# Pull, Pull, Pulleys in Mesopotamia

| | |
|---|---|
| **Author** | Danna Lagerquist |
| **Grade Level** | 6 |
| **Duration** | 3 class periods |

| National Standards | AZ Standards | Arizona Social Science Standards |
|---|---|---|
| **GEOGRAPHY**<br>**Element 5: Environment and Society**<br>14. How human actions modify the physical environment<br>15. How physical systems affect human systems<br>16. The changes that occur in the meaning, use, distribution, and importance of resources<br><br>**NEXT GENERATION OF SCIENCE STANDARDS**<br>**MS. Human Impacts**<br>**MS-ESS3-1.** Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.<br>**MS. Engineering Design**<br>**MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. | **ELA**<br>**Writing**<br>**Production and Distribution of Writing**<br>6.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.<br>**Language**<br>**Vocabulary Acquisition and Use**<br>6.L.6 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.<br><br>**SCIENCE**<br>**Life Science**<br>6.L2U1.14 Construct a model that shows the cycling of matter and flow of energy in ecosystems. | **GEOGRAPHY**<br>**Human-environment interactions are essential aspects of human life in all societies.**<br>6.G2.1 Compare diverse ways people or groups of people have impacted, modified, or adapted to the environment of the Eastern Hemisphere.<br>**Examining human population and movement helps individuals understand past, present, and future conditions on Earth's surface.**<br>6.G3.1 Analyze how cultural and environmental characteristics affect the distribution and movement of people, goods, and ideas.<br>6.G3.2 Analyze the influence of location, use of natural resources, catastrophic environmental events, and technological developments on human settlement and migration.<br>**HISTORY**<br>**The development of civilizations, societies, cultures, and innovations have influenced history and continue to impact the modern world.**<br>6.H1.1 Compare the development and characteristics of historical cultures and civilizations from different global regions within designated time periods.<br>6.H1.2 Explain the causes and effects of interactions between cultures and civilizations. |

## SIOP Elements

| Preparation | Scaffolding | Grouping Option |
|---|---|---|
| Adapting content<br>Linking to background | Modeling<br>Guided practice | Whole class |

MESA COMMUNITY COLLEGE
Education Studies Department
Teachers of Language Learners Learning Community (TL$^3$C)

ARIZONA GEOGRAPHIC ALLIANCE

| | | |
|---|---|---|
| **Linking to past learning**<br>Strategies used | Independent practice<br>**Comprehensible input** | **Small groups**<br>Partners<br>Independent |
| **Integrating Processes**<br>**Reading**<br>**Writing**<br>**Speaking**<br>**Listening** | **Application**<br>Hands on<br>Meaningful<br>Linked to objectives<br>**Promotes engagement** | **Assessment**<br>**Individual**<br>**Group**<br>**Written**<br>Oral |

**Arizona English Language Proficiency Standards**

**Stage IV**
**Basic**
**Reading**
**Standard 4: The student will analyze text for expression, enjoyment, and response to other related content areas. The student will demonstrate knowledge of reading comprehension by:**
B-8: summarizing the main idea and supporting details from text.
B-21: applying understanding of content area vocabulary within math, science and social studies texts.
B-23: locating information in print and electronic reference sources (e.g., encyclopedia, atlas, almanac, dictionary, thesaurus, periodicals, website, and textbooks) periodicals for a specific purpose.
**Writing**
**Standard 1: The student will express his or her thinking and ideas in a variety of writing genres.**
**The student will express his or her thinking and ideas by using a variety of writing genres, as demonstrated by**
B-4: writing a paragraph based on research using topic sentences, main ideas, relevant facts, details, and concluding statements.
B-8: writing a persuasive paragraph using facts, ideas and concepts to influence the reader.

## Overview

Students often have no concept of what engineering designs and concepts have preceeded them. They are so accustomed to machines doing man's work that they don't fully appreciate the evolution of technology.

## Purpose

In this lesson, students will learn about the ancient civilization of Mesopotamia and how man created the pulley to make his life easier. This lesson includes strategies for diverse learners (ELLs).

## Key Vocabulary

**lift:** to bring upward
**energy:** the ability to do work
**machine:** a device that makes work easier
**simple machine:** a device with few or no moving parts
**pulley:** a grooved wheel with a rope around it
**groove:** a cut in the surface

## Materials

- Reading on Mesopotamia
- Pulley Vocabulary
- The Pulley readings (#1 is more difficult than #2)
- Engineering Design Process worksheet
- Group Work Score Sheet
- Writing Assignment
- Scoring Rubric for Building a Pulley
- Vocabulary Cards and Vocabulary Test
- What is Civil Engineering? reading (optional)
- 1 thread spool per group
- String
- Round pencils
- Paperclips
- Small paper cups

- Water
- Sand to act like water (optional)
- Scissors

## Objectives

The student will be able to:

- Use vocabulary associated with history and science.
- Apply the Engineering Design Process to create a device using a pulley.
- Explain how the people of Mesopotamia interacted with their environment.

## Procedures

*Prior Knowledge: Students will have read about Mesopotamia in their textbook or use the optional materials to give students some background in The Fertile Crescent.*

**SESSION ONE**

**Engage:**

1. Introduce the lesson by saying, "Today and tomorrow, you will function as an engineer working with a team of other engineers. You will be designing a device that can move water. The device will be used in Mesopotamia."
2. Review the textbook information or do the optional Reading on Mesopotamia. **(Preparation: Linking to Past Learning)**

**Explore:**

3. Divide the students into groups of four or five. **(Grouping Option: Small groups)**
4. Pose the problem: People in ancient Mesopotamia need to move water from its source (Tigris or Euphrates River) to where they will use it. With your team, draw out a solution to this problem by creating a device that can move water.
5. Allow students enough time to collaborate and then draw their devices.
6. Have the students share orally their designs and how their devices work with a partner group. **(Application: Promotes Engagement) (Integrated Processes: Speaking)**

**Explain:**

7. End the lesson by projecting the Pulley Vocabulary and explaining any of the vocabulary words that are unfamiliar to the students. **(Scaffolding: Comprehensible Input)**
8. Read and explain either #1 or #2 of The Pulley readings. **(Integrated Processes: Reading)**
9. Close this session with a ticket out the door: Describe how a pulley works using at least 3 of the vocabulary words. **(Assessment: Individual)**

**SESSION TWO**

**Elaborate:**

10. Reassemble the groups from Session One. Give each group an Engineering Design Process worksheet. **(Grouping Option: Small groups)**
11. Show them the materials they may use (scissors, thread spool, round pencil, paper cups, paper clips, string, and water or sand).
12. Have them start by defining the problem (build a device that uses a pulley and can move water) and the constraints (must use classroom materials (Ask) and then continue to brainstorm ideas and select the best one (Imagine).
13. After they show you the group's diagram and materials list (Plan), they can get materials and begin assembling their device (Create).
14. Stop the groups at some point so they can see each others' devices. Then have them return to their own device and make adjustments (Improve). **(Application: Hands on, Promotes engagement)**

**SESSION THREE**

**15.** Show the PowerPoint on Mesopotamia. Emphasize how water was an important part of this civilization. **(Integrated Processes: Listening)**

**Evaluate:**

16. Have students evaluate their performance on the group task using the Group Work Score Sheet.
17. Explain the writing assignment and how it will be graded. If students are not finished with the writing assignment, it can be completed as homework. **(Assessment: Individual, Group, Written)**

## Assessment

**Science**

To show mastery, students will score 3's or higher on the Scoring Rubric for Building a Pulley for a science grade.

.

To show mastery, students will score an average of 8 or higher on Group Work Score Sheet for a science grade.

**ELA and Social Science**
To show mastery, students will score a 4 or higher on the 6 Traits Writing Rubric for their paragraph about Mesopotamia and its dependence on water. They traits that will be scored are Ideas and Content and Voice.

To show mastery, students will score 80% or higher on the Vocabulary Test.

## Extensions

Students can learn about Civil Engineering by reading and discussing the optional reading provided.

## Sources

http://www.newworldencyclopedia.org/entry/Pulley

Overview information on Mesopotamia
http://mesopotamia.mrdonn.org/geography.html