 

**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: Build a Band Challenge

Grade Level: Middle School

Questions to ask before designing a lesson:

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

How does an instruments design affect its pitch?

* 1. Why is the question relevant?

Sound is a major science concept, but also ties into the other STEM subjects.

* 1. What is the connection to real life?

Sound is part of everyday life and many careers. Sound is used in medicine, the military, and  
 the entertainment industry, among others. Sound can affect the body in both positive and  
 negative ways.

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 to completion this challenge. Before building, a class discussion will take place to introduce the challenge. During the design phase, students will be communicating throughout the process. Students will also present their instrument to the class.
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 |

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| **STEM Lesson Title:** Build a Band Challenge |
| **Higher-Order Question:** How is what you did with your vocal chords related to pitch? |
| **Objective(s):** How does an instruments design affect its pitch? |
| **Materials:** Duct Tape, Scissors, 2 Pencils, 4 Craft Sticks, 4 Rubber-bands (2 Medium, 2 Thin), Shoebox |
| **Engagement:**  -Have the students touch the front of their throats and say something to a neighbor.  -Ask: How is what you feel related to sound?  -Have the students touch the front of their throats again. The students are now going to make a high-pitched sound and a low-pitched sound.  -Ask: How do your vocal chords feel as you changed pitch?  -Ask: What are some different kinds of stringed instruments?  -Today’s challenge is to design and build a four-stringed instrument that can be used to play a tune. |
| **Exploration/Explanation:**  -Design instrument  -Build instrument  -Test instrument  -Refine instrument  -Share instrument: What did you design? And play a tune.  -Reflection |
| **Extension:** Once you build your instrument, try to play one of the following songs: We Will Rock You, Happy Birthday, Twinkle Twinkle Little Star |
| **Evaluation:** Presentation, Reflection Questions |
| **Homework:** None |
| **Reflection:**  -Who might be interested in a low-cost, low-tech instrument?  -What factors cause different pitches?  -How does a rubber-band’s thickness affect its pitch?  -What could you do to improve your instrument? |