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Geology and Connecticut

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INTRODUCTION:

Geology, the study of the Earth, has not received much attention in the science curriculum. This unit will not only satisfy this need but include the AAAS benchmarks for science and technology. As we know, intelligent earth management decisions must be made in the future so it is important that we make the individual aware of the importance of conserving natural resources.

This unit is using geology as the focal point to become technologically proficient while using area resources, whenever possible, as a motivator for instruction. Researching New Haven and Connecticut geology is now part of the curriculum and this unit will cover these demands.

We must make the student aware that the earth has undergone changes in the past, is still undergoing changes and will continue to change into the foreseeable future.

The unit will begin by doing an activity that helps to demonstrate the “Big Bang Theory” as the origin of the Universe. This will be followed by another activity that helps to show how the sun and planets formed from these dust and gas particles. The video “A World Is Born” is an animated video that the students seem to be able to relate and enjoy as part of this introductory sequence.

We will study some of the basics in physical geology using videos, computer lessons, readings and the Internet. Performance Task Assessment List will be used to give students direction and a clear understanding of what is expected to be achieved.

I. Division of the earth.

Although we will not go into great detail at this time about the atmosphere, the student should be aware of some atmospheric phenomena that affect the physical earth.

The atmosphere moderates the heat around the world, exerts pressure on the surface of the earth, and because of these differences in pressures and temperature , winds of varying force are created. These factors effect weathering and erosion which in turn help determine various features on the earth.

As with everything else, the atmosphere has undergone changes in the past but, probably because of man, it

has undergone the fastest changes in the last two hundred years. This again is why I choose to mention the atmosphere at this time. If we are aware of the need to use these natural resources wisely and learn ways to prevent unwanted pollutants from entering our environment, we will be able to help our environment continue to use its self-cleansing ability for a more stable environment.

The hydrosphere is another important feature of the earth that needs to be discussed briefly at this time. Water, known as the "Universal Solvent," dissolves more substances than any other single substance. Because of this and other forms of energy like waves etc., water plays an important part in shaping physical features of our earth. This might be a good time to introduce or reintroduce the water cycle. Have the students set up a distillation experiment. Let them distill a salt water solution and taste the water before and after distillation. This not only makes them aware of the movement of water in our closed system but , it gives them an opportunity to understand why the oceans are "salty."

Although water covers nearly 75% of the earth's surface, when compared to the total earth, it really is a small amount.

We know that water is called the "universal solvent." This means that it can dissove more materials than any other know substance. Our concern, with this unit, is industrial wastes which includes heavy metals and other industrial contaminants that must be prevented from entering our water supply.

Earth is a "closed system" which means that almost nothing new can impact our system. This makes it important for us to decide how to use this resource and others wisely as well as safely.

Earth's Interior

The earth is like an egg. The shell of an egg can be compared to the thin outer crust of the earth. We are interested in knowing about the crust for various reasons, one being that we live on the crust and must learn how to use the resources to their maximum potential to support life forms.

The mantle can be compared to the white of an egg. No one has ever drilled into the mantle although project "MOHO" attempted to accomplish this feat but ran out of funds to support the project.

The egg yoke is similar to the core of the earth. Our earth has a outer and inner core but for our purposes at this time, the comparisons will be satisfactory.

Really want to see what internet resources can be used for the main thrust of the unit. To be developed.

- II. Minerals
  - A. Definition
  - B. Formation
  - C. Identification
- III. Rocks
  - A. Igneous
    1. Definition
    2. Formation
    3. Identification
  - B. Sedimentary

1. Definition
2. Formation
3. Identification

C. Metamorphic

1. Definition
2. Formation
3. Identification

IV. Rock Cycle

V. Erosion

A. Gravity
B. Wind
C. Running Water
D. Glaciers
E. Waves

V. Plate Tectonics

VI. Geological Features of Connecticut and their Importance.

VII. Computer Activities

Lesson 1:

PURPOSE:

This activity will review the use of the single pan balance and introduce the overflow can to find specific gravity.

GOAL:

Upon completion of this activity, 95% of my students will be able to use specific gravity as a way to help identify minerals.

PROCEDURE:
1. Review how to use the single pan balance.
2. Demonstrate how to use the overflow can.
3. Break the class into groups of 3 or 4 students. Give each group a set of 5 minerals and a mineral identification sheet that shows the specific gravity.
4. Hand out the Performance Task Assessment List Data Table and have group make a data table.
5. Find the specific gravity of each mineral.

APPLICATION:

1. Record results on data table.
2. Have the students compare their results with those found on the chart. 3. Use the percent error formula for thiscomparison.

EVALUATION: PERFORMANCE ASSESSMENT LIST

1. The data table carries the appropriate date.
2. An appropriate title for the data table is provided.
3. The information on the data table columns is appropriately organized and labeled.
4. Units of measurement for all variables are clearly indicated.
5. The data have an appropriate number of significant figures
6. Accuracy of the data is appropriate to the measuring equipment or instrument being used.
7. Data from multiple trials are clearly shown.

Lesson 2:

PURPOSE:

The purpose of this activity is to compare cooling rate to crystal size.

GOAL: Upon completion of this activity, 85% of the students will be able to explain the difference in crystal size between intrusive and extrusive rocks.

PROCEDURE:

1. Break students into groups of 3 or 4 students.
2. Have students view different igneous rocks using a hand lens or some other form of magnifier.
3. Have the students list what they observe for each rock.
4. Activity: Melt sulfur in a pyrex test tube. Place some of the melted sulfur in water and leave some in an open area to cool and harden.

APPLICATION:

1. After cooling and hardening, have the students use a magnifier and examine the crystal size of each sample.
2. Have each group devise a list for determining if rocks were formed intrusively or extrusively.

EVALUATION: PERFORMANCE TASK ASSESSMENT LIST

1. Observations were made safely using all appropriate senses.
2. Uses appropriate tools and materials to make observations.
3. Avoids personal opinions, conclusions, or inferences while making observations.
4. Data are recorded and organized appropriately and neatly.

Lesson 3:

PURPOSE:

To investigate the effect of surface area on weathering.

GOAL:

Upon completion of this investigation, 85% of the students will be able to explain the relationship of exposed area to weathering.

PROCEDURE:

1. Obtain two pieces of chalk of equal lengths.
2. Break one of the pieces into smaller units.
3. Place the unbroken piece of chalk into one of two plastic cups. Into the other cup, place the broken pieces.
4. Pour enough vinegar into each cup to cover the chalk.
5. Observe.

APPLICATION:

Answer these questions.

1. Did breaking the chalk change the surface area?
2. If so, which has the greater surface area? Why?
3. What kind of weathering is taking place with the vinegar and the chalk?
4. Did the chalk in both cups weather at the same rate? Why or why not?
6. Formulate an hypothesis about surface area on weathering.

EVALUATION:

Performance Task Assessment

1. The hypothesis is a simple declarative statement that reflects the observations.
2. Predictions emerge from the hypothesis.
3. The predictions are useful in crafting experiments.

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