The Earth and the Moon

Grade 3

FLA 518
Content-based Instruction for English Language Learners
7/17/03
Introduction
Unit: The Earth and the Moon

Grade: 3rd

Class: Mainstream Class with Integrated ELLs

You might be particularly interested in how this teacher:

- Assisted students in their reading skills by having the ELL students previously read a summary outline and create a T-list (Each lesson).
- Varying questions during experiment according to the students language level (26).
- Simplified rewrite of Moon book (44-49).
- How the teacher conceptualizes the lesson by using gestures while reading out loud (39).
- How the teacher uses the whiteboard to help the students formulate their ideas (60, 76).
- How the teacher used functional/Notional charts (9, 27, 62).
- How the teacher provided a variety of lesson objectives (5, 38).
Introduction

1. **Title:** “The Solar System” especially “The Earth and the Moon”
2. **Grade Level:** Third Grade
3. **Target Group:** Mainstream class with integrated ELL students (dual immersion)
4. **Sources of Written Materials:**
5. **Source of Original Lessons:**
6. **Learning Goals:**
   - I want my students to know...
   - ...that the sun and the rotation of the Earth create night and day and the cycles of the moon.
   - ...important features of the Earth and the moon.
   - ...the relationship of cycles and the solar system.
   - ...the vocabulary and formulae to describe different aspects of the Earth and the moon.
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<th>Language</th>
<th>Content</th>
<th>Learning Strategies</th>
</tr>
</thead>
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<tr>
<td></td>
<td>-Vocabulary and formula to describe different aspects of the solar system</td>
<td>-The sun and rotation create night and day, and the moon's cycle.</td>
<td>-read and recognize the features of a non-fiction text.</td>
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<td>-The important features of the solar system and it's components.</td>
<td>-The relationship of cycles and the solar system.</td>
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<tr>
<td>Skills</td>
<td>-label the Earth's layers on a diagram.</td>
<td>-name and describe the Earth's layers.</td>
<td>-use the table of contents and/or index to locate information.</td>
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<td></td>
<td>-describe each of the Earth's layers in one sentence.</td>
<td>-explain and demonstrate how night and day occur.</td>
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<td>-act out and orally explain how night and day occur.</td>
<td>-demonstrate how a planet (Earth) orbits and rotates.</td>
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<td></td>
<td>-write a paragraph to describe the moon.</td>
<td>-explain the features of the Earth's moon.</td>
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<td></td>
<td>-demonstrate and describe the moon's cycle.</td>
<td>-demonstrate and briefly describe how the sun relates to the moon's cycle.</td>
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<td></td>
<td>-write a brochure which highlights unique features of the moon.</td>
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<td>Attitudes and Awareness</td>
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<td>-aware that the Earth is one part of a much larger solar system.</td>
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<td>-aware that cycles occur in nature.</td>
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Narrative

In the following lessons I present lessons which have been modified to benefit English Language Learners (ELLs) of varying levels, from beginning to fluent. The lessons are written for a dual-immersion third grade class which includes both mainstream students and ELLs.

Although many modifications are noted in each lesson there are several modifications that teachers should ALWAYS keep in mind. These modifications include the use of:

◊ gestures
◊ pauses
◊ simplified syntax
◊ repetition
◊ paraphrasing
◊ consistent vocabulary and formulae
◊ slow pace

These modifications are used for adjusting discourse and help to make input more comprehensible.

Because the intended target group for these lessons is a dual-immersion classroom the students are always encouraged to utilize there native language to assist them and the teacher or instructional assistant may use the native language to explain concepts that seem unclear. For example, students may answer questions, make a plan for writing, or ask for clarification in their native language. However, because sheltered strategies are being utilized, it is expected that English will be used as the language of instruction for these lessons. The native language is mostly used by the students and mostly for clarification purposes.

Throughout these lessons I use several sheltered strategies. For example, I often use the whiteboard to note key vocabulary, draw images, and frame the main idea. I include realia, pictures, and gesturing during the reading of the text to make it more comprehensible. Also, during the
reading of the text, I adjust the teacher speech by suggesting to read at a slower pace, using gestures, and using pauses. I adjust the questions for varying levels of ELLs from pre-production to fluent speakers. I modify assignments for varying levels of ELL’s by using multiple versions of both listening guides and writing activities.

The students work together often throughout the lessons. This allows for students to serve as models in many cases. By having the students work in pairs or small groups they will have to negotiate meaning, discuss content and ask questions. Also, when the teacher or instructional assistant present questions, he/she presents the questions to the pair or group, not to the individual, thus the students can work together and build off of one another to help to formulate their ideas.

Often as the lessons progress, the students go through stages of usage of the key vocabulary and formulae. In the first part of the lesson the students are listening to and reading the key vocabulary and formulae. In the second portion of the lessons the students are asked to use the vocabulary and formulae orally to respond to questions and when interacting with their partner. In the final section of many lessons, the students use what they have learned to write and describe content information.

By using adjusted discourse, sheltered strategies, active engagement of students and appropriate challenges the students will be developing in the areas of both content and language. The use of such strategies benefit both ELLs, mainstream students, and also students with special needs such as learning disabilities, language impairments, or interrupted schooling.
Lesson 1
Lesson 1-Instructional Unit

**Goal:** I want my students to know that the Earth has layers and the vocabulary and “formula” to name and describe those layers.

**Objectives:**
*All* students will be able to:
- name the four main layers of the Earth and label them on a diagram.
- create a model of the Earth’s four main layers.

*Most* students will be able to:
- name and describe the Earth’s four main layers.

*Some* students will be able to:
- name and describe the Earth’s four main layers as well as the more distinct layers of the crust and core.

**Materials:**
- clay: brown, yellow, orange, and red
- plastic knives
- apple or peach
- piece of metal (realia)
- piece of rock (realia)
- cup of soil (realia)
- student sheets
- *The Magic School Bus: Inside the Earth* by Joanna Cole
### Functional-Notional-Lesson 1

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<tr>
<th>Function</th>
<th>Situation</th>
<th>Formula</th>
<th>Grammar Structure</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>List</td>
<td>The layers of the Earth</td>
<td>The layers of the Earth are...</td>
<td>nouns</td>
<td>crust, mantle, outer core, inner core</td>
</tr>
<tr>
<td>Describe</td>
<td>The Earth has...</td>
<td>The ____ is made of __________.</td>
<td>verb-have, nouns, adjectives</td>
<td>four layers, crust, mantle, outer core, inner core, soil, metal, rock, melted, solid</td>
</tr>
</tbody>
</table>
Procedure:

1. The teacher will read the text aloud to the students. (20 min.)

-The teacher will begin the lesson by asking the students to name things that have layers. As the students give examples the teacher can quickly sketch or show examples of what they have named. For example, drawing a layered cake or pointing out a students who is wearing layers of clothes.

-The teacher will then frame the main idea of this lesson by telling the students that we will be studying the layers of the Earth and by writing “Layers of the Earth” on the white board.

-The teacher will read the text aloud using adjusted speech: pausing, slow pace, gestures, paraphrasing, enunciating. (See text excerpt pages 10-16)

-During the read aloud students will complete a listening guide. (See listening guide pages 17-19) There are three varying levels of listening guides. Also, the teacher will draw and label the layers of the Earth on the white board.

-When the book discusses that the Earth is made of rock, metal, and soil, the teacher will show and describe the realia. The teacher will write this key vocabulary on the white board. (See whiteboard page 20)

-On page 28, when the book shows a diagram of the inside of the Earth, the teacher will cut an apple in half and show the students the “layers” of the apple. (original lesson)

2. The students will create models of the Earth using clay. (20 min.)

-The students will work in pairs to create a model of the Earth which includes all four layers. (original lesson)
crust-brown
mantle-yellow
outer core-orange
inner core-red

-The teacher will demonstrate by making a model showing the different thickness' that he/she is considering during the construction.

-The students will then cut their “Earth” in half so that they can observe the the layers. (original lesson) The teacher and instructional assistant will circulate the room asking for pairs to name and describe the layers that they have created in their model. The students may refer to the white board and work together when naming and describing the layers.
Sample questions for various levels of ELL’s:

**Pre-production:**
*Point to the mantle/inner core/outer core/crust.
*Is this the mantle/inner core/outer core/crust?

**Early Production:**
*Is the crust made of soil and rock?
*Is the inner core solid or liquid?
*Can you point to and name the layers?

**Speech Emergence:**
*Tell me about the crust/mantle/inner core/outer core.
*Describe the crust.
*How is the mantle like the outer core?

**Intermediate Fluency:**
*Describe the mantle.
*Compare the inner core and the outer core.
*How are the mantle and the outer core similar?

**Fluency:**
*Describe the crust and it’s layers.
*Name and describe the Earth’s layers.
3. The students will complete the student sheet appropriate for their level. (20 min.)
- All levels will have a diagram to label.

- Each student sheet will have a writing activity of which the level of the text and difficulty of the writing assignment will vary according to the level of the student. (see student sheets pages 21-23)
When the spinning finally stopped, some things had changed. We all had on new clothes. The bus had turned into a steam shovel. And there were shovels and picks for every kid in the class. "Start digging!" yelled Ms. Frizzle. And we began making a huge hole right in the middle of the field.
FIRST, WE WILL DIG THROUGH THE EARTH'S CRUST. THE TOP LAYER OF THE CRUST IS SOIL.

IT LOOKS LIKE DIRT TO ME.

DIRT IS ANOTHER WORD FOR SOIL.

OH, GREAT! NOW SHE CAN READ MY MIND!

WHAT IS SOIL?

by Florrie

Soil is made of ground-up rock, mixed with clay, bits of dead leaves, sticks, and small pebbles.

Without rock there would be no soil for plants and trees to grow in.
“Hey, these rocks have stripes,” said a kid. Ms. Frizzle explained that each stripe was a different kind of rock.

Millions of years ago, these rocks were formed in layers.

This tan rock is called sandstone.

This gray stripe is shale.

This white rock is limestone.

Layers—hmmm, like a cake.

Don’t try to eat it!
We went down even farther toward the center of the earth.
We hit rock that was formed billions of years ago from a pool of melted rock under the earth's surface.
Rock like this is called igneous rock.

\[\text{THIS IGNEOUS ROCK IS CALLED GRANITE. MANY BUILDINGS AND MONUMENTS ARE MADE OF GRANITE.}\]

\[\text{ARNOLD, WILL YOU CARRY THESE SAMPLES?}\]

\[\text{EARTH SCIENCE IS HEAVY, MAN.}\]

\[\text{I NEVER KNEW ROCKS COULD MELT!}\]

**Still Another Earth Science Word**

by Dorothy Ann

Igneous comes from a word that means "fire".

The heat inside the earth is like fire.

It can melt rocks.

**How Igneous Rocks Were Formed**

by Michael

Melted rock can push up through cracks in the earth's crust.

When the melted rock cools and hardens, it is called igneous rock.
She stepped on the gas,
and the bus started really drilling.
Soon we were actually inside the earth.
It was hot, hot, hot!
And it got hotter and hotter
as we zoomed toward the center.
We were glad when Ms. Frizzle headed out again.
We reached the earth's crust and drove straight up through a tunnel of black rock.
It was great to see the sky.

WHAT IS INSIDE THE EARTH by Ralph
Under the earth's crust there are pockets of melted rock. Below this is the mantle, made of solid hot rock.
The outer core is liquid metal and the very center of the earth, the inner core, is a ball of solid metal larger than the moon!
The Layers of the Earth

1. The crust is made of soil.
2. The mantle is made of solid rock.
3. The outer core is made of melted metal.
4. The inner core is made of solid metal.
The Layers of the Earth

1. The crust is made of ________________________.
2. The mantle is made of ________________________.
3. The outer core is made of ________________________.
4. The inner core is made of ________________________.
The Layers of the Earth

1. Write the name of the layer on the line and what that layer is made of below the line.

2. The layers of the crust are _______________________________________.

3. __________ can be found in the layers of the crust.

4. As you move closer to the center of the Earth it gets __________.

5. The three types of rock are _________________________________.

~19~
The Layers of the Earth

Word Bank:

layers, soil, solid, rock, melted, metal

The _________ is made of ________________.
The Layers of the Earth

The four main layers of the Earth are the ___________, the ___________, the __________ core, and the __________ __________.

The crust is made of ___________ and ___________.

In the center of the Earth, it is very ___________.

**Word Bank:**

- soil
- inner
- mantle
- core
- hot
- crust
- outer
- rock
The Layers of the Earth

Write a paragraph to describe the four main layers of the Earth. The topic sentence is started for you.

The four main layers of the Earth are ________________.
The Layers of the Earth

Write two paragraphs to describe the Earth’s layers on a separate sheet of paper. The first paragraph should name and describe the four main layers of the Earth. The second paragraph should name and describe the layers of the crust and the types of rocks.
Lesson 2
Lesson 2-Instructional Unit

**Goal:** I want my students to know that the Sun and the rotation of the Earth create night and day.
I want my students to know the relationship of cycles and the solar system.

**Objectives:**
**All** students will be able to:
-demonstrate the rotation of the Earth which creates night and day.

**Most** students will be able to:
-demonstrate and explain orally, the rotation of the Earth which creates night and day.

**Some** students will be able to:
-demonstrate and explain orally, the rotation of the Earth which creates night and day, and the rotation of the moon.

**Materials:**
-flashlights
-Multiple copies of *What Makes Night and Day* by Franklyn M. Branley
-student sheets
-globe
<table>
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</thead>
<tbody>
<tr>
<td>List</td>
<td>How night and day occur.</td>
<td>As the Earth turns we have...</td>
<td>verb-have</td>
<td>day, night, sunset, sunrise</td>
</tr>
<tr>
<td>Describe</td>
<td>The Earth's rotation</td>
<td>The Earth... When the Earth is facing towards/away from the sun it is night/day.</td>
<td>present tense verb-be prepositions</td>
<td>spins, rotates, turns, towards, away</td>
</tr>
</tbody>
</table>
Procedure:

1. Teacher introduces the activity and activates background knowledge. (10-15 min.)

   - The teacher will begin the lesson by framing the main idea. He/She will do this by telling the students that today we will look at the cycle of night and day. He/She will write “Night and Day” on the white board with small pictures of a moon and a sun above the corresponding words. (see white board page 28)

   - The teacher then will ask if anyone can explain what a cycle is. (Those students have been in the school since Kindergarten will have had the prior experience of studying life cycles.)

   - The teacher should then ask why night and day is an example of a cycle.

   - The teacher will then prompt the students to discuss how they think night and day occur.

   - As the students discuss the teacher will write key words from their descriptions onto the white board. If the students do not name a particular word in their descriptions, the teacher or instructional assistant may contribute a description using the key vocabulary, or the teacher may add the word and ask the students if they can use that word to describe the cycle. Key Vocabulary: sun, Earth, rotate, day, night, sunrise, sunset.

2. Students will read the text and complete the outline (t-list) (20 min.)

   - Beginning and possibly intermediate ELL’s will have read the summary prior to this activity, either at home or with the instructional assistant or ESL teacher. (see summary page 29)
The students will work in pairs to read the text and complete the T-list. Each pair can decide if they want one person to read the text and one to complete the T-list or if they want to each have a turn at each of the jobs. (see text excerpt pages 30-36 and t-list page 37)

3. The students will perform the experiment as described in the text. (10 min.)

The text describes an experiment which demonstrates night and day using two students and a flashlight. One student is the “sun” and holds the flashlight. The other student is the “Earth.” The “Earth” rotates, when the light is shining on the “Earth’s” face it is daytime, when the “Earth” can’t see the light, it is night.

- The teacher and instructional assistant should circulate at this time to ask students to describe what is happening.

  *Pre-production*
  - Is it day?
  - Is it night?
  - Who is the “sun”?

  *Early Production*
  - Is it day or night?
  - Can you see the sun now?

  *Speech Emergence*
  - Tell me about what is happening.

  *Intermediate Fluency*
  - Describe what happens when it’s night.
  - Compare day and night.

4. Students return to circle to discuss their findings.

- The teacher asks a pair to describe the cycle of night and day using their flashlight and the globe.
Night and Day

spins

Earth

rotate

day

sunrise

sun
nenight

sunset
Summary

We live on the Earth.

The Earth is round.

The Earth is spinning.

We don’t feel the Earth turning.

The Earth spins around once in 24 hours.

From space you can see the Earth.

Light from the sun makes day.

As the Earth spins we move through the light from the sun.

As the Earth turns we have sunrise, daylight, sunset, and night.

You can do an experiment.

You will be the Earth.

A flashlight or lamp will be the sun.

You can turn your body.

When the lamp is in front of you it is day.

When the lamp is behind you it is night.

The Earth is always turning.

You can watch the sun rise and set.

The moon turns too.

It is day for two weeks on the moon.

It is day for 12 hours on the Earth.
What Makes Day and Night
Franklyn M. Branley - illustrated by Arthur Dorros
The earth is our planet.
It is round like a big ball.
And it is spinning.
It’s hard to believe the earth is always turning, because we don’t feel any motion. This is because the earth spins smoothly—always at the same speed.
Imagine you are in a spaceship high above the North Pole. Imagine you can stay there twenty-four hours and watch the earth make one complete turn.
As the earth turns we have sunrise, daylight, sunset, and night.

People at A have sunrise. Later, because the earth is turning, they are at B. It is the middle of the day for them. It is noontime.
Stand so that your left side is toward the lamp. Hold your arms out all the way. Your left hand points toward the lamp. This is sunrise.

Stay in the same spot. Keep your arms out from your sides, and turn to your left. Now the lamp is in front of you. It is the middle of the day. It is noontime.

Keep turning. Your hand points to the light. It is sun
The earth keeps turning. Later in the day we begin to turn away from the sun. You can see sunset.

About twenty-four hours after sunrise, the sun will rise again. It all happens because the earth is spinning around.

As the earth turns, the sun seems to move across the sky.
### What Makes Day and Night

| A. The Earth spins. | 1. We live on the ______.  
|                    | 2. The Earth is r_____.  
|                    | 3. The Earth is _______  
|                    | turning.              |
| B. You can see the Earth spin from space. | 1. The Earth spins _______  
|                               | in 24 hours.         |
|                               | 2. As the Earth turns we have...  
|                               | a. ________  
|                               | b. ________  
|                               | c. ________  
|                               | d. ________   |
| C. Experiment | 1. A lamp will be the ______.  
|                | 2. A person will be the ______.  
|                | 3. The person turns.  
|                | 4. When the lamp is in front of you it is ______.  
|                | 5. When the lamp is behind you it is ______.  |
| D. The Moon | 1. The moon ______.  
|             | 2. A day on the moon lasts ______ weeks.  |
Lesson 3
Lesson 3-Instructional Unit

**Goal:** I want my students to know the important features of the solar system, including the Earth's moon.

**Objectives:**
*All* students will be able to:
- draw a picture of the moon's surface.
- know the main features of the moon.

*Most* students will be able to:
- describe the features of the moon orally.
- write a complete sentence to describe some of the main features of the moon.

*Some* students will be able to:
- write a paragraph to describe the features of the moon in detail.

**Materials:**
*What the Moon is Like* by Franklyn M. Branley
-water
-dirt
-large baking pans (one per group)
-small objects (marbles, rocks, etc.)
-student sheets
### Functional-Notional-Lesson 3

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<th>Grammar Structure</th>
<th>Vocabulary</th>
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<tbody>
<tr>
<td>List</td>
<td>The features of the moon.</td>
<td>The moon has...</td>
<td>verb-have</td>
<td>craters</td>
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<td>hills</td>
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<td>seas</td>
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<td>valleys</td>
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<tr>
<td>Describe</td>
<td></td>
<td>The moon is...</td>
<td>adjectives</td>
<td>dull</td>
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<td></td>
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<td>comparatives</td>
<td>drab</td>
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<td>grayish brown</td>
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<td>like a desert</td>
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<td>hot</td>
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<td>cold</td>
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<td>There is/are...</td>
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<td>smooth</td>
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<td>Function</td>
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<tr>
<td>Reporting about events in the past</td>
<td>The features of the moon.</td>
<td>In the past the moon had...</td>
<td>past tense</td>
<td>volcanoes, lava, rocks, ash, moonquakes, craters</td>
</tr>
<tr>
<td>Predicting</td>
<td></td>
<td>In the future the moon might have...</td>
<td>future tense, modals, nouns</td>
<td>buildings, a moon colony, people</td>
</tr>
<tr>
<td>Describing</td>
<td>Astronauts on the moon.</td>
<td>Astronauts can/are/have...</td>
<td>present tense</td>
<td>jump, walk, light, space suits, air, moon cars</td>
</tr>
</tbody>
</table>
Procedure:

1. The teacher reads the text aloud. (20 min.)

- Beginning ELL’s will have had the opportunity to look through the short summary book prior to the lesson. If possible beginning ELL’s would have also had the opportunity to discuss what they saw in the book with other beginning ELL’s, the ESL teacher, the instructional assistant, and/or the classroom teacher. (see summary book pages 44-50)

- The teacher will read the text, What the Moon is Like, aloud to the students. (See text excerpt pages 51-54)

- Pages 4-7 of the text describes the man in the moon and that some people see other things in the moon such as a rabbit, or Jack and Jill. The teacher should access prior knowledge by asking the students what they believe you can see in the moon. Several different cultures have many different variations of this.

- When reading the teacher will use several strategies to contextualize and make the text comprehensible. The teacher should use pausing, repetition, slow pace)

   **For example**, on page 9, the teacher should read the text as follows, the actual text is underlined:
   “If you could see the moon better it would look like this.” (point to picture on page 8) “The light parts.” (point to lighter area of photograph on page 8) “are covered with hills.” (draw a hill on the whiteboard and label “hill”) “and with holes called craters.” (draw a hole/crater on the whiteboard and label it “crater”) “Some are many miles across.” (make a gesture with opened arms to show big/wide) “Others are very small.” (make a gesture with fingers to show small) “The holes were made by big rocks” (hold up a rock) “that crashed into the Moon long ago.” (take
rock and make a gesture that shows the rock colliding with the moon in the picture.) "Big rocks made the craters on the Moon. The rocks crashed into the Moon.

- Also during the read aloud, the teacher can make periodic comprehension checks. For example, with use from the above excerpt, the teacher might then ask:
  - (pointing to the crater) Is this a crater?
  - What is this? (pointing to a hill)
  - How big can craters be?
  - How are craters made?
  - When were craters made?

2. Students will complete the activity. (20 min.)

- The students will make a model of the moon's surface working in groups of four.

- The teacher will have previously set up the materials needed for the model: Spread a layer of dirt from outdoors in the bottom of a large baking pan and add water to make mud with the consistency of a very thick batter. (Original Lesson)

- Let students experiment with objects of different textures, sizes, and weights (for example, a dirt ball, a mud ball, a rock, a marble) to drop into the pan. Observe the craters. (Original Lesson)

3. The students will write about their findings. (10 min.)

- All students will draw a picture of their model and label a hill and a crater. The teacher will also model this on the whiteboard.

- Most students (intermediate/advanced ELL's) will add written sentences to their descriptions.
- Some students (advanced ELL's/mainstream) will be able to write a paragraph in response to one or more of the above questions.

- There are three levels of writing activity sheets. (see writing activities pages 55-57)

**Homework:**
Look at the night sky and draw the moon.
The moon.

- flat
- "seas"
- no water
- hills
- craters
no water
no colors
no plants
no animals
no air

mountains
hills

valley

jagged
rocks
Day hot long 2 weeks

Night cold long 2 weeks
Astronauts
Low Gravity
Space suits
Now
no water
no wind
dust
hills
craters
valleys
In the past

volcano

lava
liquid rock

rock

crater
In the future

buildings
moon colony
people
What the MOON Is Like

by Franklyn M. Branley
illustrated by True Kelley
If you could see the moon better it would look like this. The light parts are covered with hills, and with holes called craters. Some are many miles across. Others are very small. The holes were made by big rocks that crashed into the Moon long ago.

The dark parts of the Moon are smoother. They are like wide fields. It would take weeks to walk across some of them. They are called the seas of the Moon because they are so flat. There is no water in them. There is no water anywhere on the Moon.
They found small rocks and great big ones. Some were as big as a house. Parts of the Moon are flat. In those places, the astronauts could move quite easily. But there are many mountains and hills. Some are smooth and rounded. Some have large jagged rocks sticking out of them. There are cliffs and deep valleys. The astronauts kept away from them.
When they did fall it was hard to get up because of the clumsy space suits, and also because of the moon dust. Much of the Moon is covered with fine dust, almost like powder. In many places the dust is a foot or more deep. When people walk, their shoes make prints in the dust. The moon car had to have wide tires to keep from sinking into it. The dust sticks to shoes and to clothes, too.
Writing Activity-Level 1

Draw and label a hill and a crater on the moon.

Write **yes** or **no** on the line.

1. The moon has craters.  
2. The moon has water.  
3. The moon is red.  
4. At night it is cold.  
5. Astronauts can take giant steps.
Writing Activity-Level 2

Draw and label a hill and a crater on the moon.

Write one sentence to answer each of the questions below.

1. How does the moon look?

2. How do you think it would feel to be an astronaut on the moon?

3. What is the temperature like on the moon?

4. How was the moon in the past?

5. How might the moon be in the future?

6. What are day and night like on the moon?
Writing Activity-Level 3

Draw and label a hill and a crater on the moon.

Select one of the following questions. Write a paragraph to explain your answer. Be sure to include a topic sentence! Use a separate piece of white lined paper.

How does the moon look?

How do you think it would feel to be an astronaut on the moon?

What is the temperature like on the moon?

How was the moon in the past?

How might the moon be in the future?

What are day and night like on the moon?
Lesson 4
Lesson 4-Instructional Unit

Goal: I want my students to know that the sun and the rotation of the moon around the Earth create the phases of the moon. I want my students to know the cycles occur in the solar system.

Objectives:
All students will be able to:
-Demonstrate the cycle of the moon.
-Illustrate the cycle of the moon.
-Name at least one phase of the moon.

Most students will be able to:
-Identify the phases of the moon.

Some students will be able to:
-Explain the cycle of the moon and how it happens.

Materials:
- *The Moon Seems to Change* by Franklyn M. Branley
- oranges (one per pair)
- flashlights (one per pair)
- black markers
- pencils or dowels.
- student sheets.
## Functional-Notional-Lesson 4

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<th>Grammar Structure</th>
<th>Vocabulary</th>
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<td>The phases of the moon.</td>
<td>Last night I saw a...</td>
<td>past tense</td>
<td>new moon&lt;br&gt;crescent moon&lt;br&gt;first quarter moon&lt;br&gt;full moon&lt;br&gt;third quarter moon</td>
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<tr>
<td>Predicting</td>
<td>The phase of the moon.</td>
<td>_____ I think it will be a...</td>
<td>future tense</td>
<td>Tonight&lt;br&gt;In one week&lt;br&gt;In two weeks&lt;br&gt;new moon&lt;br&gt;crescent moon&lt;br&gt;first quarter moon&lt;br&gt;full moon&lt;br&gt;third quarter moon&lt;br&gt;waxing&lt;br&gt;waning</td>
</tr>
<tr>
<td>Describing</td>
<td></td>
<td>I think the moon is/was...</td>
<td>present tense</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>past tense</td>
<td></td>
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Procedure:

1. The teacher reads the text aloud. (20 min.)

-The students look at their drawings from the previous nights homework. The teachers asks, “Does the moon ALWAYS look like the one you drew in the picture?

-Before reading, the teacher asks about the title, The Moon Seems to Change. The teachers writes the title on the whiteboard and asks, “Why do you think the title of this book is The Moon SEEMS to Change?” putting emphasis on the word SEEMS.

-The teacher reads the text, The Moon Seems to Change, by Franklyn M. Branley, aloud to the students using previously discussed adjusted discourse. (see text excerpt pages 63-74)

-As the teacher reads ALL students will complete the listening guide. (see listening guide page 75)

-The teacher will have a transparency of the listening guide which he/she will fill out as he/she reads.

-The teacher should stop reading on page 20 and prepare for the activity.

2. Students will complete the activity. (20 min.)

-The students will be led through the activity as described in the text on pages 20-26. (A copy is included in the text excerpt.)

-The students should work in pairs. Students will be paired as follows: beginning with intermediate ELL’s and intermediate/advanced with fluent ELL’s.
-Because all of the students will be following the teachers directions at the same time, the student pairs will serve as models for others. The teacher may point out a group who is able demonstrate what the teacher has said.

- The teacher will read the text slowly, repeat when necessary, use gestures, and point to pairs that can serve as models for others.

- Each partner should have the opportunity to hold the “moon” themselves so that they can observe the phases.

- While the students are going through the moon’s phases, the teacher will:
  - make a list on the whiteboard of the phases as the students move through them.
  - draw a small picture next to the name of the phase.
  - have the students repeat the names of the phases as they move through them.

- After all of the students have had the opportunity to observe the moon’s phases the teacher might challenge the students by naming a phase and asking them to show the phase using their orange and flashlight. The teacher could also ask a student to name a phase for the others to show.

- From this experiment the students will see for themselves how the sun affects the portion of the moon that is seen.

3. The students will write about their findings. (10 min.)

- Using the drawings from the previous nights homework, the students will continue working with their partner to describe their picture.

- As a pair, the students should decide which phase of the moon their pictures show. The teacher will have the formula written on the whiteboard to help the students to formulate their ideas. (see whiteboard page 76)
-The students can then discuss what they think the moon will look like tonight, next week, or in two weeks.
The Moon Seems to Change

by Franklyn M. Branley
illustrated by Barbara and Ed Emberley
You can do your own experiment to show the phases of the moon. You'll need a good flashlight, an orange, a pencil, a marker, and a friend.

Stick the pencil into the orange. Push it in far enough so the orange doesn't fall off.

With the marker draw a line all around the orange. Start and end where the pencil goes into the orange. Make a big X on one half of the orange.
The orange will be the moon, and your head will be the Earth. The flashlight is the sun.
Hold the orange a bit above your head so that you have to look up to see it. Turn it so that the X is toward you. Have someone on the other side of the orange shine the flashlight on it. Do this in a dark room—the darker the better.

You cannot see the lighted half of the orange. It is a new moon.
Stand on one spot. Turn your body a bit while holding the orange in front of you and a bit above your head. Always keep the X toward you. You will see a small part of the lighted half. It is a crescent moon.
Keep turning, and soon you will see more of the lighted half of the orange. It is a first-quarter moon.

Keep the orange above your head and turn some more. Soon you will see all the lighted half of the orange. The moon is full.
Keep turning and you will see less and less of the lighted part of the orange. You will see one quarter of it—the third-quarter moon. Then you’ll see a thin crescent. When you have turned all the way around, you have seen all the phases of the orange—the phases of the moon.
You held the orange so that the X on it was always toward you. That's the way it is with the moon. The same half of it is always toward Earth.
Which phase of the moon can you see tonight?

NEW  CRESCEENT  FIRST QUARTER  FULL  THIRD QUARTER  CRESCEENT
It may be big and round. It is a full moon.

- FULL

Maybe you will see only part of it. It may be a quarter moon.

- QUARTER

Or it may be only a little sliver. It is called a crescent moon.

- CRESCENT

As the nights go by you can see changes in the moon. After the moon is full you see less and less of it. There are three or four nights with no moon at all. Then you see more and more of it. The moon seems to change.
It really doesn't. It seems to change because the moon goes around Earth. As it goes around, we see more of it—the moon gets bigger. It is a waxing moon. Or we see less of it—the moon gets smaller. It is a waning moon.
Half of the moon is always lighted by the sun. Half is lighted and half is always in darkness. It's the same with Earth. While one half of Earth is having sunshine and daylight, the other half is getting no sunshine. It is night.
Listening Guide

Draw a picture of each phase of the moon.

New Moon

Crescent Moon

Waxing

First Quarter Moon

Full Moon

Third Quarter Moon

Waning

Crescent Moon

New Moon
Last night I saw...

Tonight I think it will be a...

In one week I think it will be a...

In two weeks I think it will be a...
Lesson 5
Lesson 5-Instructional Unit

**Goal:** I want my students to know the important features of the solar system.
I want my students to know vocabulary and formula to describe different aspects of the solar system.

**Objectives:**
**All** students will be able to:
-create a brochure which includes pictures, labels and/or simple sentences.

**Most** students will be able to:
-create a brochure which includes pictures and describing sentences.

**Some** students will be able to:
-create a brochure which includes pictures, captions, and written paragraphs.

**Materials:**
-brochures (realia)
-student sheets
-construction paper
### Functional-Notional-Lesson 5

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<td>Someone to visit the moon.</td>
<td>You should visit a __________ because....</td>
<td>modal adjectives</td>
<td>crater, hill, cliff, valley, jagged rock</td>
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<td></td>
<td></td>
<td>You will get to the moon by....</td>
<td>auxiliary verb-will</td>
<td>spaceship, plane, rocket</td>
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<td></td>
<td>Visit the moon during...</td>
<td>Declarative</td>
<td>the day, the night, a full moon, a crescent moon, a new moon</td>
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- **Granunar Vocabulary**
  - Structure
    - modal crater
    - adjectives
    - auxilary verb-will
  - Grammar Structure
    - declarative
**Procedure:**

1. **The teacher models an example of a brochure. (15 min.)**

   - The teacher shows the students a few brochures and asks the students if they know why brochures are made and the features of brochures.

   - The teachers and the students should discuss the purpose of brochures together while looking through the examples provided by the teacher. (purpose-to persuade/convince people to visit a certain place.)

   - The students will need to select if they would like to create a brochure to visit the moon.

   - Brochures should include:
     - **cover:** a title, the place name clearly written, a picture
     - **inside:** pictures, 2 special places to visit, best time of day to visit, how to get there.

   - The teacher will model making a brochure. An example is included. When modeling this process, the teacher will use the level 3 student sheet to plan and ask the students to share ideas. (See model page 81)

2. **Students will design a brochure. (40 min.)**

   - The students will use the student sheets to help them in their creation of a brochure. The student sheets are to be used by the students for planning and then they can transfer their ideas to the final brochure on construction paper and add pictures.

   - There are three levels of the writing activity. (See pages 82-84)

   - After completing the planning page the students can work with a partner to check for content, spelling, and grammar.
3. The students will share their brochures. (10 min.)

- In pairs the students practice reading their brochure aloud.

- In small groups the students will take turns sharing their brochures. Sharing is done in small groups so that more students have an opportunity to share and so that the students are more comfortable.
Come to the Moon!

*Remove page to read inside*
Best time to travel: Full Moon

See the biggest crater.

Fly aboard our newest spaceship.

Try to climb our highest cliff.
Writing Activity- Level 1

Title: ________________________________

Draw and label a place on the moon.

Draw and label a different place on the moon.

Visit the moon during the (day/night) ____________.

You will get to the moon by _____________________________. 
Writing Activity-Level 2

Title: ________________________________

Two important places to visit will on the moon are ________________________________

_______________________________.

The _________________ is interesting because ________________

_______________________________.

The _________________ is exciting because ________________

_______________________________.

When traveling to the moon you will need to ________________

______________________________

______________________________

The best time to visit the moon is ________________________________

______________________________
Writing Activity-Level 3

You will be creating a brochure to persuade people to visit the moon. You should write four paragraphs. Two paragraphs should each describe an interesting place to visit. The third paragraph will describe how to get to the moon. The final paragraph will describe what time of day or phase of the moon to visit. Please include pictures on your final brochure.

Title: ____________________________

Interesting Place 1: _________________
Description: _________________________

____________________________________

____________________________________

Interesting Place 2: _________________
Description: _________________________

____________________________________

____________________________________

How to get there: _________________
Description: _________________________

____________________________________

____________________________________

Best time to go: _________________
Description: _________________________

____________________________________

____________________________________
Checklists
# Grammar Checklist

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Write the PAGE NUMBERS and any other identifying features to identify those parts of your lessons that employ the following strategies.

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Original Lessons
The solar system and the objects in it may seem far-off and abstract, but the same principles that govern the heavenly bodies are in fact part of our day-to-day lives. Try some or all of the following activities to help students explore such natural phenomena as gravity, night and day, and light and shadow, and appreciate how they, too, are part of the solar system.

Where appropriate, you may encourage the students to write up their "mission" (or objective), method, observations, and conclusions. Later, they can assemble their work into "space logs."

**Revisiting the Solar System**

Combine science, movement, and art to reinforce what students are learning about our solar system and to set the stage for further investigations.

**Mission:** To create models of the solar system.

- Use an outdoor area or a large gymnasium to simulate the approximate distances and movements of planets in the solar system. Place the “Sun” (a volunteer or any appropriate object) in the middle of the area and then have students mark off the following distances in a line from the Sun. *(Note: a pace is equal to about 3 feet.)*

  - Mercury — 1 foot
  - Venus — 2 feet
  - Earth — 3 feet
  - Mars — 4 feet
  - Jupiter — 5 paces
  - Saturn — 8 paces
  - Uranus — 17 paces
  - Neptune — 26 paces
  - Pluto — 34 paces

At a given signal, ask nine students, each representing one of the planets, to start orbiting the Sun in a counterclockwise direction. Suggest that everyone start orbiting at the same time and move at the same speed. Which planets—those closer to the Sun or those farther away—take longer to make a complete orbit? Why do some orbits take longer? (more distance to cover) You might add that the gravitational pull of the Sun causes the inner planets to orbit faster than the outer planets, and let students repeat the demonstration taking this fact into account.

- Encourage students to find and use a diagram in a reference book that shows the relative sizes of the planets, or copy the diagram above for them to use as a guide. Then have them cut circles out of oaktag for the planets. (Alternatively, students can blow up balloons and cover them with papier-mâché to simulate the surface of each planet.) Let students draw or paint the colors and features of each planet, using the photos in the Big Book for reference. Then label the planets and string them on a wire across the classroom.
Since the Sun is so large, attach a giant yellow paper disk to the wall at one end of the wire. As you put up the Sun, you might want to share the following facts:

- The diameter of the Sun measures about 865,000 miles. That’s almost 10 times the diameter of Jupiter, the largest planet, and 109 times the diameter of Earth.
- The Sun is about 93 million miles away from Earth, yet it provides the light and warmth that make life on Earth possible.
- The Sun is incredibly hot. The temperature on the surface is about 10,000 degrees Fahrenheit; the temperature in the center is 27 million degrees Fahrenheit.
- Students should never look directly into the Sun—doing so could damage their eyes.

**Investigating Planet Earth**

**Mission:** To investigate the makeup of our home planet.

Look at page 4 of the Big Book and review the main layers of planet Earth with students: crust, mantle, and core. Let a volunteer describe the picture that shows these three layers, including their relative thicknesses.

![Diagram of Earth layers](image)

Then display an apple. What do the children observe about the shape of the apple? How does it compare to the shape of the Earth? Cut the apple in half. How does the thickness of the skin compare to the fleshy part of the apple? How is this like the Earth? Use a spoon to scoop out the core. What on Earth is like the thick layer that’s left between the skin and the core? (The Earth’s mantle.)

Divide the class into cooperative learning groups. Provide each group with a lump of clay that will harden. Let them use the clay to make small globes showing the three main layers inside the Earth: the thin crust (5 to 25 miles thick), the rocky mantle (1,800 miles thick), and the partly melted, partly solid metal core (2,200 miles thick from its outer edge to the center of the Earth).

Have the students form the clay into balls and then cut the balls in half with a plastic knife or the edge of a ruler. Have them paint the crust, mantle, and core different colors on one of the halves, and then repeat the pattern on the other half. They can then use a bit of plasticene clay to hold the two halves together and paint the outside of the sphere blue (to represent water). Finish by sticking bits of colored plasticene clay onto the outside to represent the continents. (Alternatively, students can paint on the continents.) Point out that by opening and closing their models, they can show the outer covering of the Earth as well as what’s inside.

**Introducing Gravity**

Introduce the activities that follow by telling the story of Sir Isaac Newton, who was in his garden more than 300 years ago, when an apple fell from a tree. The great scientist had a sudden brainstorm. He connected the force that caused the apple to fall to the force that kept the moon “tied” in orbit around the Earth. In other words, he began to develop the theory of gravity.
• Push two pushpins partway into a thick piece of cardboard as shown above. Tie a loop of string loosely around both tacks. Place a pencil tip inside the loop and move the pencil around the two tacks. Show students that you have drawn an ellipse—the flattened-circle shape in which planets orbit around the Sun. Give groups or pairs of students materials so that they can try drawing the shapes themselves. Challenge them to find out what happens if they move the pushpins farther apart. (The ellipse gets wider and flatter.) Closer together? (The ellipse gets rounder.) What would they need to do to draw a perfect circle? (use only one pushpin, which becomes the center of the circle)

Point out that they face the lamp half the time (day) and face away half the time (night). You might also point out that their view of the room changes as they move through the circle, just as students that you have drawn an ellipse—the flattened-circle shape in which planets orbit around the Sun. Give groups or pairs of students materials so that they can try drawing the shapes themselves. Challenge them to find out what happens if they move the pushpins farther apart. (The ellipse gets wider and flatter.) Closer together? (The ellipse gets rounder.) What would they need to do to draw a perfect circle? (use only one pushpin, which becomes the center of the circle)

**Student Activities**

**Mission:** To find out why shadows change during the day.

Go outdoors on a sunny morning and push a long, thin stick into level ground so that it stands up straight. Mark the end of the stick's shadow with a rock or other marker. Label the rock or marker with a piece of masking tape that notes the time. Ask: Will the shadow move? What will make it move? Where will it move? Invite students to put markers where they guess the shadow will be after one hour. An hour later, check the predictions. Did the shadow move as expected?

Return to mark the position of the shadow every hour during the day. On each visit, use a compass to find the directions of the Sun and shadows. Where is the Sun early in the day? (east) Which way does the shadow point? (west) Where is the Sun at noon? (overhead) What about the shadow? (There is none or very little.) Where is the Sun late in the day? (west) Which way does the shadow point? (east). Why do shadows change during the day? Help students understand that the Sun appears to travel across the sky from east to west, but its change in position every day is really due to the Earth's rotation.
**Spotting Planets**

When the weather is predicted to be clear, arrange for students to look for planets in the sky (if possible, with the help of a telescope or a pair of binoculars). To find the exact locations of the planets on a particular date in your area, clip a star chart from a local newspaper. Star charts often appear on the same page as a weather map. Newspapers that publish the rising and setting times of the Sun and the Moon may also publish the rising and setting times of Mars, Venus, Jupiter, and Saturn. Alternatively, find a star chart in a children’s astronomy magazine (see Additional Resources).

You might also share these general tips for successful planet viewing:

- **Mercury**: This planet is best viewed above a clear horizon. In the spring, look soon after sunset; in the fall, look before sunrise.
- **Venus**: Like Mercury, Venus rises and sets with the Sun, but it is much brighter than Mercury, and so easier to see. Look for Venus around sunset or sunrise.
- **Mars**: This planet is the only object in the sky that is red and doesn’t twinkle. It is generally highest in the sky in fall and winter months.
- **Jupiter**: Look for Jupiter around sunrise and sunset. Its moons may be visible through a telescope.
- **Saturn**: The farthest planet that can be seen with the eyes alone. Look for the rings with a telescope.
- **Uranus, Neptune, Pluto**: These planets can only be viewed through a powerful telescope.

Note that you may want to coordinate sky watching with a visit from an amateur astronomer in your area. He or she can provide a good general orientation to the sky, explain how to use a star chart, and tailor a planet watch to your area and schedule.

**Moon Watching**

Encourage students to view the Moon at home on a clear, dark evening. The best viewing is generally when either the first or last quarter is visible. Ask the students to bring in sketches of what they saw on the surface of the Moon.

Using the sketches as well as close-up photos and maps of the Moon (found in encyclopedias and other reference books), discuss the Moon’s main features. The dark patches we see from Earth are smooth, flat areas call *maria* (MAHR-ee-uh), which means “seas” in Latin. (Just one of these areas is called a *mare* [MAHR-ay].) *Maria* are not filled with water—they were formed billions of years ago when hot lava filled in low-lying areas and then hardened. The light patches we see on the Moon are rugged areas full of mountains and craters.

Discuss that all the planets and their moons are bombarded by objects from space—comets, asteroids, and meteoroids. Ask students to think about what happens when a large, heavy, speeding object hits a much larger, heavier object. (The smaller object may break up; a dent—or crater—forms in the larger object; debris flies away from the impact; etc.) Then let students test their ideas by making a model of the Moon’s surface.

To make the model, spread out newspaper on the floor. Spread a layer of dirt from outdoors in the bottom of a large baking pan (the larger, the better) and add water to make mud with the consistency of a very thick batter. Let students experiment with objects of different textures, sizes, and weights (for example, a dirt ball, a mud ball, a rock, a marble) to drop into the pan. Observe the craters. Then allow them a few days to dry.
As students create the model, you might discuss the following crater concepts and facts:

Scientists think that the Moon's surface is covered with billions of craters. Many are small, but about half a million are more than a mile wide. Most of the craters were formed when the solar system was young, as a barrage of meteoroids, asteroids, comets, and other "space junk" left over from the solar system's formation hurtled into the planets and their moons.

Ask students why they think Earth has fewer craters than the Moon does. (Most, though not all, meteoroids burn up in Earth's atmosphere before they reach the ground.) Why are the craters we do have less visible than those on the Moon? (Earth's atmosphere produces weather conditions such as wind and rain, which erode craters; plants grow over the craters, etc.)

- Mention that several planets sometimes form a line known as a syzygy (SIHZ-uh-je). During a syzygy, the gravitational force of the planets gets added together. What might this extra gravity have to do with craters? (It may send more objects crashing into planets and their moons.)

Greetings From Earth

Tell your students that the Voyager space probes, launched in 1977 to study Jupiter, Saturn, Uranus, and Neptune, also carried with them special information about our world. This information included an audio message from the President of the United States (former President Jimmy Carter), the sounds of many different kinds of animals, and greetings in 60 languages. The idea was to convey information about life on Earth to any intelligent life-forms the spacecraft might meet along the way.

Ask students what they think others should know about us and about our planet. List the ideas on the board.

Student Activities

Then have students prepare their own tape recordings of important Earth sounds. The tapes can include anything from sounds found in nature, to popular songs, to common background sounds, to spoken words. When everyone has finished, share the tapes with other classes.

Divide the class into small groups. Tell students that each group has been hired to prepare part of an ad campaign to entice people to visit the planets in the solar system. Suggest that each group select a planet and collect information on that planet from the Big Book and other sources. What special sights will visitors want to see? How should they prepare for their trip?

Next help students contact travel agencies for free samples of travel brochures. Based on these brochures, ask each group to design a brochure and poster for its planet. Allow time for each group to present its ad campaign to the rest of the class. Then vote for the most popular planet to visit.
Appendix
Extensions

These lessons are not necessarily meant to occur consecutively, although they could. More likely, however, these lessons could be used as introductions to the topics that they cover. The following are ideas for extended these lessons.

Lesson 1: Further studies could include volcanoes, earthquakes, how the continents were formed.

Lesson 2: Further studies could include the season, the tilt of the Earth and how it affects climate.

Lesson 3: Further studies could include other planets and their moons, space exploration, space missions to the moon, astronauts.

Lesson 4: Further studies could include keeping a moon journal over a one month period where the student draws the moon every night for one month. Students could then add poetry, newspaper clippings, and photographs to their moon journals.

Lesson 5: Further studies cloud other planets and making brochures to visit a planet of the students choice.