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The following lessons were created by **Judy Reeves**, a teacher participating in the National Endowment for the Humanities Summer Institute for Teachers entitled Touch the Past: Archaeology of the Upper Mississippi River Region.

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The Secrets of Garbage

Grade Level : Middle School 8th Grade

Subjects: Earth Science

Objectives:

- Analyze contents of a site (garbage bag) and record information on Data Sheet.
- Make a hypothesis about the origin of the garbage bag site and use inferences to support your hypothesis. Record 5- 8 different objects and inferences on Data Sheet.
- Analyze contents of a site garbage bag. Record information on Data Sheet.
- Classify materials from site (garbage bag) and arrange in chronological order from the least recognition to the most for second activity record.
- Create a chart to record findings.
- Present findings to the class as conclusion.

Standards:

1. Determine the results of constructive and destructive forces upon landform development with the aid of geologic maps of Louisiana (ESS-M-A720)

2. Describe how humans' actions and natural processes have modified coastal regions in Louisiana and other locations (ESS-M-A8)
3. Read and interpret topographic maps (ESS-M-A9)
4. Analyze the consequences of human activities on global Earth systems (SE-M-A4)

Science Inquiry:

1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1)
2. Identify problems, factors, and questions that must be considered in a scientific investigation (SI-M-A1)
3. Use a variety of sources to answer questions (SI-M-A1)
4. Design, predict outcomes, and conduct experiments to answer guiding questions (SIM-A2)
5. Identify independent variables, dependent variables, and variables that should be controlled in designing an experiment (SI-M-A2)
6. Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)
7. Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
8. Use consistency and precision in data collection, analysis, and reporting (SI-M-A3)
9. Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4)
10. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
11. Identify patterns in data to explain natural events (SI-M-A4)
12. Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
13. Identify and explain the limitations of models used to represent the natural world (SIM-A5)
14. Use evidence to make inferences and predict trends (SI-M-A5)
15. Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6)
16. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)

17. Write clear, step-by-step instructions that others can follow to carry out procedures and conduct an investigations (SI-M-A7)
18. Distinguish between *observations* and *inferences* (SI-M-A7)
19. Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)

Understanding Scientific Inquiry

20. Compare and critique scientific investigations (SI-M-B1)
21. Use and describe alternate methods for investigating different types of testable questions (SI-M-B1)
22. Recognize that science uses processes that involve a logical and empirical, but
23. flexible, approach to problem solving (SI-M-B1)
24. Recognize that investigations generally begin with a review of the work of others (SIM-B2)
25. Explain how technology can expand the senses and contribute to the increase and/or modification of scientific knowledge (SI-M-B3)
26. Describe why all questions cannot be answered with present technologies (SI-M-B3)
27. Recognize that there is an acceptable range of variation in collected data (SI-M-B3)
28. Explain the use of statistical methods to confirm the significance of data (e.g., mean, median, mode, range) (SI-M-B3)
29. Evaluate models, identify problems in design, and make recommendations for improvement (SI-M-B4)
30. Recognize the importance of communication among scientists about investigations in progress and the work of others (SI-M-B5)
31. Explain how skepticism about accepted scientific explanations (i.e., hypotheses and theories) leads to new understanding (SI-M-B5)
32. Explain why an experiment must be verified through multiple investigations and yield consistent results before the findings are accepted (SI-M-B5)
33. Critique and analyze their own inquiries and the inquiries of others (SI-M-B5)
34. Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6)
35. Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7)

36. Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7)

Duration: Two 50 minute class periods

Materials/Supplies: Several classroom garbage cans, recording sheet, ID Activity sheet, Power Point with Sites on Land fill from current to ancient, gloves, goggles, paper or plastic to cover work area

Vocabulary:

- **Scientific Method:** (Problem, hypothesis, experimentation, data, analyze, results, conclusion)
- **Archaeology:** A method for studying past human cultures and analyzing material evidence (artifacts and sites). NOT the study of fossils, dinosaurs, or paleontology!
- **Archaeologist:** Scientist who studies past people through the remains of their activities.
- **Artifacts:** The materials deliberately produced or used by past peoples.
Artifact: An object made or used by humans.
- **Context:** The circumstances in which an event occurs; a setting.
- **Culture:** Patterns, traits, and products considered as the expression of a particular period, class, community, or population.
- **Evidence:** A thing or things helpful in forming a conclusion or judgment.
- **Excavation:** Systematic digging and recording of an archeological site.
- **Inference:** A determination arrived at by reasoning; using facts to arrive at a broader conclusion.
- **Landfill:** A method of solid waste disposal in which refuse is buried between layers of dirt so as to fill in or reclaim low-lying ground.
- **Midden:** A surface used for trash disposal, often characterized by a dark stain or an accumulation of debris.
- **Pit:** A hole that was dug into the ground, often for storage, burials, or refuse. Also a slang word used to describe an area of excavation.
- **Site:** A geographic place where there is evidence of past human activity.
- **Society:** A group of humans broadly distinguished from other groups by mutual interests, participation in characteristic relationships, shared institutions, and a common culture.
- **Sustainability:** To supply with necessities or nourishment; provide for.

Background: Video on landfill, PowerPoint on ancient landfills, discuss sustainability, artifacts and basic vocabulary.

Archaeology is the study of human cultures of the past through objects or artifacts they left behind. Common vocabulary is an important part of the process but there is so much more to investigate. Archaeology is a branch of science some teachers never investigate; even though it is exciting and could arouse curiosity in students - it is like solving a mystery or piecing together a puzzle. Archaeology follows the Scientific Method by using problem solving, communication, classification, measurement, making inferences, and research methods; as well as fostering an appreciation for our historic resources.

This lesson does not focus on a particular location, but on the basic scientific process of archaeology in general. By learning about archaeology techniques, students can gain an age appropriate understanding of the archeology process.

Documents and similar primary sources provide much of the knowledge, but much is also learned through the artifacts humans left behind. By examining what our own material culture tells about sustainability, we can begin to see how prehistoric artifacts provide evidence of past sustainability.

DAY 1

Setting the Stage:

1. Introduce vocabulary
2. Show artifacts (example: arrowhead)
3. Power Point showing ancient landfill
4. Video on a landfill

<http://science.howstuffworks.com/environmental/green-science/landfill.htm>

5. Compare and contrast the two sites. Students will identify items in the landfill and PowerPoint. How are they alike and how different? Teacher to record answers on board.

6. End class with student entry in their Science Notebook.

Problem: Identify site through artifacts left by humans?

Hypothesis: If I observe items from a known area I will be able to identify the site with accuracy.

Procedure:

Prior to activity, collect 5 bags of garbage from 5 different classrooms. Cut paper or plastic for tables, have gloves and goggles, run off worksheets - 1 per student.

DAY 2

Setting the Stage activity: (see above)

Teacher set tables for lab activity by covering tables with plastic or paper. Make sure each table has a labeled trash bag (1-2-3-4-5) 1 bag per table (groups will vary with number of students per class size), 1 pair of gloves per students and one pair of goggles per student. Review safety rules. Review Scientific Method

I. Problem: Identify site through artifact left by humans?

II. Hypothesis: If I observe items from a known area I will be able to identify the site with accuracy

III. Procedure: on smart board/or hand write

IV. Materials: gloves, plastic bag with site number, data sheets, goggles (table should be covered with plastic or paper)

V. Procedure:

1. First fill out heading on paperwork. Archeologists have to keep field records for accuracy; they always write in pencil (data sheet attached)
2. Remember you are an archaeologist so be very observant of your site bag; you are trying to identify the name of the site through artifacts.
3. Record data on data sheet one, noting items found, possible uses, possible "site owner," and what the artifacts (trash) tell us about the owner of the trash. Turn in your completed group Data Sheet to teacher.
4. Document on Data Sheet whether your hypothesis is correct or not.
5. Data Sheet Two: Using artifacts from your inference Site Sheet One, record the artifacts from the most descriptive #5 to the least descriptive #1. These should be the ones that helped you predict the site your items came from.
6. Wait for instructions from teacher; Teacher instructions now take your sheet and tear or cut # 5 off, then pass the paper to the table to your right. Do this until the student gets their original paper back.
7. Don't forget to record your prediction for each site on prediction sheet.
8. When students receive their sheet back, go around the room and give each table a chance to share their prediction. Discuss why it became more difficult to predict the site through the artifacts (discuss: less data, and not getting to see the actual artifacts).
9. Allow students to go to each table to see artifacts (5 minutes).

VI. Conclusion: Restate hypothesis, identify if correct or not. Restate what you learned through your artifacts.

Closure: Students will close with each group identifying their site and showing their five artifacts. Students will give a concluding statement on identifying sites

of modern humans.

Evaluation: Students will give concluding statements on identifying sites of modern humans.

Extension: Follow up with prehistoric people from your area. Example: Poverty Point Archeology Traveling Box, Louisiana University Archeology speaker, and fieldtrip to Louisiana State Museum to view the model of Poverty Point

Links Louisiana:

- <http://www.crt.state.la.us/archaeology/>
- <http://www.crt.state.la.us/parks/iMarksvle.aspx>
- <http://www.crt.state.la.us/parks/ipertypt.aspx>

References:

1. Video introduction to landfill: How Stuff Works, Landfill, 2012
<http://science.howstuffworks.com/environmental/green-science/landfill.htm>
2. Glossary of terms: Mississippi Valley Archaeology Center at the University of Wisconsin - La Crosse, Glossary, 2012.
<http://www.uwlax.edu/mvac/Educators/Glossary/Glossary.htm>
3. Holliday, D., Malone, B., "Digging and Discovery", Wisconsin Historical Society Press, 2006.
4. Poverty Point Archeology Traveling Box,
<http://www.crt.state.la.us/archaeology/outreach/PovertyPointExhibitInfo.aspx>

Attachments: student instructions and 3 worksheets

The Secrets in the Garbage

I. Problem: Identify site through artifact left by humans?

II. Hypothesis: If I observe items from known area I will be able to identify the site with accuracy

III. Procedure: on smart board/or hand write

IV. Materials: gloves, plastic bag with site number, data sheets, goggles (table should be covered with plastic or paper)

V. Procedure:

1. First fill out heading on paperwork. Archeologists have to keep field records for accuracy; they always write in pencil (data sheet attached)
2. Remember you are an archaeologist so be very observant of your site bag; you are trying to identify the name of the site through artifacts.
3. Record data on data sheet one, noting items found, possible uses, possible "site owner," and what the artifacts (trash) tell us about the owner of the trash. Turn in your completed group Data Sheet to teacher.
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7. Don't forget to record your prediction for each site on prediction sheet.
8. When students receive their sheet back, go around the room and give each table a chance to share their prediction. Discuss why it became more difficult to predict the site through the artifacts (discuss: less data, and not getting to see the actual artifacts).
9. Allow students to go to each table to see artifacts (5 minutes).

VI. Conclusion: Restate hypothesis, identify if correct or not. Restate what you learned through your artifacts.

Part __:

Project Title: Garbology of STMCS Group # _____ Site # _____ Date: _____

Participants: _____

In this activity you are going to infer about your site (garbage bag) and identify the classroom through the artifacts you have sorted and classified. Then describe how the artifacts may have been used. When your forms are completed, raise your hand and your teacher will come to your site.

Type of object may be drawn and written	Quantity	Description of use

Identify the classroom:

Part __:

Project Title: Garbology of STMCS Group # _____ Site # _____ Date: _____

Participants: _____

Now using your artifacts from your inference site sheet one; record the artifacts in order from the most descriptive #5 to the least descriptive #1. These should be the ones that helped you predict the site your items came from.

When complete bring sheet to your teacher for instructions. Shhh-- don't let the other Archeologists hear your information or site name.

Number	object
1	
2	
3	
4	
5	

Part __:

Project Title: Garbology of STMCS Group # _____ Site # _____ Date: _____

Participants: _____

Recording sheet for predictions: use the table's artifact clues to help you identify the site.

Table Number	Site Hypothesis
1	
2	
3	
4	
5	