

DCM Exhibitions – Staff Training Materials

Solve It! (PART B) [Mystery Town Scenario]

Exhibition Particulars:

- Unlike other exhibitions in the Museum, *Solve It!* has a **brief orientation video** for visitors (it's just over two minutes long). It is *highly recommended* that people stop to watch this because it “sets up” the scene, describes the nature of the mystery and explains the visitor’s role.
- Visitors use **Field Notes** as a guide through the exhibition and also as a place to record their findings/answers. Visitors pick up a copy of the Field Notes sheet in the Orientation area. **[NOTE: Staff assigned to this exhibition should be familiar with the Field Notes as well as all questions & answers.]**
- The Field Notes sheet contains **color-coded questions** that correspond to large labels and activities in the exhibition (see below). **Labels with black borders** contain information about additional activities that are not on the Field Notes but are still related to the overall mystery.
- There are **six touch-screen computers** in the exhibition. Four of these are general Lab Stations that visitors can use to do further research, look up an unfamiliar term, get “help,” or file their final report. Two of the general Lab Stations are in the Lab area in the center of the exhibition, and the other two are in the Supply Warehouse and the Silver Peak Entrance structure. The other two touch-screen computers address specific topics and are in the Lab area. One features a “missing persons” database and one features an “object identification” database. **[NOTE: These computers contain a significant amount of background information relevant to the scenario. Staff assigned to this exhibition should be familiar with their content.]**
- **The exhibit is non-linear.** Visitors do not need to interact with exhibit components in any particular order. Although visitors will probably tend to start at the top of the Field Notes and work their way down from there, beginning with the first question at the top *is not* a requirement. Sometimes, information gathered from two or more activities will be used to determine an answer. In these cases, all activities will eventually need to be completed at some point during the visit.

Component Descriptions:

A. Orientation Video [Location: Exhibition entrance]

This is a brief orientation video that introduces the scene to visitors and explains their role as investigators. Two actors whose characters are based on the context of the scene engage visitors and describe the situation. Visitors learn that they are forensic investigators who have been called to the site of an abandoned town to investigate the discovery of a human skeleton and the presence of a very large, unidentified object. Visitors are asked to figure out what the place was, identify the skeleton, determine the origin of the mysterious object and submit a report.

Following the video, visitors pick up a copy of the Field Notes to take with them as they explore the exhibition.

Engagements Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Encourage visitors to watch the 2-3 minute orientation video. Ask them to predict who the person of interest may be, and what may have happened to the person.
- Distribute the Field Notes and writing utensils to visitors to aid them in their investigation.
- Remind visitors that the Field Note prompts do not need to be followed in a linear fashion; they may be solved in any order.
- If visitors opt out of viewing the brief orientation video, staff members may provide a recap of the video content, and assist visitors with questions related to exhibit content.

[Note: Questions in italics below are “answered” through visitors’ interactions with certain components throughout the exhibition. Questions appear in Field Notes and in area labels.]

B. *When was this site active?* [Location: Supply Warehouse]

Evidence Dating

Visitors sift through loose material in the dig pit to find various objects related to the scene: nails, mining tags, white rocks and yellow rocks. The nails are pictured on a label featuring a timeline of when different types of nails were used in construction. Visitors match the nails they’ve found to one of the types shown to determine the time period for the nail. They circle the answer in their Field Notes.

Stratigraphy

Stratigraphy is the study of layers in the earth. Layers that are farther away from the earth’s surface are older than layers closer to the surface. When objects are found in different layers of the earth, the position of the layer provides information about when objects were left there.

Visitors match the mining tags they’ve found to images of objects in the stratigraphy chart. They circle the time period of the mining tags in their Field Notes. This answer, together with the one from Evidence Dating, can be used to answer the question: *When was this site active?* The overlap between the two sets of dates is the correct answer.

These two activities highlight different ways of determining when objects were in use and, therefore, understanding when a particular site was “active” or populated.

*** Additional Activity** [Location: Crawl Space underneath Town Office]

Visitors can crawl through a tunnel-like space underneath the Town Office to the Supply Warehouse and back again. Inside, they’ll discover an object related to the overall scene. They can write a description of what they see in their Field Notes. The activity helps illustrate the idea that investigators need to look *everywhere* for clues because they’re not always out in the open.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.

- Encourage visitors to explore through open ended questions. Using open ended questions promotes critical and self-directed thinking. Example of open ended questions: *What did you find? What do you think it was used to accomplish?*
- Offer magnifying glasses to visitors so they may closely observe details of objects discovered in the dig pit.

C. *What evidence is found here?* [Location: Supply Warehouse]

Evidence Sorting

Visitors sift through loose material in the dig pit to find various objects related to the scene: nails, mining tags, white rocks and yellow rocks. Visitors then sort the objects into different containers and determine which object is found in the greatest quantity. This is another method of organizing and analyzing the evidence that is gathered. Investigators can theorize about the purpose or function of a place based on objects found there in large quantities.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Use minerals available as tools for engagement to further accompany ideas of archaeology, geology, and geography.

D. *What is this material?* [Location: Supply Warehouse]

Density Calculation

Density is the amount of material (mass) in a certain space (volume). Even when objects are about the same size, they can have different densities. By determining the density of a material, investigators learn more about what a substance could be and how it fits into the scene or time period.

Visitors bring yellowish rocks from the Dig Pit to this station and determine their density by following a four-step process: find the mass, measure volume without rocks, measure volume with rocks, solve the equation. Visitors weigh the rocks and then measure their volume through a displacement method using sand in a container. Using their data, visitors solve the equation ($\text{mass} \div \text{volume} = \text{density}$) and determine whether the material is pyrite or gold. They circle the answer on their Field Notes.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Use Informational packets to further discuss concepts of mass, volume, and density.
- Use the periodic table of elements to illustrate different densities between substances.
- Take out a piece of sponge and have visitors compare it to the countertop. Ask visitors what differences they notice between the two materials, and what they think might be happening at the molecular level.

E. *What is this mysterious object?* [Location: In open area, across from Lab]

In the center, open area of the exhibition is a large, “unidentified” object. It has an odor, it’s making faint noises, and it has symbols on it. This is a piece of the “puzzle” in the scene that visitors investigate.

Using smell, sound and decoding activities, visitors gather information about the object to determine what it is.

Smell Identification

Odors can be clues! A smell is coming from an “X” on the large object. The label for the activity illustrates how investigators smell odors safely. Visitors “waft” the odor to their noses to smell it. They then try to match what they’ve smelled to one of the four sample odors provided. They circle the answer for the match on their Field Notes.

Sound Identification

The large object is also emitting a sound. Visitors listen carefully to a combination of long and short beeps, jotting the pattern in their Field Notes. Using the Morse Code Key on the activity label, they match each sound with a letter, decode the word and write it in their Field Notes.

Morse code: Morse code is a method of transmitting letters and messages using electronic pulses. By listening to the combination of short and long beeps, a skilled Morse code operator can understand and translate the sounds into letters. Before phones and digital technology, Morse code was the most common way to communicate over long distances.

Each character (letter or numeral) is represented by a unique sequence of dots and dashes. The duration of a dash is three times the duration of a dot. Each dot or dash is followed by a short silence, equal to the dot duration. The letters of a word are separated by a space equal to three dots (one dash), and two words are separated by a space equal to seven dots. The dot duration is the basic unit of time measurement in code transmission. For efficiency, the length of each character in Morse is approximately inversely proportional to its frequency of occurrence in English. Thus, the most common letter in English, the letter "E," has the shortest code, a single dot.

[Source: http://en.wikipedia.org/wiki/Morse_code]

Samuel Finley Breese Morse (1791–1872) was an American artist. Morse was inspired to invent the telegraph by a chance conversation while returning from Europe on the steamship *Sully* in 1832. A fellow passenger told him about European experiments in electromagnetism. Morse remarked: “If the presence of electricity can be made visible in any part of the circuit, I see no reason why intelligence may not be transmitted by electricity.” During the rest of the voyage he worked excitedly on drawings for his plan.

Morse had an inventive mind but little knowledge of electricity. Years of work and study were needed to perfect his device. He received practical help from industrialist Alfred Vail, physicist Joseph Henry, and others. In 1837 he applied for a patent on The American Electromagnetic Telegraph. In 1843 the United States Congress appropriated \$30,000 to build a line from Washington to Baltimore. In May 1844 the first message was flashed over this wire.

Newspapers, railroads, and businesses quickly found use for the telegraph. After the founding of Western Union in 1856, wires were soon strung from coast to coast. Other scientists had worked on the problem, but Morse's invention was the basis of the land telegraph systems that developed. The code of dots and dashes used in sending messages is still known as the Morse code in honor of its inventor.

[Source: <http://kids.britannica.com/comptons/article-9275943/Samuel-FB-Morse>]

Decoding

Visitors scan the object for symbols and sketch what they find in their Field Notes. Using one of the general Lab Station touch-screen computers, visitors access the “decoding” function to learn what the symbols represent and record the information in their Field Notes.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Encourage visitors to use their powers of observation to note the different symbols on the mysterious object; they may need assistance finding the correct symbols to translate. The symbols they need to translate are the Russian script inscribed on a panel.

F. *What is in the collapsed tunnel?* [Locations: Silver Peak (Mine) Entrance, Silver Peak Smithville Co. (collapsed tunnel – no entry)]

The Silver Peak Smithville Co. building represents the entrance to a collapsed mine shaft. (**NOTE:** Visitors may not *know* it is a mine shaft yet, so staff should not share this information prematurely.) Since visitors cannot access the space physically, they use a joystick-operated camera in the adjacent structure (Silver Peak Entrance) to see inside the collapsed tunnel. Objects inside the tunnel are clues, but they must be identified first.

Sonar: A method for detecting and locating objects under the ground or under water by means of sound waves. The sound waves are sent out by a device and reflected by any objects that they reach. Those reflections reveal the size and shape of the objects.

Magnetometry: A method used to detect the presence of a metallic object or to measure the strength of a magnetic field. Modern technologies such as magnetometry allow investigators to look underground without having to dig anything up. Since natural materials like rocks, minerals, and soil have varying degrees of magnetism, a magnetometer can measure these differences and produce a picture of what lies beneath the surface. This is helpful in locating buried objects, but also in seeing man-made features such as trenches, walls, or graves. Historical activities like burning also leave magnetic traces that can be detected.

Videography: The process of capturing moving images on electronic media (like direct-to-disk recording, streaming media, etc.).

Object Identification

Visitors use the joystick to view four objects in the collapsed tunnel and make sketches of each in their Field Notes. Using the Lab Station computer for “object identification” in the Lab area, visitors research the objects they’ve sketched and write the names of the objects in their Field Notes.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.

- Provide tracing paper for visitors to trace what they find in the collapsed tunnel.
- Ask visitors why they think investigators would use a camera to search inside the tunnel, instead of finding another way to gain access. Ask them what problems investigators might encounter while using this technology.

G. What was this place?

[Locations: Silver Peak (Mine) Entrance, Silver Peak Smithville Co. (collapsed tunnel – no entry)]

Equipment Identification

There is also a large piece of equipment in the collapsed tunnel, which visitors can see by manipulating the joystick camera at one of the two stations in the Silver Peak Entrance structure. Using one of the general Lab Station touch-screen computers, visitors access the “research” function to learn about what equipment was used here. When they discover what the purpose of the equipment was, they can write the answer in their Field Notes. By identifying equipment, investigators can learn more about what types of activity occurred at a particular site.

Mineral Identification

Visitors see minerals inside the collapsed tunnel and compare them to the samples below the label for this activity. If they see something that matches what they saw in the collapsed tunnel, they circle the name of the mineral in their Field Notes. When investigators can identify a particular mineral at a site, it helps to fill in the blanks about the significance of the site, or how the site might have been used.

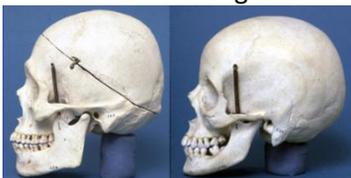
Engagement Tools and Tips:

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Ask visitors to hypothesize what the equipment is made out of and what it may have been used for.
- Have visitors use a magnifying glass to observe the physical properties of mineral samples. Ask them to identify the similarities and differences between the mineral samples. Help them formulate a hypothesis of what the minerals may be used for.

H. Who was this person?

[Location: Lab in central area]

All the activities that are connected to this question are found in the Lab, in the central area of the exhibition. The bone-testing activities are on one side of the Lab and four touch-screen computers are on the opposite side: two are general, two are specific (“missing persons” database and “object identification” database). Visitors may also observe an anatomical model of a male skull. Male skulls tend to be thicker and heavier than female skulls, and their facial bones are more pronounced. Male skulls typically possess a pronounced forehead ridge that is mostly absent in females. These are general observations, of course with humans, diversity in bone structure is prevalent and observational traits can sometimes be misleading.



(Left: Male. Right: Female Note: these images have been provided by Dr. Douglas Ousterhout. Images from the S.R. Atkinson Collection of Human Skulls, University of the Pacific School of Dentistry, Webster Street, San Francisco, California).

Bone Identification

The remains of animals can also provide important information to investigators. Visitors examine bones to determine which ones are human and which ones are animal bones. After matching the bones with one of the images, visitors make an identification and write it in their Field Notes.

Gender

Visitors compare a pelvis bone to a chart to determine whether the pelvis is from a man or a woman, and circle the correct answer in their Field Notes.

Age

The label at this activity provides information about bone density and its relationship to a person's age. Visitors use the chart within the label to determine the age range of the mystery person and circle it in their Field Notes.

Height

Completing this activity enables the visitor to learn the approximate height of the mystery person. Visitors measure the length of the femur, enter it into an equation on their Field Notes, and solve.

Cause of Death

Visitors compare the skull in the Lab with images on the label to determine how the skull was damaged, and what the likely cause of death was. (Visitors should reference what they found in the crawl space as an additional clue.)

Visitors use their answers from the bone activities above to search the "missing persons" database located in the Lab for a match. They can write the name of the person in their Field Notes.

Engagement Tools and Tips:

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Use a skeleton model to show visitors the location of the bones found in the bone identification box.

I. File a Final Report [Location: Any general Lab Station touchscreen computer]

When visitors have answered all the questions on the Field Notes sheet, they may go to any general Lab Station and file their “final reports” to see if they interpreted all the evidence correctly. Feedback is provided if certain answers were incorrect or inconsistent with other evidence.

Engagement Tools and Tips:

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Direct visitors to a Lab station for submission of their Field Notes. Demonstrate where the “Final Reports” icon is located, and encourage visitors to input their Field Note answers.

J. Careers: *What is an Investigator?* [Location: Left of exhibition exit, adjacent to Lab]

As visitors leave the exhibition, they’ll see a large panel to their left with the heading: *What is an Investigator?* This panel features pictures of investigators in the field and highlights four different aspects of their work: fact finders, mystery solvers, team players and education experts. The panel is designed to help visitors connect the activities in *Solve It!* to real-world occupations and to help support further discussion outside the Museum.

Engagement Tools and Tips:

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Ask visitors what career looks the most interesting to them and why. Show them what areas of the exhibit they might enjoy based on their responses.

K. Demonstration Desk (Location: Adjacent to *What is an Investigator?* panel)

The Demonstration desk is a place specifically designed for gallery programming. It is located at the entrance to Solve It near the Hurricane Exhibit, to entice visitors to explore the gallery space that is not clearly visible. Museum staff members are encouraged to frequent the demonstration desk area dressed in “investigative” wear to attract the attention of visitors. The desk serves as an area for ongoing demonstrations and programming, and exploration of relatable gallery materials such as minerals, bones, or fossils. These materials are located within the Solve It support room and may be utilized as tools for engagement and inquiry based interactions.

Engagement Tools and Tips:

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Solve It experience.
- Display various specimens on top of the desk and provide visitors with magnifying glasses, paper and pencils so that they can make and record observations based on what they see and feel.

- Display ecosystem puzzles so visitors can sort plants and animals into their appropriate habitats. Discuss what the plants and animals have in common, and discover their differences together.
- Display different minerals on the desk and provide visitors with magnifying glasses, paper and pencils so that they can make and record observations based on what they see and feel. Provide a piece of glass so that they can test the hardness of the minerals. Ask visitors what they think the name of the mineral may be, or what they would name it based on its physical properties.
- Between facilitated programs, temporary signage and materials are placed in the Demonstration Desk area, to encourage inquiry based learning interactions between staff members and visitors. The Demonstration Desk materials align with the gallery theme, and are carefully selected to enhance the process of hands-on exploration.