

## How long does it take? – quick to very, very, very slow Sorting out Earth events according to the time they take

Very quick

From seconds to minutes



From minutes to weeks



From weeks to years



From years to thousands of years



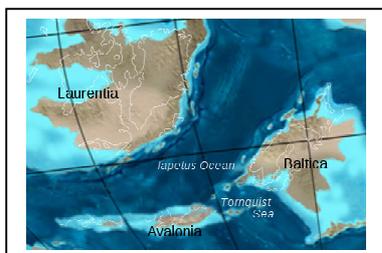
From thousands of years to millions of years



From millions of years to thousands of millions (billions) of years

Very, very, very slow

Some Earth processes are dangerously quick – but some are extremely slow. Help your pupils to understand how the rates of Earth processes differ by cutting out the cards on the next page and the scale to the left, and fitting the cards in the best places on the scale.



See below for photo captions



This has been devised as a group activity to promote discussion – so the quality of discussion is likely to be more important than the ‘right’ answers.

Extend the activity by asking pupils to think of other Earth processes and discuss where on the scale they should fit.

### The back up

**Title:** How long does it take? – quick to very, very, very slow

**Subtitle:** Sorting out Earth events according to the time they take

**Topic:** Discussing the rates of Earth processes.

**Age range of pupils:** 9-18 years

**Time needed to complete activity:** 10 mins

**Pupil learning outcomes:** Pupils can:

- determine the rates of Earth processes.
- explain how some Earth processes act very quickly, whilst others act very, very slowly.

### Context:

Pupils are asked to subdivide Earth processes according to the time they take – answers likely to result from the discussions are given below.

Very quick	How long:
From seconds to minutes	<ul style="list-style-type: none"> <li>• for an earthquake to happen?</li> <li>• for a landslide to happen?</li> <li>• for a pebble to be eroded from a river bed in a storm?</li> </ul>
From minutes to weeks	<ul style="list-style-type: none"> <li>• for mud cracks to form and be preserved?</li> <li>• for a flood deposit to be laid down?</li> </ul>
From weeks to years	<ul style="list-style-type: none"> <li>• for lava to crystallise and become solid?</li> </ul>
From years to thousands of years	<ul style="list-style-type: none"> <li>• for a glacial lake to fill with sediment?</li> <li>• for a monument to erode away</li> </ul>
From thousands of years to millions of years	<ul style="list-style-type: none"> <li>• for an intrusive igneous rock to crystallise?</li> <li>• do ice ages last?</li> <li>• does the Earth's magnetism stay in the same direction without reversal (the N magnetic pole staying near the N geographical pole)?</li> </ul>

From millions of years to thousands of millions (billions) of years

- for a supercontinent to break up and reform
- a new ocean to become 1000 km wide
- for oceanic lithosphere to be recycled from spreading centre to subduction and up again?

**Very, very, very slow**

### Following up the activity:

Try adding cards with the processes below.

Very quick	How long for:
From seconds to minutes	<ul style="list-style-type: none"> <li>• a tsunami to drown a coastline?</li> <li>• a lahar to flow down a volcano?</li> </ul>
From minutes to weeks	<ul style="list-style-type: none"> <li>• wave or current ripple marks to form?</li> </ul>
From weeks to years	<ul style="list-style-type: none"> <li>• gullies to be eroded in soil?</li> </ul>
From years to thousands of years	<ul style="list-style-type: none"> <li>• buildings to weather and erode away?</li> </ul>
From thousands of years to millions of years	<ul style="list-style-type: none"> <li>• a waterfall to erode back into a long gorge?</li> <li>• oil to be released from a source rock?</li> </ul>
From millions of years to thousands of millions (billions) of years	<ul style="list-style-type: none"> <li>• life to evolve?</li> <li>• the surface of the molten Earth to become solid?</li> </ul>

**Very, very, very slow**

### Underlying principles:

- There is a huge range in the rates of Earth processes.

### Thinking skill development:

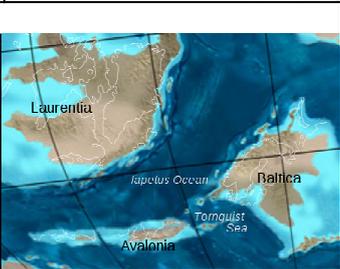
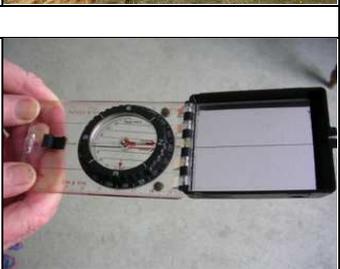
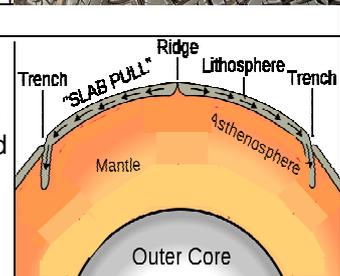
Pupils are asked to construct a pattern in the rates of Earth processes; processes with unknown rates will cause cognitive conflict.

### Resource list:

- scissors to cut out the cards

**Source:** Devised by Chris King of the Earthlearningidea Team. Many thanks to Dave Rothery for his advice.

**Quick to very, very slow – timing Earth event cards**

<p>How long for an earthquake to happen?</p> <p><i>AGI Earth Science World Image Bank; h5ipp2; courtesy United States Geological Survey.</i></p>		<p>How long for an intrusive igneous rock to crystallise?</p> <p><i>Peter Kennett.</i></p>	
<p>How long do ice ages last?</p> <p><i>Peter Kennett.</i></p>		<p>How long for a flood deposit to be laid down?</p> <p><i>Peter Kennett.</i></p>	
<p>How long for a new ocean to become 1000 km wide?</p> <p><i>Published by Dr Ron Blakey under the Creative Commons Attribution-Share Alike 3.0 Unported license.</i></p>		<p>How long for lava to crystallise and become solid?</p> <p><i>Stephanie Flude.</i></p>	
<p>How long for a monument to erode away?</p> <p><i>I, Vasyatka1, the copyright holder of this work, release this work into the public domain.</i></p>		<p>How long for a glacial lake to fill with sediment?</p> <p><i>This image is a work of the U.S. federal government, the image is in the public domain.</i></p>	
<p>How long for a supercontinent to break up and reform?</p> <p><i>Permission is granted by Kieff to publish this through the GNU Free Documentation License, Version 1.2.</i></p>		<p>How long for a landslide to happen?</p> <p><i>Peter Kennett.</i></p>	
<p>How long for mud cracks to form and be preserved?</p> <p><i>This image by Hannes Grobe is licensed under the Creative Commons Attribution-Share Alike 2.5 Generic license.</i></p>		<p>How long does the Earth's magnetism stay in the same direction without reversal (the N magnetic pole staying near the N geographical pole)?</p> <p><i>Peter Kennett.</i></p>	
<p>How long for oceanic lithosphere to be recycled from spreading centre to subduction and up again?</p> <p><i>Permission is granted by Surachit to publish this through the GNU Free Documentation License, Version 1.2.</i></p>		<p>How long for a pebble to be eroded from a river bed in a storm?</p> <p><i>Peter Kennett</i></p>	

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