 

**STEM Middle School Mini Lesson Template**

STEM lessons will take a transdisciplinary approach. This template is designed to aid in the development of a transdisciplinary STEM lesson.

Title: Paper Towers

Grade Level: Middle School

Questions to ask before designing a lesson:

1. What is the essential question(s) for the lesson?

How does the form (design) of a tower determine its function (stability)?

* 1. Why is the question relevant?

Many man-made objects have been inspired by nature. STEM encompasses fields that would form and function to create their products.

* 1. What is the connection to real life?

Form and function in nature and real-life, careers

1. What techniques are used to make the lesson:
   1. Inquiry-based? Revising and Reflection Process
   2. Project-based? Planning and Building Phase
2. What are the lesson outcomes? See Standards Chart
3. How is participant discourse promoted? Students will work with a partner or in small groups to complete the completion. After the initial building phase and competition, a class discussion will be held. During this discussion, the form and function of the successful towers will be discussed and tied into the form and structure of real-life objects from nature. After the class discussion, students will be given time to discuss, revise, and build a new tower.
4. How are science, technology, engineering, and mathematics addressed in the lesson? STEM career concepts are integrated into the lesson through the Engineering Design Process.
5. Use the table below to match standards.

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| --- | --- | --- |
| **Standard** | **Standard Number(s)** | **Activity** |
| **Common Core Standard for Mathematical Practice** | 6  7 | Entire Process  Design, Build, Test, and Revise |
| **International Technology Education Association Standards for Technological Literacy** | 8  9  10  11  20 | Design, Build, Test, and Revise  Design, Build, Test, and Revise  Design, Build, Test, and Revise  Design, Build, Test, and Revise  Design, Build, Test, and Revise |
| **Common Core Reading Standards for Literacy in Science and Technical Subjects** | 8 | Reflection |
| **Common Core Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects** | 1  2  4  10 | Reflection  Reflection, Planning  Reflection, Planning  Reflection, Planning, Free Write |
| **Maryland Science Skills and Processes Standards** | A1  D Design Systems  D Making Models | Design, Build, Test, and Revise  Design, Build, Test, and Revise  Design, Build, Test, and Revise |
| **STEM Lesson Title:** Paper Towers | | |
| **Higher-Order Question:** Analyze the relationship between form and function in both living organisms and man-made structure. | | |
| **Objective(s):** How does the form (design) of a tower determine its function (stability)? | | |
| **Materials:** Newspaper, Tape, Scissors | | |
| **Engagement:** Free Write: Why do you believe that the Leaning Tower of Pisa has not fallen over? Have students share ideas with the class and then introduce the Paper Tower Challenge. | | |
| **Exploration/Explanation:**  - Today we are going to be conducting a challenge. You are going to be using a limited amount of newspaper and tape to build the tallest tower possible. Your tower has to be able to withstand your teacher trying to blow the tower over from a distance of 1 arm length. Tape can only be used to connect two pieces of paper together.  -Design tower  -Build tower  -Test tower  -Class discussion  -Extension  -Reflection | | |
| **Extension:** Day 2 tower build | | |
| **Evaluation:** Design process and written reflection | | |
| **Homework:** Practice building additional towers and design a tower for Day 2 | | |
| **Reflection:** In your design, what did you modify and why?  What design aspects made so many of the Day 2 towers much taller than the Day 1 towers?  Compare the structure of a tree to that of a sky-scrapper. | | |