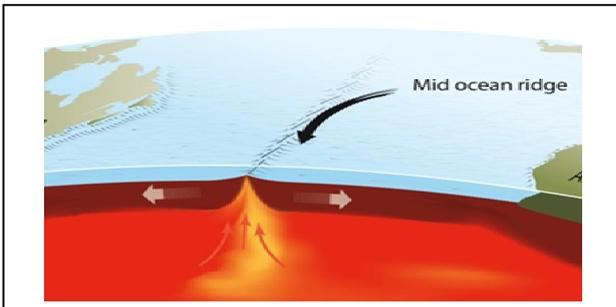


## Plate tectonics through the window

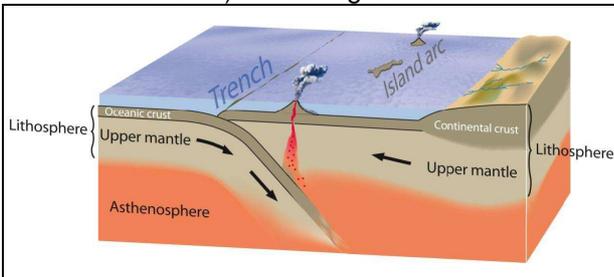
### What might you see through a window or porthole at an active plate margin?

If you were at a plate tectonic margin that was very active, what might you see? What might you hear? What might you sense? What might you feel?

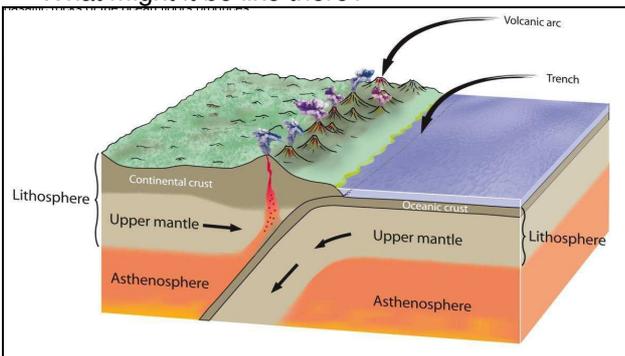
1. Think about a **constructive (divergent) plate margin in an ocean area**. Here there is an oceanic ridge where currents in the mantle beneath are rising and carrying the oceanic plates apart, allowing magma to rise in between to form new plate material. A rift valley in the centre has earthquakes (eg. the Atlantic Ocean on and near Iceland). What might you see, hear, sense and feel here?



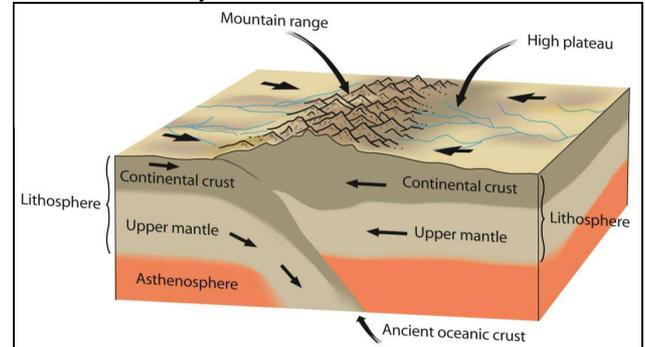
2. What about a **destructive (convergent) margin in an oceanic area**? Here, one plate is subducted beneath another at a trench, causing earthquakes. Molten magma from the subducting plate rises to form explosive volcanoes in a row of islands (eg. Japan and the West Indies). What might this be like?



3. At a **destructive margin on a continent near an ocean**; here an oceanic plate is subducted under a continental plate at a trench causing earthquakes, a mountain chain is formed on the continent whilst explosive volcanoes are caused by rising magma from the subducting plate (eg. the west coast of South America), What might it be like there?



4. Think about being at a **destructive plate margin between two continents**. Here two plates carrying continents have collided forming a great chain of mountains, affected by major earthquakes (eg. the Himalayan Mountains where India has collided with Asia). What would you see, hear, sense or feel here?



5. If you found yourself at a **sliding or conservative plate margin** where plates slide past each other, but can become stuck, causing violent earthquakes (as happens beneath the sea and at the San Andreas fault in California, USA), what might this be like?



*This image of the San Andreas Fault sliding plate margin in California, USA is in the public domain because it contains materials that originally came from the United States Geological Survey.*

6. What might it be like if you were near a **constructive plate margin within a continent**? Here currents in the mantle beneath the crust rise and move apart, carrying the plate above with them. This forms a long rift valley with faults on either side, often with lakes in between. Magma from the mantle below rises forming volcanoes that are fairly predictable but spectacular (eg. in the East African Rift Valley).



A satellite view of the East African Rift Valley, widening into the Red Sea to the north.

*This satellite view is in the public domain because it was created by NASA.*

## The back up

**Title:** Plate tectonics through the window

**Subtitle:** What might you see through a window or porthole at an active plate margin?

**Topic:** Imagining the scenery and plate activity at different plate margins.

**Age range of pupils:** 14 – 19 years

**Time needed to complete activity:** 20 mins

**Pupil learning outcomes:** Pupils can:

- describe and explain geographical and geological features at different types of plate margin;
- imagine and describe the feelings of people living in plate margin areas, particularly when these are active.

### Context:

This is what you might see, feel and sense at each of these margins.

1. **A constructive (divergent) plate margin in an ocean area.** Unless you were on an island like Iceland, you could see only sea through the porthole. If you descended in a bathysphere, you might be able to see volcanic activity and hydrothermal vents on the sea floor. On Iceland, you might see a volcanic eruption producing lava in flows with fire fountains and ash; spectacular but fairly safe. On Iceland, you could also feel earthquakes and volcanic eruptions from time to time and smell the gases from hydrothermal vents – otherwise, all you could hear and taste would be the sea going up and down – making you seasick!
2. **A destructive (convergent) margin in an oceanic area.** This plate activity produces volcanic islands and your view would depend where on Earth the islands are; temperate, tropical or arctic islands would each have typical vegetation and buildings. You might see the sea in the distance. Above a trench, you would see only sea, with maybe a conical volcanic island in the distance. On a volcanic island you might sense violent volcanic eruptions and earthquakes. Out at sea above a trench, all you could probably sense would be the sea.
3. **A destructive margin on a continent near an ocean.** The mountain chain formed by plate activity would probably be very rugged with some volcanic peaks and high altitude vegetation. Earthquake damage might be common; earthquake-proof buildings might be seen in more developed countries whilst damaged buildings might be common in less developed areas. You could sense earthquakes from time to time and, if unlucky, might feel the effects of a tsunami near the coast. Volcanic activity might cause smells and vibrations.
4. **A destructive plate margin between two continents.** In this high rugged mountain chain, only high altitude plant species can grow. The effects of earthquakes and landslides might be seen.

Monsoonal rain and snow might be common and glaciers might be visible too. At these high altitudes, it would be difficult to breathe and to walk far until you were acclimatised. You might sense the effects of earthquakes and landslides.

5. **A sliding or conservative plate margin.** If you were on land and unlucky, you might see an earthquake, with the land surface moving up and down in waves, destroying the buildings around you. You might see a steep slope forming a line across the country (a fault scarp) and straight lines crossing the fault might be offset (eg. rivers, lines of trees in orchards, fences, railway rails). You would certainly be able to sense the effects of an earthquake or a tsunami triggered by an earthquake.
6. **A constructive plate margin within a continent.** You might see along a steep-sided valley with a flat bottom, often containing a long lake. The steep valley sides are fault scarps. There may be volcanic peaks nearby with many sheets of lava. There may also be hydrothermal areas (geysers, etc.). You might sense the volcanic eruptions, the hydrothermal areas and the earthquakes caused as the central part of the valley slips downwards along the faulted edges.

### Following up the activity:

Invite pupils to describe what it might be like at an active plate margin to their friends and families.

### Underlying principles:

- The principles of plate tectonics, plate movement and its effects.

### Thinking skill development:

Imagining a plate margin involves bridging between an understanding of plate tectonic activity and its likely effects on people in the region.

### Resource list:

- a powerful imagination

### Useful links:

The US Geological Survey has published a useful downloadable book about plate tectonics on its website, called 'This dynamic Earth: the story of plate tectonics' available at:

<http://pubs.usgs.gov/gip/dynamic/dynamic.html>

**Source:** This activity was originally devised by Chris King as a worksheet for the Earth Science Education Unit (ESEU) © The Earth Science Education Unit: <http://www.earthscienceeducation.com/> licensed under an Attribution-Noncommercial-Share Alike 3.0 Unported Creative Commons licence <http://creativecommons.org/licenses/by-nc-sa/3.0/> The diagrams were first published in the 'This dynamic Earth' booklet noted above, by the US Geological Survey, and were redrawn, with permission, by the ESEU. The ESEU has given permission for their use here.

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