Learning Assessment #1 – Plate Tectonics

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This assignment is the first of a series of in-class activities known as learning assessments. These assignments were used in an introductory physical geology course that is a requirement for geoscience majors but has no pre-requisites and is open to students in all faculties.

The purpose of the learning assessments is to provide students with frequent feedback on their understanding of the fundamental concepts taught in the course. The learning assessments also provide information to the instructors and teaching assistants on student learning which can be used to help direct instruction in the course.

This assignment package includes:

1. Instructions for students
2. Assignment worksheets
3. Checklist of required elements

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Learning Assessment #1 – Plate Tectonics

Instructions

Part 1: On the topographic profile provided draw a cross section of the plates encountered along the section line A-A' (flip this page over to see the map along which section A-A').

Draw the plates to the asthenosphere layer. Please note, your cross section does not have to be drawn to scale, it is a schematic cross section, however relative thickness differences between the oceanic and continental crust and the lithospheric mantle should be reflected in your cross-section.

Use the following figures in your textbook (Earth: Portrait of a Planet by Marshak, 3rd Edition) to help you complete your cross-section and answer the questions:

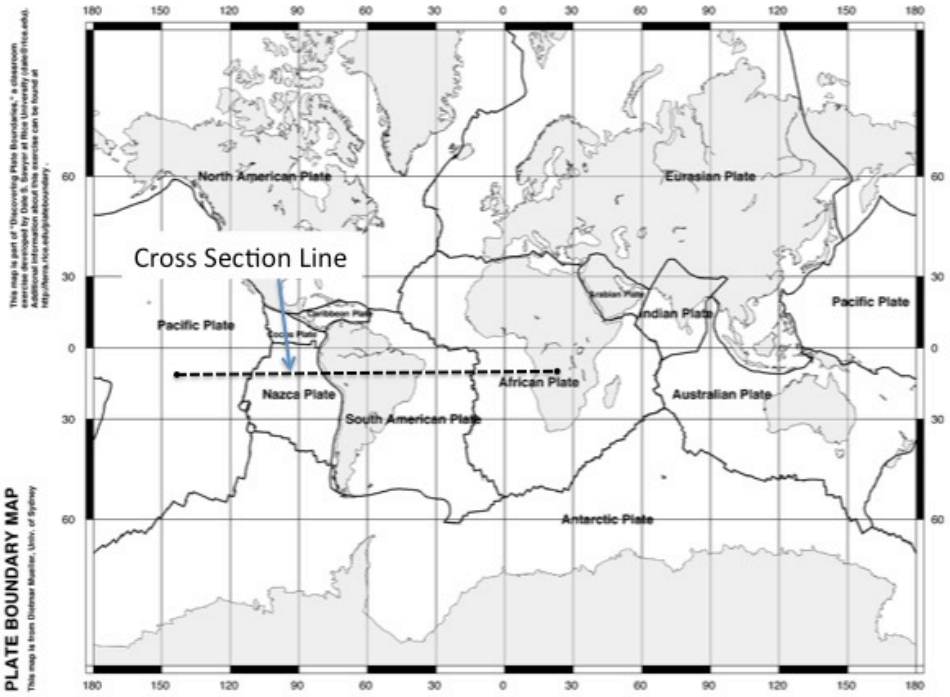
- Chapter 2: Figure 2.7 (surface elevation map of the world)
- Chapter 4: 4.11 (age of the ocean crust map)
- Appendix B: B.4 (earthquake and volcano location map)
- Earth surface heat flow map

On your cross section, clearly label all the features indicated in the legend using the symbols provided with the handout. Also make sure that on your cross section you have labeled or indicated the following:

- The names of the tectonic plates (place the name label them above the cross section and make sure you indicate with a vertical line the edges of the plate that extends from the plate boundary at the surface up in the air)
- Draw an arrow under the plate name indicating the direction it is moving
- Show the variations in thickness of the oceanic and continental crust.
- Show were melting is occurring at depth and connect this melting to volcanoes or volcanic vents at the surface using an arrow from the melting area to the volcanic activity

Part 2:

Answer the 2 questions on the second page of the worksheet provided.



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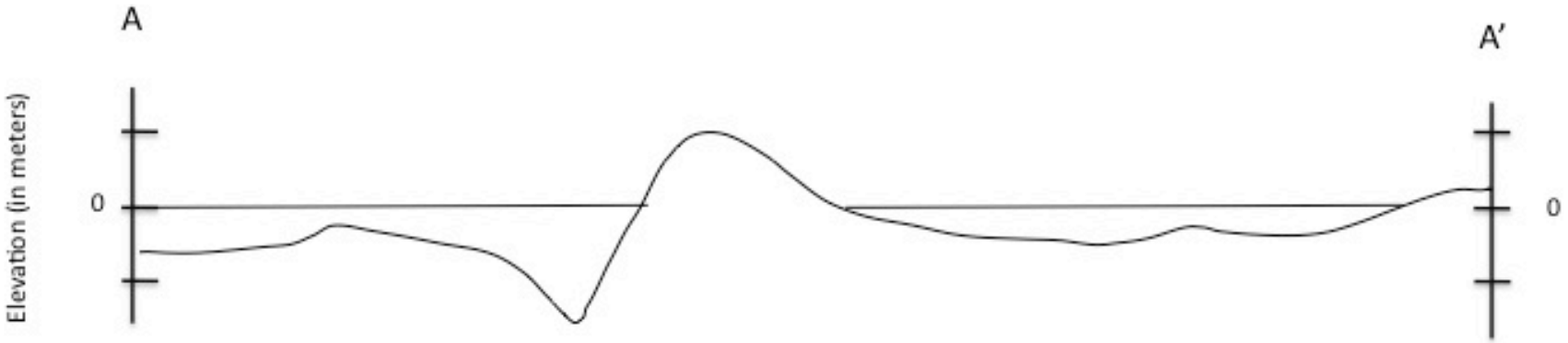
GLGY201 Learning Assessment #1: Plate Tectonics

Last Name: _____ First Name: _____ ID: _____

Part 1



Legend

- E = earthquake origin
- V = area of volcanic activity
- M = area of melting
- SZ = subduction zone
- VA = volcanic arc
- T = trench
- MOR = mid-ocean ridge

- = continental crust
- =oceanic crust
- = lithospheric mantle
- A = asthenosphere
- = arrow showing plate motion
- = boundary between tectonic plates

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Part 2: Evidence of Plate Boundaries

1. What geologic and geophysical evidence support your location of divergent boundaries (i.e. Mid-ocean ridges) and convergent boundaries (i.e. subduction zones)? You can use point form and refer to the different figures provided as lines of evidence.

Evidence for divergent boundaries	Evidence for convergent boundaries

2. Bonus Question:
   If the spreading along the divergent boundary in the Atlantic Ocean were to stop, but all other plate boundaries continued to be active what would happen to the continents around the Atlantic and the ocean crust in between after ~100 Ma?

Learning Assessment #1 (Plate Tectonics) Student Checklist

PART 1 (Total /40)

Tectonic plates
___ plates named & labelled
___ correct plate direction is indicated

Crust, mantle, lithosphere
___ continental crust drawn where appropriate
___ oceanic crust drawn where appropriate
___ relative thicknesses of crust are properly drawn
___ mantle drawn in correctly
___ lithospheric mantle indicated
___ asthenosphere indicated

Plate Geometries
___ tectonic plates are drawn with appropriate shapes / angles

Ocean features
___ trench(es) are identified
___ mid-ocean ridge(s) are identified

Earthquakes
___ earthquake activity is labelled in all appropriate locations

Volcanoes
___ all areas of melting are properly indicated
___ volcanic arc is labelled
___ all areas of volcanic activity labelled

Part 2 (Total /6)

Q1. Evidence of plate boundaries

___ Evidence for divergent plate boundary is given (citing / using reference maps and figures)
___ Evidence for convergent boundary is given (citing / using reference maps and figures)

Q2. Bonus Question: What would happen if…..

___ Description / explanation of what would happen to oceanic crust, and why
___ Description / explanation of what would happen to continents, and why