

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

**Dancing in the Moonlight
Lesson 2**

*FOSS California, Grade 3, Sun, Moon, and Stars, "The Moon", Investigation 2
This lesson is done in conjunction with lesson 3*

CONTENT STANDARDS

Dance Grade 3

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

Earth Science Grade 3

ES4b Students know the way in which the moon's appearance changes during the four-week lunar cycle.

ES4d Students know that the Earth is one of several planets that orbit the Sun and that the Moon orbits the Earth.

ESSENTIAL QUESTIONS (*Questions students might ask about the topic*)

- What causes the Moon to look different each night?
- What are the eight phases of the Moon?
- How does dance help me understand the phases of the moon?

OBJECTIVES & STUDENT OUTCOMES (*Students will be able to.....*)

- demonstrate the Moon phases and lunar cycle through movement.
- demonstrate the orbit of the Moon around the Earth.

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

- **Feedback for Teacher**
 - Student response to inquiry
 - Performance
- **Feedback for Student**
 - Teacher feedback
 - Viewing Videotape

WORDS TO KNOW

Dance

- **Axial Movement:** Movement anchored to one spot by a body part. Movement is organized around the axis of the body and does not travel from one location to another (e.g, stretching, bending, twisting, turning in place, gesturing).
- **Beat:** Unit of measure of rhythmic time: a steady pulse of movement.
- **Locomotor Movement:** Movement that takes the body from point A to point B: walk, run, hop, skip, gallop, slide, leap, roll, crawl, jump, etc.
- **Pathway:** The path on which the body or a body part travels in curved or straight lines.
- **Shape:** A position of the body in space. A shape can be still or moving.

Science

- **Crescent:** A word used to describe the curved shape of the visible part of the Moon before and after a new Moon.

- **First-quarter Moon:** A phase of the lunar cycle halfway between a new Moon and a full Moon.
- **Full Moon:** A phase of the Moon in the lunar cycle when all of the sunlit side of the Moon is visible from the Earth.
- **Gibbous:** A word used to describe the Moon when it appears to be more than half but less than full before and after the full moon.
- **Lunar Cycle:** The 4-week period during which the Moon orbits Earth one time and all of its phases are visible from Earth.
- **Moon:** Earth's natural satellite.
- **Moon phase:** The shape of the visible part of the Moon.
- **New Moon:** The phase of the moon in the lunar cycle when the sunlit side of the Moon is not visible from the Earth.
- **Reflect:** To bounce off an object or surface. Sun light reflects from the Moon.
- **Third-quarter Moon:** The phase of the moon in the lunar cycle halfway between the full Moon and the new Moon. The Moon appears from the Earth to be a "half Moon."
- **Waning:** Getting smaller.
- **Waxing:** Getting larger.
- **Orbit:** To move or travel around an object in a curved path. Earth orbits the Sun. The Moon orbits the Earth.

MATERIALS

- "Phases of the Moon", Teacher Answer Sheet, *FOSS California, Grade 3, Sun, Moon, and Stars*, Teacher Guide, pg. 176
- Hand drum
- Diagram #1: A list of three locomotor words: walk, crawl, jump to post on the overhead, chart paper, or board (attached)
- Lunar Cycle cards (attached)
- "Earth and Moon" and "Phases of the Moon Song" by Myra Lingle (attached)
- CD Player and music
- Video Camera
- Science notebooks (1/student)

RESOURCES

- *FOSS California, Grade 3, Sun, Moon, and Stars*, "The Moon", Investigation 2
- Internet resources: Brigham Young University, <http://education.byu.edu/arts/lessonplans/dance.html>
- "Earth and Moon", and "the Phases of the Moon Song", by Myra Lingle

PREPARATION

- Review from lesson #1, the Earth, how it rotates, and how long it takes to complete a full rotation.
- Introduce the words **orbit** and revolve. Tell the students that these words mean the same when they are applied to a satellite's circular movement around a star or planet.
- Complete Investigation 2, Parts 1 and 2 in *FOSS California, Gr. 3, Sun, Moon, and Stars, The Moon*".
- If doing the extension of this lesson, make an additional three copies of the Lunar Cycle cards.
- Have a video camera ready to videotape all exercises for further discussion.

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

(3 minutes)

- Review from lesson #1 the Earth and its rotation (direction, length of a full day), and the gesture for the vocabulary word rotate.
- *Ask the following questions [accept student answers]:*
 - *What do you know about the **Moon**?*
 - *Describe or illustrate how the **Moon** looked each time you saw it.*

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

(15 minutes)

The **Moon** and its **Orbit**

- Students are seated. Introduce the words **orbit** and revolve. Tell the students that these words mean the same when they are applied to a satellite's circular movement around a star or planet.
- *Say: The **Moon** is a satellite, a very large object that **orbits** (revolves) around the Earth. It takes about four weeks or a month for the **Moon** to make one complete **orbit** (revolution) around the Earth.*
 - Teach a gesture for **orbit** (or revolution). Hold up a fist (to represent the Earth) and with the index finger of the right hand (to represent the **Moon**), circle the finger in a counterclockwise direction around the fist.
 - *Say and repeat: My fist represents the Earth and my finger represents the **Moon**. The **Moon Orbits** (or revolves) around the Earth!*
 - Perform the gesture and the phrase several times with the students.
- *Say: Introduce the word **pathway**. A **pathway** is the path you would take to get from one place to another. The **Moon** makes a circular **pathway** around the Earth.*
- Arrange students in pairs. Identify one student (partner A) as the Earth and the other as the **Moon** (partner B).
 - The student as the **Moon** (partner B) will walk counterclockwise in a circular **pathway** around student as the Earth (partner A).
 - *Say: (While students are demonstrating), You are **orbiting** (revolving) around your partner.*
- Stop the activity and have students sit down.
- Select two volunteers.
- *Say:*
 - *The **Moon** is smaller than the Earth.*
 - *Partner A (identify which student will be partner A) will be the Earth. Partner A will use the gesture (rotating the hand), or the Toe-Tap dance step from lesson #1 to show the Earth rotating on its axis.*
 - *Partner B (identify the other student as partner B) will be the **Moon** and will create a smaller **shape** that will **orbit** (revolve) counterclockwise around the Earth. (Have student B make a smaller shape).*
 - *Partner B, you use a slow walking locomotor movement to show the **Moon orbiting** (revolving) around the Earth.*
 - *We will take 16 slow **beats** to make a circular **pathway** or one **orbit** (revolution) around the Earth.*
 - Demonstrate on a drum or with clapping a slow, 16-beat phrase before students do the exercise.
 - Using a hand drum, claps or counts, have Partner B slowly walk 16 **beats** around Partner A.
 - Note: If students move too quickly and complete the **orbit** early, tell them that on **beat** eight, they should be halfway around their partner. You may have to stop the exercise on **beat** 3 to make certain they are not moving too fast. This is important for the next exercise.
- Post a list of three locomotor words: walk, crawl, jump.
- Have students stand and return to their pairs.
- *Say:*
 - *Partner A will be the Earth and partner B will be the **Moon**.*
 - *Remember, the **Moon** is smaller than the Earth. Partner B, show me how you can make a **shape** smaller than your partner.*
 - *Partner B, choose a **locomotor** step from this list (point to the list of three words) to show the **Moon orbiting** counterclockwise around the Earth.*
 - *When I say go, partner A (the Earth) will do the rotating movement with their hand (or the dance step) and partner B (the **Moon**) will **orbit** counterclockwise around the Earth. We will do this for 16 slow **beats**.*
 - Use a hand drum, clapping or counting to keep steady **beat**. All students perform exercise.
 - Switch roles and repeat one more time.
 - Videotape the exercise to use for later discussion.

The **Moon** and its **shape**

- Say: *I have some questions for you to think about.*
- Turn to a partner and discuss. Share answers.
 - Ask:
 - Does the **Moon** have its own light? [No]
 - Where does the light we see coming from the **Moon** come from? [The Sun]
 - Does the light we see coming from the **Moon** ever look different to you? What does it look like? [Accept student responses]
- Say: *The **Moon** appears to change its shape because part of it is lit by the Sun and part of it is in shadow. The **Moon** appears to change **shape** each night because it revolves around the Earth.*
 - Have students repeat the phrase “The **Moon** appears to change **shape** each night because it revolves around the Earth”, two times.

GUIDED PRACTICE (*Application of knowledge, problem solving, corrective feedback*)

(28 minutes)

Part One: The **Moon Phases** and **Lunar Cycle**

- Introduce the phases of the **Moon**.
- Post a chart of the phases of the **Moon**. Refer to page 92-93 *FOSS California, Grade 3, Sun, Moon, and Stars*, Teacher Guide.
- Ask/Say:
 - *When the **Moon** revolves around the Earth for four weeks or one month, we see changes to the patterns of light reflected from the **Moon** to us. We call these changing shapes of light **phases**. The **shapes** always follow a predictable pattern that repeats over and over again. We call this the **lunar cycle**.*
- Model and teach the **shape** for a **full Moon** and a **new Moon**. Students will stand tall with arms overhead to make a large open circle over their head for the **full Moon** and will make a tucked shape for the **new Moon**.
 - Make a **full Moon shape** and Say:
 - *When a **full Moon's shape** begins to shrink and get smaller (move slowly into a tucked **shape**) we call that a **waning moon**. When the moon's shape shrinks so much that we can't see it, we call that a **new moon**. Is the **Moon** really shrinking and going away? [No it just appears to go away because the **Moon** is in full shadow.] When the **Moon** is in full shadow, called a **new moon** we cannot see it in the night sky.*
 - *What a **new Moon** grows into a **full Moon**, we call that a **waxing Moon** (slowly move from a tucked **shape** into a **full Moon shape**.*
- Have students practice moving from a **full Moon** to a **new Moon** shape. Start in a **new Moon shape**.
 - Say: *Slowly move from a **new Moon shape** to a **full Moon shape**. You are a **waxing Moon**. You get bigger and bigger until you are a **full Moon**.*
 - *Slowly move from a **full Moon shape** to a **new Moon shape**. You are a **waning Moon**. You get smaller and smaller until you are a **new Moon**. You are now in complete shadow.*
- Teach the **shapes** for **crescent**, **first quarter** and **gibbous Moon** for both **waxing** and **waning Moons** (pictures attached). Practice these in order from **New Moon** to **full Moon** and back again going through the entire **Lunar Cycle**.
 - Say: *Light on the right is a **waxing Moon**. Bigger and bigger it grows. We do the shapes on the right side of our body because the right side of a **waxing Moon** is lit, while the left side of the **Moon** is in shadow.*
 - *Have students say the chant several times: Light on the right is a **waxing Moon**. Bigger and bigger it grows.*
 - *Have students move from **new Moon** to **full Moon** while saying performing the **shapes** for **crescent, first quarter, gibbous** and **full Moon**.*
 - Say: *Light on the left is a **waning Moon**. Smaller and smaller it gets. Shapes done on the left mean a **waning Moon** or a **Moon** that appears to change shape and get smaller. We do the shapes on the left side of our body because the left side of a **waning Moon** is lit, while the right*

side of the **Moon** is in shadow.

- The call and response chant should proceed as follows:
 - The teacher calls: “Light on the right is a **waxing Moon**”. Students respond “Bigger and bigger it grows.” Together, everyone says and performs “**crepuscular, first quarter, gibbous and full**”.
 - The teacher calls: “Light on the left is a **waning moon**”. Students respond: “Smaller and smaller it gets”. Together, everyone says “**gibbous, third quarter, crescent and new**”.
 - Lead the students through the entire **lunar** and movement **cycle** with the call and response chant several times.
 - Note: As the teacher you must mirror the class or turn around and demonstrate the cycle. Make sure the shapes are on the correct side of the body.

Part Two: Series of **Moon** phases

- Refer to the chart of the phases of the **Moon** on pages 92-93 of the *FOSS California, Grade 3, Sun, Moon, and Stars*, Teacher Guide.
- Select eight students to demonstrate the eight phases of the moon in a horizontal line with their backs to the observers.
- Each student makes the shape for one phase of the **lunar cycle** in sequence, starting with the **new Moon** and ending with the **waning crescent**.
- The entire class will call out the **Moon’s** phases as the **shapes** are made: **new moon, crescent, first quarter, gibbous, full moon, gibbous, third quarter, crescent**.
- Select four students to represent a fragment of the **lunar cycle** series: **waxing crescent, first quarter, waxing gibbous**, and a **full Moon**.
- Ask the audience to predict which phase comes before the **waxing crescent** and which phase comes next the **full Moon**.
- Repeat with another moon phase (e.g., **waning gibbous, third quarter, crescent, new Moon**).
- Ask the audience to predict which phase comes before the **waxing crescent** and which phase comes next the **full Moon**.
- Option: Refer to the “Phases of the Moon”, Teacher Answer Sheet, *FOSS California, Grade 3, Sun, Moon, and Stars*, Teacher Guide, pg. 176. Ask students to complete the **lunar cycle** in a circular pattern around a student representing the Earth.

DEBRIEF & REFLECT (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

(3 minutes)

- *Exit questions:* Orally review with the class or have students pair share responses to the following prompts. Have students write a response to each question in their science notebooks.
 - *What is the difference between a **waxing** and a **waning Moon**? [A **waxing Moon** appears to get bigger. A **waning Moon** appears to get smaller.]*
 - *How does the **Moon** change its **shape** over four weeks? [The **Moon** has eight phases, new moon, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, third quarter, waning crescent, and new Moon.]*
 - *When the **Moon** is in full shadow, what is that phase called? [New Moon]*
 - *How did dance help me to learn about the **phases of the moon**?*

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

- View the videotape and discuss the **phases** of the **Moon** and the **lunar cycle**.
- **The Lunar Cycle**
 - Arrange students in groups of eight.
 - Have 4 four sets of **lunar cycle** cards prepared (one set is attached).
 - Distribute a **moon phase** card from a set to each student in the group.
 - Have students make the shape of their phase. Remind students to show **waxing shapes** on their

right and **waning shapes** on their left. Remind students that shape is the lit part of the **Moon**. Assist students as necessary.

- Each group of eight students are to arrange themselves, in sequence, for one **lunar cycle**.
- After **lunar cycles** have been created, examine each group for accuracy. Guide groups who create horizontal formations into a circular formation to represent the repeated pattern.
- *Ask: How much time does one **lunar phase** represent?* [One month]
- *How much time would two **lunar phases** represent?* [Two months]
- *How much time would all our **lunar phases** represent?* [Responses should reflect the number of phases equal to one month.]
- Play daily games to commit the **phases** of the **Moon** to memory.
- Explore the “Moon Dance Lesson” at <http://education.byu.edu/arts/lessonplans/dance.html>, Grade 3
- Use songs created by Myra Lingle, “Earth and Moon” and “Phases of the Moon Song” (see attached)

Diagram #1: LOCOMOTOR WORDS

W A L K

C R A W L

J U M P

EARTH, MOON, AND PHASES - by Myra Lingle

<p align="center">Earth and Moon To the tune of “The Ants Go Marching”</p>	<p align="center">The Phases of the Moon Song – To the tune – “The Wheels on the Bus”</p>
<p>The Earth revolves around the sun, Hooray! Hooray! It takes one year its orbit to make, Hooray! Hooray! Three hundred sixty-five days it takes, One complete revolution it makes, Then it starts all over again, again, again.</p> <p>The Earth rotates on its axis, Hooray! Hooray! Twenty-four hours is what it takes, Hooray! Hooray! Rotation causes day and night, It’s the reason for dark and light, Then it starts all over again, again, again.</p> <p>The moon revolves around the earth, Hooray! Hooray! It takes one month this orbit to make, Hooray! Hooray! We see the moon go through each phase, All eight upon them we can gaze, Then it starts all over again, again, again.</p> <p>The movements of the earth and moon, Hooray! Hooray! Are natural cycles that can be found, Hooray! Hooray! The seasons and the day and night, Even the tides – Yes, that’s right! Then it starts all over again, again, again</p>	<p>The phases of the moon go round, round, round, Round, round, round, round, round, round, The phases of the moon go round, round, round, All through the month.</p> <p>The new moon is the phase where you can’t see Any light, any light, The new moon is the phase where you can’t see Any light at all.</p> <p>The waxing crescent has a sliver of light, Sliver of light, sliver of light, The waxing crescent has a sliver of light A sliver of light on the right.</p> <p>The first quarter phase is half lit up, Half lit up, Half lit up, The first quarter phase is half lit up The right half has the light.</p> <p>The waxing gibbous is more than a half But not quite full, not quite full. The waxing gibbous is more than half The full moon will be next.</p> <p>The full moon is a circle of light, Circle of light, circle of light, The full moon is a circle of light, That lights up the night sky.</p> <p>The waning gibbous is less than full, Less than full, less than full, The waning gibbous is less than full, Coming after a full moon.</p> <p>The third quarter phase is half lit up, Half lit up, half lit up, The third quarter phase is half lit up, The left half has the light.</p> <p>The waning crescent has a sliver of light, Sliver of light, sliver of light, The waning crescent has a sliver of light, The light is on the left.</p> <p>That’s our song about the phases of the moon, Phases of the moon, phases of the moon, That’s our song about the phases of the moon, A natural cycle of Earth.</p>