MODIFIED UBD LESSON PLAN



COURSE: Middle School

UNIT: Acoustics and Electromagnetism | EXERCISE: Ukulele | TIME FRAME: 3-4 Hours

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PREPARATION: Summary of "to do's" that the teacher should understand and prepare before bringing this lesson to the classroom.

Teachers will need to ensure that the proper supplies are available for students to build their solutions.

Materials:

- Ukulele kit
- Markers/Pencils (optional)

Tools:

- Mini Glue gun (optional)
- Hand drill/Power drill (optional)
- Phillips screw driver (inside kit)
- 1/8" drill bit (inside kit)



SAFETY: Summary of safety strategies in the lesson.

Students will be using a construction adhesive and screwdriver. They may also be using a hand drill/power drill and hot glue gun. Use caution when using tools.

S1 DESIRED RESULTS:

ESTABLISHED GOALS:

Problem Solving Techniques and Applications Standards:

Teachers should use the STEM Academy Standards Correlation System available in the STEM Connections area of a unit to extract specific standards and insert these standards here.

TRANSFER:

Students will be able to independently use their learning to...

Build and test a basic ukulele.

UNDERSTANDINGS

Students will understand that...

- When ukuleles were invented
- What region a ukulele originated from
- Difference between a ukulele and guitar

MEANING:

ESSENTIAL QUESTIONS Students will keep considering...

- What is the science behind a ukulele?
- Do we really know the origin of a ukulele?

ACQUISITION OF KNOWLEDGE AND SKILL:

Students will know...

- The basic parts of a ukulele and their purposes.
- Engineers use the design process to develop new products.

Students will be skilled at...

- Identifying and properly use measurement systems and techniques
- Differentiating functional versus form
- Analyzing resources given to solve a problem
- Demonstrating the critical application of the 6-step process
- Following instructions for building an ukulele
- Safely use tools to process a wide variety of materials.



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UNIT: ACOUSTICS AND ELECTROMAGNETISM EXERCISE: UKULELE TIME FRAME: 3-4 HOURS

S2 EVIDENCE:

EVALUATIVE CRITERIA:

ASSESSMENT EVIDENCE:

Graded Rubric

Performance Task(s):

The challenge is to make a basic working ukulele. You will need roughly three or four class periods and all the pages of this STEM Learning activity to complete this STEM challenge.

Constraints:

- 1. The ukulele must be made from kit components only.
- Any design work on your ukulele is encouraged. Be creative and make your ukulele stand out!

Other Evidence:

- Thoughtful, clear, thorough
- Graded on accuracy, multiple choice questions
- Completed on time

- Online end of unit test
- Self-reflection

33 LEARNING

LEARNING PLAN: Summary of Key Learning Events and Instruction

Pre-Assessment:

Presenting the Solution pre-test

Outline:

1. Introduce

- a. Have students read the problem and the criteria
- b. Have students listen and write down any extra criteria or special instructions you give them
- c. Watch the videos on the construction of the ukulele

2. Construct

a. Construct your ukulele

Test

- a. Students tune and test their ukulele
- b. Students turn in their ukulele

4. Communicate Results

a. Students discuss and write a brief presentation to share their results. They can speak in front of the class or create a short video

Construction Instruction

Step 1: Body and Neck assembly

For this step, you will need the body, neck, wood dowel pin and adhesive. Apply adhesive in the hole at the end of the neck. Also, apply adhesive to the hole in the body. The dowel pin will be inserted into both holes. Before inserting the dowel pin, apply adhesive to the "V" shaped end of the neck. This will allow it to bond to the body after assembly. Push the wood dowel into the hole in the neck first. You may need to push the dowel on a table to make sure it is inserted to the proper depth. Now push the dowel into the body and make sure the neck and body components make a tight connection. Apply painter's tape on the joint to hold the pieces together.

NOTE: A 1 5/8" trim screw could be used to hold the neck to the body as well. There is a 1/8" drill bit in your bag that can be used to pre-drill through the neck (not the body) to make it easier for the trim screw to be applied.

Step 2: Attach Fretboard and Nut

You will be gluing the Fretboard to the neck and body as well as the Nut. This will require the use of the Power Grab adhesive. Apply a consistent bead of adhesive to the backside of the Fretboard. Align the Fretboard properly and apply painters' tape to hold tightly in position. Proper alignment is important.



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The last gold Fret line on the wider end should line up with the Body and Neck joint. Apply painter's tape to hold tightly in position. The nut is positioned at the narrow end of the Fretboard. Notice the curved end on the Nut. This curved end needs to face the Tuning Peg holes.

Step 3: Attach the Tuning Pegs

Find the Tuning Pegs; eight small screws and the Tuning Peg plastic decorative covers. The Tuning Pegs will be fastened on the bottom side of the Neck. There are pre-drilled holes for proper alignment of the Tuning Pegs. It is important that the gear faces toward the Body. Place a small amount of adhesive on the plastic decorative cover and attach over the Tuning Peg shaft.

Step 4: Attach the Bridge

You will need the Bridge, Saddle, two plastic hole caps and two screws. Fasten the Bridge to the Body using the two screws. There are locating holes in the Body to properly align the Bridge. Place the Caps in the holes when the screws are secure. Snap the Saddle in the groove on the top of the Bridge. It's time to string your Ukulele!

Step 5: Attached the strings

There are four strings for the Ukulele. All are different diameters and it is important to install the strings in the proper order. Tie a knot in your string. You may need to double knot the thinner string(s). The knot will go in the side groove of the Bridge. Now, place the string through the Tuning Peg. Be sure that the string is in the proper slot in the nut. The string needs to go through the hole in the Tuning Peg. There is an order for where the strings go. Push the string through the hole and then back through the hole a second time.

With the string pulled tight, turn the Tuning Peg knob counterclockwise to tighten the string until you can strum it and hear it play a note. Do not over tighten the strings. You will tune your Ukulele once all strings are attached.

Step 6: Tune your Ukulele

There are many sites that you can go to for tuning your Ukulele. Here is one site you can use. https://ukebuddy.com/ukulele-tuner ENJOY YOUR UKULELE!!!

Progress Monitoring:

The teacher will need to monitor student progress. Teachers should move throughout the classroom checking to see that students are keeping up with the lesson. After lecturing, the teacher should use students to help move students forward during the activity by sharing their expertise. Teacher may choose to post exemplars of student work for students to use who may have missed the lesson, missed some steps in the process, or may be struggling to keep pace with the class.



DIFFERENTIATION: Summary of Key Differentiation Techniques

Please use this space to insert your differentiation techniques. Depending on the needs of students, various techniques might be needed in a classroom, therefore use the information below and experts in the area needed to design your plan for differentiation.

The ASCD Study Guide for Integrating Differentiated Instruction and Understating by Design: Connecting Content and Kids. by Carol Ann Tomlinson, Jay McTighe

Integrating Differentiated Instruction and Understating by Design: Connecting Content and Kids. by Carol Ann Tomlinson, Jay McTighe ISBN-13: 978-1416602842 ISBN-10: 1416602844

Differentiating Reading Instruction by Laura Robb. ISBN13: 9780545022989

A Teacher's Guide to Differentiating Instruction
The Center for Comprehensive School Reform and Improvement



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CAREER CONNECTIONS: Summary of Career Opportunities Associated with this Lesson

Please use this space to insert careers that might be connected to this lesson. This section will need continuous updating as new careers and emerging technologies change the opportunities available in the workforce.

Good sources for career connections:

Occupational Outlook Handbook http://www.bls.gov/ooh

The National Career Clusters® Framework http://www.careertech.org/career-clusters



KEYWORDS: Please Insert Keywords from this Lesson with their Definitions

Please use this space to insert keywords and their definitions

Use resources like dictionary.com to find definitions to your keywords

