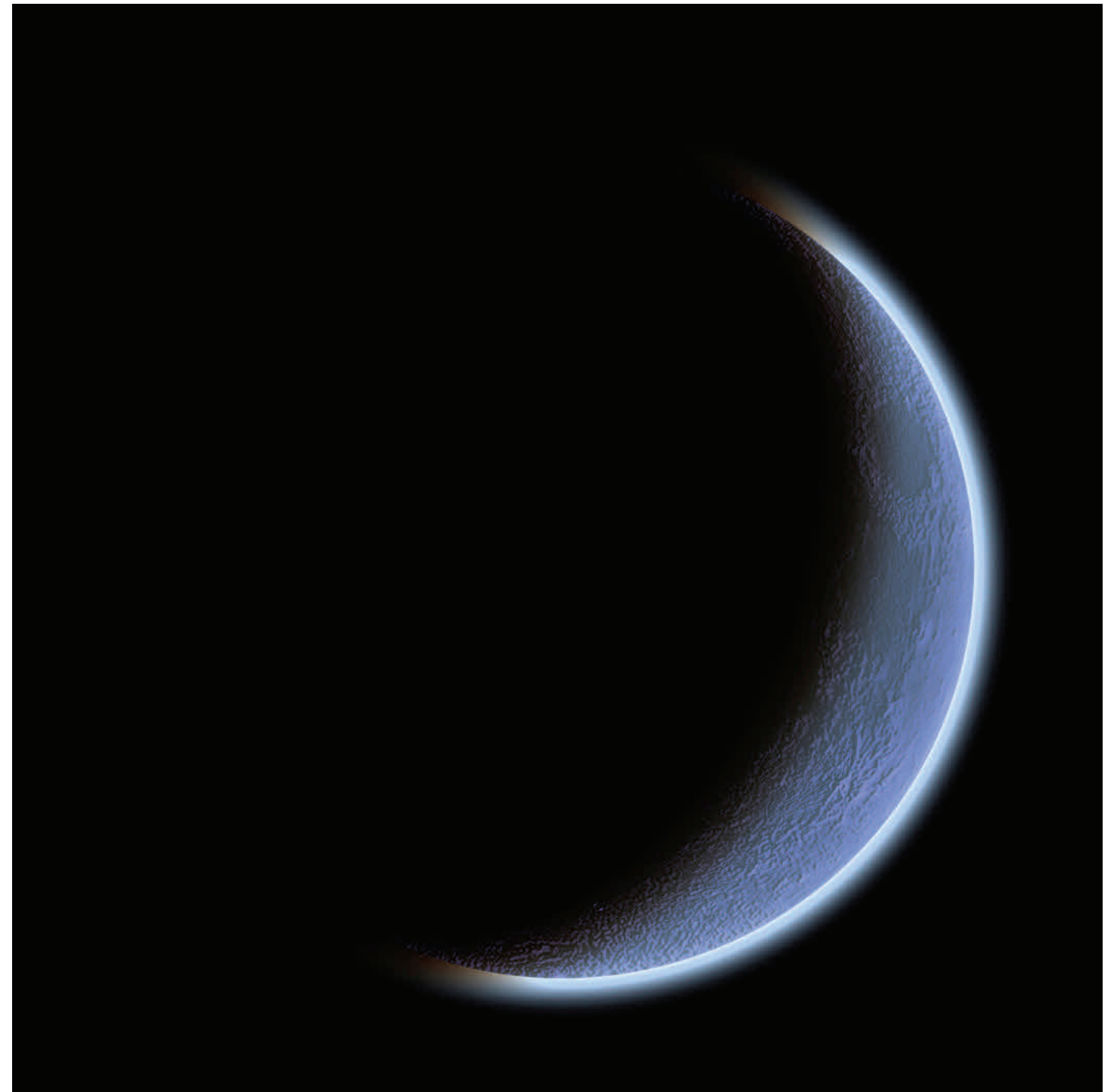


Day and Night Cycles • Phases of the Moon •



**Assessment**

- Students should accurately use movement to model the position and motion of the sun, moon, and earth.
- Students should accurately use movements to demonstrate the phases of the moon.
- Students should accurately identify time of day from model showing the position of the sun, moon, and earth.
- Students should display appropriate audience behavior during performances.

**Georgia Performance Standards**

SCIENCE  
GRADE 4

- S4CS4:** Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.
- S4E2:** Students will model the position and motion of the earth in the solar system and will explain the role of relative position and motion in determining sequence of the phases of the moon.
- Explain the day/night cycle of the earth using a model.
  - Explain the sequence of the phases of the moon.
  - Demonstrate the revolution of the earth around the sun and the earth's tilt to explain the seasonal changes.
  - Demonstrate the relative size and order from the sun of the planets in the solar system.

THEATER  
GRADE 4

- TAES4.3:** Acting by developing, communicating, and sustaining roles within a variety of situations and environments
- TAES4.7:** Integrating various art forms, other content areas, and life experiences, to create theatre
- TAES4.11:** Engaging actively and appropriately as an audience member in theatre or other media experiences

**National Standards**

SCIENCE

**NS.K-4.4:** As a result of their activities in grades K-4, all students should develop an understanding of:

- Properties of earth materials
- Objects in the sky
- Changes in earth and sky

THEATRE ARTS

- Standard 2:** Acting by assuming roles and interacting in improvisations
- Standard 5:** Researching by finding information to support classroom dramatizations



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## Phases of the Moon

This lesson builds on the class's prior knowledge of the solar system and the planet's positions. Having students use their bodies to model the day/night cycles of the Sun and Earth allows them to become these elements. Next we discuss the moon's role in the solar system and explore the eight phases of the moon through acting out a story. Finally, a song brings it all together to deepen the learning.

**Essential Question: How can the process of acting increase comprehension in other subject areas?**

### Process:

#### SOLAR SYSTEM

"Does anyone know what this is a picture of? (The Solar System) Do you know the names of the planets? Notice the position of the planets in relation to the sun."

#### DAY & NIGHT

"When I say the word "day" what do you think about? When I say the word "night" what do you think about?"

Use "who, what, when, why" questions to get answers from students.

"So, how do we see the sun throughout the daytime? The sun rises in the morning and we call that time Sunrise. That's the beginning of the day. Then at Noon time or 12:00, midday, the sun is at its brightest point. After diner and at about bedtime the sun disappears. What is this time called? Then, when it's dark and no sunlight is visible, what time of day do we call that? We sleep for most of this time. It's called Night. What do you think causes day and night to happen? Day and night occurs as a result of the Earth's rotation."

#### DAY & NIGHT CYCLE EMBODIED (THE SUN & THE EARTH DANCE)

"Let's see how day and night occurs by bringing it to life. Really day and night is just a dance between the Sun and The Earth. I need 2 volunteers:

1. Earth
  2. Sun (to hold the lamp or flashlight)
- Give the lamp or flashlight to the Sun/student.
  - Show the map of the world.
  - Place the sticker on the place where your school is located and explain to students that the sticker represents your town. Ask students to focus on the sticker in a minute.
  - Place the wrap-around map around the student/Earth so that your town is on his/her chest.
  - Ask student to hold both arms out to the side and point fingers the whole time and make sure he/she can be seen by the other students.
  - Darken room and turn on lamp.
  - Explain that the lamp represents the Sun and tell students that the Earth is going to rotate around the Sun. Remind students to focus on the sticker or your town as the Earth rotates.
  - Have student/Earth begin with his/her back to the lamp. Ask students if they think it is day or night in their town. (NIGHT)
  - Have student/Earth rotate slowly in a counterclockwise fashion, until his/her left arm is pointed to the Sun. Ask students if they think it is sunrise or still night. (SUNRISE)
  - Student/Earth continues the counterclockwise rotation until he/she faces the Sun directly. (NOON) Ask students what time it is now in their town. Students can see that it is noon, the middle of the day, when we get the most light from the Sun.
  - Ask Student/Earth to rotate a little more. Have him/her stop when his/her right arm is pointed toward the Sun. (SUNSET) Ask students what time of day it is. They should be able to tell you that it is sunset.
  - Complete the day/night cycle by having the student return to his/her original position, with his/her back to the Sun. (MIDNIGHT) Students should be able to tell you that is midnight.
  - Ask students to notice what time of day it is on the other side other Earth (student's back is facing the Sun and it is noon).
  - Explain that one half of the Earth is always light while the other is dark. It is the Earth's own shadow that makes the night side of the Earth dark.

"So, now we have a better idea of the relationship between the Sun and the Earth. What if we throw the Moon in the mix? Let's talk about the Moon."

#### THE MOON

"Is the moon a planet? NO. Is the moon a star? NO. A moon is its own class.

Any object that revolves around a planet is called a moon. Every planet has a moon. Moons move around planets but stars stay still. The Moon that revolves around our planet, Earth, is called The Moon. It is much smaller than the Earth – ¼ the size of Earth itself. Because of its smaller size, the Moon's gravity is one-sixth of the Earth's gravity. We saw this demonstrated by the giant leaps of the Apollo astronauts. There are many interesting surface features such as craters, mountain ranges, rilles, and lava plains on the Moon's surface. The Moon doesn't produce its own light, but looks bright because it reflects light from the Sun. Think of the Sun as a light bulb, the Moon as a mirror, reflecting light from the light bulb. The lunar phase changes as the Moon orbits the Earth and different portions of its surface are illuminated by the Sun."

#### **Materials**

- Headlamp with headband for Sun's light
- Clip Light (with 200w bulb)
- Music – "I Don't Want to Live on the Moon"
- Video of phases of the moon
- Body Map

#### **Vocabulary**

##### **Sunrise**

the appearance of the sun in the morning; the beginning of day

##### **Day**

the time of light between one night and the next

##### **Noon**

12 o'clock at midday

##### **Sunset**

the disappearance of the sun in the evening; the beginning of night

##### **Night**

the time from dusk to dawn when no sunlight is visible

##### **Day and Night Cycle**

occurs as a result of the Earth's rotation

##### **Moon**

any object that revolves around a planet

##### **Crescent Moon**

A crescent moon is part way between a half moon and a new moon, or between a new moon and a half moon.

##### **Full Moon**

A full moon appears as an entire circle in the sky. The full moon is given different names, depending on when it appears. For example, the "Harvest moon" is the full moon that appears nearest to the Autumnal Equinox, occurring in late September or early October.

##### **Gibbous Moon**

A gibbous moon is between a full moon and a half moon, or between a half moon and a full moon.

##### **Half Moon**

A half moon looks like half a circle. It is sometimes called a quarter moon (this Moon has completed one quarter of an orbit around the Earth from either the full or new position and one quarter of the moon's surface is visible from Earth).

##### **New Moon**

The new moon is the phase of the moon when the moon is not visible from Earth, because the side of the moon that is facing us is not being lit by the sun.

#### **Resources**

- Video of the moon:  
[http://en.wikipedia.org/wiki/File:Lunar\\_libration\\_with\\_phase\\_Oct\\_2007\\_450px.gif#file](http://en.wikipedia.org/wiki/File:Lunar_libration_with_phase_Oct_2007_450px.gif#file)
- Body Map (print on copy and tape together pages to wrap around students' body):  
[http://eyeonthesky.org/activities\\_pdf/05sun\\_dayni\\_map.pdf](http://eyeonthesky.org/activities_pdf/05sun_dayni_map.pdf)

#### LUNAR CYCLE IN MOTION

"Let's use our bodies and act out the relationship between the Sun, Earth & Moon."

- Put students in groups of three for the roles of Earth, moon, and sun.
- Ask students to describe qualities of each of the roles:
  - Earth – round, blue and green
  - moon - changes shapes
  - sun – bright yellow and hot
- The sun shines a flashlight on the earth, the Earth simply stands and rotates in one spot, and the moon slowly circles the Earth, passing between the earth and the sun.
- This activity illustrates one moon cycle in a simple manner.

#### PHASES OF THE MOON

"Each moon cycle has 8 phases. That means that the moon looks different in each phase. What is the phase of the moon? The changing shape of the bright part of the Moon that we see is called its phase. The phases are named after how much of the moon we can see, and whether the amount visible is increasing or decreasing each day. Why does the moon keep changing its shape? The alignment of the moon and the sun determines the phase of the moon.

- When the bright part is getting bigger, the moon is **waxing**.
- When it is getting smaller, the moon is **waning**
- When the moon is more than half-lit, it is called a **gibbous** moon.
- When the moon is less than half-lit, it is called a **crescent** moon."

#### PHASES IN MOTION IN ARM MOTION

- Use arms to make moon.
- It GROWS (arms up to the right, left elbow swings open to the left),
- Reaches full moon (circle open),
- and then it SHRINKS (right elbow comes in to meet the left on the left).
- Drop arms and bring back to first position.

#### Let's Go to the Moon!

"A girl earns a new job (New Moon), where she is asked to wax the crescent (Waxing Crescent). Her boss is pleased and she earns her first quarter (First Quarter). Her next job is to wax the gibbous (Waxing Gibbous). Again, the boss is pleased so she earns her first full paycheck (Full Moon). Then she gets lazy. She begins to wane the gibbous (Waning Gibbous), so the boss says, "You're fired. This is your last quarter. Finish the job and leave." (Last Quarter). She wanes the crescent before leaving to find a new job (Waning Crescent)."

- Ask students to use their arms in the correct positions as you tell the story.
- Invite the children to share what they have observed about how our Moon changes.
  - Does it change?
  - In what way?
  - Is there a pattern to the changes?
  - Over what period of time do the changes occur?

#### PHRASES WITH PHASES

Sung to the tune *The Ants Go Marching* (Lyrics by Becky Nelson, Lunar and Planetary Institute):

Each Moon phase marches COUNTERCLOCKWISE —

Now, let's start . . .

The FIRST PHASE is the NEW MOON that we see as DARK.

Then next the WAXING CRESCENT shines

A LITTLE LIGHT upon the RIGHT,

And after that's the

QUARTER MOON, where the

RIGHT HALF'S LIGHT.

Following is WAXING GIBBOUS on the RIGHT,

Where the LIGHT continues SPREADING and becoming bright.

We'll be HALFWAY through the phases soon,

With the FULLEst, brightest, biggest MOON,

Just before the DARK creeps

On the RIGHT

Of a WANING MOON.

The WANING GIBBOUS phase is when the LIGHT will SHRINK,

Then what will be the next phase after that, you think?

It's once AGAIN a QUARTER MOON,

But the DARK HALF's now upon the RIGHT,

And the LEFT side is the

One's that's BRIGHT!!

Did you get that right?

The next phase is the LAST phase where there's just a spark

Of light, so WANING CRESCENT appears ALMOST DARK!

The Moon is really magical,

When it's WAXING, WANING, NEW OR FULL.

And it COULDN'T SHINE at all

WITHOUT .....THE SUN'S .....bright light!!