Lesson Objective

Students will create a video of two objects interacting through electric or magnetic fields and illustrate the changes in energy on the objects through the music embedded in the video.

Essential Question

How do context and the manner in which musical work is presented influence audience response?

How are forces related to energy?

21st CENTURY SKILLS:

✓ Critical Thinking
✓ Creative Thinking
☐ Collaborating
✓ Initiative
✓ Communicating
✓ Media Literacy
✓ Informational Literacy
✓ Tech Literacy
☐ Flexibility
☐ Social Skills
☐ Leadership
☐ Productivity

Content Standards

HS-PS3-5

Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Arts Standards

MU:Pr6.1.C.IIIa

Share live or recorded performances of works (both personal and others’), and explain and/or demonstrate understanding of how the expressive intent of the music is conveyed.
LESSON OVERVIEW

In this lesson, students will create a video which models two objects interacting in either an electric or magnetic field which clearly illustrates the forces between objects and how energy changes due to interactions of the objects. This cause and effect relationship is based on stored and used energy, which varies depending on an object’s position. After students film the video, they will find music to associate with the video which expressively aligns and moves with the objects and the force field changes.

ENGAGEMENT

Pairs

Break students into groups of 4 or 6, and then within those groups, put students in pairs (so there might be 3 groups of 2).

Challenge each group to come up with as many pairs of things that go together as possible (Mickey and Minnie, peanut butter and jelly, eggs and bacon, etc). Partners should be talking almost silently so they cannot be heard. Give them about 5 minutes.

Bring partners back into their groups and compare lists. Like the game of Scattergories, the object is to come up with as many “unique” pairs as possible.

STEP 1

Relationship Between Energy and Forces

Review the concept of energy and forces with students. As stated in the Next Generation Science Standards (PS3.C), when two objects interacting through a field change relative position, the energy stored in the field is changed. Also review the concepts of magnetic and electrical fields, as well as polarity. At this level in their high school careers, the concepts should be solid, and a quick review will be enough to ground students in to the lesson.
STEP 2

The Importance of Music in Film

Music in film is often the unspoken character. Yet we often don’t notice it, until we look at it with a different set of eyes.

In the following two video segments, students will experience familiar movie scenes through the lens of different styles of music, and at times, no music. Share them each with students, and along the way, after each segment, stop and discuss mood, tone, etc from the varying music clips.

- Pirates of the Caribbean Boat Scene - How Music Can Change a Film
- The Lion King - How Music Affects Film

Ask students to share which of the elements of music (pitch, duration, dynamics, tone color, form or texture) seems to be most important in the selection of music to accompany a film. Consider the essential question, “How do context and the manner in which musical work is presented influence audience response?” Does the music help to clarify artistic intent?

Main Activity

Students will create a short video that demonstrates two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. They may create the video using any application they are comfortable with. It does not have to have all sorts of effects and features to complete the activity, but they can be added if desired. The video should film the objects in real time, and then if necessary, they may use video effects such as speed to enhance the lesson. They should remember to focus on the cause and effect relationships of the objects and the fields. If desired, they may create a backstory for the objects and include that in the film if it helps to convey the film’s message.
Main Activity continued

Once they have filmed the video, they will need to select a piece of music to be used in the background of the film, to help convey the forces, their speed and their changes. The music chosen can be original and played live or a recorded performance of their choice. They will need to be sure to consider the elements of music and consider the expressive intent of the music when combined with their film.

**ESTIMATED TIME:** 2-3 class periods

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**CLOSURE**

**Reflection**

Allow students to share their videos. If time allows, they could share for the whole class, but minimum get in groups of 3-4 so that they see a variety of approaches.

Variations:
- Have students show the film with no background music first, then again with their music choice. Note audience reactions.
- Have students “swap” music choices with one another’s film. Does it make a difference?

Engage in a discussion about the similarities and differences between films, particularly noting the music chosen, and how it affected each film’s overall impression.
Did the student video adequately illustrate the forces and changes in energy from the interaction of two objects?

Did the music chosen by the student fit appropriately and enhance the video that was made and demonstrate understanding of the expressive intent of both the music and the video?
Your Task

Part 1
You will create a short video that demonstrates two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. Your video should film the objects in real time, and then if necessary, you may use video effects such as speed to enhance the lesson you are sharing. Remember to focus on the cause and effect relationships of the objects and the fields. You may create a backstory for the objects and include that in your film as well if it helps to convey your message.

Part 2
Once you have filmed your video, you will need to select a piece of music to be used in the background of your film, to help convey the forces, their speed and their changes. The music you choose can be original and played live or a recorded performance of your choice. You will need to be sure to consider the elements of music and consider the expressive intent of the music when combined with your film.
# Project Plan - Video

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<tr>
<th>Task / Item to include</th>
<th>Steps to take</th>
<th>Notes / Reflections</th>
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Project Plan - Music

As you are deciding what music to use in your video, begin by narrowing down some of your choices, and focusing on a few selections that stand out to you to help you decide.

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<th>Elements of Music that are strongest</th>
<th>Expressive intent</th>
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Place a star by the one that you will ultimately use, and add a few more notes as to why it is your final choice.
THE ELEMENTS OF MUSIC

Pt - Pitch
Moving from one distance of sound to another. High to low.

Du - Duration
The amount of time a sound occurs.
- Long (whole notes, half notes)
- Short (quarter notes, eighth notes, sixteenth notes)

Dy - Dynamics
The sound level at which music is played.
- Loud (forte, fortissimo)
- Soft (piano, pianissimo)
- Medium is often called mezzo-piano (pronounced “met-so pi-ahno”) or mezzoforte (pronounced “met-so four-tay”)

Tc - Tone Color
The quality of sound, what the voice or instrument sounds like. This is also referred to as “Timbre” (pronounced tam-ber).
Examples include: light, airy, dark, mystical, rich, full, dancing, excited.

Fo - Form
The organization of music. Examples include:
- ABA (first section, second section, first section repeats)
- AB (first section, followed by second section)
- Rondo (ABACA - The A section always comes after each new section)

Tx - Texture
The layers of sound within a piece of music.
- Just melody (monophony)
- Melody and harmony (polyphony)
- Chords (3 or more notes played at the same time)
Instruments can add to the texture of music: blaring, rough, smooth, choppy, disjointed, tight, rich.