

Identifying minerals – use your sense(s)!

Minerals in the dark: identifying minerals when the lights fail

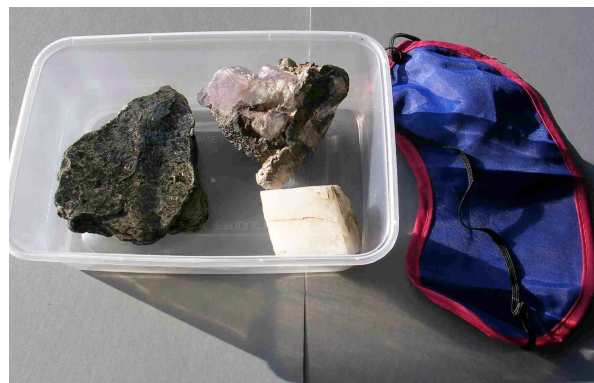
Explain to pupils that there is more than one way in which we can examine geological materials. We are going to try to identify several minerals, using senses other than sight, so most people will be blindfolded!

Use good examples of any minerals that you have available, so long as they pose no risk to pupils, e.g. by being toxic or by having long fibres.

Prepare trays of minerals in groups, as shown in the diagram, and cover them up.

Seat a group of pupils around each covered tray and ask them to study a key to mineral identification, which you have prepared in advance. (An example is given for a particular suite of eleven minerals, with one duplicate to make twelve, shown in the photographs. These minerals have been divided into groups of three to be used by four groups of pupils). Explain any technical terms used in the key, using pictures of good minerals like these, so that everybody knows what to expect.

All the pupils except one in each group are then blindfolded. The sighted pupil (the reader) removes the cover from the tray and the blindfolded pupils take it in turns to pick up a mineral. The reader reads out the key in stages and the blindfolded pupil has to decide which answers to follow through the key, until s/he has identified the mineral. The other blindfolded pupils then tackle their own minerals in the same way. When all groups have finished, cover the trays and move them on to the next group. Ask the pupils to swap jobs, and then to have a go at identifying the new set of minerals.



A tray of three minerals and a blindfold

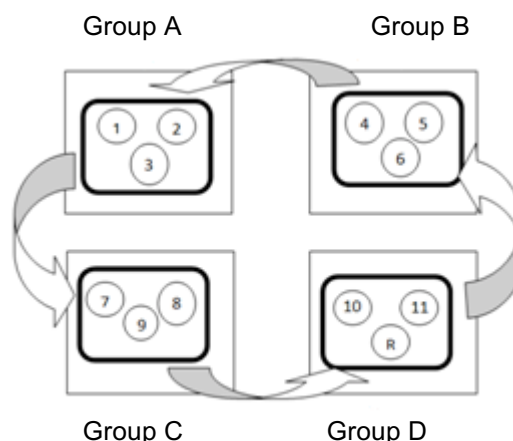


Diagram for the rotation of the minerals (numbered circles) around four groups (squares). In each rotation, the group of minerals rotates. In this case, there are three different minerals in each group with one repeated mineral ("R").

The back up

Title: Identifying minerals – use your sense(s)!

Subtitle: Minerals in the dark: identifying minerals when the lights fail.

Topic: Pupils use their senses other than sight to enable them to identify a range of different minerals.

Age range of pupils: 11 -18 years

Time needed to complete activity: 30 minutes for the activity itself, plus discussion time

Pupil learning outcomes: Pupils can:

- appreciate that we use several senses in identifying unknown objects, often without realising it;
- be encouraged to use a range of tests on minerals and not rely on snap judgements based on sight alone;
- learn to work co-operatively when many in the group are disadvantaged by being blindfolded;
- memorise the properties of several minerals by carrying out tests themselves.

Context:

Detailed knowledge of individual minerals is seldom specified for pupils' learning in general science courses. However, this activity reinforces that minerals are substances of well-defined composition which have reliable physical properties. They form the "building blocks" of rocks, and it is useful to acquire some understanding of them.

Following up the activity:

- Compare the results of the groups, building up a list of the minerals on the board or screen.
- Invite the groups to devise their own keys, either based around the minerals they have already handled, or different ones.
- Discuss the difficulties in identifying the samples which the pupils faced when in an unfamiliar situation.
- Ask pupils what other problems blind people might face in their daily lives and encourage a sympathetic approach from them, when they meet blind people themselves.

- Try another similar activity, using fossils instead of minerals.

Underlying principles:

- Minerals are naturally occurring inorganic compounds, (or sometimes, single elements), with a well defined chemical composition and a definite atomic structure.
- Minerals display reliable physical and chemical properties.
- Common minerals may be readily identified with the use of the senses, or by applying simple tests.
- Most minerals are crystalline and may exhibit good crystal faces, and/or good cleavage faces.
- Rocks are mixtures of minerals and may also contain rock or fossil fragments.

Thinking skill development:

Pupils build up a cognitive pattern as they work through their minerals. Some specimens may bring up a cognitive conflict. Applying their skills to other samples of unknown minerals is a bridging skill.

Resource list:

- A selection of different minerals, such as the 11 good examples of different common minerals needed for each cluster of 16 pupils, as shown here. In this example, a further specimen of one of the minerals is also required to make up the 12 samples

- bigger classes will require another set of 11 + 1 minerals, which may be the same as above or different
- a set of photographs for each cluster of 16 pupils, to explain some of the terms used; some examples are shown in the photographs below.
- sets of small trays and an opaque cover for each
- a key, devised to suit whichever minerals you have available, modelled on the example below
- a small but strong bar magnet

NOTE. Please ensure that the minerals are non-toxic and that they do not have a fibrous habit, like asbestos. Pupils should be warned NOT to taste any minerals, especially when blindfolded.

Useful links: www.mineralogy4kids.org (but the diagram of the rock cycle is extremely simplified) <http://www.mindat.org/photosearch.php>

Source: Written by Peter Kennett of the Earthlearningidea team, based on an activity written for the www.earthlearningidea.com website by Daniel Reis and fellow students studying for Masters' degrees in Biology and Geology at the University of Oporto, Portugal.

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Key

Number	Property	Mineral
1	Normal density (about the same as a sandstone rock)	Go to 2
	Much denser than normal	Go to 8
2	Soapy feel; easily turned to dust; no smell	Talc
	Does not feel soapy;	Go to 3
3	Brittle and smells of sulphur	Sulphur
	Does not smell of sulphur	Go to 4
4	You can split off flexible flakes with your fingernail	Mica
	You cannot split off flexible flakes with your fingernail	Go to 5
5	You can scratch it easily with your fingernail	Gypsum
	You cannot scratch it easily with your fingernail	Go to 6
6	Crystals are long and prismatic, with a pyramid shaped end	Quartz
	Crystals are of equal dimensions	Go to 7
7	Crystals are cubic	Fluorite
	Crystals are rhombohedral (like a squashed cube)	Calcite
8	Mineral is roughly three times as dense as normal	Galena
	Mineral is roughly twice as dense as normal	Go to 9
9	Attracts a bar magnet, balanced across your finger	Magnetite
	Does not attract a bar magnet, balanced across your finger	Go to 10
10	Surface of mineral is rounded and lumpy	Haematite
	Surface of mineral is "stepped"	Barite



Quartz, showing prismatic habit



Fluorite showing cubic habit



Calcite, (cleaved crystal) showing rhombohedral habit



Haematite, "kidney ore"



Galena, with cubic cleavage



Barite



Mica, showing platy cleavage



Gypsum



Talc



Sulphur



Magnetite

Some examples of crystals of common minerals (*All photos by Peter Kennett*)