

MiSP PLATE TECTONICS UNIT

Introduction

For students to be successful with the MiSP worksheets in this unit, they should be familiar with the following concepts

1. convection
2. properties of the earth's interior
3. movement of the earth's crust due to convection (continental drift)
4. different crustal plate interactions (convergent, divergent, and transform)
5. subduction

ILST Core Curriculum - Major Understandings:

Standard 4 Physical Setting 2.2d, 2.2e, 2.2f

Physical Setting/Earth Science Core Curriculum -

Standard 6 Key Idea 5

Standard 4 Physical Setting - Major Understandings: 2.1b, 2.1k, 2.1l, 2.1m, 2.1n, 2.1o

Objectives:

After completing this unit students will be able to

- Use Plate Tectonics to explain the relative age of Pacific Islands and ocean floor rocks in the Atlantic Ocean.
- Relate distance from the mid-ocean ridge and a Pacific hot spot to age of rocks.
- Using graphs, determine the age of ocean locations
- Calculate unit rate of change of tectonic plate movements
- Use linear equations to calculate ages/distances of ocean floor and islands

Day 1 - Introductory Lesson -

The MiSP activities assume that the students have already learned about Continental Drift, divergent, convergent, and transform plate boundaries, mid-ocean ridges, subduction, and the role that convection currents in the earth's mantle play in causing these phenomena.

Day 1 is a chance to wrap up the vocabulary and content of Plate Tectonics. Students should begin worksheet #1. Teachers may want to assign some of the items on worksheet #1 for homework.

QUESTION OF THE DAY

How do scientists determine the age of rocks under the ocean?

Teacher Guide - MiSP - Plate Tectonics

Day 2 - Sea Floor Spreading - Worksheet #1

All directions are contained on the worksheet.

Students may need help converting rate and slope from km/millions of years to cm/year.

Summer 2010 participants recommended deleting some Level 1 questions when the unit is implemented at Level 3. Teachers may do so at their discretion but they have been left in the worksheets because of the questions' roles in building an understanding about the connection between rate of movement and slope (unit rate of change) and the science concept that the rates of sea floor spreading have changed. (The questions that participants recommended removing from Level 3 work are 1-3.)

QUESTION OF THE DAY

In the next worksheet, you will learn that some Hawaiian Islands are older than others. If one island is the oldest and one is the youngest, what differences would you be able to observe if you vacationed on both islands - thinking about both earth science and biology?

Day Three and Floor - The Hawaiian Islands - Tectonic Plate Movement - Worksheet #2

This activity is based on "Lab 4-4: Origin of the Hawaiian Islands" in Osmun, Vorwald, and Wegner, *Explorations in Earth Science*, UPCO, 2001.

A world or Pacific Ocean Map would help with the introduction to the lab.

A simple but effective demonstration to help the students visualize the relationship between plate movement, a hot spot, and volcanic island formation uses a caulk gun, hot glue gun, tooth paste, or Elmer' Glue and screen material or cardboard with holes in it. The squirty material is squeezed up through the screen or cardboard to form an "island." The screen as tectonic plate moves, the hot spot remains stationary, and squirts up into a new spot forming a younger island.

Two graphs are done. One will show a large span of islands over almost 40° longitude. Level 2 and 3 math work will not be done with that graph. The other graph focuses on the Hawaiian Islands. All three levels will be addressed.

Day 5 Plate Tectonics Assessment - Day 5

Administer assessment (Plate Tectonics Worksheet #3).