Sunken Treasure

(GPN # 70)

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Program Description: What could be left of a ship that sank in 1622? Video footage shows many treasures and artifacts found by divers who located the Atocha, the ship which is the subject of this show's feature book.
To explore the subject of sunken treasure further, Dr. Robert Ballard, who located and explored the Titanic—the most famous shipwreck in history—shares the technology he used in his search.

All That Glitters

Key Words: gold, tarnish, rust, corrosion, chemical reaction, metal

Concept: Gold does not tarnish or rust because it does not undergo chemical reactions as easily as many other metals.

Throughout history gold has been highly valued. Its value is enhanced by the fact that it stays shiny when other metals rust or tarnish. Rust and tarnish are caused by corrosive chemical reactions which can ruin metals. Because salt water promotes corrosion, non-gold sunken treasures are at risk. See how salt water affects metals.

Materials: Cups, tablespoons, salt, water, bowls, sets of shiny coins, paper towels.

1. Arrange one set of shiny coins (include a quarter, dime, nickel and penny) on a paper towel in a bowl. Repeat this in the other bowl.

2. Mix two tablespoons of salt in a cup of water. Pour enough of this salt water into one bowl to soak the paper towel and surround the coins, but not to cover them. Soak a second paper towel with salt water and place it over the coins.

3. Repeat Step 2 using unsalted water with the other set of coins.

4. In a day or two, the coins covered with salt water will have corroded while the ones in unsalted water will still have a shine.

Science Note: Corrosion happened quickly in this activity because the paper towels kept the coins damp but also allowed oxygen to reach them. Oxygen, which is necessary for corrosion, is less available in the deep ocean, so corrosion takes longer. Over many years, sunken treasure made of most metals will corrode, but those made of gold never will.

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EPISODE #70 SUNKEN TREASURE
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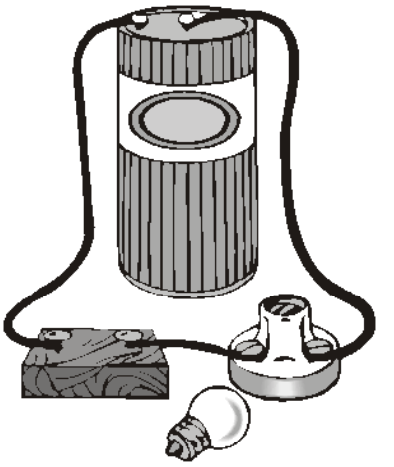
Metal Detectives

Key Words: properties, iron, magnetic, metal, conduct, electricity



Concept: Metals can be detected by their ability to conduct electricity.

Metal detectors work by making use of the special properties of metal. Some metals, especially those that contain iron, are magnetic. Metals also conduct electricity. Build this simple metal detector and test these properties.

Materials: Battery, three wires, flashlight bulb, tape, socket (or two paper clips, aluminum foil, and a small piece of cardboard), clay or sand, a variety of small metal and nonmetal objects: e.g., coins, marbles, acorns, plastic and metal bottle caps.

1. Build a simple circuit using wires, socket* and bulb. Tape an end of one wire to the top of the battery and an end of a second wire to the bottom. Connect the end of one of these wires to one side of the socket and connect an end of the third wire (the one not yet used) to the other side of the socket. When the two remaining loose wire ends touch, the bulb will light.

2. To use this circuit as a metal detector, begin by covering several small metal and nonmetal objects with clay or sand so that they cannot be identified. After reviewing how the bulb lights when the wires touch, show students that the bulb will also light when both wires touch the same metal object. This will not happen when the wires connect with most nonmetals. Have students take turns testing the metal detector on the hidden objects.

* To make a socket, push the light bulb into one loop of a paper clip so that the clip is up to the collar of the bulb. Cover another paper clip with a small piece of aluminum foil. Hold the second paper clip so that the aluminum foil touches the metal end on the bottom of the bulb. Sandwich the small piece of cardboard between the paper clips and tape all three together. The cardboard will keep the paper clips from touching.

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Breaking the Surface

Key Words: buoyant force, lift, heavy, submerge

Concept: Water exerts a buoyant force on a submerged object.

Lifting sunken treasure above the surface of the water is a challenge. Because water exerts a buoyant force, an object will feel lighter in the water than in the air. Therefore a diver who is able to lift a heavy object to the surface, may not be able to lift it out of the water. This buoyant force can be experienced without going diving.

Materials: Small heavy objects (e.g., coins, washers or marbles), plastic netting or pieces of nylon from a stocking, paper clips, thin rubber bands, tub of salt water (2 tablespoons of salt to each quart of water), rulers.

1. Cut a thin rubber band so it's a single strand and tie a paper clip (bent open in the shape of a hook) to it.

2. Have each group of students wrap several heavy objects in netting or nylon. Attach the net to the paper clip hook.

3. ave students in each group suspend the heavy objects in a tub of water and measure the length of the rubber band.

4. Then have them lift the objects out of the water and measure the length of the rubber band.

5. Discuss how the buoyant force impacts on lifting heavy treasures out of the ocean.

The rubber band is shorter when the object is submerged because water pushes up on the object (this is the buoyant force) and the object feels lighter. The rubber band is stretched longer by the same object when it is out of the water because there is no buoyant force to counteract the weight.

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Grid Work

Key Words: grid, document, reconstruct

Concept: Carefully documenting a site allows others to understand how objects were arranged.

Before the objects in the Atocha were moved, the site was marked off by a grid and each section was carefully documented—illustrated, photographed and labelled—so the records could be used to reconstruct the site. Try this technique of using a grid and creating a numbering system for reconstructing a drawing.

Materials: Grid paper, pencils, crayons, scissors.

1. Give each student a sheet of 2 cm (or 1 inch) grid paper to create a drawing of a sunken ship or underwater landscape which will be coded and then cut apart for reconstruction.

2. When the drawings are finished, students can create a numbering system to code each square of their pictures. Then have them cut their pictures into the individually coded 2 cm. squares.

3. Students can trade their sets of squares with other students who then have the challenge of reconstructing the drawings by using the numbering systems. After giving students a chance to decode the numbering systems and reconstruct the pictures, they can discuss how they numbered their drawings.

4. As a class, discuss the importance of having a coding system that is understandable, especially when it is used for record keeping, so others can understand and use it.

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Giving Treasure a Lift

Key Words: equipment, device, design

Concept: Devices can be designed to help us do work.

Modern diving equipment makes it possible to raise most shipwrecked treasure. Still, some ships have sunk in water too deep for divers—so devices have been created to retrieve the treasure. Design a treasure-raising device.

Materials: Large tub or bucket, water, several objects that sink, a variety of materials to create lifting devices: e.g., cups, paper clips, string, fishing line, corks, plastic.

1. Put several non-floating objects into a tub of water and challenge students to use available materials to design devices for lifting objects ("treasure") from the bottom of the tub.

2. Students can work alone, in pairs, or in small groups to construct and test their designs. They may need to adapt their original designs to make them work successfully.

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