

# First In, Last Out: Stratigraphy

## Overview

Often archaeologists give approximate dates for archaeological sites. Without precise clues, it can be difficult for archaeologists to determine exactly when someone lived or worked at a site. However, the ground is made of many different layers. Archaeologists can use these layers, or strata, to provide additional clues about the artifacts and help date the site.

## Objectives

Students will:

- learn about the principle of stratigraphy
- understand how archaeologist use stratigraphy
- predict events and activities that might rearrange layers of dirt
- practice putting artifacts in relative order
- determine relative order for layers in the ground

## Core Standards in Kit

2.2 Problem Solving Process

6.4 Historical Connections

6.6 Being a Historian

## Additional Standards

6.7 Geographical Knowledge

## Age Level


Grades 4-12/ Ages 9-18

## Time

1 hour

## Materials

- *The All-New Amelia*
- copies of "First In, Last Out" worksheet
- 5 textbooks
- old coin (i.e. 1961)

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- old artifact (i.e. pottery or nail)
  - recent artifact (i.e. button or pen)
  - DK Eyewitness Book *Archeology*
  - copies of "Layers of History" worksheet

### Background

Imagine that you are making a sandwich. The bottom piece of bread goes on the plate first, then mayonnaise, ham, cheese, mustard, and finally the top piece of bread.

Likewise, when you fill a cylinder with dirt, the first scoop of dirt you throw in will be at the bottom of the cylinder. After working for a while, the last scoop you throw in will be at the top of the cylinder.

This system is also true for artifacts in the ground. For undisturbed artifacts, older objects are buried farther down than newer objects. Archaeologists use the principal of "first in, last out" to help determine the age of an object found in the ground. The relative depth of the artifact gives the archaeologist an important clue about the relative age of the artifact. Scientists study the stratigraphy, or the horizontal layers of dirt, to help estimate when an artifact was left on or in the ground. Over the years, layers are created by the decay of organic materials, by weather conditions, and by people, animals, and insects.

The layers of dirt are often disturbed by natural forces, animals, and humans. Floods can move dirt around and add layers of silt on top. Erosion of riverbanks can deposit artifacts out of chronological order. Tree roots can disturb the original location of artifacts. If the tree is uprooted, these artifacts can be brought to the surface and found by people. Animals might burrow into the dirt and disturb artifacts. People often alter the location of artifacts through farming, specifically with plows. Digging a well or a grave also changes the position of artifacts and rearranges layers of soil.

When these actions occur and disturb the stratigraphy, archaeologists must rely on other clues to help date objects. However, some layers, like a plow zone, can offer additional clues or give more definitive dates.

Certain artifacts or features can provide archaeologists with definite beginning or ending dates for sites. The archaeological terms for such dates are *terminus ante quem* and *terminus post quem*.

*Terminus ante quem* refers to the date before which...


*Terminus post quem* refers to the date after which...

For example, a U.S. dime with the date 1972 could provide a *terminus post quem* date. The coin could have landed on the ground anytime after 1972, but no time before 1972.

A *terminus ante quem* date could come from a road first paved in 1928. Artifacts found under the paved road could be from anytime before 1928, but from no time after 1928.

#### Procedure

1. Introduce the concept of stratigraphy to the students. In the book *The All-New Amelia*, Amelia correlates stratigraphy to lasagna in order to explain the layers of history.
2. Hand out the "First In, Last Out" worksheet and have the students put the artifacts in order by date.  
(Answers: 1-b; 2-a; 3-d; 4-e; 5-c)
3. Review the answers. Ask the students to brainstorm about what might happen to disturb the order of the layers of dirt.
4. Introduce the concepts of *terminus post quem* and *terminus ante quem*. One way to illustrate these concepts is adapted from the Smithsonian publication "Decoding the Past: The Work of Archaeologists" (see Resource List). For *terminus post quem*, place a pile of textbooks at the front of the classroom on a table or desk visible by all students. Have a student put one book on the desk, and then stack another textbook on top of it. Place an old coin on top of the second textbook. Add two more layers of textbooks. Place a new artifact (more recent than the coin, like a button or pen) on top of the fourth textbook. Add one textbook as a final layer.

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5. Have a student archaeologist excavate the textbooks, layer by layer. Demonstrate how the artifact can be dated relative to the coin. The date on the coin is the earliest date that layer could be. Anything above the coin layer is from a time after the coin date. (Some students may find this a challenging concept.)
  6. To demonstrate *terminus ante quem*, start another stack of textbooks. After the second layer, add an artifact like a broken piece of pottery or an old nail. Place two more layers of textbooks on top. On the fourth book, add a layer of paper covering the entire textbook. This paper represents a sidewalk that was built in the 1930s. Add one final textbook layer to indicate the dirt and leaves that have covered the sidewalk over the years.
  7. Ask a student to excavate the textbooks. Illustrate how the artifact can be dated relative to the layer of sidewalk with a known date. Any artifacts found below the sidewalk date from a time before the sidewalk was built.
  8. Examine the stratigraphy cross-section on page 11 of the DK Eyewitness Book *Archeology*. This is an excellent example of layers of history in a city.
  9. Once the students understand the concept of stratigraphy and relative dating, hand out "Layers of History" worksheet. The students should be able to put the layers in order and answer the questions about the artifacts and layers of soil. When discussing the questions, pay particular attention to the layers created by disturbances at a later date, like the well and rabbit burrow.

### Evaluation

Ask students to draw their own examples of stratigraphy, illustrating *terminus ante quem* and *terminus post quem*.

### What Next?

These concepts of stratigraphy and relative dating are very important to archaeology. Knowledge of the layers of history will help the students make sense of the "Excavating Vermont Game." Continue with other Principles of Archaeology lessons or proceed to the artifact activities.

# First In, Last Out

Examine the pictures of artifacts on the left. On the right, place the artifacts in order from the newest at the top to the oldest at the bottom.

A. pin from 1980 Olympics



1.

B. Harry Potter toy



2.

C. Archaic spear point



3.

D. coin from 1920



4.

E. nail from house built in 1793

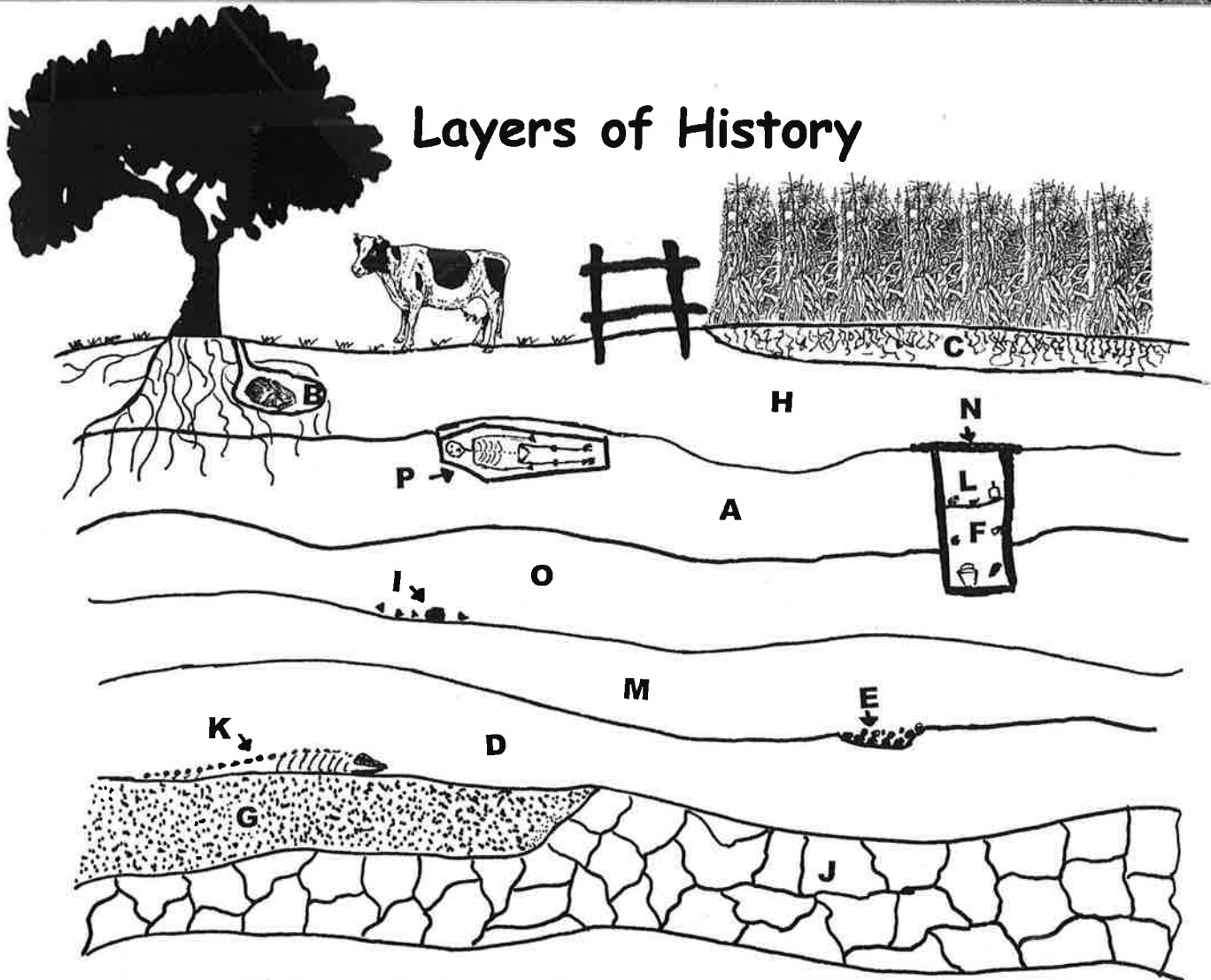


5.

BOTTOM



# Layers of History

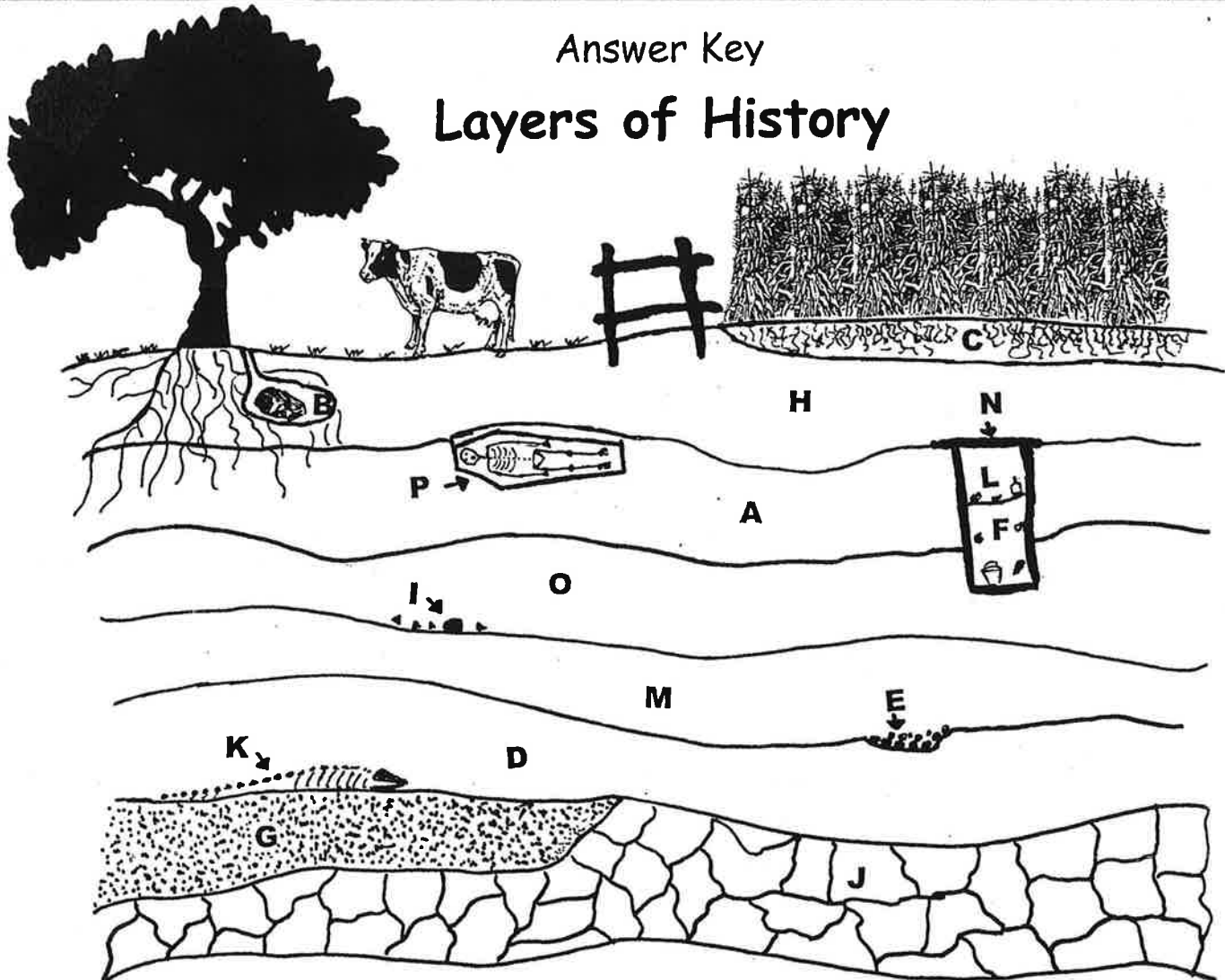


Examine the layers of ground in the picture above. Think about what happened at this site over the years.

- Using the letters from A to P, put the layers of soil and objects in order from OLDEST to NEWEST.
- Which layer shows signs of disturbance from farming?
- Name 4 layers that resulted from digging down into a previous layer.
- How might you interpret the hole of N-L-F?
- What is the lowest level that shows evidence of human habitation?

## Answer Key

# Layers of History



Examine the layers of ground in the picture above. Think about what happened at this site over the years.

1. Using the letters from A to P, put the layers of soil and objects in order from **OLDEST** to **NEWEST**

**J, G, K, D, E, M, I, O, A, P, F, L, N, H, C, B**  
or **F, L, N, P, B, C**

2. Which layer shows signs of disturbance from farming?  
**C (plow zone)**
3. Name 4 layers that resulted from digging down into a previous layer.  
**E, F, L, P, B, C**
4. How might you interpret the hole of N-L-F?  
**outhouse/ well**
5. What is the lowest level that shows evidence of human habitation?  
**E (firepit)**