

## Chemical Weathering

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### **Purpose:**

This model shows the effects of acid rain on four different rock types. Users will be able to visually see the effects of chemical weathering on rocks. The model shows the effect of three different variables. Users can change the rock type, concentration of the rainfall, and terrain uniformity.

### **How it Works:**

As rain falls in the model, the rock selected begins to change color signifying weathering. Based on the rock type selected the weathering process speeds or slows down due to the rocks various characteristics. The model can also show the effect of acidity of the rain that falls. As the acidity increases the rate of weathering also increases. The third variable of terrain uniformity switches between a bumpy surface and a smooth surface. The smooth surface will weather uniformly, while the bumpy surface will weather faster at higher elevations and slower at lower elevations.

### **How to Use it:**

First the user must select a rock type using the chooser on the interface, a concentration of rain acidity using the slider on the interface, and turn on or off the bumpy surface using the switch on the interface. Then the user should select setup to place selected variables in the world. Once the world is set up with desired specifications, the user can press Go to start the model and keep the model running continuously or the user can press Go Once to see the model move tick by tick.

## **NYS Standards**

### **Earth Science:**

Standard 4 –Performance Indicator 2.1s:

Weathering is the physical and chemical breakdown of rocks at or near Earth’s surface. Soils are the result of weathering and biological activity over long periods of time

Standard 6- Key Idea 2:

Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.

## **Chemistry:**

Standard 6 -- Key Idea 2:

Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.

2.2 Collect information about the behavior of a system and use modeling tools to represent the operation of the system.

Standard 4 -- Performance Indicator 3:

3.1ss The acidity or alkalinity of an aqueous solution can be measured by its pH value.

The relative level of acidity or alkalinity of these solutions can be shown by using indicators.

3.1tt On the pH scale, each decrease of one unit of pH represents a tenfold increase in hydronium ion concentration.

3.1xx In the process of neutralization, an Arrhenius acid and an Arrhenius base react to form a salt and water

## **Algebra I: (if leaning towards Earth Science)**

F-LE.A.2

Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F-LE.A.3

Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

## **Algebra II: (if leaning towards Chemistry)**

F-LE.A.4

For exponential models, express as a logarithm the solution to  $ab^{ct} = d$  where  $a$ ,  $c$ , and  $d$  are numbers and the base  $b$  is 2, 10, or  $e$ ; evaluate the logarithm using technology.★