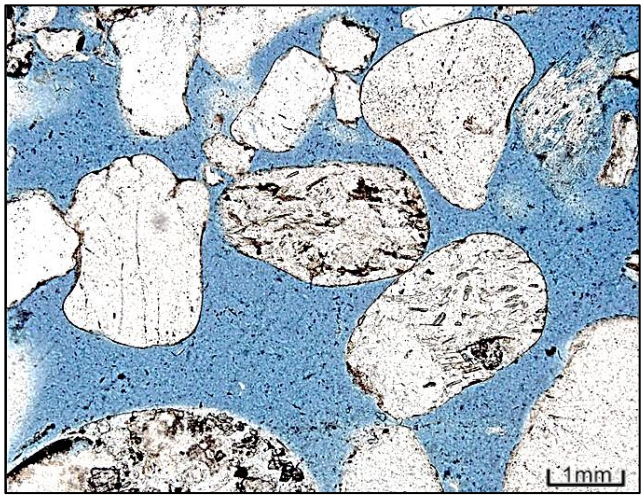
Rock grain cut out

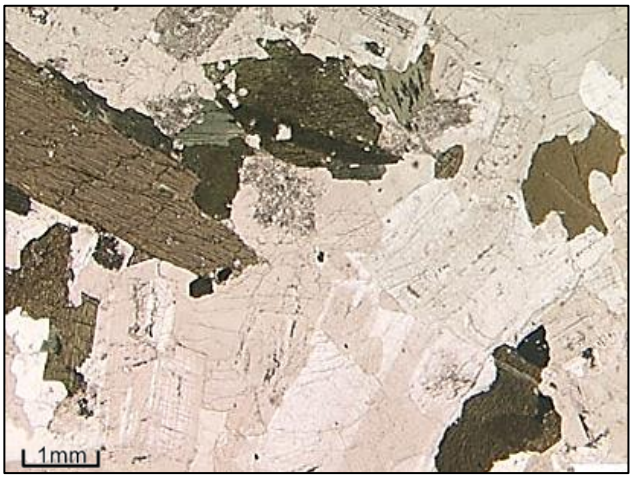
How can you tell which grains come from which rock?



A sedimentary rock – magnified (spaces dyed blue).

A sedimentary rock – magnified (spaces filled with natural cement).

A metamorphic rock – magnified (no spaces).



An igneous rock – magnified (no spaces).

Use scissors to cut out two typical grains from each picture on page 3 (or make a tracing or drawing of two of the grains); in one of the rocks, the grains are fossils.

Stick the two grains for each rock onto a piece of paper (or into a book) and add their rock name.

Under the name of each rock, write down the features of the grains that make them typical of that rock, by looking at the cut-out grains and the rock photos they have been cut from.

Thin section rock images:

- Top left: Jurassic lithic-arenite and top right: Pennsylvanian biosparite – both published by Michael C. Rygel under the Creative Commons Attribution-Share Alike 3.0 Unported Licence.
- Bottom left: blueschist – released into the public domain by its author, Fe3Al2Si3O12 at English Wikipedia.
- Bottom right: tonalite – published by Chiara Groppo in Atlante di petrografia and released under the Creative Commons Attribution-Share Alike 2.5 Generic license.

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The back up

Title: Rock grain cut out

Subtitle: How can you tell which grains come from which rock?

Topic: A scissors and paper activity to tell apart the grains from sedimentary, igneous and metamorphic rocks.

Age range of pupils: 9 years upwards

Time needed to complete activity: 15 minutes

Pupil learning outcomes: Pupils can:

- follow instructions and cut out paper shapes safely;
- distinguish some of the characteristics of sedimentary, igneous and metamorphic grains from their pictures and cut outs.

Context:

This cutting out and pasting activity is designed to encourage pupils to think carefully about the characteristics of rock grains and how they fit together, in the three major rock groups.

Their results might be as follows:

Sedimentary rock
Grains are rounded
Grains are different sizes
Some grains are made of other rocks
Grains have spaces between them

Sedimentary rock
Grains are fossils
Fossils are different sizes
Fossils are not broken
Grains have spaces between them (filled with natural cement)

Metamorphic rock
Grains are long and thin
Some have grown around other grains
Some have cracks
They are lined up in the same direction
Some have parallel lines inside them (cleavage)
Grains have no spaces between them

Igneous rock
Grains are different shapes
Grains are different sizes
Some have grown around other grains
Some have parallel lines inside them (cleavage)
They lie in different directions
Grains have no spaces between them

The four rocks pictured are thin sections; these are slices of rocks cut thin enough for light to pass through and highlight the different grains present, when seen through a microscope.

Following up the activity:
Try the Earthlearningidea activity to sort out sedimentary, igneous and metamorphic rocks, *Rock detective – rocky clues to the past Investigating your local rocks to find out how they formed* or the Earthlearningidea in which Salol is cooled to form crystals like those in igneous rocks*, Why do igneous rocks have different crystal sizes? simulating crystallisation from a melt at different rates of cooling*.

Underlying principles:
- Sedimentary rocks often have rounded grains of different sizes (which may be fossils) and usually have gaps (pores) between the grains, unless they are filled with natural cement.
- Igneous rocks have grains that are single crystals which interlock randomly, with no pore spaces.
- Metamorphic rocks formed under increased pressure in regional metamorphism have aligned grains (crystals) which have formed or grown during metamorphism, with long and/or thin crystals aligned at right angles to the pressures which formed them.
- These grain characteristics can be used to distinguish the three main groups of rocks from one another.

Thinking skill development:
Pupils seek patterns through construction, whilst cognitive conflict is caused when some grains or arrangements show differences from these patterns. Explaining their findings causes metacognition.

Resource list:
- the sheet of magnified rocks on page 3
- scissors
- glue and paper or a book for sticking on the cut-out grains

Useful links:
Put “rock thin sections” into a search engine like Google™ and click on ‘images’ to see views through a microscope of thin sections of a wide range of rock types. The colours appear when special polarising filters are used in a microscope – this method is used to help to identify the grains and crystals.

Source: Chris King of the Earthlearningidea Team.

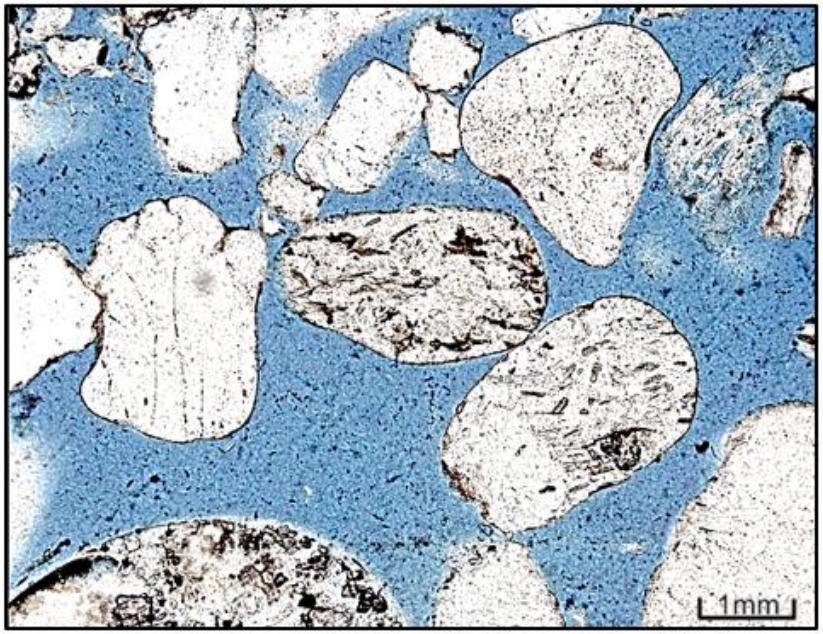
Rock grain cut out

How can you tell which grains come from which rock?

Use scissors to cut out two typical grains from each picture (or make a tracing or drawing of two grains); in one rock, the grains are fossils.

Stick the two grains for each rock onto a piece of paper (or into a book) and add their rock name.

Under the name of each rock, write down the features of the grains that make them typical of that rock, by looking at the cut-out grains and the rock photos they have been cut from.



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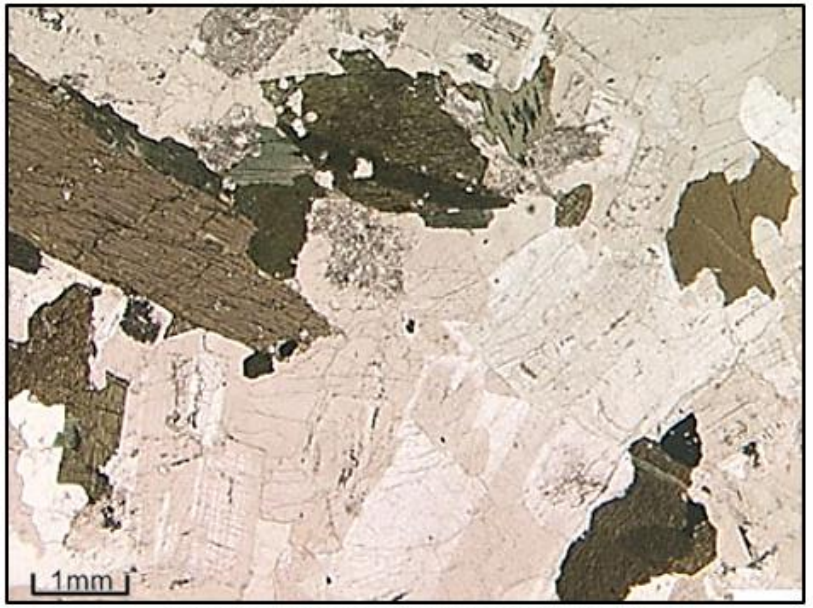

An igneous rock – magnified (no spaces).