

General Information

Teacher Name: Elizabeth Valente, Jen Halman, Otis Elementary

Subject: Science and Dance, 6th Grade

Topic: Forces and Motion

Time Frame: Ten, 50-minute class periods

Guiding Questions: How can we use our bodies to demonstrate laws of force and nature?

Goals, Standards and Vocabulary

Overview (How and where this art-integrated unit fits into the curriculum):

This dance unit works with the physical science section of the [Scott Foresman Science](#), Grade 6 series. Chapters 15, 16, and 17 are addressed, which focus on Newton's Three Laws of Motion.

Goals (What students will realize by using the art form to activate content area):

Students will use their bodies and connect physical science concepts to dance. Science concepts will be reinforced through the creation of an original dance composition.

Academic Standards and Descriptors: Illinois State Standards in the content area that this unit addresses.

Stage F

12C. Students who meet the standard know and apply concepts that describe properties of matter and energy and the interactions between them.

12.C.1. Apply scientific inquiries or technological designs to demonstrate the interactions of energy forms explaining how interactions of matter and energy affect the changes of state, tracing electrical current in simple direct and alternating circuits, or diagramming how sound, heat and light energy forms are detected by humans and other organisms.

12D. Students who meet the standard know and apply concepts that describe force and motion and the principles that explain them.

12.D.2. Apply scientific inquiries or technological designs to incorporate the impact of force on motion, associating Newton's three laws of motion to mass, distance, and acceleration, making metric mathematical calculations of average speed, velocity, and acceleration, or comparing resistance and friction factors in electrical, magnetic, fluid, and physical systems.

Fine Arts Standards and Descriptors: Illinois State Standards in the fine arts that this unit addresses.

Stage F

25A. Students who meet the standard understand the sensory elements, organizational principles and expressive qualities of the arts.

25.A.1. Describe dance compositions in terms of sensory elements (time, space, force, flow).

26A. Students who meet the standard understand processes, traditional tools, and modern technologies used in the arts.

26.A.3. Observe and discuss how processes (e.g., performing, improvising, exploring, composing, and choreographing) affect the expressive qualities of dance compositions.

26B. Students who meet the standard can apply skills and knowledge necessary to create and perform in one or more of the arts.

26.B.2. Practice and improve precision, clarity, and quality in use of body parts, actions, and sensory elements when dancing.

Vocabulary Lists – Content and Art:

Content – force, friction, gravity, inertia, momentum, acceleration, action/reaction, static friction, weight displacement, motion, Issac Newton Laws of Motion.

UNIT LAYOUT

Content and Art Making Activities

Dance

Dance – balance, parallel, *plie*, theme, direction, locomotor, stationary, focus, energy, frozen pose, counterbalance, double-time, accentuate, pantomime, composition.

Day 1

Focus:

Weight Displacement, EAEC Curriculum Dance Positions and Name Game Activity

Materials Needed:

Music of varying tempo, CD/MP3 music player, open space, EAEC Name Game Step-by-Step Guide

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Vocabulary includes parallel position, *plie*, contract, and release. The next warm-up is the Name Game. Students stand in a circle. One at a time, each student says their name with a gesture. The rest of the class repeats the name and gesture. As a final warm-up, students practice passing an imaginary ball around the circle. The weight, size and temperature of the ball changes as it is passed from student to student. Students have to indicate the change of the weight, size, and temperature of the ball with their bodies.

Main Activity:

Focus is weight displacement and the body. Introduce the definition of force and weight displacement.

Ask for two volunteers and demonstrate this weight displacement activity before having the whole class attempt. In pairs, students face each other about 2 feet apart, with feet parallel. Placing their palms together (fingers are not interlocked) while taking a couple steps back and transferring their weight through their palms by pushing forward so that their weight, or force, is pushing towards their partner. Students slowly take more steps back, trying to put as much distance as possible, with their force (equal weight) holding them up.

Wrap-Up and Post Assessment Activities:

Separate the pairs into two groups – one group the audience, the other performers. Each group demonstrates their use of weight displacement. The audience states what it observes. Groups switch positions and repeat. In a group discussion, have students wrap-up by stating any vocabulary or concepts learned. Teacher should take note of student responses in both the performing and observing as a way to pre-assess students' knowledge of movement.

Ask students to help move desks and chairs back to where they belong.

UNIT LAYOUT

Content and Art Making Activities

Dance

Day 2

Focus:

Types of Motion

Materials Needed:

Music of varying tempos, CD/MP3 music player, open space, EAEC Curriculum Give and Take activity

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Vocabulary includes parallel position, plie, contract, and release. Muscle groups are described and previously learned vocabulary reviewed. Lead the students in an warm-up of walking through the space- students walk to a specific tempo (play some music) with specific motions included, such as zigzag, slicing, swirling.

Main Activity:

Locomotor vs. stationary motion are defined. With the whole class, have students demonstrate locomotor motions and stationary motions for basketball, football, soccer, and volleyball. First, they practice the motions in pairs.

Breaking into small groups of four or five, students engage in a “Give and Take” activity. One group member starts with the ball and moves around the space his/her group occupies. This student then passes the ball to another group member. When the ball is passed, that student freezes and the student who has received the ball then demonstrates the next locomotor movement. At first, the teacher may need to provide directives as to when the ball is passed and which locomotor movement is next. The speed changes as students become more comfortable with the activity. Vocabulary includes slow motion, double time, and accentuate. At the end, one group performs the sport, while the audience observes what they see. Then they switch.

Wrap-Up and Post Assessment Activities:

In a group discussion, have students wrap-up by stating any vocabulary or concepts learned. Teacher should take note of student responses to prepare for the next lesson.

Ask students to help move desks and chairs back to where they belong.

Day 3

Focus:

Newton’s First Law of Motion

Materials Needed:

Music of varying tempos, CD/MP3 music player, open space, EAEC Curriculum Pass the Movement Step-by-Step Guides

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Vocabulary includes parallel position, plie, contract, and release. Muscle groups are described and previously learned vocabulary reviewed.

Pass the Movement: in a circle, the leader makes a sound and gesture to the person to their right; that sound and gesture is passed or given to the person on their right, all the way around the circle. The person physically demonstrates receiving (taking) that motion. Review of locomotor and stationary motion.

UNIT LAYOUT

Content and Art Making Activities

Dance

Split the class into teams and have them pantomime a game of tug of war. Pantomime involves expressing an idea or thought using gestures instead of words. The students demonstrate the act of tug of war with physical actions/gestures. When told to freeze, the audience observes and states what they see.

Main Activity:

Newton's First Law of Motion: An object at rest remains at rest, and an object in motion remains in motion at constant speed and in a straight line, unless acted on by an unbalanced force.

Divide the class into two groups: one audience and one participants. First, warm up with walking through the space to different tempos. Choose one student to be a leader. When the instructor says begin, everyone but the leader demonstrates stationary motion. The leader moves through the space in a straight line. When the leader 'tags' someone who is stationary, that person then begins to move throughout the space and the previous leader freezes. The new leader should try to match the speed of the previous leader as they move through the space. As the students are engaged in this activity, continue to reinforce how they are demonstrating Newton's First Law of Motion. The action is repeated for several tries throughout the group. Groups switch places and repeat the activity.

Wrap-Up and Post Assessment Activities:

In a group discussion, have students wrap-up by stating any vocabulary or concepts learned. Record their responses on the board.

Ask students to help move desks and chairs back to where they belong.

Day 4

Focus:

Mirroring Movement - Stationary

Materials Needed:

Music of varying tempos, CD/MP3 music player, open space, EAEC Curriculum Mirroring and Isolating the Body Step-by-Step Guide

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Students complete two KWL charts: 1) laws of motion, and 2) movement or dance. As a group, discuss the Ks and Ws of each chart. Record their responses for future reference. Warm-up now includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Dance vocabulary includes parallel position, *plié*, contract, and release. Muscle groups are described and previously learned vocabulary reviewed.

Main Activity:

Mirror Game: Students work in pairs. One student is the leader, the other is the 'mirror.' The leader takes the 'mirror' through a series of stationary motions. After a few minutes, students switch roles. Once each side has practiced, music is added. Leaders take their 'mirrors' through stationary movements to the tempo of the music. After a few minutes, students switch roles.

Wrap-Up and Post Assessment Activities:

In a student journal, have the students record how they felt at the end of the lesson.

Ask students to help move desks and chairs back to where they belong.

UNIT LAYOUT

Content and Art Making Activities

Dance

Day 5

Focus:

Mirroring Movement - Locomotor

Materials Needed:

Music of varying tempos, CD/MP3 music player, open space, EAEC Curriculum Dance Positions and Yoga Step-by-Step Guide, student journals

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Warm-up now includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Stress is put on moving to the right and left in the circle. Vocabulary includes parallel position, plie, contract, and release. Muscle groups are described and previously learned vocabulary is reviewed. Yoga poses (1/2 Sun Salutation, Downward Facing Dog, Tree) are introduced into warm-up. Lead students through a conversation about why we warm-up muscles before we begin any kind of movement.

Main Activity:

Review of the Mirror Game from the previous lesson. Continuing the ideas of the Mirror Game, students will now follow the guidelines of the game using locomotor movements. The teacher demonstrates the actions with three students. Next, break the class into four groups. Each group has approximately 7 minutes to practice locomotor mirror movements with their partners.

Groups must demonstrate:

- 1) stationary movements
- 2) locomotor movements
- 3) levels

After the groups have practiced, each group performs to the tempo of the music. Audience members should keep notes in their student journals and be prepared to report on whether they observed all three guidelines from the pairs in each group.

Wrap-Up and Post Assessment Activities:

In a group discussion, have students wrap-up by stating any vocabulary or concepts learned. Record their responses on the board.

Ask students to help move desks and chairs back to where they belong.

Day 6

Focus:

Weight Displacement and Force

Materials Needed:

Music of varying tempos, CD/MP3 music player, open space, EAEC Dance Warm-Ups and Machine Step-by-Step Guide

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Warm-up is done to a faster tempo. Warm-up includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Stress is put on moving to the right and left in the circle. Vocabulary includes parallel position, plie, contract, and release.

UNIT LAYOUT

Content and Art Making Activities

Dance

Separate the class into four or five rows, with one row standing in front of another row.

Practice traveling across the space. Each row will move across the space to the tempo of the music. The row will move in a straight motion across the floor lunging into a plie movement. When the first row reaches the end of the room, they turn around and sit down. Each row repeats the exercise until all rows have traveled across the space. Variation: repeat the above, but with girls doing a sweeping motion with their arms and boys continuing the plie motion.

Main Activity:

Review Newton's Laws of Motion, defining weight displacement and force.

Machine exercise. Break the students into equal groups (five to a group is best). Students will make a machine with their bodies. Each student is a 'part' of the machine. Each 'part' must touch at least one other 'part' in the machine (weight displacement).

Criteria – students must:

- a) demonstrate weight displacement
- b) show levels in their machines
- c) have a locomotor movement that matches the tempo
- d) demonstrate force, either a push or pull

Give each group about 5 minutes to practice their 'machine'. Each group will then perform their 'machine' to the rest of the class. Audience members will indicate whether the criteria has been met by each team.

Wrap-Up and Post Assessment Activities:

In their student journals, have each student respond to the following questions:

- 1) What meaning/science concepts did you communicate in your machine?
- 2) Where did you get stuck in the machine exercise? How did you solve this problem?

Ask students to help move desks and chairs back to where they belong.

Day 7

Focus:

Newton's 1st Law of Motion: An object at rest, remains at rest, and an object in motion remains in motion at constant speed and in a straight line, unless acted upon by an unbalanced force

Materials Needed:

Music of fast and slow tempo, CD/MP3 music player, open space, student journals

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Students will warm up and stretch muscle groups in time to 2 different tempos- one fast and one slow. Warm-up includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Stress is put on moving to the right and left in the circle. Vocabulary includes parallel position, plie, contract, and release, alignment, balance/ counterbalance. Science vocabulary includes inertia and friction.

Main Activity:

Students will be broken up into groups of 4 or 5 (students will work in these groups for the remainder of the unit) and they must demonstrate moving from balance – or stationary movement to counterbalance. They also must show inertia and friction in their composition.

UNIT LAYOUT

Content and Art Making Activities

Dance

Each composition will consist of demonstrating Newton's first law, and must have balance (with locomotor movement), counterbalance (with locomotor movement), inertia, and friction for a phrase of 16 counts to the tempo of their choice.

The students will have 10 minutes to practice and then the other groups will give feedback.

Wrap-Up and Post Assessment Activities:

Review the day's lesson and vocabulary.

In their journals students respond to the following reflection questions:

- 1) Were there variations of movement? Describe any variations.
- 2) Did you show emotion in your bodies and create a theme? How?
- 3) Did you balance your weight in motion? How?
- 4) Did you demonstrate the knowledge of the science vocabulary? Explain.

Ask students to help move desks and chairs back to where they belong.

Day 8

Focus:

Choreographing a piece to Newton's Laws of Motion

Materials Needed:

Music of fast and slow tempo, CD/MP3 music player, open space, Dance Rubric (Appendix A), Science Rubric (Appendix B)

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Students will warm up and stretch muscle groups in time to 2 different tempos- one fast and one slow. Warm-up includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Stress is put on moving to the right and left in the circle. Vocabulary includes parallel position, plie, contract, and release, alignment, balance/ counterbalance. Science vocabulary includes inertia and friction.

Main Activity:

From the students, generate:

- 1) a list of arm movements
- 2) list of locomotor movements
- 3) how to travel across the space
- 4) beginning and ending formations
- 5) ways to make levels

**This is the menu that students will choose from to choreograph a composition.*

Next, with the whole class, create a rubric to evaluate the compositions, including the science terms that must be evident in their pieces. Discuss how each part of the rubric is evaluated. Refer to Appendix A and Appendix B for sample rubrics.

UNIT LAYOUT

Content and Art Making Activities

Dance

Split the class into two groups, one group facing the other. With the music playing, have the students practice the arm movements from the list to different tempos. Next, have the students travel in groups of four across the room using the arm movements.

Wrap-Up and Post Assessment Activities:

Students need to start planning which movements from the menu they wish to use for their composition.

Ask students to help move desks and chairs back to where they belong.

Day 9

Focus:

Choreographing a piece to Newton's Laws of Motion

Materials Needed:

Music of fast and slow tempo, CD/MP3 music player, open space, Dance and Science Rubrics (Appendix A and B), Pre-Dance Graphic Organizer (Appendix C)

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Students will warm up and stretch muscle groups in time to 2 different tempos – one fast and one slow. Warm-up includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Stress is put on moving to the right and left in the circle. Vocabulary includes parallel position, plie, contract, and release, alignment, balance/counterbalance. Science vocabulary includes inertia and friction.

Main Activity:

Review the Dance / Science Rubric that will be used to evaluate their compositions. In their groups, students brainstorm ideas from the list of movements created last class. Then students map (write out) the choreography for their piece. Have each group complete a Pre-Dance Graphic Organizer.

Practice the choreography. Evaluate what is working and what needs to be changed. At the end of the period, each group will perform a rehearsal dance for the rest of the class. Using the rubric, which is posted on the wall, the audience will report what they observed. Groups will note what was suggested.

Wrap-Up and Post Assessment Activities:

Groups will self-evaluate their compositions for final production. One student in each group should take notes of suggestions.

Ask students to help move desks and chairs back to where they belong.

Day 10

Focus:

Performance of Choreographed Composition

Materials Needed:

Music of fast and slow tempo, CD/MP3 music player, open space, Choreographing a Composition worksheet (Appendix D)

UNIT LAYOUT

Content and Art Making Activities

Dance

Warm-Up and Pre-Assessment Activities:

Have students help move desks and chairs to the side of the room if space is needed.

Students will warm up and stretch muscle groups in time to 2 different tempos- one fast and one slow. Warm-up includes both types of movement, stationary and locomotor. Standing or sitting in a circle, students follow a series of gentle stretches to warm up the body. Stress is put on moving to the right and left in the circle. Vocabulary includes parallel position, plie, contract, and release, alignment, balance/ counterbalance. Science vocabulary includes inertia and friction.

Main Activity:

After the warm-up, each group will be given 10 minutes to rehearse their composition. Each group will give a final performance of their piece.

Wrap-Up and Post Assessment Activities:

Each student completes the Choreographing a Composition worksheet.

Rubric Score from performance for fine arts grade and science grade.

Ask students to help move desks and chairs back to where they belong.

Unit Assessments – Formative and Summative:

See Attached: Dance Rubric
 Choreographing a Composition worksheet
 Pre-Dance Graphic Organizer
 Student Journals
 Performances

Unit Support and Resources:

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EAEC Curriculum Artmaking Activities; Step-by-Step Guides
African drumming music or music with various tempos
CD/MP3 music player

Field Trip: Field trip associated with this unit.

There is no field trip planned in relation to this unit.

Documentation (photos, student work, student interviews, etc.):

Photos, Student writing samples, Rubric scores from performances

Appendix A

Name: _____

Date: _____

Dance Rubric	3 Exceeds Expectations	2 Meets Expectations	1 Attempts, but needs work	0 Not present Not identifiable
Beginning Formation -frozen for 8 counts -identifiable shape -demonstrates balance/counterbalance				
Tempo -consistent and identifiable				
Direction -focused and has energy				
Levels -demonstrated and with variation				
Locomotor Movement -primary movement defined -uses the space				
Body Parts – Arms -clear, defined movements				
Body Parts – Legs -clear, defined movements				
Closing Formation -frozen for 8 counts -identifiable shape -demonstrates balance/counterbalance				

Appendix B

Name: _____

Date: _____

Science Rubric				
	3 Exceeds Expectations	2 Meets Expectations	1 Attempts, but needs work	0 Not present Not identifiable
Force -push or pull				
Friction demonstrated				
Gravity -strong positions				
Inertia demonstrated				
Momentum evident				
Acceleration evident				
Action/Reaction evident				
Static Friction evident				

Appendix C
Pre-Dance Graphic Organizer

Team Names:	
Formations Beginning End	Arm Movements
Locomotor/ Travel	Science Ideas/ Terms

Appendix D

Choreographing a Composition

- 1) Opening formation. Where is each member of the group going to be standing and what frozen pose will they hold for 8 counts?

- 2) How will the arm movements work with the locomotor/travel movements?
Sharp? Curved?

- 3) Will you change the arm movements?

- 4) What tempo?

- 5) How will you travel across the space? How many counts will you travel with each motion? Which direction?

- 6) How do you plan to show inertia, friction, and Newton's 1st Law of Motion in the composition?

- 7) Ending Formation. Where is each member of the group going to be standing and what frozen pose will they hold for 8 counts?