

## DCM Exhibitions – Staff Training Materials

### Solve It! -- Mystery Town & Ancient City (PART A)

#### Exhibition Overview:

*Solve It!* is an exhibition about the art of investigation. Unique among the Museum's exhibits, *Solve It!* features changing scenarios over time. These scenarios define the environments in which visitors pursue answers to questions that together reveal a completed puzzle. Designed for visitors ages 8 to 12, *Solve It!* highlights skills central to the processes of fact finding, analysis and theorizing, including evidence sorting and dating, measurement, examination and comparison of objects, density calculation, decoding, and bone identification. Upon entering, visitors watch a brief orientation video during which the specific scenario and mystery are shared. With Field Notes in hand, visitors begin their investigation in various areas of the environment to gather and record their data. Multiple touch-screen computers provide background information on relevant topics, activity "help," and an opportunity to file a "final report." A wrap-up area highlights real-life "job descriptions" of investigators from different fields.

Two distinct scenarios have been developed to date. ***Mystery Town*** was featured when the Museum opened. The *Mystery Town* scenario represents an abandoned mining town somewhere in Nevada. (Visitors *discover* it is a mining town as they gather their data.) Later, a second scenario, ***Ancient City***, replaced *Mystery Town*. The *Ancient City* scenario represents an archeological site in central South America. [***Mystery Town*** = MT, ***Ancient City*** = AC]

#### Target Audiences:

Children ages 8-12 + adults (families), school groups (3<sup>rd</sup> – 7<sup>th</sup> grade)

#### Education & Experience Goals:

- Visitors encounter an immersive environment that 1) represents a particular place and 2) provides the context for a series of questions to investigate. Visitors gather and record data, compare and contrast, research and hypothesize.
- Visitors investigate a thematic "scene" using tools and other resources to gather clues. Data is analyzed in a "lab" setting.
- Visitors utilize six basic science process skills:
  - Observation (the act of gathering information by noting facts or occurrences)
  - Inference (an educated guess about something based on things you know to be true)
  - Measurement (the process used to determine the size, length, or amount of something)
  - Communication (the process by which information is exchanged between individuals)
  - Classification (the systematic arrangement or sorting of items into groups or categories based on similar qualities)
  - Prediction (a statement about what will happen or might happen in the future, based on patterns that have been observed or studied)
- Visitors gather data to answer key questions tied to the scene:
  - *When was this site active?* (MT) / *What type of structure was this?* (AC)
  - *What evidence is found here?* (MT) / *When did people live here?* (AC)
  - *What is this material?* (MT) / *What is this material?* (AC)

- *What is this mysterious object? (MT) / What is this mysterious object? (AC)*
- *What was this place? (MT) / What culture lived here? (AC)*
- *What are the objects in the collapsed tunnel? (MT) / What is in the hidden chamber? (AC)*
- *Who was this person? (MT) / Who is this person? (AC)*
- Visitors work individually or collaborate with friends or family members. Activities support both approaches.
- Visitors analyze their findings and submit “final reports” via computer stations. Opportunities for re-evaluation or further research are highlighted.
- Visitors connect processes and activities to the fields of investigation and archaeology, and have opportunities to learn more about people in these occupations.
- Visitors discuss and reflect on their findings and conclusions with friends, family members or teachers. The experience launches conversations beyond the Museum.
- Staff supports and extends the visitor experience by facilitating educational interactions at individual components and providing guidance where needed.

### Key Takeaway Messages:

- **The big picture is made up of smaller parts.** Investigators and archaeologists must consider *all* the evidence before developing a conclusion.
- **Curiosity and collaboration can solve mysteries.** Perhaps the most important tool investigators or archaeologists have is their own curiosity – it pushes them to find out “*why?*” Working with others (who are equally curious!) to compare data and discuss different theories can lead to answers.

### Appendix A

**IMPORTANT NOTE:** For each of the scenarios, Mystery Town and Ancient City, there are **computer research stations** in the exhibit for visitors to use while they work on solving the mystery. These stations contain a significant amount of background information relevant to the scenario. Familiarizing yourself with this information increases your knowledge of the exhibit and also enables you to facilitate the visitors’ use of the computer stations as they work to answer various questions.

### Background Information:

#### ***Forensic Investigation***

Forensic investigation encompasses any scientific investigation that is used for purposes of the law, such as in a legal proceeding. Forensic investigators apply scientific knowledge and research skills for the benefit of society, public health and public safety. The most well-known application is in criminal-justice proceedings, as in the “CSI” television series. In criminal cases, forensic investigators provide scientifically-based information through the objective laboratory analysis of physical evidence that was collected at a crime scene. In the arena of civil justice, forensic investigation can help to determine the validity of a signature on a legal document, whether companies are complying with environmental law, and whether product-liability claims have merit, for example.

Sources:

**National Institute of Justice, Forensic Sciences**

<http://www.nij.gov/nij/topics/forensics/welcome.htm>

**The Center for Forensic Science Research and Education**

<https://www.forensicscienceeducation.org/>

**Scientific Process**

The Scientific Process, or Scientific Method, sometimes is presented in science textbooks as a step-by-step, linear process. This description is much more simplistic than the way scientific investigation is carried out in practice. Rather than a set of prescribed steps that researchers follow, the Scientific Process is an open-ended series of steps used to investigate a question of interest. All the steps may not be followed, or steps may happen in a different order than traditionally presented in science class.

With those caveats, the traditional steps of the Scientific Process are a) defining a question to investigate; b) making predictions or hypotheses; c) gathering data or making observations; d) analyzing data; and e) drawing conclusions, which often lead to new questions to explore.

Sources:

**Understanding Science: How Science Really Works, UC Museum of Paleontology, University of California at Berkeley**

[http://undsci.berkeley.edu/article/0\\_0\\_0/howscienceworks\\_02](http://undsci.berkeley.edu/article/0_0_0/howscienceworks_02)

**American Museum of Natural History, The Scientific Process**

<http://www.amnh.org/explore/science-bulletins/the-scientific-process>

**Archaeology**

Archaeology is the study of the physical remains of humanity's past. The word "archaeology" comes from the Greek words *archaios* ("ancient") and *logia* ("study of"). Pioneering archaeologists concentrated on the study of ancient objects that were *made* by people (such as homes, tools, weapons and adornments) or *used* by people (such as remnants of animal or plant food). In the 20<sup>th</sup> century, archaeology has broadened to encompass more than the study of objects, and now includes research on societies, religions, economies, arts and technology of ancient cultures. Another development of modern archaeology is an interest in not only *how* cultures may have changed, but also *why* certain changes occurred.

Most archaeologists work for colleges or universities, government agencies, museums, or private research foundations. The work of archaeologists primarily involves collecting, analyzing and making sense of data. Once a site of interest is located, an archaeologist studies its geography, then begins excavating (or digging) at the site. Materials are collected and then analyzed to determine their age and likely culture of origin. The final step is to draft research reports that describe the way of life that existed at the historical site.

Sources:

**Compton's by Britannica, Britannica Online for Kids**

<http://kids.britannica.com/comptons/article-9272936/archaeology>

**Archaeology for Kids - National Park Service**

<https://www.nps.gov/archeology/public/kids/index.htm>

### ***Artifacts***

Think about all the objects you use in your daily life: cell phone, toothbrush, pencil, baseball glove, headphones, just to name a few. These objects say a lot about who you are and what you do. Imagine if you had to get to know someone just by looking at the objects they use each day. This is exactly what archaeologists do when they study artifacts.

Any object made or used by humans is an artifact. This can include tools, clothing, jewelry, artwork, weapons, money, pottery, and more. The main reason archaeologists excavate a site is to discover artifacts for study and analysis. Most of the time the discoveries are little bits and pieces of ancient or historical objects, but on rare occasions archaeologists discover a fully intact piece or extraordinary treasure.

Natural objects such as seeds, pollen grains, or bones are a special kind of artifact because they are connected to human activities. These artifacts are called biofacts or ecofacts.

Objects that are large or impossible to move, such as buildings and wells, are called features. These were made or used by humans, but they are not technically considered artifacts.

Sources:

***Hands-on Archaeology, Eyewitness Series (Book)***

**Archeology for Kids - National Park Service**

<https://www.nps.gov/archeology/public/kids/index.htm>

### ***Ancient Symbols***

Whether cut into stone, written on paper, woven into textiles or carved out of wood, symbols were an important part of many ancient cultures.

In some cultures, such as the Mayan culture of Central America, symbols were a written language. The Mayans had a large and complex writing system used to record history and ideas. These symbols, when studied and translated, provide an amazingly personal look into the everyday lives of these ancient people. Some symbols are like letters, but symbols called logograms actually represent a whole word.

In other ancient cultures, such as the Tiwanaku culture of South America, archaeologists do not believe the symbols have any language meaning. However, this does not mean the symbols are meaningless. Symbols can honor important religious beliefs, track the passage of time, indicate family or status, or exist as beautiful or pleasing designs.

Source:

**Foundation for the Advancement of Mesoamerican Studies**

<http://www.famsi.org/index.html>

***DNA & Archaeology***

DNA (DeoxyriboNucleic Acid) is the material in every living cell that tells the cell how to grow and what to do. For example, DNA instructions tell a heart cell to beat like a heart and an inner-ear cell to listen like an ear. Because every living thing gets its DNA from its parents, DNA also is responsible for passing genetic traits from generation to generation. Though tiny enough to fit in one part of a single cell, DNA can have more than a million parts. These parts are arranged in a unique pattern called a double helix, which looks like a spiraling ladder.

DNA samples can be obtained from mummies and skeletons from different types of tissue including skin, blood, hair, and teeth. The material can be used to learn about family structures, time periods, diseases, and causes of death. For example, DNA provided the scientific evidence to confirm that an unknown Egyptian mummy called KV55 was the long-lost father of King Tutankhamun (King Tut).

Sources:

**Mummies, Companion to Paleopathology**

<http://onlinelibrary.wiley.com/book/10.1002/9781444345940>

**How Forensic Techniques Aid Archeology**

<https://daily.jstor.org/forensic-archaeology/>

***Mummies & Skeletons***

Artifacts are the objects people made or used in the past, but mummies and skeletons are the people themselves. Human remains, as they are formally called, are valuable sources of information for archaeologists. They reveal details about work, health, diet, and nearby resources. Since mummies and skeletons are the remains of actual people who lived before us, archaeologists treat these discoveries with great care and respect.

Mummies were prepared in ways that stop the natural decomposition process. This means that even thousands of years later, the skin, flesh, organs and hair are still relatively undamaged. It is almost as if history pressed the pause button, and now scientists can study this one moment in time through a person who actually lived it.

Skeletons, unlike mummies, are only the bones of a person who lived in the past, but bones can be a great source of information as well. Even without skin or hair, human skeletons provide many clues about gender, size, disease, and injury.

Sources:

**Mummies - Britannica Kids**

<https://kids.britannica.com/kids/article/mummy/351403>

**Skeletons - Britannica Kids**

<https://kids.britannica.com/kids/article/skeletal-system/353778>

**Mummies, Companion to Paleopathology**

<http://onlinelibrary.wiley.com/book/10.1002/9781444345940>

**Resources:*****Forensic Investigation***

<http://www.nij.gov/nij/topics/forensics/welcome.htm>

National Institute of Justice, Forensic Sciences

<https://www.forensicscienceeducation.org/>

The Center for Forensic Science Research and Education

<http://idahoptv.org/sciencetrek/topics/csi/facts.cfm>

Idaho Public Television, "What is CSI?"

<http://www.stem-works.com/subjects/10-crime-scene-investigation>

STEM-Works, Crime Scene Investigation

***Scientific Process***

[http://undsci.berkeley.edu/article/0\\_0\\_0/howscienceworks\\_02](http://undsci.berkeley.edu/article/0_0_0/howscienceworks_02)

Understanding Science: How Science Really Works, UC Museum of Paleontology, University of California at Berkeley

<http://www.amnh.org/explore/science-bulletins/the-scientific-process>

American Museum of Natural History, The Scientific Process

[http://www.sciencebuddies.org/science-fair-projects/project\\_scientific\\_method.shtml#overviewofthescientificmethod](http://www.sciencebuddies.org/science-fair-projects/project_scientific_method.shtml#overviewofthescientificmethod)

Science Buddies.org, Overview of the Scientific Method

***Archaeology***

<http://www.nps.gov/archeology/public/kids/index.htm>

U.S. Department of the Interior, National Park Service, Archaeology for Kids

<http://www.archaeological.org/education>

Archaeological Institute of America - Education Section of Website includes: what archaeology is, educator resources, lesson plans and activities.

[http://shop.cricketmedia.com/magazines/Dig-Magazine-for-Kids.html?\\_ga=2.219875353.1843391075.1520805838-264077120.1520805838](http://shop.cricketmedia.com/magazines/Dig-Magazine-for-Kids.html?_ga=2.219875353.1843391075.1520805838-264077120.1520805838)  
*Dig*, The Archaeology Magazine for Kids

<https://kids.nationalgeographic.com/explore/youtube-playlist-pages/youtube-playlist-archaeology/>  
National Geographic Kids, Archaeology Videos

<https://www.nps.gov/archeology/public/kids/index.htm>  
Archeology for Kids - National Park Service