

Lesson Title: Laws of Motion in Dance

STEM Foundation 1: Academic Language Proficiency

Dance- High School 10-12 Grade

English Language Arts Science and Technical Subjects 9-12
RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11–12 texts and topics</i> .
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.11-12.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Arkansas State Standards- Science: Strand 1 Motion and Force
M.F.1.P.11 Apply Newton’s third law of motion to explain action-reaction pairs

Arkansas Career Education (ACE) Standards- Career and Technical Skills
ACE 1.1 Spell, define and pronounce terminology correctly and appropriately

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Informational Texts and Documents

Newton's Third Law of Motion L1070- one per student

Materials

- Knowledge Rating Scale handout – one per student
- Online video - Newton's Laws of Motion Song
<http://www.youtube.com/watch?v=PkAO8F-Tm-w>
- Online video - Newton's Third Law of Motion:
<http://www.youtube.com/watch?v=Xx9kiF00rts>
- Sticky Notes
- projector
- screen
- lined paper
- pencils/pens
- Chart paper
- Chart paper markers
- Easel

Objectives

Students will demonstrate their understanding of content specific vocabulary (physics and dance) by reviewing laws of physics (Newton's 3rd law of motion) and creating a dance that defends their understanding. Students will write a brief informational text using the vocabulary they learned today that demonstrates their understanding of Newton's Third Law of Motion and how it relates to dance.

Vocabulary

Academic vocabulary (Tier 2)—*stationary, reaction, action, balance*

Content vocabulary (Tier 3)—*force, motion, friction, acceleration, inertia, weight, mass*

Dance Terms – *rotation, movement: suspended, sustained, percussive*

Procedures

BUILDING BACKGROUND

1. As students stretch play the song, Newton's Laws of Motion Song
<http://www.youtube.com/watch?v=PkAO8F-Tm-w>
2. Students will individually complete the activity **Knowledge Rating Scale** for the key content and academic vocabulary words, *stationary, reaction, action, balance, force, motion, friction, acceleration, inertia, weight, mass*.

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3. With a partner students are asked to share their knowledge rating. Encourage students to help one another with any words they were unfamiliar with.
4. On a large chart paper, ask students to share out their understanding of the terms, one at a time. Record the students' definitions onto a large chart paper. This will create a **word wall** to be referenced throughout the lesson.
5. Tell students that the words they just explored are related to the study of motion and that they will be thinking specifically about Newton's 3rd Law of motion and how these words and concepts relate to dance.

GUIDED PRACTICE

1. Show students the video on Newton's Third Law of Motion: For every action there is an equal and opposite reaction. <http://www.youtube.com/watch?v=Xx9kiF00rts>
2. Ask students to **Pair Share** what they understood from the video.
-From the vocabulary we discussed earlier, what examples did you see in the video?
-What did it teach you about Newton's Third Law of Motion?
3. Whole class debrief: Ask the students to share what they understand about Newton's Third Law of Motion. Record their ideas onto a large **T-chart** in the column labeled, "Newton's Third Law of Motion".

Newton's Third Law of Motion	Dance

4. Have students read the text *Newton's Third Law of Motion*. After they finish reading the text, ask the class:
-What else have you learned or understood about Newton's Third Law of Motion?
Add their ideas to the T-chart (Newton's Third Law of Motion).
5. Ask students where these terms are represented in dance and to record their answers on sticky notes (one idea per sticky note). Remind students that they can use the words on the Word Wall to write their ideas.
6. After students have had time to talk and write their answers on sticky notes, ask students to place their sticky notes onto the T-chart in the "Dance" column next to the corresponding information about Newton's Third Law of Motion. Review the chart with the class.

APPLICATION:

1. Organize students into 4 groups of 3. Provide each group with a prompt that will become the basis of a dance sequence/combination that illustrates one or more of the vocabulary words related to Newton's 3rd Law of Motion. An example of a prompt might be "Work for ten minutes to create three eight-counts of dance that illustrate too much force, too little force, and just the right amount of force." Use each vocabulary word in at least one prompt. (*Dance teacher will have four prompts ready on the day of filming.*)
2. Have each group demonstrate its dance for one other group. The groups will analyze the dance they observe for the vocabulary terms.

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P U B L I S H I N G

3. Using a jigsaw strategy, one member from each group will combine to form a new group to collaborate the four sequences/combinations into one dance that illustrates all vocabulary terms. After they finish their dance and demonstrate their creation one group at a time, ask the class how Newton's 3rd Law of Motion could be used to analyze a movement and how its application could increase the dancer's success. Remind students to use the content and academic vocabulary in their observation.

INDEPENDENT PRACTICE:

1. Ask students to write an informational text using the vocabulary they learned today that demonstrates their understanding of the connections between Newton's Third Law of Motion and dance using the **Student Response Form**. Remind students to use the vocabulary alignment chart they created.