OFFLINE ACTIVITY · YEAR 8 SCIENCE · AC9S8U04

Rock identification key.

About 40 minutes · Pairs
A kit of up to 8 rocks
ausgeology.org/rock-identification/

Igneous formed from melted rock | **Sedimentary** formed from layers of sediment | **Metamorphic** changed by heat and pressure

Use this key on real rocks. For each specimen, start at question 1, choose the line that fits your rock, and follow the "go to" number until you reach a name. Write the lines you chose on the record sheet, like this: 1b 2b 4b 6b 9a 11a. If the name does not look like your rock, go back a step and try the other line.

You will need

- A hand lens (×10)
- Vinegar and a dropper, and a steel nail and a coin
- A bowl of water and some white paper
- Up to 8 rock specimens, numbered
- The record sheet on the next page

Safety

- Vinegar is the only acid students use. Dilute hydrochloric acid is for the teacher, with goggles.
- Do not break rocks unless your teacher says so, and then only with safety glasses on.
- Wash your hands after handling rocks, especially coal.

NO.	WHAT YOU SEE OR TEST	THEN
1a	Shiny like glass, with no crystals or grains. Broken faces are smooth and curved, with sharp edges.	**Obsidian**
1b	Not glassy. The surface is dull, grainy, sparkly or speckled.	go to 2
2a	Full of holes, like a sponge or a honeycomb.	go to 3
2b	Solid, with few or no holes.	go to 4
3a	Pale grey, cream or white. Very light, and it floats on water.	**Pumice**
3b	Dark red-brown to black. Heavier, and it sinks.	**Scoria**
4a	Separate grains, pebbles or broken pieces stuck together, with tiny gaps between them. Often gritty or crumbly.	Sedimentary, go to 5
4b	Crystals that lock together with no gaps. Flat crystal faces flash when you turn it in the light.	go to 6
4c	Too fine to see any grains or crystals, even with the hand lens.	go to 10
5a	Some pieces are bigger than a grain of sand, more than about 2 mm across.	go to 7
5b	All the pieces are sand-sized or smaller. It feels like sandpaper.	**Sandstone**
6a	Bands or stripes of different colours, or shiny flakes lined up in wavy layers.	Metamorphic, go to 8
6b	No pattern. The crystals point every way, like a mosaic.	go to 9
7a	Rounded and smooth, like pebbles from a river bed.	**Conglomerate**
7b	Sharp-edged and angular, like broken crockery.	**Breccia**
8a	Light and dark bands of crystals big enough to see.	**Gneiss**
8b	Thin shiny flakes of mica lined up in wavy layers. Sparkles when you turn it; may have small dark red garnets.	**Schist**
9a	Several colours mixed together, like speckled paint.	Igneous, go to 11
9b	All one pale colour, with a sugary look.	Metamorphic, go to 12
10a	Fizzes with vinegar or dilute acid, and a steel nail scratches it. May have bits of shell in it.	**Limestone**
10b	No fizz.	go to 13
11a	Light overall: grey, pink and white crystals with black flecks.	**Granite**
11b	Dark overall: black and grey, sometimes with greenish crystals. Heavy.	**Gabbro**
12a	Fizzes with vinegar or dilute acid, and a steel nail scratches it.	**Marble**
12b	No fizz. Very hard, and scratches glass.	**Quartzite**
13a	Black and light for its size. Can leave a black smudge on paper.	**Coal**
13b	Splits into thin flat sheets or layers.	go to 14
13c	Solid and hard, with no layers.	Igneous, go to 15
14a	Hard, smooth and slightly shiny. Rings when you tap it. Grey, blue-grey or green.	**Slate**
14b	Soft, dull and crumbly. Smells of mud when wet. Grey to brown.	**Shale**
15a	Dark grey to black. May have a few small holes.	**Basalt**
15b	Pale pink, cream or light grey. May show faint stripes, or a few larger crystals.	**Rhyolite**

RECORD SHEET · ROCK IDENTIFICATION

My specimens.

Name _____
Class _____ Date _____

For each specimen, write what you see with the hand lens (grains, crystals or too fine; any bands, sheets, holes or fossils; colour), the results of any tests you did, the lines you chose in the key, and the name and family you reached.

SPECIMEN	WHAT I SEE	TEST RESULTS	KEY PATH	ROCK AND FAMILY
1				
2				
3				
4				
5				
6				
7				
8				

Questions

1. Which test or observation did the most work in separating your specimens? Explain why it helped.

2. Pick two of your specimens that look alike. Which question in the key separated them, and what did you have to look at or test to answer it?

3. Choose one specimen. Describe its texture (how big its grains or crystals are, and how they fit together) and explain what that texture tells you about how the rock formed.

4. Suppose a specimen is not one of the 18 rocks in this key. What would happen when you used the key on it, and how could you tell that something had gone wrong?

FOR THE TEACHER · NOT FOR STUDENTS

Notes and answers.

Running the activity

- Any school rock kit will do. A set of eight that works well has at least two rocks from each family and one look-alike pair, such as granite, basalt, pumice, sandstone, limestone, shale, slate and marble. Keep the names hidden until the end.
- Vinegar fizzes slowly on limestone and marble, so students need to watch through the hand lens for up to half a minute, on a fresh surface. Dilute hydrochloric acid gives an instant result as a teacher demonstration.
- Three questions in the key (10, 12 and 14) depend on tests rather than looks. If a test cannot be done, give the result for that specimen.
- Weathered surfaces hide texture. Where a specimen has no fresh face, students should look at a chipped edge or corner.
- The online page (ausgeology.org/rock-identification/) has the same key with a picture at every step, all 18 rocks as 3D specimens, and a mystery-rock practice round for students who finish early or have no kit.

Key path for each rock

ROCK	FAMILY	PATH THROUGH THE KEY	ROCK	FAMILY	PATH THROUGH THE KEY
Granite	Igneous	1b 2b 4b 6b 9a 11a	**Breccia**	Sedimentary	1b 2b 4a 5a 7b
Gabbro	Igneous	1b 2b 4b 6b 9a 11b	**Shale**	Sedimentary	1b 2b 4c 10b 13b 14b
Basalt	Igneous	1b 2b 4c 10b 13c 15a	**Limestone**	Sedimentary	1b 2b 4c 10a
Scoria	Igneous	1b 2a 3b	**Coal**	Sedimentary	1b 2b 4c 10b 13a
Pumice	Igneous	1b 2a 3a	**Slate**	Metamorphic	1b 2b 4c 10b 13b 14a
Obsidian	Igneous	1a	**Schist**	Metamorphic	1b 2b 4b 6a 8b
Rhyolite	Igneous	1b 2b 4c 10b 13c 15b	**Gneiss**	Metamorphic	1b 2b 4b 6a 8a
Sandstone	Sedimentary	1b 2b 4a 5b	**Marble**	Metamorphic	1b 2b 4b 6b 9b 12a
Conglomerate	Sedimentary	1b 2b 4a 5a 7a	**Quartzite**	Metamorphic	1b 2b 4b 6b 9b 12b

Answers to the questions

1. Any reasoned answer. Most students find that the first look with the hand lens (grains, crystals or too fine) does the most work, because question 4 splits the rocks into three groups at once. The fizz test is often named too, since it is the only clean separation of limestone and marble from everything else.
2. Depends on the pair. Common pairs: shale and slate are separated at question 14 by hardness, sound and smell; sandstone and quartzite at question 4 by whether grains rub off and whether the rock is made of grains or locked crystals; limestone and marble at question 4 (fine, or sugary crystals) and then by the fizz test; granite and gneiss at question 6 by bands; basalt and gabbro at question 4 by whether crystals can be seen.
3. Look for the link between texture and formation: large locked crystals mean slow cooling underground (granite, gabbro); crystals too small to see mean fast cooling at the surface (basalt, rhyolite); holes mean gas in lava (pumice, scoria); grains stuck together mean sediment that was buried and cemented (sandstone, conglomerate, breccia); bands or flakes mean heat and pressure that lined up the minerals (gneiss, schist, slate).
4. The key always gives a name, because every line leads somewhere, so an unknown rock would be given the name of the rock it most resembles. The student could tell something was wrong if the name's description did not match the specimen on points the key did not ask about, such as colour, weight or a test result. The fix is to check the result against a full description, not to trust the key alone.