KRONOSAURUS KORNER
RICHMOND OUTBACK QUEENSLAND

Year 9 Teacher's Notes

Rationale:
The students will understand how plate tectonics are responsible for continental movement over geological time. They will compare the position of Australia today relative to 120 million years ago by reconstructing a world map from the Cretaceous Period. Through observing satellite imagery, they will identify major plates on a world map. They will investigate models of sea-floor spreading by simulating the impact of heat energy and convection currents. They will learn how earthquakes and volcanic eruptions result from activity at plate boundaries. Through studying the position of Australia on the Indo-Australian plate, they will realise the relative geological stability and extreme age of the Australia.
The students will be engaged by activities suited for various learning preferences, with new information processed with the use of visual sources (observing videos and maps) and kinaesthetic-based investigations (modelling sea-floor spreading). They will also enjoy using ICT to determine the position of major tectonic plates.

Learning Outcomes:
Cognitive:
Students will:-
1. Understand how plate tectonics are responsible for continental movement and geological activity such as earthquakes and volcanic eruptions.
2. Recognise the major tectonic plates on the world map.
3. Comprehend how sea-floor spreading is created by heat energy and convection currents.
4. Realise the relative stability and age of Australian is a result of its tectonic history.

Affective:
Students will:-
5. Be excited to role play sea-floor spreading.
6. Enjoy watching videos.
7. Appreciate using ICT to research the movement of the continents through time.
8. Enjoy arranging the positon of major landmasses on the world map.

Procedural/Skill:
Students will:-
9. Improve their ICT skills.
10. Develop their observational skills through studying tectonic plates on satellite images of earth.
11. Refine their communication skills through discussions with their teacher and fellow students.
12. Advance their ability to create diagrams.

Resources:
Activity Sheets, teacher's computer, projector, student computers, satellite image/map of the world, scissors and glue.

Suggested YouTube clips:
1. 'Earth 100 Million Years From Now'
https://www.youtube.com/watch?v=uGcDed4xVD4 - (animation continental drift in the past and future).
2. 'Convection currents Planet Earth'
https://www.youtube.com/watch?v=MmMX83diwl0 – (animation of convection currents).
3. 'Introduction to Earthquakes'
https://www.youtube.com/watch?v=JrBaiPN6AW8 - (video on earthquakes and tsunamis).

For related teachers' notes and activity sheets, please go to www.kronosauruskorner.com.

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Procedure:

Engagement:

The students will be asked if they feel the ground underneath them moving. They will be told that Australia is shifting very slowly, heading north towards Asia at seven centimetres per year. Three individuals will be selected to calculate how far north Australia will move in one hundred, one thousand and one million years. The students will be shown YouTube clip 1 depicting the position of Earth's landmasses in the past and future. The teacher will state that Australia will collide with Asia in hundreds of millions of years.

Lesson steps:

1. The students will be asked to name the tallest mountain in the world. The teacher will state that Mount Everest is being forced upwards by the movement and collision of two different tectonic plates. They will demonstrate this by drawing a line down the middle of a page representing the margin between two these plates. They will push the ends of the page together to represent the uplift of Mount Everest.

2. The teacher will explain how the lithosphere (the outer shell of the planet) is broken up into moving tectonic plates underneath land and water. They will draw and name the different tectonic plates on a satellite image of the world, either on an electronic whiteboard or large map. The students will be asked how scientists can track the movement of tectonic plate from space (answer: GPS satellites can detect changes).

3. After observing this map, the students will be asked whether Australia crosses the borders of any tectonic plates (answer: no). The teacher will note that Australia doesn't have any very tall mountains, as there are no plates colliding underneath Australia. They will state that Australia is relatively geologically stable with no active volcanos or large earthquakes. As a result, it also has some of the oldest undisturbed rocks in the world.

4. The students will watch YouTube clips 2 and 3, with the teacher asking how convection currents are created (answer: hot material rising from the mantle. The material cools and sinks, then is heated and rises again in a cycle). They will ask how volcanos and earthquakes are created.

5. Several students will be selected to simulate convection currents and sea-floor spreading. Two students will stand back to back with a roll of toilet paper each representing convection currents. Another two students will unwind the rolls by slowly walking away while holding onto the ends - representing sea-floor spreading. While observing this model, the teacher will state that the oldest parts of the sea-floor can be found further away from ocean ridges where plates collide.

6. The students will complete Tasks 1-2 on their Activity Sheets. They will need scissors and glue to arrange paper drawings of major landmasses in their books. They will search for information online on the position of Earth's landmasses 120 million years ago.

   Conclusion:

7. The students will clean up any mess and hand in their work if they're finished. They will be asked to explain how continents move. The teacher will recap the major points on tectonic plates, convection currents, sea-floor spreading and relevant geological activity.

Homework:

Students who haven't completed their Activity Sheets can finish any remaining tasks for homework.

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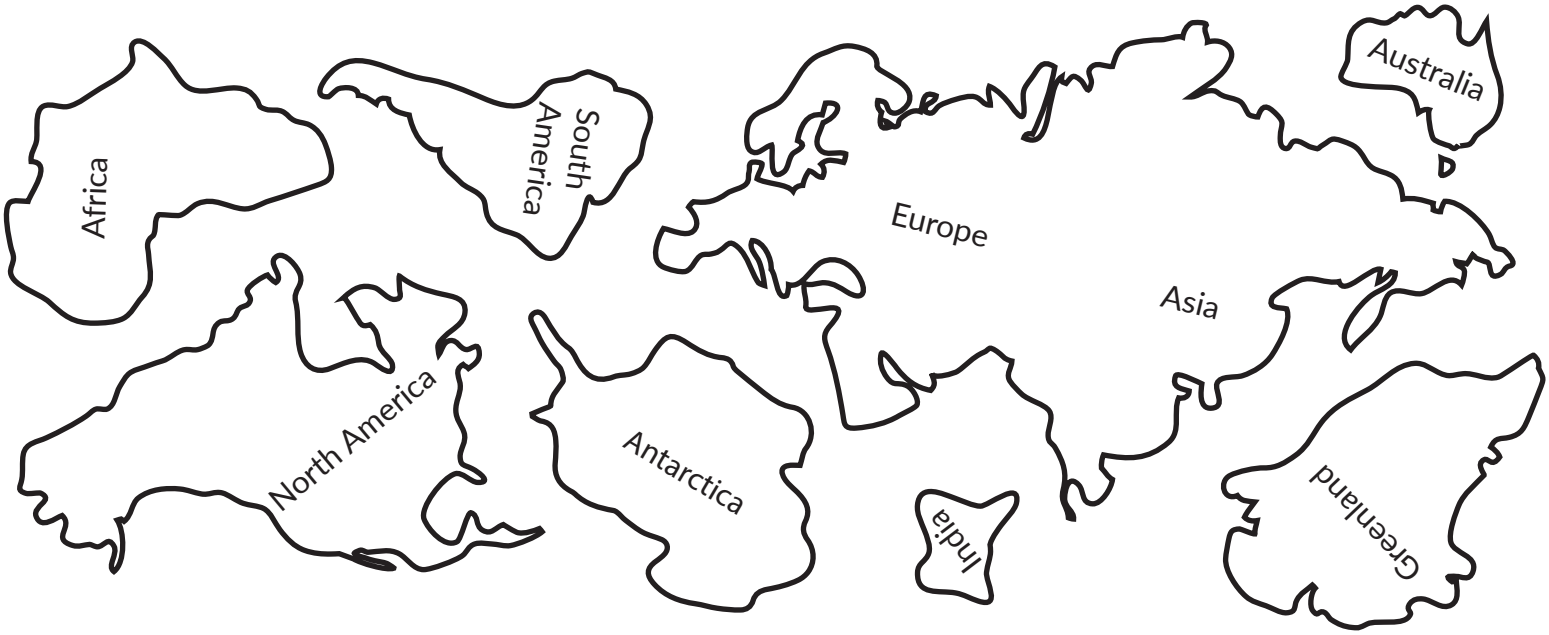
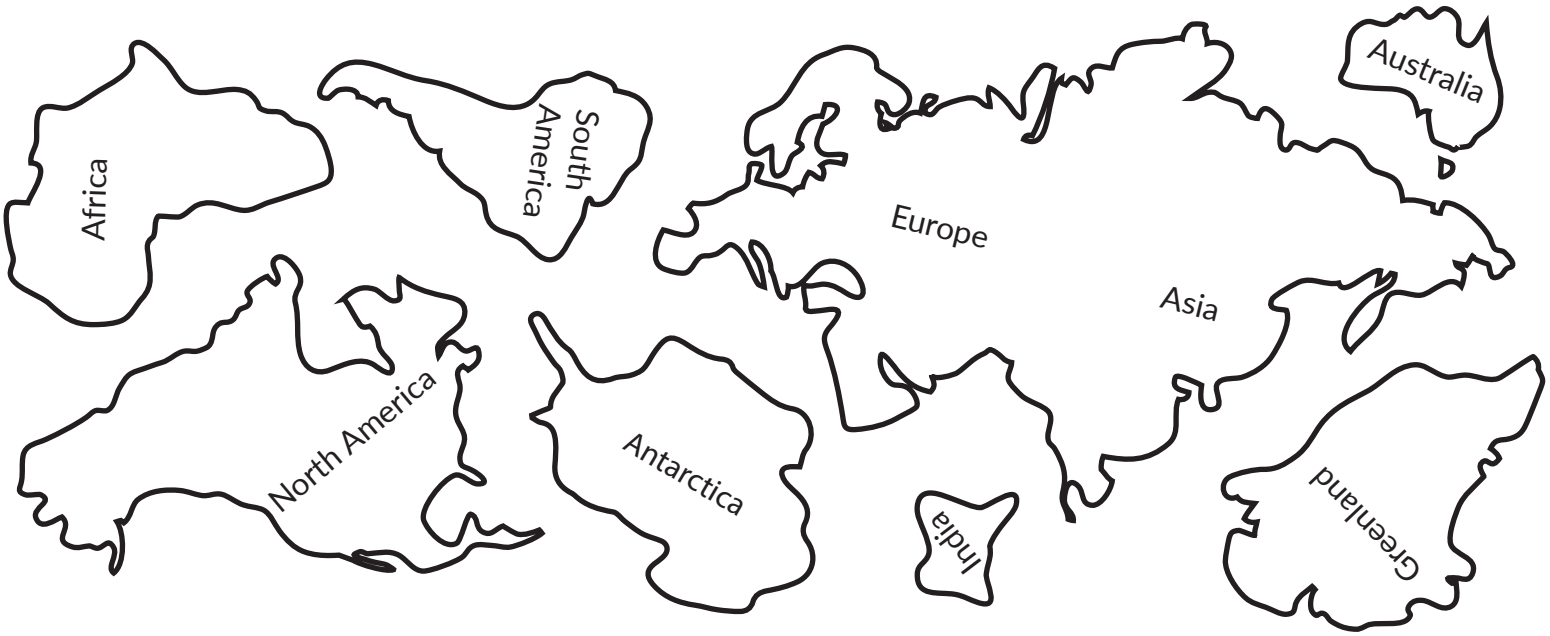
Year 9 Activity Sheet

Task 1. Cut out these landmasses, arrange them in their current positions and stick them in your workbook. Give this arrangement the title 'Position of landmasses today'. Draw and label tectonic plates on the map.



Task 2. Cut out these landmasses, arrange them in their positions from 120 million years ago and stick them in your workbook. Give this ancient map an appropriate title.



To correctly place these landmasses, search online for images of Aptian/Early Cretaceous maps.

Additional directions:
- Position the landmasses in their current positions with Africa in the centre of your map.
- Move South America to the right so that it nestles along the coast of Africa.
- Move Antarctica up so that it nearly touches the bottom of Africa.
- Move Australia to the southwest so that it touches Antarctica.
- Move India down so that it nearly touches Antarctica and Australia.
- Move North America and Greenland to the right so that they nearly touch the coast of Europe.