Virtual Water Testing and Treatment
http://www.glencoe.com/sites/common_assets/science/virtual_labs/CT04/CT04.html

Name: _____

Suppose you were hiking along a stream or lake and became very thirsty. Do you think it would be safe to drink the water? *In many cases, it wouldn't.* Each source of fresh water on or beneath Earth's surface is affected by contaminants. Though the sources of these contaminants are varied, all can make water unfit to drink if they are allowed to increase beyond safe limits. The most common water contaminants are:

Acidity: The pH scale is a measure of acidity in water and other substances. Water with a pH reading of zero to six, or acidic water, is **unsafe to drink and can corrode metal pipes**. The most significant environmental impact of a high or low pH level is that it **<u>can magnify the effect of other contaminants.</u>**

Bacteria: *Coliform bacteria* and other microorganisms are found in the **fecal matter of warm blooded animals and humans.** This bacteria is most commonly found in lakes, rivers, and ponds, but can seep into groundwater supplies. When coliform bacteria are present in your drinking water, your risk of contracting a water-borne illness is increased.

Metals: Copper and Iron are two of the more common metal contaminants found in water supplies. An overabundance of copper and iron can cause water to be discolored and foul-tasting. **Liver damage** can also be traced to unsafe levels of metallic contaminants in water. Most copper and iron contaminants enter the water supply through rusty and corroded pipes. However, metallic contaminants can also enter groundwater through erosion as the water travels through layers of rock and minerals.

Nitrates: Nitrates are a form of nitrogen found in **animal wastes, chemical fertilizers and food preservatives.** Found in both surface water and groundwater, nitrates enter the water supply *through surface runoff from farms and from leaking household septic tanks*. Nitrates pose little threat to humans, but an **overabundance of nitrate can kill fish and other aquatic creatures.**

Pesticides: Pesticides and herbicides are manufactured chemicals that are used to kill weeds, molds and insects. Carbofuran and Alachlor are examples of common herbicides used in agriculture. **Surface runoff can introduce pesticides and herbicides into the water supply.** *In concentrated amounts, these substances can cause a number of health problems, including anemia and liver and kidney disorders.*

Directions: In this virtual lab, you will test a variety of water samples, then you will determine how to treat the water samples to make them safe to drink.

Procedures:

1: Click the **right and left arrows** to *select a body of water to analyze*

2: Click **TEST** to test the water sample.

3: Look at the results of the water analysis to ***identify which contaminants exceed the safe limits***

4: Click the tabs to ***find information on how to treat each contaminant***

5: Enter the **contaminant and treatment information** into the table

6: Click **GO TO TREATMENT** to go to the treatment screen

7: Use the information in the table and click the wheels on the valves *to add chemicals or additives to the water sample*

8: Click the **TREATMENT SWITCH** to start treating water. *The safe/unsafe sign will indicate whether the water is safe to drink*

9: If the water is safe to drink, use **RETURN TO LAB** to go to the lab screen and test another water sample

Data Table:

Water Sample	Acidity pH	Metals (mg/L)	Coliform Bacteria (ml)	Pesticides Herbicides(mg/L)
City				
Lake				
Mountain				
Rural				
Well				

Nitrates(mg/L)	Type Of Contamination	Treatment

Data Analysis/Questions:

1: What contaminants were found in the surface water samples? What contaminants were found in the groundwater samples?

2: Why might groundwater and surface water have different contaminants?

3: Generally, farmers do not farm and industries do not build factories on the sides of mountains in remote wilderness areas. These areas are usually not highly populated by people. What might explain the high nitrate level in the mountain water in this activity?

4: What is pH level, what are its characteristics and how does it contribute to pollution? What chemicals are used in treating low pH levels?

5: Water in an old building, tested recently, showed high copper and iron content, and low pH levels. A water reading taken 20 years before showed low pH levels, but only minimal traces of copper and iron. If none of the new buildings on the same street showed signs of metallic contaminants, but all reported lower than normal pH readings, how might these readings be explained?