

Picturing Minerals -2

Visualise and draw minerals from a verbal description

Encourage pupils to look carefully at minerals 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 minerals, printed off and cut out 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. Pupils must not name the mineral but should be encouraged to use technical terms, e.g. for the shape of each mineral - needle-like, fibrous, tabular etc. Crystal faces may also be described, e.g. cubic, octahedral, etc. The hardness is

shown, but should not be quoted until the partner is ready to suggest an identification of the mineral. 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 minerals 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. The scale bar in the photographs is 10mm. Note that the numbers and letters have been continued from 'Picturing minerals - 1', to avoid confusion if more than one set is issued at a time.

M Hardness = 6



N Hardness = 3



O Hardness = 2.5



P Hardness = 7.5



Q. Hardness = 2



R Hardness = 7



S Hardness = 5.5



T Hardness = 7

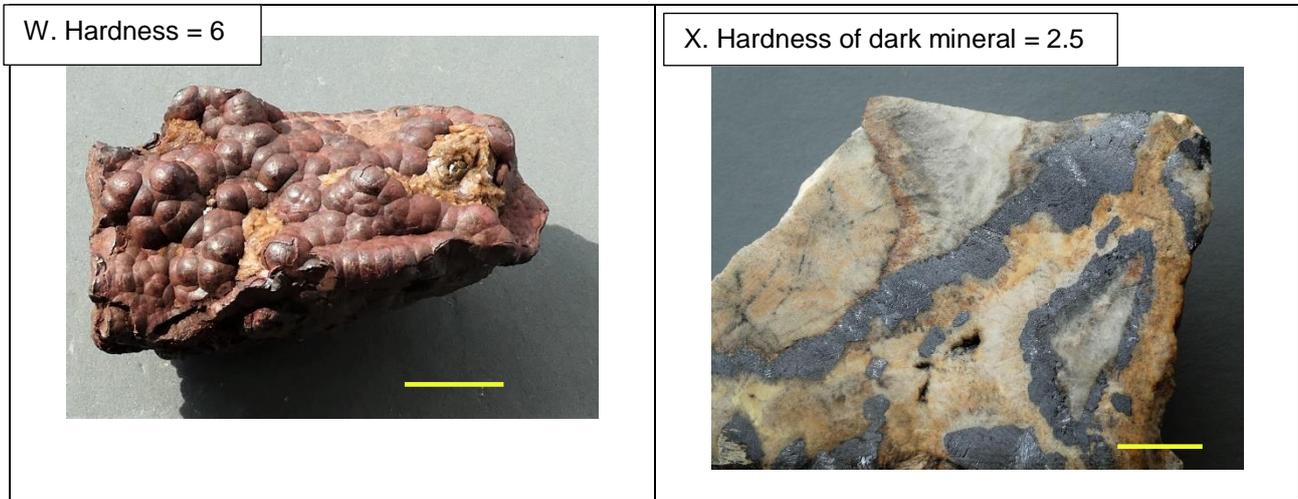


U Hardness = 7.5



V Hardness = 4





Prompt Card
Use this card as a check list to aid your verbal description of your photographs to your partner
 Even if you think that you know the name of the mineral, do not tell your partner. Instead, describe the mineral using its visual properties. These could include:
 Optical properties: colour, lustre, transparency
 Mineral shape: needle-like, fibrous, prismatic, kidney-shaped, flaky, tabular, twinned
 Fracture: conchoidal, uneven
 Cleavage: single, multiple – e.g. cubic, octahedral, rhombohedral
 If your partner wishes to suggest the name for the mineral, they may request its hardness.

Descriptions of the photographs

<p>13. Quartz, var. “rock crystal [SiO₂] Transparent, colourless, vitreous crystal. Hexagonal prism faces, capped by a hexagonal pyramid. There is no cleavage but a hint of conchoidal fracture at the base. Part of a second intergrown crystal is visible at the rear.</p>	<p>19. Orthoclase feldspar [KAlSi₃O₈] This white, tabular crystal has been chipped out of a rock: hence the rough surface and dull lustre. The edges of the crystal faces at the top and base of the specimen can be seen, in spite of some rock matrix still adhering to the feldspar.</p>
<p>14. Gypsum var. satin spar [CaSO₄] A fibrous example of gypsum, with silky lustre and slightly translucent. The fallen fragments demonstrate the ease with which pieces cleave from the mineral.</p>	<p>20. Garnet [The garnet family are silicates of Ca, Al, Mg, Fe etc] Pinkish, slightly translucent crystal with a vitreous Lustre. The faces form a rhombododecahedron (12 faces)</p>
<p>15. Calcite var. dog tooth spar [CaCO₃] Translucent, with rather dull lustre on the front face, which appears to be stained with iron oxide. The main faces meet in a sharp point: hence the common name of dog tooth spar. Faint rhombohedral cleavage planes are visible.</p>	<p>21. Tourmaline [Borosilicate of Al, Na, Ca, Mg, Fe etc] The black crystal of tourmaline projects from a pegmatite (a coarse grained rock consisting of quartz, feldspars and mica). It is lustrous and needle-like (acicular) in habit.</p>
<p>16. Haematite [Fe₂O₃] Opaque, reddish-brown mineral, with a metallic lustre and kidney-shaped (reniform) upper surface.</p>	<p>22. Fluorite [CaF₂] Very pale purple, translucent, vitreous crystal showing cubic crystal faces, with one octahedral cleavage face at the back of the photograph. Another cleavage plane runs across the front face.</p>
<p>17. Galena [PbS] Opaque, lead grey mineral, with a metallic lustre. This is an unusually fine specimen, showing two crystal forms – the cube and the octahedron. A second intergrown crystal is visible to the rear.</p>	<p>23. Galena vein [Vein of PbS with barite and fluorite] The cut front surface displays the dark grey galena, with dull metallic lustre, associated with barite and fluorite, although these cannot be positively identified from the photo alone.</p>
<p>18. Augite [Silicate of Ca, Mg, Fe, Al] This small crystal has been extracted from a lava. It is black and opaque, with a resinous lustre. 4 vertical prism faces are visible and typical crystals may have up to 8.</p>	<p>24. Staurolite twin [Silicate of Fe, Al] Yellow-brown in colour, opaque and with a resinous lustre. The re-entrant angles show that this is a twinned crystal. Staurolite occurs in metamorphic rocks.</p>

The back up

Title: Picturing minerals - 2

Subtitle: Visualise and draw minerals from a verbal description

Topic: Enhancing pupils' skills of description and interpretation using photographs of minerals

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 minerals carefully and describe them intelligibly;
- listen carefully to a verbal description and interpret it in a drawing;
- enhance their observational skills as a prelude to field work.;
- use the properties to identify the mineral.

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

M19, N15, O17, P21, Q14, R24, S18, T13, U20, V22, W16, X23

Following up the activity:

- Adopt the same approach to real specimens, if you have them.
- Ensure that pupils use the same careful description and interpretation approach to geology in the field.

Underlying principles:

- 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. 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.
- For those who wish to examine more examples, a data sheet of the properties of some common minerals is given in the Appendix, page 5.

Useful links:

https://www.earthlearningidea.com/PDF/412_Picturing_minerals1.pdf

https://www.earthlearningidea.com/Video/166_Minerals_2.html

See the table on page 6 for other Earthlearningidea activities in the "Picturing" series.

Source: Written by Peter Kennett of the Earthlearningidea Team. Photos by Peter Kennett

Appendix

Common Mineral Data Sheet for ELI activities

Name	Cleavage/Fracture	Hardness	Relative Density	Streak	Lustre	Colour	Other diagnostic properties
Quartz	RF *none/conchoidal	7	2.65	scratches streak plate	vitreous	colourless, milky but variable	hexagonal prisms terminated by pyramids
Orthoclase Feldspar	RF *2 good, 90	*6	2.6	scratches streak plate	vitreous	pink, white	
Plagioclase Feldspar	RF *2 good, 90	*6	2.7	scratches streak plate	vitreous	creamy-white, grey, colourless	
Muscovite Mica	RF *1 perfect (basal)	*2.5	2.7-3.1	white	pearly	colourless or pale yellow, green or brown	*flaky
Biotite Mica	RF *1 perfect (basal)	*2.5-3	2.7-3.1	white	pearly	brown/black	*flaky
Hornblende	RF *2 good, 60/120	*5-6	3.0-3.5	scratches streak plate	vitreous	black, dark green	prismatic crystals
Augite	RF *2 good, 90	*5-6	3.2-3.5	scratches streak plate	vitreous	greenish-black	prismatic crystals
Olivine	RF none/conchoidal	*6-7	3.2-4.3	scratches streak plate	vitreous	*olive green	
Chialstolite/Andalusite	poor 1/ uneven fracture	7.5	3.1-3.3	scratches streak plate	vitreous	pearly grey/pink	needle crystals with square x-sections, black centre
Garnet	none	*6.5-7.5	3.5-4.3	scratches streak plate	vitreous	red/brown	*12-sided crystals - each face rhomb shaped
Calcite	RF *3 good, not at 90, perfect rhombs	*3	2.71	white	vitreous	colourless, white, tints	*effervesces with 0.5M HCl, rhombic shape
Fluorite	*4 good, parallel to octahedron	*4	3.0-3.2	white	vitreous	colourless purple/green/yellow	fluoresces in uv light, cubic or octahedral crystals
Halite	3 good, 90 cubic	*2.5	2.2	white	vitreous	colourless, white, often stained	*salty taste cubic crystals, often stained
Gypsum	1 good (basal)	*1.5-2	2.3	white	silky, pearly	colourless, white, often stained	fibrous
Barite	2 good, 90	*3-3.5	*4.5	white	vitreous, pearly	white, pink	bladed crystals
Chalcopyrite	poor/conchoidal	4	4.2	*black	metallic	bronze yellow	*tarnished to peacock colours
Pyrite	none/conchoidal	*6	5.0	*greenish-black	metallic	brass yellow	crystals often striated cubes
Galena	*3 good, 90 cubic	*2.5	*7.5	*lead grey	metallic	lead grey	cubic crystals
Haematite	poor/subconchoidal	*5.5-6.5	4.9-5.3	*cherry red	metallic-dull	red/black/steel grey	kidney shaped masses, fibrous

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* – Useful property for diagnosis

RF – Common rock-forming mineral

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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
Landforms 2	Visualise and draw landforms from a verbal description