

SALTY SEA SCIENCE-MARITIME MUSEUM OF B.C.

WATER WONDERS MODULE

Synopsis of Salty Sea Science Program:

The Salty Sea Science Program is designed to introduce basic marine science principals to school students through hands-on experiments and problem solving exercises. The overall program is set out in a series of modules that cover a wide range of themes that have curriculum linkages for both Elementary and Middle School applications. The intent is to offer these modules incrementally as they are developed, with the first module, Water Wonders, exploring the unique nature of water.

Overview of Lesson: ‘Water Wonders’

“Water, water everywhere, nor any drop to drink”

This line from the *Rime of the Ancient Mariner* by Samuel Taylor Coleridge is both evocative and appropriate for the current state of water in the world. Coleridge was talking about thirsty sailors being surrounded by undrinkable salt water, but it could also relate to water use and abuse throughout our planet. After all, 70% of earth is water, but 97% of that is salty.

The Water Wonders module highlights the near magical properties of water and illustrates its paramount importance to life on this planet. Although the program looks at the make-up of water in general, it focuses on salt water, exploring the cause of salinity, water density and buoyancy, and how these are impacted by temperature. Participants in this program will explore this water thematic though participating in a series of hands-on basic experiments offered up in a light hearted and accessible manner by the Maritime Museum’s resident sea scientist, Master Brine. Our goal is to make science engaging and non threatening, and to encourage the students to want to learn and explore their own natural world.

Program Duration:

The program is 90 minutes in length, but is flexible enough to fit into other time slots if desired.

Rationale:

Knowledge of the natural world is fundamental for understanding how we humans fit into it and what impacts we have upon our environment. A key element to this understanding is the study of the physical, earth and life sciences. The Salty Sea Science Program aims to engage students in the uncovering the basic principals of marine science and to be a catalyst for ongoing learning.

Learning Objectives:

The participants will: (for overall Salty Sea Science Program)
discover and understand selected marine science principals
realize that science is fun and approachable
recognize that science is relevant to ones daily life
appreciate that the health of the marine world is important to all
know that they can solve problems

The participants will understand: (for Water Wonders Module)
the 3 states of matter (liquid, solid and gas)
that water is found naturally in all 3 states
that water can change to all 3 states and be reversed
the importance of water to life on earth
the extent and present state of water on earth
the reason for and special nature of salt water (salinity)
the principals of density and buoyancy
the effects that temperature has on water

Curriculum Linkages:

It is expected that students will:

Grade K-1:

Differentiate between solids, liquids, and gases.

Demonstrate changes in properties of matter when heated or cooled

Grade 2-3:

Describe the 3 states of matter

Distinguish changes in matter that cannot be readily reversed and those that can

Grade 4:

Compare and contrast fresh water and salt water environments

Describe human impact on earth's water resources

Grade 6:

Demonstrate chemical and physical changes in matter

Program outline:

Overview:

The Water Wonders module is set out in a series of linked components, starting with a general overview and introduction to our water based world, followed by a more in-depth exploration of the unique nature of both fresh and salt water, continuing onto a series of interactive experiments to illustrate basic science principals, and finally a message reinforcing wrap-up.

Introduction:

The program first introduces the students to water, the most common substance on earth. It outlines what water is and its importance to all life on planet earth. It is intended to get the class thinking about water as something more than the stuff that comes out the tap.

The Nature of Water: Fresh, Salty and In Between

This section expands upon the introductory comments to further explore the nature of water in all of its many forms. Students will appreciate what a unique substance water is and how it is found in three forms; liquid, solid and gas. This then segways into a discussion of the extent of water on our globe and the marvelous perpetual system that the water cycle represents. Students will be encouraged to think about the impacts of human waste and pollution of our essential resource. To conclude this section, the focus will shift to salt water and why the oceans are salty.

Experiment Time:

Students will participate in a series of kitchen sink experiments that illustrate basic water oriented science principals. Each of the experiments applies practical knowledge and provides support for the various thematic elements associated with water.

a) Salinity

The origin and reasons for salt water will be explained, focusing on erosion, surface runoff, evaporation and freezing.

b) Buoyancy

Students will be introduced to the principal of buoyancy and appreciate how it impacts their world, from their own experiences in the swimming pool, to the design of ships, and even how submarines work.

c) Density

Liquids and solids on planet earth all have varying densities. In the case of water, its salinity and temperature impact upon its density. Students will experiment with density and see how water can float on water.

d) Temperature

Water changes in form depending upon temperature. Students will learn how water becomes a solid when frozen (and can reverse when

melted), then becomes a vapor or gas when boiled, and becomes liquid again when the vapor or gas is cooled.

Wrap-Up

The practical knowledge covered throughout the presentation will be briefly reinforced. Students will be invited to comment upon what they have experienced and if they will now look at water slightly differently. The overall intent of the program is to underline what water is, its special attributes in all forms, and to encourage the students to act as stewards for this essential resource.

Pre and Post Visit Study:

There are a large number of very informative web sites that cover general science subjects and suitable projects for various school grades. In addition, there are more specific sites that focus on ocean and marine science