

LAYER CAKE CORE DRILLING
 (Advanced version of Cupcake Core Drilling)

STANDARDS

See summary of National Science Education Standards.

Original: <http://books.nap.edu/readingroom/books/nse/>

Standard Concept	General Standard	Specific Standard	General Standard	Specific Standard	General Standard	Specific Standard
Grade Level		K-4		5-8		9-12
Science as Inquiry (A)	Abilities ... to do ... inquiry	A.1.4.1	Abilities ... to do ... inquiry	A.1.8.1	Abilities ... to do ... inquiry	A.1.12.5
		A.1.4.2		A.1.8.2		
		A.1.4.3		A.1.8.3		
		A.1.4.4		A.1.8.4		
		A.1.4.5		A.1.8.5		
				A.1.8.6		
				A.1.8.7		
				A.1.8.8		
	Understandings about ... inquiry	A.2.4.1	Understandings about ... inquiry	A.2.8.1	Understandings about ... inquiry	A.2.12.3
		A.2.4.2		A.2.8.3		A.2.12.4
		A.2.4.3				
		A.2.4.4				
		A.2.4.5				
		A.2.4.6				
Earth and Space Science (D)	Properties of Earth materials	D.1.4.1	Structure of Earth system	D.1.8.1		
Science and technology (E)	Understanding about science and technology	E.2.4.5				
History and Nature of Science (G)					Science as a human endeavor	G.1.12.3
			Nature of Science	G.2.8.1		



LAYER CAKE CORE DRILLING

(Advanced version of Cupcake Core Drilling)

INTRODUCTION

Trying to “see” what is beneath the surface of the earth is one of the jobs of a geologist. Instead of digging up vast tracts of land, core samples can be taken and analyzed to determine the likely composition of the earth’s interior.

PURPOSE

In this activity students model core sampling techniques that reveal the structure of rocks beneath the surface using a specially prepared layer cake.

MATERIALS NEEDED:

- 2 pkgs White Cake Mixes
- 1 pkg Chocolate Frosting
- 1 Rectangular foil baking pan
- Food Coloring (blue, red, green yellow)
- Plastic Transparent Straws
- Graph Paper
- Colored Pencils (black, blue, red, green yellow)
- Rulers
- Paper Plates
- Plastic Forks
- Napkins
- Sharp Knife

PROCEDURE

1) CAKE PREPARATION:

- a) Make layer cake with at least three layers of colored batter.
 - i) Mix 2 cakes mixes together.
 - ii) Take approximately 1/3 of the batter and set aside.
 - iii) Take the remaining 2/3 of the batter and divide in 3 or 4 (depending on number of colors used) small bowl for coloring.
 - iv) Add a different food color to each bowl (make sure it is dark for that color).
 - v) Layer all the batters in the baking pan.
 - vi) Use different patterns and thickness while leaving some areas uncolored.
 - vii) Baking and temperature will have to be estimated.
 - viii) Temperature should be approximately 25 degrees lower than directions and time will be anywhere from 10 to 20 minutes longer.
 - (1) Check center of cake with toothpick for doneness. Toothpick should be clean and sides pulling away from pan.
- b) Once cake has cooled, frost the cake in the pan to prevent showing any of the cake.



2) ACTIVITY:

- a) Provide each student/group with a straw, graph paper, colored pencils and ruler.
 - i) Straws can be cut to a length slightly higher than the cake.
 - ii) Ask the students how they might get more information about the layer cake without peeling the foil back or cutting the cake open.
- b) Determine a coordinate system for straw drill holes (i.e., X, Y); making sure that the coordinate system and the cake are oriented the same and that **North** is indicated. The grid should reflect the rectangular shape of the pan.
- c) Determine a unit of measurement all must use (centimeters or other artificial measure).
- d) Have students/group drill the cake (one per group) and then create their cross-section on graph paper.
- e) Once cross-section has been done and students have discussed the exercise, cut cake and see how the cake compares to the cross-section.
- f) Eat cake.

EVALUATION

- 1) Through this activity, students should be able to answer questions and discuss various answers about the structures of their cakes.
 - a) Does the cross section represent the structure of the whole cake?
 - b) How could the internal structure of the whole cake be represented?
 - c) Which layer comprises the most volume of the cake?
 - d) Predict the locations of the various layers in another “drill hole.” Check the prediction.
 - e) Measure the thicknesses of the layers.
- 2) Relate the model to the real Earth. Discuss how the model is similar to the Earth, and discuss how it is different.
- 3) Students should raise and answer their own questions.

