Subject: Elementary Gifted Resource
Grade Level: Elementary, Third Grade

Case Summary
Museums showcase art objects from all over the world, from all times in history. But how do those objects get there? Why are they important? And what if the people whose lives they represent want to have them back? Audrey Aims, Art Conservator, is about find out...

This Problem Based Learning unit is grounded in Cobb County Elementary Gifted Standards and CCGPS (Common Core Georgia Performance Standards) and has been developed for the resource (once a week) gifted classroom. Instruction will take approximately 12 weeks via interdisciplinary activities with a focus on science, research, art, and creative productivity. This unit will actively engage students in hands-on, minds-on problem solving.

Credits
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Experiments were adapted from

Unit Standards
Cobb County Elementary Gifted Standards and correlating elements:
G1. Critical Thinking: Students will utilize higher order reasoning and reflect upon their thinking.

G2. Convergent Thinking: Students will reason logically using induction and deduction.

G4. Divergent Thinking: Students will think creatively to generate innovative ideas, products, or solutions to problems.

G5. Evaluative Thinking: Students will evaluate and solve a variety of authentic problems.
G6. Relationships & Connections: Students will make relationships and connections among various topics and disciplines.

G7. Communication: Students will interact and exchange ideas, feelings, information, thoughts, and knowledge with others.

G8. Collaboration: Students will work toward a common goal with shared accountability for the final outcome.

G10. Respect for Others: Students will be respectful members of their communities.

G11. Self-Directed Learner: Students will be self-directed learners
Scene 1: Meet Audrey Aims, Art Conservator

Case Summary
Audrey Aims is in her lab for her first day on the job as art conservator at the Michael C. Carlos Museum. Excited about new possibilities, she contemplates her career choice and begins her adventure journal.

Learning Objectives
1. Students will understand the role of an art conservator and the responsibilities associated with the position.
2. Students will research art conservator as a career: education required, job responsibilities, etc.
3. Students will research Michael C. Carlos Museum to learn about the museum and describe the types of displays found there.
4. Students will create a PBL journal for recording their learning.
5. Students will formulate thought-provoking questions to explore relationships and connections within the scene, in connection to Scene 1, and beyond the PBL to other content areas.
6. Students will support opinions, theories, conjectures, and conclusions with logical reasoning when completing and discussing their KWIQ.
7. Students will apply core critical thinking skills throughout the PBL unit and reflect upon them.
8. Students will read informational text for the purpose of extending their knowledge.
9. Students will collaborate with teammates.

Georgia Performance Standards
ELACC3W7. Conduct short research projects that build knowledge about a topic.

ELACC3W8. Recall information from experience or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.


Additional Materials
Scene 1 narrative
KWIQ chart #1
Journals
Craft Materials

Vocabulary
Conservator
Investigation
Intervention
Prevention
Documentation
Ancient
Artifact

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**Implementation Guide**

<table>
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<th>DAY</th>
<th>TIME</th>
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| 1   | 60 - 75 min | Read Scene 1  
Determine collaborative groups  
Complete KWIQ chart  
Create/Design Journal | *Graphic organizer |
| 2   | 120 min | Reread Scene 1  
Consolidate KWIQ charts onto one master class chart  
Jigsaw questions and research answers to questions using provided materials; record in journals  
Summary of the learning (see questions) | *Participation in group discussion  
*Journal – reflection of labs and summarization of learning |

**Facilitator Guide**
- Where is the Michael C. Carlos Museum?
- What types of artifacts does it house?
- What does an art conservator do?
- Why is the work of a conservator important?
- What core critical thinking skills did you utilize today? Why and when?

**Resources**
What is conservation?
http://www.conservation-us.org/about-conservation#.UyDRObRCy-8  
http://www.carlos.emory.edu/conservation/what-conservation
Scene 2: The Adventure Begins – Helping Isis

Case Summary
Audrey Aims is visited by the Egyptian goddess, Isis. Isis desires the museum’s copy of The Book of the Dead. Audrey must strike a bargain with her and learn all that she can about paper fibers and hieroglyphics so that she can recreate the famed piece of papyrus.

Learning Objectives
1. Students will understand that conservators need to identify paper types in order to make treatment decisions.
2. Students will understand the difference between acids and bases.
3. Students will compare and contrast acidic and non-acidic papers.
4. Students will solve the mysteries of the lab using logical reasoning.
5. Students will make predictions using deductive and inductive reasoning.
6. Students will implement the evaluative thinking process.
7. Students will research the story of Isis and Osiris, The purpose of The Book of the Dead, and hieroglyphics.
8. Students will create a papyrus and write on it using hieroglyphics.
9. Students will think creatively to generate an innovative product.
10. Students will understand and adjust communication for a given audience.
11. Students will assess, reflect, and modify their papyrus utilizing the four cognitive components of divergent thinking.
12. Students will formulate thought-provoking questions to explore relationships and connections within the scene, in connection to Scene 1, and beyond the PBL to other content areas.
13. Students will support opinions, theories, conjectures, and conclusions with logical reasoning when completing and discussing their KWIQ.
14. Students will apply core critical thinking skills throughout the PBL unit.
15. Students will read informational text for the purpose of extending their knowledge.
16. Students will collaborate with teammates.

Georgia Performance Standards
ELACC3W7. Conduct short research projects that build knowledge about a topic.

ELACC3W8. Recall information from experience or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

SC7. Students will characterize the properties that describe solutions and the nature of acids and bases.
   a. Compare, contrast, and evaluate the nature of acids and bases
SSWH1. The student will analyze the origins, structures, and interactions of complex societies in ancient Easter Mediterranean from 3500 BCE to 500 BCE.
   b. Describe the relationship of religion and political authority in Ancient Egypt.
   e. Explain the development and importance of writing; include hieroglyphics.

Additional Materials
Scene 2 narrative
KWIQ chart #2
Journals
Various paper types (newspaper, phone book, construction paper, notebook paper, printer paper, filter paper)
Acid identifier pens
Paper making supplies – filter paper, large tub, water, screen, blender, washcloth
Markers
pH test strips
Various liquids in beakers or plastic cups (Lemon Soda, White Vinegar, Apple Juice, Baking Soda, Shampoo (preferably clear), Conditioner (preferably clear), Hand Sanitizer)
Purple cabbage
Strainer
Plastic spoons

Vocabulary
Egypt Hieroglyphics
Headdress Deity
Ankh Acid
Papyrus Base
The Book of the Dead Neutral
Isis pH
Osiris Fiber

Implementation Guide

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<tbody>
<tr>
<td>1</td>
<td>120-150 min</td>
<td>Read Scene 2 Complete KWIQ chart \nJigsaw questions and research answers using provided materials or resources; record in journals \nDevelop Action Plan to create scroll. \nSummarize the learning (see Questions for Day 1 below)</td>
<td><em>Graphic organizer \n</em>Participation in group discussion \n<em>Journal – reflection of labs and summarization of learning \n</em>Evaluative Thinking \n*Process student sheet</td>
</tr>
</tbody>
</table>
### Facilitator Guide

#### Day 1:
- Why is Isis trying to revive Osiris?
- How will the Book of the Dead aid her in this quest?
- Why do you think the ancient Egyptians wrote The Book of the Dead? What was its intended purpose?
- What core critical thinking skills did you utilize today? Why and when?

#### Day 2:
- What is the difference between an acid and a base?
- How does acid affect paper?
- What type of paper lasts longer? Why?
- What do you predict is the acidity of papyrus? Why?
- What core critical thinking skills did you utilize today? Why and when?

#### Day 3:
- What is papyrus made from?
- Who decoded hieroglyphics? Why did it take so long to figure it out?
- What core critical thinking skills did you utilize today? Why and when?
Resources
Isis and Osiris
http://images.scholastic.co.uk/assets/a/b4/98/jet-ibc-9308.pdf

Paper
http://www.hqpapermaker.com/paper-history/

Making Papyrus
http://www.historyforkids.org/crafts/projects/papyrus.htm

Hieroglyphics
https://education.scholastic.co.uk/resources/5167
http://egypt.mrdonn.org/hieroglyphics.html
http://www.virtual-egypt.com/newhtml/hieroglyphics/

Acid/Base Lab
http://emhs151254.tripod.com/hcab.html
http://www.stevespanglerscience.com/lab/experiments/red-cabbage-chemistry
Scene 3: The Adventure Continues – Assisting Inti

Case Summary
Audrey Aims is visited by the Incan god, Inti. Inti demands the ancient Andean double bird motif textile belt. Audrey must strike a bargain with him and learn all that she can about natural textile fibers and geometric patterns so that she can recreate the belt.

Learning Objectives
1. Students will understand that conservators need to identify fiber types in order to make treatment decisions.
2. Students will compare and contrast cotton and wool fibers.
3. Students will solve the mysteries of the lab using logical reasoning.
4. Students will make predictions using deductive and inductive reasoning.
5. Students will implement the evaluative thinking process.
6. Students will research the story of Inti and information about South American textiles.
7. Students will create a textile belt decorated with geometric patterns.
8. Students will think creatively to generate an innovative product.
9. Students will understand and adjust communication for a given audience.
10. Students will assess, reflect, and modify their belt utilizing the four cognitive components of divergent thinking.
11. Students will formulate thought-provoking questions to explore relationships and connections within the scene, in connection to Scenes 1 and 2, and beyond the PBL to other content areas.
12. Students will support opinions, theories, conjectures, and conclusions with logical reasoning when completing and discussing their KWIQ.
13. Students will apply core critical thinking skills throughout the PBL unit.
14. Students will read informational text for the purpose of extending their knowledge.
15. Students will collaborate with teammates.

Georgia Performance Standards
ELACC3W7. Conduct short research projects that build knowledge about a topic.

ELACC3W8. Recall information from experience or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

S5L3. Students will diagram and label parts of various cells (plant, animal, single-celled, multi-celled).
   a. Use magnifiers such as a microscopes or hand lenses to observe cells and their structure.
SC1. Students will analyze the nature of matter and its classifications.
   b. Identify substances based on chemical and physical properties.

SFS2. Students will use various scientific techniques to analyze physical and trace evidence.
   b. Analyze the morphology and types of hair, fibers, soil, and grass.

SSWH8. The student will demonstrate an understanding of the development of societies in Central and South America.
   b. Compare the culture of the Americas; include government, economy, religion, and the arts of the Mayans, Aztecs, and Incas.

### Additional Materials
- Scene 3 narrative
- KWIQ chart
- Journals
- Pure textile samples (wool and cotton)
- Strand of human hair
- Piece of notebook paper
- Tweezers
- Candle
- Matches or lighter
- Magnifying glass

### Vocabulary
- Incan Empire
- South America
- Inti
- textile
- luminescent
- offering
- fiber
- geometric pattern
- natural
- synthetic

### Implementation Guide

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| 1   | 120-150 min | Read Scene 3  
Complete KWIQ chart  
Jigsaw questions and research answers using provided materials or resources; record in journals  
Determine groups and create action plan to create belt.  
Summarize the learning (see Questions for Day 1 below) | *Graphic organizer  
*Participation in group discussion  
*Journal – reflection of labs and summarization of learning  
*Evaluative Thinking  
*Process student sheet |
| 2   | 120-150 min | Reread Scene 3  
Fiber Background information shared  
Fiber lab  
Collaborative work on belt creation  
Summarize the learning (see Questions for Day 2 below) | *Participation in labs  
*Journal – reflection of labs and summarization of learning  
*Collaboration rubric |

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Textile Identification Lab – Modified for 3rd Grade

**Introduction**

Many objects are made from textiles, including tapestries (wall-hangings), upholstery, quilts, clothing, etc. These objects may be functional as well as decorative, and are often collected as works of art or historic artifacts. Textiles are woven from fibers. These fibers can be animal, plant or man-made. Common historical fibers used include cotton, wool, silk, and linen. Conservators need to identify fiber types in order to make treatment decisions. Different fibers will react differently to various chemicals. Categorizing fiber types also helps conservators identify the origin of a textile because different fibers are characteristic of different regions. Cotton and wool were often used in Ancient American art. Silk had numerous uses in art and trade in China, while linen was used extensively in Ancient Egypt. In this lab, students examine various natural fiber types using physical and chemical characteristics.

**Objectives**

- Compare and contrast different types of natural fibers using magnification and burn tests

**Georgia Performance Standards**

**SCSh4.** Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

- a. Develop and use systematic procedures for recording and organizing information.

**S5L3:** Students will diagram and label parts of various cells (plant, animal, single-celled, multi-celled).

- c. Use magnifiers such as a microscopes or hand lenses to observe cells and their structure.

**SC1 Students will analyze the nature of matter and its classifications.**

- b. Identify substances based on chemical and physical properties.

**SFS2.** Students will use various scientific techniques to analyze physical and trace evidence.

- b. Analyze the morphology and types of hair, fibers, soil and glass.
Materials
Strand of human hair
Piece of notebook paper or newsprint, cut in 10cm x 10cm pieces
Pure textile samples - wool and cotton, 10cm x 10cm pieces
Synthetic textile sample – polyester and/or nylon, 10cm x 10cm pieces
*Be sure to use light neutral colored fabrics (tan, beige, or off white)
Microscope slides or plastic pieces for mounting items
Tweezers (metal, unpainted)
Magnifying glasses
Candle in a stable holder
Matches or lighter

Safety
Be careful with an open flame. Also make sure the area is well ventilated as to not cause the fire alarms to go off while completing the burn tests.

Teacher Pre-lab
Magnification Test

1. Cut out a 10cm x 10cm piece of paper. Mount on a slide or clear plastic film.
2. Repeat for each of the fabrics.
3. Using tweezers and a straight pin, pull threads from cotton, wool and synthetic pieces.
4. Mount on a slide or clear plastic film and label A, B, and C.
5. Shred one end of a thread to reveal the fibers.
6. Mount on a slide or clear plastic film and label A, B, and C.
7. Print and cut out the images of the different fibers provided in the teacher resources, Natural Fiber Images and Synthetic Fiber Images. You may want to laminate for protection. Create a key of the images for student use.

Burn Tests

1. Cut a 2cm x 2cm piece of paper.
2. Cut a 2cm x 2cm piece for each of the fabrics. Label with a letter for identification.
3. Obtain a piece of human hair.

Lab

Review with students the proper way to use a magnifying glass. Explain and demonstrate to the students how they will use the magnifier to examine different threads and fibers in order to try and identify the item. Distribute the Student Magnification Lab Sheet for student recording.

I. Magnification Test

A. Paper & Human Hair
   1. Use the magnifying glass to look at a mounted piece of paper. Draw and write a detailed observation of the paper.
   2. Use the magnifying glass to look at a strand of human hair. Use the magnifying glass to look at details. Draw and write a detailed observation of the hair.
   3. Discuss the findings.

B. Natural and Synthetic Fibers
   1. Use the magnifying glass to look at Sample A. (Do not reveal that it is cotton.)
   2. Draw and write a detailed observation of the sample.
   3. Use the fiber and synthetic images to predict the possible identification of fabric “A”.
   4. Repeat steps 1-4 with fabrics “B” (wool) and “C” (synthetic).

II. Burn Tests

A. Paper & Human Hair
   1. Hold the paper sample with the tweezers. Carefully set the paper on fire using a lit candle. Write detailed observations of the paper, including the smell.
   2. Hold a piece of human hair with the tweezers. Carefully set the hair on fire. Write detailed observations of the hair, including the smell.

B. Natural Fibers
   1. Hold the 1cm x 1cm piece of fabric “A” with tweezers.
   2. Bring the fiber sample near the flame. Write observations of the fabric.
   3. Now put the fabric directly in the flame. Write observations of the fabric, noting the smell.
   4. Write observations of the ashes of fabric “A”.
   5. Use the Table 1 (student) to give possible identifications of fabric “A”.
   6. Repeat steps 1-5 with fabrics “B”, “C”, and possibly “D”.

Clean up

All materials can be disposed of in the trashcan.

Optional Lab - Using a Microscope to view fibers
If you have access to microscopes that students may use,

Natural Fibers

1. Obtain a 1cm x 1cm piece of cotton fabric and place it on a slide. View the dry mount using low (4x) and high (10x) power. Draw what you see.
2. Place a small drop of water on the fabric and cover with a cover slip.
3. Using low power (4x), put the slide on the stage, center the fabric in the field of view.
4. Label, describe and draw what you see.
5. Carefully view fabric “A” using high power (10x). Be sure to only use the fine adjustment to focus. Describe and draw what you see.
6. Use provided photos to try to identify the fibers.
7. Repeat steps 1-5 using wool fabrics
8. *Students can also view fibers using 40x power if available.*
Facilitator Guide
Day 1:
- Why was Inti so revered?
- Why would a farmer give the textile belt to Inti?
- Why do you think the ancient Incas believed their ruler was related to Inti?
- What core critical thinking skills did you utilize today? Why and when?

Day 2:
- What is the difference between wool and cotton?
- What is the difference between natural fibers and synthetic fibers?
- Linen was used extensively in Ancient Egypt. Do you think it is made from natural fibers or synthetic ones? Why?
- What core critical thinking skills did you utilize today? Why and when?

Day 3:
- What animals is Andean wool usually made from?
- It has been said that in order for South American weavers to create a textile, the weaver would have to possess both outstanding creative and mathematical abilities. Why is this?
- What core critical thinking skills did you utilize today? Why and when?

Resources
Inti
http://www.machupicchu-inca.com/inca-gods.html
http://latinamericanhistory.about.com/od/ancientlatinamerica/p/Inti-The-Inca-Sun-God.htm

Fibers

University of Ohio, College of Education and Human Ecology. Fiber Reference Image Library.
https://fril.osu.edu/index.cfm?fuseaction=site.getThisPage&SitePageID=124&Page=Browse%20Collections
http://www.nios.ac.in/media/documents/SecHmscicour/english/Home%20Science%20(Eng)%20Ch-10.pdf

How to Make Looms
http://www.ehow.com/how_5259940_make-use-backstrap-loom.html
http://www.instructables.com/id/how-to-weave-on-a-cardboard-loom/?ALLSTEPS

Incan Weavings
http://www.incas.org/category/weavings
http://www.naturalhistorymag.com/features/112333/the-mur-a-code

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