

Urban fieldwork – the stories from materials, colours, lines and shapes

Find out the stories told by materials used in building and for decoration

When you look at the stones used for buildings and in parks and cemeteries, there are key features to help you to work out the stories locked up in the rocks.

Use the sheets on pages 3 (colour), 4 (lines), 5 (shapes) and the recording sheet on page 6 to note down what the stones can tell you.

Materials – natural or not

First look carefully at the materials to see if they are natural or have been manufactured. Most of the features below tell you that they are natural. If they are manufactured, go to the 'Rock around

your school' Earthlearningidea to discover the stories that manufactured materials can tell you.

Natural materials

If the stones are natural materials, the sheets on colours, lines and shapes will help you to find out their stories.

If you want to try to identify the different types of stones, use the Earthlearningideas on building stones (see 'The back up') to match the stones you find in the streets with the pictures given – to add even more to the stories of the stones.



Building stones used to add interest to a pavement, hotel and shop fronts in Nice, France. (Google Maps street view).

The back up

Title: Urban fieldwork – the stories from materials, colours, lines and shapes.

Subtitle: Find out the stories told by materials used in building and for decoration.

Topic: Using the colours, lines and shapes of building stones and other natural decorative materials to help to tell their stories.

Age range of pupils: 8 – 80 years

Time needed to complete activity: This depends on the building stone opportunities in the area.

Pupil learning outcomes: Pupils can:

- use the more 'obvious' features of building stones, their colours, lines and shapes, to describe how the rocks formed or were later deformed;
- explain how building and decorative stones with different features can be used to add character to an area.

Context:

Pupils use sheets focussed on colours, lines and shapes to begin to tell the stories of the stones used in urban areas. This urban fieldwork helps them to see that, wherever stones are found or used, the features within them can be used to tell the stories of how they formed, and sometimes, how they were later deformed.

Following up the activity:

Use the sheets in the building stone Earthlearningideas to identify, name and find out much more about the rocks the pupils find.

Building Stones 1 – a resource for several Earthlearningidea activities: use a key to identify many different attractive-looking rocks

Key to some rocks commonly used for ornamental purposes

Crystalline or Building Stone

Does stone react vigorously when touched with acid dropper? Check if this allowed

Yes

Can you see the crystals or grains when 'look up the stone'? (Shin it back, if needed)

Yes

Is the stone crystalline with crystals that interlock?

Yes

Coarse crystals clearly visible with naked eye

Medium to light coloured, speckled

Granite

Medium sized crystals (just visible with naked eye)

Dark grey or green-grey

Gabbro

Crystals rounded or angular and grains interlocking together

Dark grey or green-grey

Dolerite

No

Thin dark grey, purple or brownish colour

Sandstone

Many 'holes' (pores) or irregular shapes

Slate

No

Many 'holes' (pores) or irregular shapes

Marble

Many 'holes' (pores) or irregular shapes

Limestone

Building Stones 2 – Igneous rocks: What are the differences between igneous rocks commonly used as building stones?

Igneous rocks - 1

Building Stones 3 – Sedimentary rocks How do the sedimentary rocks used for building stones differ?

Sedimentary Rocks - 1

Building Stones 4 - Metamorphic rocks: What are the differences between metamorphic rocks commonly used as building stones?

Metamorphic Rocks

Underlying principles:

- The more 'obvious' features of, colour, lines and shapes of the building stones seen in urban fieldwork can all help to tell their stories.

Thinking skill development:

- Pupils look for patterns within rocks to enable them to distinguish between them.
- Working out of doors provides a good opportunity to make a bridge with normal classroom studies.

Resource list:

- the attached sheets, on colours, lines and shapes and the recording sheet

Useful links:





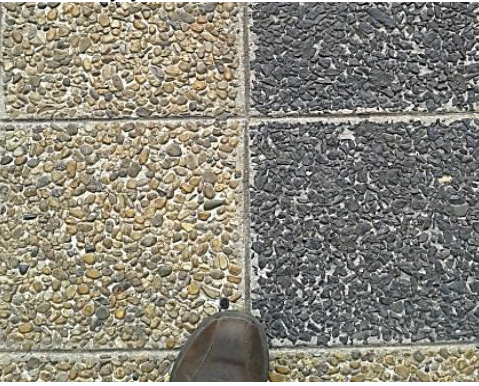



'Will my gravestone last?' from <http://www.earthlearningidea.com>
<http://www.nationalstonecentre.org.uk>
<http://geoscenic.bgs.ac.uk/asset-bank/action/viewAsset?id=344745&index=96&total=110&view=viewSearchItem>

Source: Chris King of the Earthlearningidea Team. Photos by Chris King, unless otherwise stated.





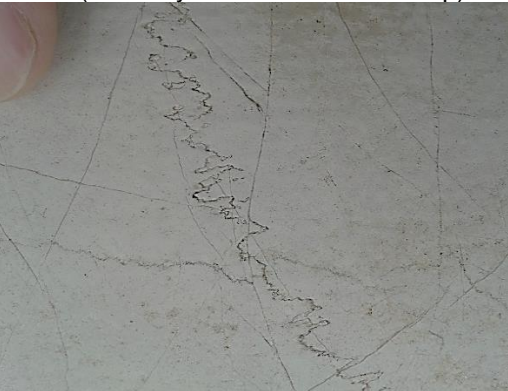



© Earthlearningidea team. The Earthlearningidea team seeks to produce a teaching idea regularly, at minimal cost, with minimal resources, for teacher educators and teachers of Earth science through school-level geography or science, with an online discussion around every idea in order to develop a global support network. 'Earthlearningidea' has little funding and is produced largely by voluntary effort. Copyright is waived for original material contained in this activity if it is required for use within the laboratory or classroom. Copyright material contained herein from other publishers rests with them. Any organisation wishing to use this material should contact the Earthlearningidea team. Every effort has been made to locate and contact copyright holders of materials included in this activity in order to obtain their permission. Please contact us if, however, you believe your copyright is being infringed: we welcome any information that will help us to update our records. If you have any difficulty with the readability of these documents, please contact the Earthlearningidea team for further help.



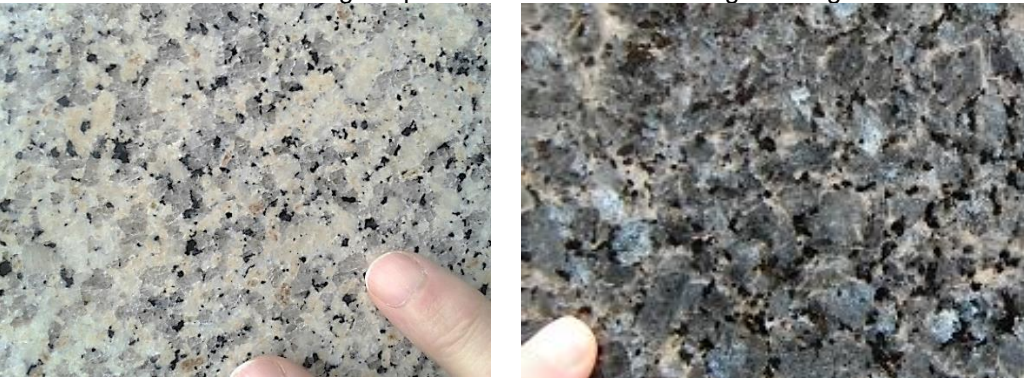



Colours

White	Pale colours	Speckled white	Dark pink and reddish
<p>Usually formed of pure calcium carbonate, if sedimentary they are limestones, if metamorphic, they are marbles*.</p>  <p>White marble and reddish marble.</p> <p>* Some metaquartzites are white but are not common building stones; they do not react with dilute acid when calcium carbonate rocks do.</p>	<p>Probably calcium carbonate with impurities – giving a range of colours including pinks, greens and greys.</p>  <p>Decoration with white, grey and green marble. (Licensed by Illustratedjc – Creative Commons Attribution-Share Alike 4.0 International licence).</p>	<p>Speckled whitish rocks are probably the pale-coloured igneous rock, granite; individual white or pale crystals are large enough to be seen, with dark mica crystals between them.</p>  <p>The whitish minerals in granite, with dark micas.</p>	<p>Dark pink and reddish materials usually contain oxidised iron minerals; in sedimentary rocks, this usually means they formed in tropical conditions; pink minerals in igneous rocks are feldspars, containing small amounts of trace elements.</p>  <p>Pink feldspars in granite (coin here and in later photos 2cm across). (Peter Kennett).</p>
<p>Yellowish-brown to dark brown</p> <p>Yellowish-brown to dark brown rocks contain oxidised iron; brown sedimentary rocks are laid down in many environments; weathering often brings iron to the outer surfaces, giving them rusty yellow colours.</p>  <p>Slabs surfaced by yellowish quartzite pebbles and crushed dark grey basalt.</p>	<p>Mid grey</p> <p>Mid-grey sedimentary rocks are usually quartz-rich sandstones/ siltstones/ mudstones or carbonate-rich limestones – with a lot of clay minerals giving the grey colour; if the finer rocks have become metamorphosed, they form grey slates.</p>  <p>Pale-grey sandstone and pure-white limestone.</p>	<p>Dark grey</p> <p>Dark grey sedimentary rocks usually contain a lot of clay minerals or organic material; dark grey igneous rocks have dark iron-rich minerals and are gabbros if coarse-grained, dolerites if medium-grained and basalts if fine-grained.</p>  <p>White fairly-pure marble, with dark-grey slate.</p>	<p>Greenish</p> <p>Greenish rocks are either marble with impurities or are fine volcanic ash or slates formed by metamorphism of the ash.</p>  <p>Greenish slate, metamorphosed from original volcanic ash. (Peter Kennett)</p>

Lines (beware – some lines in building stones are the tool marks made during quarrying, and so tell us nothing about how the rock formed – careful observation is needed).

Bedding	Cross-bedding	Ripple marks	
<p>The lines seen in many sedimentary rocks are the layers or beds which formed as the original sediments were laid down – called bedding.</p> <div style="display: flex; justify-content: space-around;">   </div> <div style="display: flex; justify-content: space-around;"> <p data-bbox="107 694 604 742">A slab that has been cut across the bedding showing the straight bedding lines.</p> <p data-bbox="633 694 1093 742">Bedding in a pale-coloured limestone called travertine.</p> </div>	<p>Some sedimentary rocks show layers at shallow angles to the main bedding – this is cross bedding, where the original sediments were laid down on a slope; the downward slope direction is the flow direction of the current that laid down the sediment.</p>  <p data-bbox="1171 746 1568 794">Cross bedding in sandstone, current flow from left to right. (Peter Kennett).</p>	<p>The broad parallel lines across some sedimentary rocks are ripple marks, formed by waves as the sediment was first deposited; ripple marks form parallel to wave crests, which are often parallel to coasts.</p>  <p data-bbox="1641 746 2136 794">A ripple-marked sandstone – the original coastline probably ran from left to right.</p>	
<p>Stylolites</p> <p>The wiggly lines in some limestones and marbles are stylolites – that formed as some of the rock dissolved under pressure, usually when it was deeply buried (normally more than 500m deep).</p>  <p data-bbox="163 1382 546 1406">A stylolite and fractures in white marble.</p>	<p>Fractures</p> <p>The fractures seems in some building stones are small faults (if the rock on either side has moved) or joints (if it has not). They usually formed as the original rocks were pulled apart by tension deep in the crust.</p>  <p data-bbox="667 1382 1061 1430">Small faults and joints in a piece of slate. (Peter Kennett).</p>	<p>Fracture filled with minerals</p> <p>Mineral veins form when, long after the rocks first formed, they were cracked by pressures in the crust; then water flowed along the crack and minerals crystallised from the water, filling the crack.</p>  <p data-bbox="1205 1382 1532 1406">White mineral vein in pink marble.</p>	<p>Leisegang rings</p> <p>Lines of rusty yellowish, reddish and brownish colours can cross building stones, often cutting across other features. These are called Leisegang rings and are formed of iron minerals during the rock-forming process.</p>  <p data-bbox="1641 1382 2136 1430">Rust-coloured Leisegang rings in sandstone paving stones. (Peter Kennett).</p>

Shapes

Interlocking crystals		Fossils	
<p>Igneous rocks are made of minerals which grew together as they crystallised from the molten rock. Their interlocking shapes can be seen in coarse-grained igneous rocks.</p>  <p>Interlocking pale and dark crystals in a granite.</p> <p>Interlocking crystals in a dark igneous rock – Larvikite.</p>	<p>Fossils form the shapes found in many sedimentary rocks; they come in a range of shapes and sizes.</p>  <p>Fossil casts in Portland Limestone. (Peter Kennett).</p> <p>Fossil crinoids in limestone. (Peter Kennett).</p>		
<p>Rounded crystal clumps</p> <p>Some granites used for buildings have rounded crystals with concentric layers that crystallised in this way as the granite solidified.</p>  <p>Orbicular granite from Finland. (Peter Kennett).</p>	<p>Broken fragments</p> <p>Some rocks are made of broken fragments of other original rocks, when the broken fragments usually have sharp jagged edges.</p>  <p>Rock formed of broken fragments of a white rock, cemented together by a darker cement.</p>	<p>Angular pieces</p> <p>Slabs are sometimes surfaced by crushed rock; the angular fragments have sharp edges.</p>  <p>Slab surfaced with angular fragments of broken fine-grained igneous rock – basalt.</p>	<p>Rounded pieces</p> <p>The rounded rock fragments on some slabs were rounded as they were transported as sedimentary particles by currents in rivers or the sea.</p>  <p>Slab surfaced with rounded fragments of river or beach gravel.</p>

Urban fieldwork – the stories from materials, colours, lines and shapes
Find out the stories told by materials used in building and decoration

Recording sheet

Example stone

Where I saw the stone:
On the steps of the Boscolo Hotel, Avenue Verdun, Nice in France.

The stone is natural/manufactured

The colour tells me:
The white rock is likely to be marble; the pink rock is likely to be marble too, coloured by containing some iron – both are metamorphic rocks

The lines tell me:
The lines in the white rock are stylolites, wiggly lines formed when the rock was buried; the line in the pink rock is a fracture filled by white material – a mineral vein – this formed long after the pink rock was first formed

The shapes tell me:
No shapes can be seen in this rock

Summary – the story of this stone is:
Both rocks are metamorphic rocks formed of calcium carbonate, called marble; both show later changes, the stylolites in the white rock and the mineral vein in the pink rock.



Stone 1

Where I saw the stone:

The stone is: natural/manufactured

The colour tells me:

The lines tell me:

The shapes tell me:

Summary – the story of this stone is:

Stone 2

Where I saw the stone:

The stone is: natural/manufactured

The colour tells me:

The lines tell me:

The shapes tell me:

Summary – the story of this stone is:

Stone 3

Where I saw the stone:

The stone is: natural/manufactured

The colour tells me:

The lines tell me:

The shapes tell me:

Summary – the story of this stone is: