

BEHIND THE SCENE

Have you ever been to a concert or performance? What could you hear and see?

Rockin' School Productions is looking for new talent. We want groups with the whole package in order to attract a crowd willing to pay \$50 and more for a single ticket. Most established bands now have an incredible light show. Therefore, new musicians breaking in on the concert scene need to have a working knowledge of both sound and light.

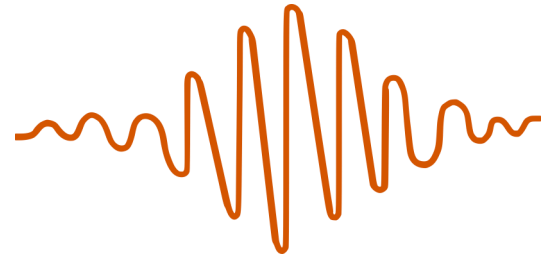
How can you, as a production designer, design a music and light show that will entertain your audience?

Using the engineering Design Process you will design a sound and light show and an instrument out of "found" items.



IMAGINE

Think about how and what you will do to create an engaging light show.



Light Show:

Create a computer model of the light show

Make a physical model of a light show using a cardboard box for a stage

Utilize school stage and lighting to demonstrate the light show

Make a light show at home and record it to show in class

Sound Show :

Determine frequencies that are most like your concert type.

Consider amplitude for your show.

Consider the venue how will sound travel.

Will you use echo or other sound effects?

You will need to present your ideas to your class.

PLAN/CREATE

Make notes, drawings, plans to start creating your show. These plans should change and improve as we go through the “Light and Sound” unit. Your presentation should follow the rubric to make sure that you are including all requirements into your presentation

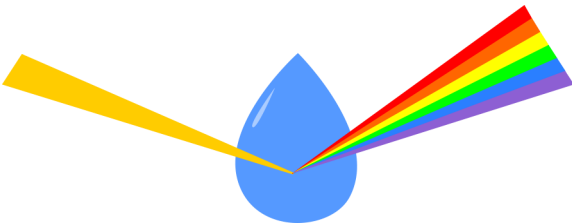
INSTRUMENT

You will make an instrument out of “found” or recycled items to build an instrument that can make a minimum of 4 pitches. You may make more than one instrument as you and your group would like. You will need to perform these notes as well as explain how and why they change as part of your presentation.

WORDS AND IDEAS TO KNOW AND INCLUDE IN YOUR PRESENTATION:

Light:

Transverse	Reflect
Ray	Refract
Wavelength	Visible spectrum
Absorb	Frequency
Reflect	Transmit
Transparent	Absorb
Translucent	Prism
Opaque	shadow



Sound:

Vibrate	A diagram of a xylophone with eight colorful bars (blue, purple, red, orange, yellow, green, cyan, purple) on a wooden frame. Two mallets with green heads are positioned above the bars. Sound waves are shown emanating from the instrument.
Frequency	
High frequency	
Low frequency	
Pitch	
High pitch	
Low Pitch	
String instrument	
Wind instrument	
Percussion instrument	
Wavelength	
Phases of Matter	
Compression	

IMPROVE

After you have completed your Light and Sound show, think about what you would do to improve it. You will need to write a conclusion statement that includes what learned from this experience; what went well and what you would change in order to improve your show. You should use correct vocabulary to thoughtfully conclude and explain the changes you would make to your show. You must explain your reasons for each of the changes you would make.

Light and Sound PBL Rubric		4	3	2	1
Demonstrate understanding of the behavior of light.	Use mirrors to understand the reflection of light.	Design and explanation showed full understanding of the topic.	Design and explanation showed some understanding of the topic.	Design or explanation showed some explanation of the topic.	This topic is not shown or explained in the design.
	Analyze a prism's effect on white light and describe why it occurs.	Design and explanation showed full understanding of	Design and explanation showed some understanding of	Design or explanation showed some explanation of the	This topic is not shown or explained in the design.
	Include examples of transparent, translucent, and opaque matter.	Design and explanation showed full understanding of the topic.	Design and explanation showed some understanding of the topic.	Design or explanation showed some explanation of the topic.	This topic is not shown or explained in the design.
Demonstrate understanding of the behavior of sound.	Demonstrate knowledge of the cause of sound.	Design and explanation showed full understanding of the topic.	Design and explanation showed some understanding of the topic.	Design or explanation showed some explanation of the topic.	This topic is not shown or explained in the design.
	Demonstrate knowledge of how different musical instruments make sound.	Design and explanation showed full understanding of the topic.	Design and explanation showed some understanding of the topic.	Design or explanation showed some explanation of the topic.	This topic is not shown or explained in the design.
	Demonstrate and explain the relationship between frequency and pitch.	Design and explanation showed full understanding of the topic.	Design and explanation showed some understanding of the topic.	Design or explanation showed some explanation of the topic.	This topic is not shown or explained in the design.
Speak in a purposeful manner to inform.	Report on a topic or text using relevant facts and descriptive details to support main ideas or themes.	All explanations use relevant facts and descriptive details to support the topic.	Several explanations use relevant facts and descriptive details to support the topic.	Explanations may use facts and/or descriptive details to support the topic.	Explanations do not include relevant facts or descriptive details to support the topic.
	Exhibit the ability to collaborate with diverse teams.	Took part in all activities and completed all work. Was helpful to others and shared many ideas. Took risks by trying new things.	Took part in all activities. Did the work that was assigned. Was helpful to others and often said positive things to other students.	Did most work. Took part in all activities. Was helpful to others, but was sometimes noisy or critical.	Did not take part in some activities. Was critical of others and the project. Was not helpful.
Use information creatively to enhance the design-build process.	Create an engaging light and sound show.	Design of both the light and sound show was unique	Design of both the light and sound show was original.	Design of the light or sound show was original.	Little creativity is evident in the light and sound show.

LEARN ABOUT SOUND

Acoustical Engineer

Acoustics is a fancy word for the study of sound. So simply, an acoustical engineering is engineering for sound. It's an acoustical engineer's job to study, design and build classrooms, theaters, arenas, and outdoor stadiums to maximize the sound quality the building was designed for.

In some cases this means making a room quiet and minimizing outside noise. In other cases it means designing the layout of each room so that the noise from one room doesn't affect the sound in another. In yet other cases it can be designing a theater or arena so that the quality of the sound is the same no matter where in the arena you are. This means that if you go to see your favorite band live, it doesn't matter how close you are to the stage it will still sound great!

Acoustical engineers also design equipment to reduce or alter sound. They are experts in how sound waves travel and know how to place speakers and other sound-making equipment in a room to make it sound great!

To become an acoustical engineer you must complete a bachelor's (4 years) degree in physics, electrical engineering, or mechanical engineering and a master's (2 years) or PhD (3-5 years) degree in acoustics.

Learn More about Acoustics

Check out the following website to learn more about different kinds of acoustics:

<http://www.exploresound.org/>

Click on the link below to explore cool activities you can do to learn about sound:

<http://www.exploresound.org/home/activities/?gradelevel=3-5>

Listen to some cool sounds here:

<http://exploresound.org/explore-sound-home/acoustics-for-k-12/acoustics-activities/listen-learn/>

Learn More about the History of Acoustical Engineering

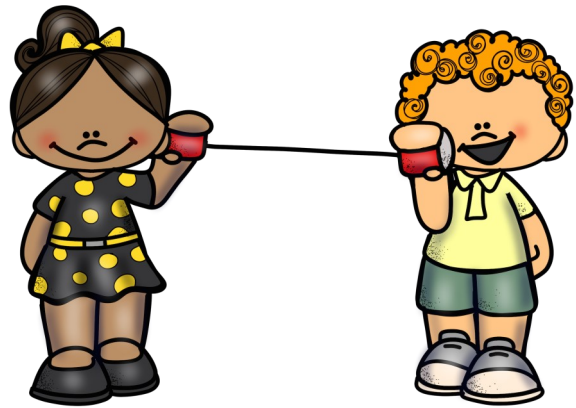
Now you may think that acoustical engineering is a job for today's world, but the Ancient Greeks and Mayans created amphitheaters and buildings that are amazing examples of acoustical engineering.

Check out the amphitheater in Epidaurus built by the ancient Greeks over two thousand years ago:

<http://www.youtube.com/watch?v=2CVO9Vd067U&feature=related>

To learn about the Mayan's acoustic engineering feats in ancient times check out this video:

<http://www.youtube.com/watch?v=kRDy31O9czs>



LEARN ABOUT LIGHTING

Theatrical lighting designers work collaboratively with other members of an artistic and production team under the guidance of the director. The lighting designer typically attends rehearsals and design meetings, performs research and consults with other team members on issues that may affect them, such as color, special effects, safety, fog and floor surfaces. Working with a master electrician, the lighting designer also supervises the maintenance, hanging and focusing of the lighting design.



Job Duties

Using computer-aided software, lighting designers usually create what's known as the light plot or the drawings of the location of the lighting equipment on the stage. They also produce the cue sheet for the electrician, which indicates the changes in lighting and how they should be implemented. Other materials the designer produces are the focus chart, which outlines the focus of each lighting instrument and a hook-up chart, which includes such things as mounting position, color, dimmer number and focus for each light.

History of Stage Lighting

<https://www.eaton.com/us/en-us/company/news-insights/lighting-resource/trends/lighting-the-stage-a-history-of-early-theater-lighting-technology.html>

How to build a Stage Lighting Scene

<https://www.instructables.com/id/Light-Show-on-Music/>

How to make UV lights from a cell phone.

<https://www.wired.com/2016/12/make-uv-light-phones-led-flash/>