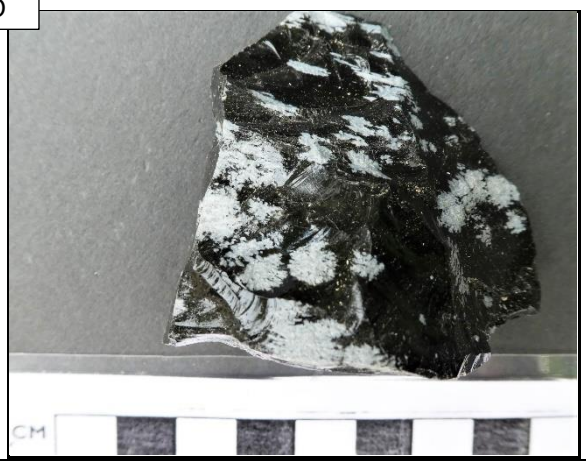
When all have finished, give out the descriptive cards and ask pupils to match the descriptions to the photographs which they have been using.

Note that the numbers and letters have been continued from 'Picturing igneous rocks – 1', to avoid confusion if more than one set is issued at a time.

M Height of section c. 1.5m

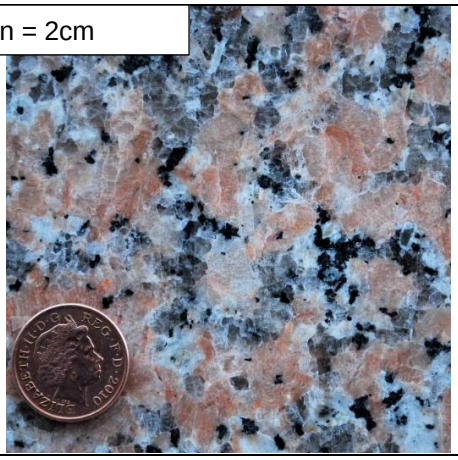
N Coin = 2cm

O

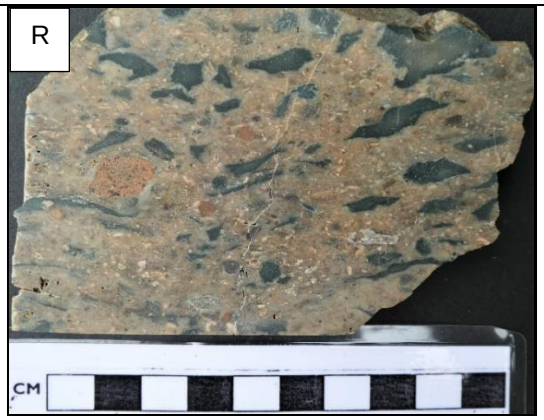


P

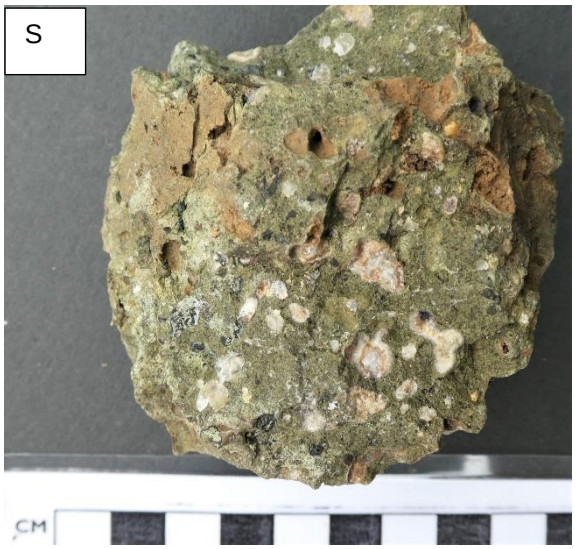
Q Coin = 2cm



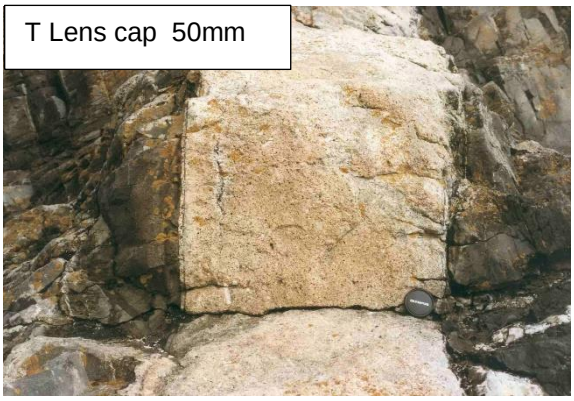
R



S

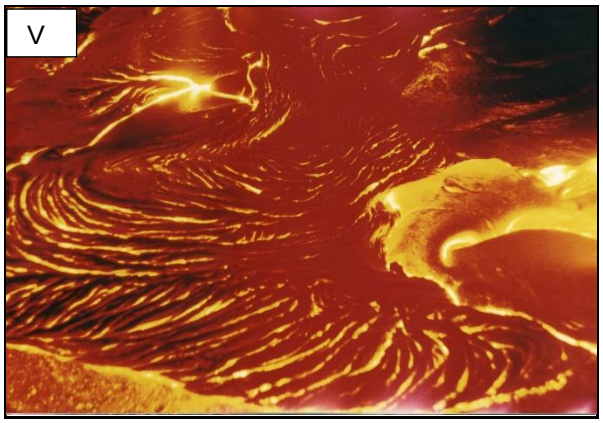


T Lens cap 50mm



U

V



W

X

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?
- Is there any alignment to the grains?

For a landscape feature:

- What impact does the igneous feature have on the landscape?
- 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 from the molten state?

Descriptions of the photographs

13. Amygdaloidal lava, Peak District, England. As the lava erupted, gas was given off, and the lava crystallised, leaving a hole (known as a vesicle). Many vesicles later became filled with minerals, e.g. calcite, carried by groundwater. Some of these minerals have then been weathered out, resulting in a brown oxidised tint to the rock and the vesicle holes.	19. A sill and a cone sheet, Kilchoan, Ardnamurchan, Scotland. Both are of dolerite and are identified by the more massive structure than the sedimentary rocks and by the brown colour resulting from the weathering of the iron-rich minerals. The sill is at the base of the section, parallel to the bedding and the cone sheet is the sloping feature beneath the student. The photo does not show the contact between them, so we cannot say which was intruded first. Cone sheets are sets of near-concentric dykes which slope inwards, thus giving a cone-shape.
14. Rosa Porrino Granite, Spain, from a kitchen work surface. A coarse-grained rock consisting of pink feldspars, clear quartz and dark ferromagnesian minerals, where the feldspars have tended to clump together somewhat.	20. Obsidian, location unknown. This is a rapidly cooled volcanic glass, which cooled so quickly that there was not time for crystals to form; this specimen has slowly devitrified over time forming white 'snowflake' crystals.
15. Ropy basalt lava, Hawaii. This is the result of the crystallisation of a very mobile (fluid) lava, where the top surface began to solidify into a plastic layer while the lava beneath was still mobile enough to move in a swirly pattern. Ropy lava is known by its Hawaiian name of 'pahoehoe'.	21. Molten basalt lava flowing from a vent on the island of Hawaii. As it cools, it will crystallise as 'ropy' lava, known in Hawaiian as 'pahoehoe', and this can be seen to be developing in the photo.
16. 'Baltic Brown' Granite, Finland. This Precambrian granite displays orbicular texture. The pink orthoclase feldspars have been made roughly spherical, probably by movement within the magma, and have then become coated with a greenish plagioclase feldspar as they cooled and the surrounding rock solidified. The dark minerals are ferromagnesian minerals. The rock is nicknamed the 'Scotch Egg Rock'. The Finnish name is Rapakivi Granite.	22. Dyke, Porthmeor, Cornwall, England. A vertical pale-coloured dyke cuts cleanly through the darker country rock. It is of granitic composition and is an offshoot from a larger granite pluton at a late stage in the crystallisation of the magma.
17. Spheroidal weathering in basalt, Giant's Causeway, Antrim Coast, Northern Ireland. This is produced when weathering attacks along the joints in a rock and is concentrated on the corners where the most surface area is exposed. This results in spheroids being formed, surrounded by the brown oxidised remnants of the rest of the basalt.	23. Ignimbrite, Glencoe, Scotland. The larger fragments of igneous rocks and glass shards are aligned from left to right. They are set in an ashy matrix, now hardened to form a very tough rock. Some of the glass shards (a shard is a broken piece of glass) have the characteristic shape of a hook on its side and indicate that the ignimbrite was produced by an incandescently hot ash flow (a nu*ée ardente*) flowing down the slopes of an ancient volcano.

18. The outcrop of the Whin Sill, at Housesteads, Northumberland, UK. The Whin Sill is a thick dolerite intrusion, mostly intruded along bedding planes in sedimentary rocks which here dip gently to the right. The dolerite resists erosion better than the sedimentary rocks, so the sill forms a line of crags, on which the Romans built much of Hadrian's Wall, in about 128 A.D.	24. Rangitoto Island off Auckland, North Island, New Zealand. A typical shield volcano shape with very gentle slopes across a wide base. The peak may have been caused by a spatter cone of lava, with a lava flow on the left hand side of the picture. There is unlikely to be much volcanic ash on this volcano.

The back up

Title: Picturing igneous rocks - 2

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:

M17	N16	O20	P15	Q14	R23
S13	T22	U19	V21	W24	X18

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 provide 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/394_Picturing_igneous_rocks_1.pdf
https://www.earthlearningidea.com/PDF/137_Building_stones_igneous.pdf
See the table below for other Earthlearningidea activities in the "Picturing" series.

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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