Module 3: Geology

Topic 1 Application: Isostasy Scientific Investigation

Before you begin the scientific investigation, make sure to download the Isostasy Scientific Investigation Report. As you complete this scientific investigation, fill in any needed information on the report template. If you need more information about each section of the report, please visit the Developmental Module.

Introduction

The Earth is made of four main layers: inner core, outer core, mantle, and crust. The Earth's crust is in isostatic equilibrium, or balance with the mantle. According to Archimedes' Principle, the ocean crust and continental crust will sink only by adding material to them.

Objectives

In this scientific investigation, you will:

- examine the forces involved in isostasy.
- observe the effect of mass on a floating object.

Hypothesis

Using the Procedure and Data Collection section below, read through the procedural information for this scientific investigation. Based on your understanding of the procedure, develop your own hypotheses which describe your expected results. Specifically, how do you think the addition of pennies will affect a floating block of wood? Record your hypotheses in the Hypothesis section of your Towing for Plankton Scientific Investigation Report.

Equipment and Materials

- 2 similarly sized blocks of wood that float but are of different weights (1 heavy and 1 light)
- Large basin (big enough to hold the 2 blocks of wood and 15 mm or about 6 inches of water)
- Towels
- 60 pennies
- Metric ruler
- Permanent marker

Procedure and Data Collection

Investigation Set-Up

1. Fill a large basin with about 15 mm or 6 inches of water.
2. Using the permanent marker, label the heavy block of wood #1 and label the light block of wood #2.
3. Make sure to carefully record all your measurements under the corresponding column for each block throughout this scientific investigation.

Block #1 (Heavy Block)

4. With the label facing up, float Block #1 in the basin of water.
5. Using the metric ruler, measure the amount of wood above the water's surface in millimeters. Record the measurement in the data table row for 0 pennies.
6. Carefully place ten pennies on the surface of Block #1, making sure to balance the placement of pennies so that the wood floats evenly on the surface of the water.
7. Measure the amount of wood above the water's surface in millimeters. Record this new measurement in the data table row for 10 pennies.
8. Add two more pennies, measure the amount of wood above the water's surface, and record each new measurement in the appropriate row.
9. Repeat Step 8 until the wood sinks just below the water's surface or the pennies spill into the basin of water. If this requires more pennies, simply add additional rows to the data table and record your results accordingly.

Block #2 (Light Block)

Repeat steps 1-9 above with the light block of wood (Block #2). Record your measurements in the appropriate data table and row.

Data

Use the data table provided in the Data section of your Isostasy Scientific Investigation Report to record your data from this scientific investigation. The required information and the data table are also shown below:

Sample Block Data Table

Number of Pennies	Inches Above the Water
0	
10	
12	
14	
16	
18	
20	
22	
24	
26	
28	
30	
32	
34	
36	
38	
40	
42	
44	
46	
48	

50	
52	
54	
56	
58	
60	

Data Analysis

In the Data Analysis section of your Isostasy Scientific Investigation Report, provide responses to the following questions. Make sure to completely answer each question.

1. How many pennies did it take for Block #1 to sink? How many pennies did it take for Block #2 to sink?
2. Which block of wood was able to hold more pennies? Why?
3. How do you think this investigation represents the relationship between the Earth's crust and the mantle?

Conclusion

Using the Conclusion section of your Isostasy Scientific Investigation Report, compose three to four sentences describing an overall conclusion based on your data. Were your hypotheses true or false, and how do you know? Use the data and notes that you collected from your experience to form your conclusion. Make sure that you include information that you gained from data analysis to support your conclusion.

Experimental Sources of Error

On your Isostasy Scientific Investigation Report, provide responses to the following questions: Are there any sources of error? If so, what are they, and what could be done to minimize error?

Once you have completed the Isostasy Scientific Investigation Report, please submit your work to the dropbox.