

Sand on a sill

What will happen to a sand grain left on a window sill? – a rock cycle discussion

Take a coloured* grain of sand** and place it on a windowsill outside the classroom. Draw a circle around it to show where it has been placed. Then ask groups of pupils to discuss what might happen to the sand. They might need prompting by such questions as: 'What might happen next?', 'And then?' or 'Can you think of another idea?'



A 2 mm diameter grain of yellow-coloured sand on a windowsill with a circle drawn around it (Chris King)

Pupils' stories are only constrained by their imagination. Most stories will involve parts of the rock cycle – the main focus of this discussion.

The stories might include:

- The wind blows it off

And then?

- It falls to the ground

And then?

- It is washed away by rain into a drain

And then?

- It is washed into a river and settles to the bottom

And then?

- It is picked up and washed into the sea

And then?

- It settles to the sea bed

And then?

- It is buried by more sand

And then?

- It hardens into sandstone

And then?

- It is raised up into a mountain during a mountain-building event

And then?

- It is eroded and the cycle begins again

Another idea

- Rainwater washes it off the windowsill
- It falls into the soil
- It stays in the soil for ever

* You can colour a grain of sand brightly with paint, such as paint for touching up cars, or you can buy brightly-coloured sand or gravel from the internet or aquarium-sellers

** Use any appropriate size of grain. Sand sizes are measured by geologists using the Wentworth Scale – according to this scale 2 mm diameter is the largest size of sand grains (which range from 2mm – 0.125 mm (1/8 mm) in size), particles larger than 2mm are called granules; larger sizes are pebbles, cobbles and boulders, smaller sizes are silt and clay.

Another idea

- Wind blows it off
- It lands on a path
- Someone steps on the sand grain – it becomes stuck into the sole of their trainer
- It falls off on a road
- It is crushed by a car tyre
- The smaller grains get washed into a gutter and then a drain and a river
- More sand builds up and the sand is buried for a very long time

Another idea

- A painter brushes it off the windowsill before painting the sill again
- It lands in the soil
- Weeds grow in the soil
- When the weeds are pulled up, the sand grain is in the attached soil
- It is taken to the refuse dump and thrown in the 'garden waste' skip
- It is recycled to make compost
- It is sold in a garden centre
- It is used to fertilise the soil somewhere else

Another idea

- After being blown onto the soil, the soil builds up
- It is buried as more and more sediment is laid down on top
- It eventually becomes a sedimentary rock
- It becomes metamorphosed to metamorphic rock
- It melts and is intruded or extruded as igneous rock
- It is recycled again as part of the rock cycle

After your class discussion:

- ask your class to check on the sand grain every day;
- if it falls off, get them to look for it on the ground beneath the windowsill and talk about what might happen next;
- revisit the discussion after six months to see how much of it they have remembered and also, what links with Earth cycles they can make (e.g. links with the rock cycle, the water cycle (rain, stream), biological cycles (soil), atmospheric cycles (wind)).

The back up

Title: Sand on a sill

Subtitle: What will happen to a sand grain left on a window sill? – a rock cycle discussion

Topic: A pupil group discussion activity based on what will happen to a sand grain left on a windowsill.

Age range of pupils: 5 – 15 years

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:

- explain different processes that could move sand grains;
- describe where sand grains might be 'stored' as part of the rock cycle;
- describe creative ways of moving and storing sand grains;
- link their explanations with other Earth cycles.

Context:

This discussion activity has been devised to encourage pupils to think about rock cycle processes in the context of the area outside their own school. By leading the small group discussion using questions such as: 'What might happen next?', 'And then?' or 'Can you think of another idea?', teachers should be able to encourage pupils to consider a range of different processes and products of the rock cycle and how these link to other Earth cycles, as below:

Rock cycle processes	Links to other Earth cycles
Weathering – physical break-up or chemical breakdown	Break-up or break down linked to biological cycles
Erosion of sand by wind or water	Wind as part of the atmospheric cycle
Transportation of sand by wind or water	Water as part of the water cycle
Deposition of sand by wind or water	
Erosion, transportation and deposition of sand by human activity	
Soil-formation	Soil processes as part of biological cycles (water, carbon, nitrogen, etc. cycles)
Lithification by compaction/ cementation	Lithification as part of the sedimentary cycle
Rock deformation	Internal Earth cycles – linked to plate tectonic activity
Metamorphism	
Melting	
Igneous activity – intrusion or extrusion	
Uplift	Plate tectonic mountain-building processes

The discussion might include these rock cycle products:

Rock cycle products
Soil
Sediment
Sediment sequence
Sedimentary rock
Metamorphic rock
Igneous rock
Deformed rock (by folding or faulting)

Following up the activity:

Ask if the stories would be different with larger particles (pebbles, cobbles, boulders) or smaller particles (finer sand, silt or clay particles).

Ask pupils to draw pictures showing what happens to the grain of sand or write a story 'The Adventures of Sandy Grain'.

Underlying principles:

- The rock and other cycles can be considered as series of processes and products.
- Rock cycle processes link to other Earth cycles.
- Most sand grains are eroded grains of quartz (silicon dioxide), often coated in orange-red iron oxide. The quartz minerals originally crystallised out from a magma as it cooled and solidified into an igneous rock, before becoming eroded (as part of the rock cycle).

Thinking skill development:

Pupils have to apply their knowledge and imagination to the instance of a sand grain on the sill, by constructing ideas of what might happen to the grain, engaging in argumentation and cognitive conflict with others in their groups, which will develop metacognitive skills. Matching their ideas to real Earth processes involves bridging.

Resource list:

- a sand grain (e.g. around 2 mm across)
- brightly-coloured paint to colour the grain (car touch-up paint is often readily available) or use of a pre-coloured grain (e.g. from the internet or aquarium suppliers)

Useful links:

See the range of other Earthlearningideas related to the rock cycle, <http://www.earthlearningidea.com>

Source: Chris King of the Earthlearningidea Team.

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