

**ITQ ARTS AND SCIENCE INTEGRATION
GRADE 3
DANCE AND PHYSICAL SCIENCE**

**Energy on the Move: Transfer and Waves
Lesson 2**

CONTENT STANDARDS

Dance

5.1 Explain relationships between dance elements and other subjects (e.g., spatial pathways – maps and grids, geometric shapes – body shapes).

Physical Science

PS1d Students know energy can be carried from one place to another by waves, such as water waves and sound waves, by electric current, and by moving objects.

ESSENTIAL QUESTIONS

- How does energy move from one place to another?
- How can I show how energy moves?

OBJECTIVES & STUDENT OUTCOMES

- Students will distinguish between, describe, explore, and demonstrate through movement, transfer of energy and energy waves.

ASSESSMENT (Various strategies to evaluate effectiveness of instruction and student learning)

- **Feedback for Teacher**
 - Student response to inquiry
 - Student performance
- **Feedback for Student**
 - Teacher feedback
 - Performance

WORDS TO KNOW

- **energy transfer:** The movement of energy from one thing to another or the change of energy from one form to another..
- **locomotor movement:** movement that takes a dancer from point A to point B (walking, running, leaping, skipping, and galloping are examples of locomotor movement).
- **shape:** A position of the body in space. A shape can be still or moving.
- **stored energy:** Energy available for use.
- **wave:** A regular, repeating pattern, such as an ocean wave or a sound wave.

MATERIALS

- Hand drum or other percussive instrument
- CD Player and Music
- Scarves (2)

RESOURCES

- *Music for Creative Dance* by Eric Chappelle
- *FOSS Kit Grade 3*, “Physical Science: Matter and Energy,” Investigation 1: Energy, Part 3

PREPARATION

- Make enough space in the classroom for students to move safely.
- Teach *FOSS Kit Grade 3*, “Physical Science: Matter and Energy,” Investigation 1: Energy, Part 3

WARM UP (*Engage students, access prior learning, review, hook or activity to focus the student for learning*)

(5 minutes)

- Review gestures for motion, heat and light.
- Review working energy and **stored energy**.
- *Say: I am going to teach you an “Energy Dance Chant” to help you remember what energy is and what it does.*
 - Post the chant:
 - *Say: Energy causes action and makes things happen.* Repeat several times having students say the chant until it is memorized.
 - Teach the movement:
 1. Step out to the right in a lunge, place right arm in a high diagonal, left arm is bent at elbow across chest (looks like a lightning bolt) (*Energy causes*)
 2. Step back to left foot, roll arms (*action that*)
 3. Clap 2 times (*makes things*)
 4. Jump high into the air (*happen*).
 5. Repeat chant and movement several times until memorized.

MODELING (*Presentation of new material, demonstration of the process, direct instruction*)

(10 minutes)

- Post new vocabulary and discuss: **energy transfer, waves**
- Discuss **shape** with students. Practice making several different kinds of frozen shapes (twisted, flat, large, small, curved, moving shapes, etc.).
- Procedure:
 - Arrange students in a circle or a line (depending on available space).
 - Create a **shape** in stillness (e.g., standing, feet together, body tucked at a medium level); this shape will represent **stored energy** (energy waiting to happen).
 - The **energy transfer** will be shown by student one jumping up then gently touching the shoulder of the student on his or her right, then returning to the **stored energy shape** to complete the motion. Student two will then jump, pass the energy to student three and return to the **stored energy shape**. Continue until all students have transferred the energy.
- Performing the exercise.
- One half of the class will perform the **energy transfer**. The other half will say and perform the chant. All students begin at dancer’s ready position.
- *Say:*
 1. **Stored energy** [Group one performing students are in tucked **shape**.]
 2. **Chant** [Group two students perform the chant.]
 3. **Energy transfer** [Group one students pass the **energy** and return to **stored energy shape**.]
 4. Switch groups and repeat using a different movement.
- *Ask:*
 - *What is energy?* [makes things happen, causes action]
 - *What is energy transfer?* [energy moving from one thing to another]
 - *Where can we find sources of stored energy?* [batteries, food, fuel]

GUIDED PRACTICE (*Presentation of new material, demonstration of the process, direct instruction*)

(30 minutes)

- *Say: Moving objects can also carry energy from the place to another. In dance, we use*

locomotor movement to move our bodies from one place to another.

- Ask: Can you think of ways to move your body from one place to another? [Run, walk, roll, skip, hop, jump, gallop, leap, etc.]
- Let's demonstrate this with bowling from your investigation in science. We are going to use our bodies to show how **energy transfers** from one place to another by moving objects.
- Bowling Demonstration – Setting it up
 - Select eight student volunteers. Student A is the bowler, student B is the ball and six students will be the pins.
 - The rest of the class will perform the chant and identify **stored energy, energy transfer** and source of energy.
 - Begin with the thrower positioned behind the ball.
 - Ask: How can you make your body like a bowling ball? [The ball should be in a small, tight, curled shape on the floor.]
 - Say: Show me how you can roll like a bowling ball. [The student should roll like an egg in a tucked position.]
- Bowling Demonstration Procedure:
 - All performers begin in still **shapes**.
 - Ask: Where is the **stored energy**? [in the muscles of the thrower] What will be the energy source? [The bowler's moving hand/arm.]
 - Student observers say the chant and the action starts.
 - Student A starts by placing one hand on student B and gently pushes student B into motion.
 - The student as the ball starts rolling toward the pins and the yarn is lengthening as it moves.
 - The ball gently bumps into the front pin showing the **transfer of energy** from ball to pin as the front pin falls.
 - The pins fall gently to floor and the ball stops.
 - Note: If one student as the bowling pin does not get touched by either the ball or another pin, then that student did not receive any energy transfer and should not fall.
- Ask:
 - What was the order of the **energy transfer** starting with the person who threw the bowling ball? [The energy transferred from the bowler's arm to the ball which made the ball roll. The ball transferred the energy to the pins by hitting them and making them fall down.]
 - What form of energy is the rolling of the ball and the falling of the pins? [**Motion**]
 - When the bowling pins fall, where did the energy transfer? [Accept student responses. The energy would likely go into the floor or any other object the pins were touching after they were hit.]
- Say: Energy often travels in waves or in a current like electricity does through metal wires.
- Ask: Can you think of a place where you have seen waves? [Ocean waves, ripples in a pond]
- If the class is large, split the students into two groups. One half will say and perform the chant while the other half performs the wave. Switch groups often.
- Say:
- We will now create group movement to demonstrate **energy transfer** through **waves**.
 - Get into a semi-circle so you can see each other and stand shoulder to shoulder.
 - When I say, "**stored energy**," I want you to say and perform the chant.
 - Remember our waves investigation when we created waves with the pop
 - We're going to do the stadium wave like the fans do at a football game.
- Practice the wave from one end of the line to the other until it moves smoothly by raising and lowering arms).
- Remember our waves investigation when we created waves with our popsicle sticks?
 - Say: When I say "**energy transfer**," I will act like the stick and start the wave. Hold hands

but leave enough room for your arms to move up and down freely. The first student that I touch will start the wave and the wave will move from one person to the next.

- Ask:
 - *What happened in our investigation when the wave hit the end of the container?* [The wave came back to where it started.]
 - *How do you think we could represent that action with our movement?* [The person on the end of the line needs to start the wave action back to the starting point.]
- Practice the wave until it moves smoothly starting at one end and coming back again.
- *Say: This scarf represents a person floating on the water.* (Place the scarf on the joined hands of a couple of students.)
- *Ask: (Pointing to the scarf) What do you think will happen to this person as the wave arrives?* [The person will move up and down with the wave.]
- Repeat the exercise again. Perform the chant. As the **wave** rises and falls, the scarf will rise and fall too.
- Switch groups.
- Ask:
 - *How did the energy travel from point A to point B?* [The energy traveled by a **wave, energy transfer**]
 - *How would you describe how a water **wave** travels?* [Water **waves** travel up and down with a rolling motion]

DEBRIEF AND EVALUATE (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet expected outcomes?*)
(5 minutes)

- Ask:
 - *What is energy?* [Energy causes action that something else to happen.]
 - *Besides a rolling ball, what other kinds of objects have moving energy?* [A skateboard moving downhill, a falling ball or apple from a tree, a person running, etc.]
 - *What are some examples of **stored energy**?* [your muscles, food, battery, fuel (like gas) for cars and wood for fires]
 - *How can **stored energy** change into moving energy?* [by rolling a ball, rolling downhill on a grassy bank, burning gasoline to power a car, burning wood or coal to make a steam engine run to move a train, moving your body to exercise or do chores]
 - *Can you name some things that transfer energy?* [Expect answers such as: a microwave transfers energy to heat food, car stereo transfer sound, a bat transfers energy to a ball as in baseball, your foot transfers energy to a ball as in soccer, etc.]

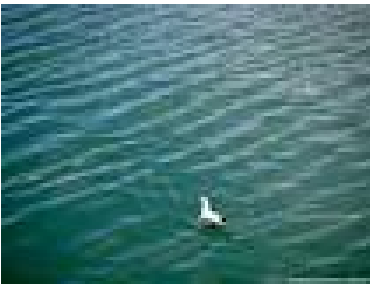
EXTENSION (*Expectations created by the teacher that encourages students to participate in further research, make connections and apply understanding and skills previously learned to personal experiences.*)

- Simulate falling dominos. Have students kneel next to each other in a line or curve. Start the **energy transfer** by gently touching the end student. Each student will gently fall sideways while gently transferring the energy to the next student.
- Explore with a parachute and a ball.
- Have small groups explore how electric current travels. Use dance vocabulary (pathway, direction) and create a short movement sequence (e.g., switch turns on flow, electricity particles travel in a line in a certain direction, the object turns on and moves, lights up or gives off heat, and switch turns off flow).
- Illustrate and label the steps of the dance.

WAVES TRANSFER ENERGY!



HAVE YOU EVER BEEN KNOCKED DOWN BY ONE OF THESE AT THE BEACH?



HAVE YOU EVER SEEN THE WIND MAKE RIPPLES IN A LAKE OR POND LIKE THIS?



HAVE YOU EVER DROPPED A PEBBLE INTO A POND AND MADE RIPPLES THAT LOOK LIKE THIS?