

## M&M GEOLOGY

### 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.1.8.4	Abilities ... to do ... inquiry	A.1.12.5
		A.1.4.2		A.1.8.8		
		A.1.4.4				
		A.1.4.5				
	Understandings about ... inquiry	A.2.4.2	Understandings about ... inquiry	A.2.8.1	Understandings about ... inquiry	A.2.12.4
				A.2.8.3		
Physical Science (B)	Properties of ... materials	B.1.4.2				
Earth Science (D)			Structure of Earth system	D.1.8.4		



## M&M GEOLOGY

### INTRODUCTION

Geologists study the structure of the Earth. In order to define and determine that structure, geologists must study the types of minerals that make up the various structures of the Earth.

### PURPOSE

Using a bag of M&Ms, students will model the work and study needed to accurately predict the types and quantity of minerals that may be found in a given section of the earth.

### MATERIALS

- One package M&Ms for each student.
- One M&M Geology graph page for each student.
- One box crayons or colored pencils (match M&M colors) available to each student.

### PROCEDURE

- 1) Without opening the M&M bag, each student looks at and feels his/her package of M&Ms and then predicts how many M&Ms are in the package. This number is to be written down on the top of the top graph.
- 2) After predicting how many M&Ms are in the package, the student will predict how many of each color are in the package and color in as many squares on the top graph. (The total number of colored squares should equal the predicted number of M&Ms in the package.)
- 3) When the top graph is finished, the student may open the package of M&Ms and counts how many are really in the package. This number will be placed at the top of the second graph.
  - a) The M&Ms should be charted onto the second graph, according to color, one square per M&M.
- 4) The differences between predicted amounts and actual amounts can be plotted on the bottom (third) graph.

### EVALUATION

- 1) Collections of minerals define the rock types. In a stratigraphic layer, is it expected that the types of minerals will be found in random assemblages?
- 2) Within a group of various layers, how might types of minerals be distributed?
- 3) Compare this model with an actual distribution of minerals within a rock that has large enough mineral crystals to be readily distinguished, such as a granite or gneiss.
- 4) How does this model compare with actual rock layers and mineral assemblages?
  - a) How is this model different from geologic samples?
  - b) How is the model similar to geologic samples?
  - c) How might information such as this be used to define rock types?



## TEACHER TIPS

- Students will be surprised to see the differences in the predicting and the reality of the package contents.
- Students can now use the vertical bar graph to chart their prediction beside the actual contents.
- The white 'M' stamp on each piece of candy is made from a pigment derived from titanium dioxide (the mineral, rutile).
- Other types of candy can also be used, such as: Sweet 'n Fruity, Skittles, Dots, Chiclets (tiny size), etc.

## OPTIONS:

Assign a specific mineral to each color with a value and have the students determine the value of their M&M's based on their research of current market value. Have students play Birdseed Mining as a follow-up.



## M&M Geology

<b>I think there are _____ M&amp;Ms in the package.</b>													
Blue													
Brown													
Green													
Orange													
Red													
Yellow													

<b>There are really _____ M&amp;Ms in the package.</b>													
Blue													
Brown													
Green													
Orange													
Red													
Yellow													

<p><b>This graph shows the difference between my prediction and what was really in the bag.</b></p>													
	Color												
	<b>Blue</b>	<b>Brown</b>	<b>Green</b>	<b>Orange</b>	<b>Red</b>	<b>Yellow</b>							



## M&M Geology

<b>I think there are _____ in the package.</b>													
color:													

<b>There are really _____ in the package.</b>													
color:													

<p><b>This graph shows the difference between my prediction and what was really in the bag/package.</b></p>													