Solar System
Unit Plan
For
Fourth
Grade

By: Andrea Spindler

Space Unit Rationale

I chose the topic of the solar system because it is an area of interest for students around the fourth grade level. The idea of something larger than Earth fascinates children. The goals of this unit directly relates to that of the Wisconsin Standards (DPI) in science and use concepts to incorporate the science themes. This unit will be conducted in a eleven day period with one of those days being a day to present. One hour each day will be devoted to the unit. The engaging lessons of this unit will keep students interest in this topic. It is full of questions that will get them thinking and hands on activities that will expand their inquiry.

The different types of lessons will meet the different learning styles of my classroom. Each lesson has a visual or hands on materials to meet the needs of our visual learners. I have also incorporated books and videos as well. We will also be using technology such as the internet to research our planets. The planet research project is done in pairs, but there are also individual assignments. I have added in any adaptations or extensions that could be used to meet the individual student's needs. The subjects integrated in this unit are art, literature, math and technology. This will bring a variety to the unit which will keep the students engaged.

It is important to assess the students consistently throughout the unit. This will be my formative assessment. Throughout this unit, the students will be keeping a discovery journal where they will be writing new things they've learned and questions they have. This will help me assess what they are observing and how they are explaining their thinking. The assessment will help me modify the lessons and my teaching to meet their needs. As they work in groups, I will be going around and taking notes to see where their thinking process is and how much they are participating. My summative assessment will be to have the students create their space portfolio of all the things we have worked on in this unit. This will give them an opportunity to revisit the concepts learned.

Solar System Unit Over View

Unit integrated from:
Mundell, Maureen (2002). Science Unit Plan on Space for First Grade . Retrieved September 26, 2008, Web site: http://students.ed.uiuc.edu/mundell/eport/SpaceScienceUnit.htm

Themes (from Wisconsin Standards): Change, Evidence, Explanation, Identification, Measurement, Models, Prediction, Communication, Formulate.

Integrated Subjects: Science, Art, Literature, Math, Technology

Overall time: 11 days, 1 hours class periods

Schedule:

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1 The Moon & Stars	Introductory Lesson Plan- Beginning the "journey" into outer space	Space Food	The Moon, Phases of the Moon.	Making Impact Craters	Constilations
Week 2 The Sun & Earth	Introduce Planet Reasearch project	The sun & the four seasons	Distance between planets	Orbiting the sun	Project work day

(Monday of week 3 will be a day to present the planet research projects.)

***Specific Objectives Addressed in the Unit*:**

- Students will participate in creating a KWL chart.
- Students will watch a space launch & complete a journal entry.
- Students will create astronauts as they begin their "space exploration."
- Students will gain an understanding of the need for dehydrated food in space.
- Students will practice & demonstrate knowledge of measurement.
- Students will classify the moon according to the different phases.
- Students will observe images of the surface of the moon and will collect and analyze data to determine whether the size of a meteoroid affects the size of a crater.
- Students will be able to describe characteristics of the surface of the moon and explain how craters are formed in their journals.
- Students will learn about star patterns as the teacher reads "Zoo in the Sky" aloud to the class.
- Students will be able to identify various constellations.

- Students will create their own constellation and write a description to go along with their drawing.
- Students will identify the sun as a source of energy and will be able to explain the importance of the sun in their everyday lives.
- Students will be able to explain that the seasons are caused by the tilt of the Earth & the distance from the sun.
- Students will demonstrate an understanding of the order of the planets.
- Students will be able to work in a group to
- Students will demonstrate an understanding of the relative distances of the planets from the sun.
- Students will be able to demonstrate an understanding of the different amounts of time that it takes planets to orbit the sun.
- Students will be able to describe characteristics of the planet they have researched.
- Students will be able to organize their learning and questions by writing in a daily discovery journal.

Wisconsin Standards:

A.4.3 When investigating a science-related problem, decide what data can be collected to determine the most useful explanations
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.3 Select multiple sources of information to help answer questions selected for classroom investigations*
C.4.5 Use data they have collected to develop explanations* and answer questions generated by investigations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*
E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Bibliography:

Mundell, Maureen (2002). Science Unit Plan on Space for First Grade . Retrieved September 26, 2008, Web site: http://students.ed.uiuc.edu/mundell/eport/SpaceScienceUnit.htm

Fourth-Grade Terms To Use on a Space Word Wall:
Solar System, Astronaut, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, Moon, Constellation, Big Dipper, Gravity, Rotation.

Rubric for Unit:

	5 points	3 points	1 point
Participation			
Discovery Logs/Portfolio			
Project			
Group Work			

Lesson One Intoduction

Goal (Standards):
Students will:
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*

Process Standards:
Explanation
Identification

Integrated Subject: Literature

Objectives:
Students will:

- Participate in creating a KWL chart.
- Watch a space launch & complete a journal entry.
- Create astronauts as they begin their "space exploration."

Materials:

- Large piece of chart paper
- NASA website (http://www.nasa.gov)
- Laptop and projector
- Astronaut hand out for each student
- Individual picture of each student

Time: 45-60 min.

Procedure:

- Create a KWL chart with the class. “What do you know about space? What do you want to know about space?
- Explain how we will be taking our own “space journey” while studying astronauts, planets, and the sun, moon and stars.
- Have the students create their own astronaut and glue their own picture to it.
- Show a clip of the space shuttle launch from the NASA website.
- Have the students write in their journals; some things they learned and a question they have.

Assessment:

- There will be an informal assessment as I observe the students participation in the KWL chart discussion and their writing in the their logs.

Lesson 2: Space Food

Goal (Standards):
Students will:
A.4.3 When investigating a science-related problem, decide what data can be collected to determine the most useful explanations
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*

Process Standards:
Explanation
Measurement

Integrated Subject: Math

Objectives:
Students will:

- Gain an understanding of the need for dehydrated food in space.
- Practice & demonstrate knowledge of measurement.

Materials:

- 1 cup of milk
- 1 cup of whipping cream

- ¼ cup sugar
- ½ tbs. vanilla
- 1 qt. zipper freezer bag
- 1 gal. zipper freezer bag
- Duck tape
- Towels
- ½ cup rock salt
- ¾ cup water

Time: 45-60 min.

Procedure:

- Go over space food facts taken from http://www.sciencemaster.com/jump/space/space_food.php and explain how space food is essential for astronauts.
- Discuss the different types of foods astronauts eat while they are traveling in space and why food is dehydrated (preservation, space-saving storage, zero-gravity, more convenient, less waste, ect.)
- Go over instructions on how to make ice cream and then make it as a class.
    - Mix the four ingredients in the 1 qt. zipper freezer bag, zip close and duck tape the top so there will not be any spilling. Put crushed ice and ½ cup rock salt in the 1 gal. zipper freezer bag. Then place your bag with the ice cream ingredients in the 1 gal. bag, add the ¾ cup of cold water to the 1 gal. bag and duck tap the top. Pass the bag back and forth between two students continuously for 10 minutes.
- Enjoy your space snack.
- Have the students write in their log about something they learned and aspects about the activity. Have them answer why astronauts cant take ice cream with them into space. What would happen?

Assessment:

- Students will be assessed by their participation and their journal entry.

Lesson Three: Phases of the Moon

Integrated from:
Cataldo, Jacqueline (2008). Phases of the Moon Plan. Retrieved September 28, 2008, Website: http://www.brighthub.com/education/k-12/articles/2523.aspx

Goal (Standards):
Students will:

C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*

E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Observing
Predicting
Change
Identification

Integrated Subject: Literature

Objectives:
Students will:

- Be able to better distinguish between different phases of the moon.
- Be able to make predictions in text.

Theme: Patterns of change "How long will it be before the next full moon?"

Materials:

- Cry Baby Moon By Katerina Mataira and Terewai Kemp Illustrator Hone Ihi-o-te-rangi Ngata
- Moon phase chart
- Paper, crayons, markers, scissors

Time: 45-60 min.

Procedure:

- Read Cry-baby Moon book aloud to students. Before you read a page, ask the students what they think is happening in the picture. As you proceed through the book ask open-ended questions such as "What do you think will happen next" or "Will the moon ever see his reflection?"
- After reading Cry-baby Moon show the students the chart of the moon phases. Before going into detail, ask the students to give their perception or view of what the phases are, what the names of each phase is, why the moon goes through different phases, etc. Use examples: during a full moon the moon looks like a big cookie; explain to the students that the moon is not actually changing shape, it

simply looks different because of where moon is located in the orbit. Teach them the proper phase names.

- Have students choose which part of the book they enjoyed most. Allow them to color a picture showing that phase of the moon. After students are done, quiz them. Ask them if they could try to stand in order depending on the phase they chose to draw. Example: new moon, 1st quarter, etc.
- Have the students observe the moon when they go home that night. Have them draw a picture of it in their journal and write what phase it is in. Also have them write some things they learned and questions they have.

Assessment:

- There will be an informal assessment as I observe their participation during the reading. I will also assess their understanding by their drawings and journal writings.

Adaptations:

- If there are students who are not grasping the full idea of the phases of the moon than give them their own copy of the moon phase chart and try to demonstrate it with a ball and a flashlight.

Lesson 4: Making impact craters

Goal (Standards):
Students will:
A.4.3 When investigating a science-related problem, decide what data can be collected to determine the most useful explanations
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.5 Use data they have collected to develop explanations* and answer questions generated by investigations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*

Process Standards:
Observing
Change
Measurement
Explanation
Identification

Integrated Subject: Literature

Objectives:

Students will:

- Observe images of the surface of the moon and will collect and analyze data to determine whether the size of a meteoroid affects the size of a crater.
- Be able to describe characteristics of the surface of the moon and explain how craters are formed in their journals

Theme: Evolution "Where did these 'dents' on the moon come from?" "Have they always been there?"

Materials:

- Over heads with pictures of the moon
- Overhead projector
- 1 container instant chocolate milk powder (Nestle Quick)
- Four 5 lb. bags of flour
- Dishpan or aluminum foil container for each group of four students
- Small containers to hold 1 cup of chocolate mix for each group
- Old newspapers
- Three rocks (small, medium and large with diameters from about ¼ - ½ inches
- 1 spoon for each group
- Craters activity sheet

Time: 60 min.

Procedure:

- Tell the students to imagine being an astronaut landing on the surface of the moon.
- Show them the images of the moon, telling them this is how the moon would look if you looked through a telescope
- "What do you see on the moon's surface?" (light, & dark areas, craters, etc.)
- Explain craters as "dents" on the moon.
- "What do you think causes craters in the moon?"
- "Do you know what a meteor is?" If not , then explain to them. (a meteor is a rock in space, a meteor is the same rock falling through earth's atmosphere, a fragments of meteors that land on earth's surface are meterorites.)
- Tell the class that they will investigate what happens when a meteoroid hits the moon's surface.
- The students' will use a pan of flour and rock to investigate craters. The flour represents the moon's surface, and the rocks represent meteoroids.
- Demonstrate the technique:
    - Sprinkle chocolate mix on top of flour to create a contrast.
    - Hold a rock at shoulder level and tell the children they will drop not throw a rock into the pan.
    - They are then going to observe what happens to the flour.
- Tell students to write a prediction in their science journal.

- Split the students into groups of four, and explain how they will take turns dropping a rock and observing what happens. They should draw a picture in their science journal.
- After free exploration, ask the children what they observed. (The impressions are called a crater basin, the rim, streaks radiating outward from the crater, etc.)
- Show the overhead image again. “What affects the size of the crater?”
- Explain the procedure:
    - Students will drop each of the rocks from the same height and measure the size of the crater (diameter) leveling the flour each time. (You may want to demonstrate this.)
    - They will drop each size rock 3 times.
    - Students will record their date on their date sheet.
    - Have the students clean up the materials.
    - “Which size rock created the biggest crater, and have students share other observations.
- Have the students write in the journals about the activity, things they learned and questions they have.

Assessment:

- I will assess the students on their data worksheets and journals.

Accommodations:

- Extension: Have groups who finish early conduct an experiment to see if the speed of the meteoroid determines the size of the crater by dropping the same size rock at different heights (should, waist, knee). Explain to the students that the higher up the rock is dropped, the faster it will be going when it hits the flour.

Name: _____

DATA

	BIG ROCK	**MEDIUM ROCK**	**SMALL ROCK**

1st Drop			
2nd Drop			
3rd Drop			

Lesson 5: Constellations
Goal (Standards):

Students will:
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*
E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Model
Formulate
Identification

Integrated Subject: Language arts

Objectives:
Students will:

- Learn about star patterns.
- Be able to identify various constellations
- Create their own constellation and write a description to go along with their drawing.

Materials:

- Zoo in the Sky By Jaqueline Mitton Illustrated by Christina Balit
- Black construction paper
- White crayons
- Glue
- Various size beads, sequins, or glitter
- Flashlights
- Star shape cutouts

Time: 90 min.

Procedure:

- Read Zoo in the Sky aloud to the class, noting different constellations and their stories.
- Ask for student volunteers and direct each one to stand on one of the star shape cutouts that you have arranged on the floor in the shape of a specific constellation.
- Have each of the volunteers hold a flashlight and turn it on, pointing the flashlight straight up to the ceiling.
- Students will return to their seats, and match up star patterns with their constellation. These cards can be used as a matching game, or students can glue them on a piece of construction paper to make constellation booklets.

- Students will then create their own constellation at their seats using the materials provided.
- Students will then write a short story or description to go along with their constellation.

Assessment:
- The students will be assessed on the matching of their constellation cards and written description.

Lesson 6: Planet Project

Goal (Standards):
Students will:
A.4.3 When investigating a science-related problem, decide what data can be collected to determine the most useful explanations
C.4.3 Select multiple sources of information to help answer questions selected for classroom investigations*
C.4.5 Use data they have collected to develop explanations* and answer questions generated by investigations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*
E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Evidence
Explanation
Identification
Model
Communicate

Integrated Subject: Art, Language Arts, Technology

Objectives:
Students will:
- Participate in creating a KWL chart.
- Be able to conduct their own research using the internet.
- Have an understanding of the different planets in the solar system.

Materials:
- Large piece of chart paper.
- Computers.

Time: 90 min.

Procedure:

- Complete a KWL with the class discussing what they know about the planets.
- Demonstrate looking up information about planets on the internet (what to do, what not to do, staying away from bad sites, collecting good information)
- Split the class into pairs and give each pair a planet that they will be doing research on.
- Explain how they will need to collect information on their planet that will go on a poster board to present to the class at the end of the unit.
- Work time.

Assessment: I will be assessing their participation in the KWL chart discussion, their working in pairs and their research.

Adaptations: For students that may have a difficulty with research, you could provide them with some helpful website or information to guide them.

Lesson 7: The Sun & The Four Seasons

Goal (Standards):
Students will:
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*
E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Identify
Explanation
Change

Integrated Subject: Art, Language Arts

Objectives:
Students will:

- Identify the sun as a source of energy and will be able to explain the importance of the sun in their everyday lives.

- Be able to explain that the seasons are caused by the tilt of the Earth & the distance from the sun.

Materials:

- *The Sun* By Paulette Bourgeoris and Cynthia Pratt Nicolson Illustrator Bill Slavin
- Article *Seasons on Earth & Other Planets* written for children located on the Thursday's Classroom Website: http://www.thursdaysclassroom.com/23sep99/article1a.html
- Large construction paper & art supplies

Time: 45-60 min.

Procedure:

- As a class, brainstorm reasons why the sun is important (we need the sun for energy, warmth, food, etc.)
- Read *The Sun* to the class, and have the students add additional reasons.
- Read the short article, *Seasons of the Earth & Other Planets* to the class, which introduces the idea that the seasons are caused by the distance away from the sun.
- Have the students fold a piece of construction paper into four sections, and then illustrate and write about the about each of the four seasons.
- Have the students complete a journal entry explaining what causes the four seasons.

Assessment:

- The students will be assessed on their illustrations and written work, along with their journal entrys.

Lesson 8: Modeling the Distance Between the Planets

Goal (Standards):
Students will:
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*
E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Demonstrate
Identification
Model
Measurement

Integrated Subject: Math

Objectives:
Students will:

- Demonstrate an understanding of the order of the planets.
- Demonstrate and understanding of the relative distances of the planets from the sun.

Materials:

- 12” square of yellow construction paper
- Nine images of the planets on index cards
- Display area (wall or poster board)
- 9 clothespins
- Clothesline
- Ruler

Time: 30 min.

Procedure:

- Have a student attach the sun image to one end of the display area
- Pin the clothesline from the sun to the other end of the display area.
- Have students come up to the display and clip the planets onto the clothesline one at a time, using the following measurements.
- Mercury 1”
- Venus 1.5”
- Mars 2”
- Earth 3”
- Jupiter 11.5”
- Saturn 19”
- Uranus 38”
  Neptune 60”
- Pluto 79”
- Have the students write in their journals something new they learned and questions they have.

Assessment:

- Students will be assessed by their participation in the activity and their journal writings.

Lesson 9: Orbiting the Sun

Goal (Standards):
Students will:
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*

C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*

E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Explanation
Model

Integrated Subject: Language Arts

Objectives:
Students will:

- Be able to demonstrate an understanding of the different amounts of time that it takes planets to orbit the sun.

Materials:

- Models or enlarged images of the planets and the sun.

Time: 40 min.

Procedure:

- Review the order of the planets with the students.
- Take the class outside onto the playground and assign "parts," one student to each of the planets and the sun. The rest of the students are "astronomers."
- Have the children help to place the planets in the correct order from the sun with the sun in the center.
- Have the planets "orbit" around the edge.
- Ask the astronomers to explain what they saw. (Example: It took some planets much longer to orbit the sun than others.)
- "What do we notice about the planets as they 'orbit'?" "Which planet has the shortest/longest trip?" Explain that the amount of time that it takes each planet to orbit the sun is called a year and ask which two planets has a longer year.
- Take the students back into the classroom to complete their journal entries. Have them write an interesting thing they learned and also have them respond to some of the questions that were asked during the activity.

Assessment:

- The students will be assessed on their participation in the activity and their responses in their journal logs.

Lesson 10: Project Work Day

Goal (Standards):
Students will:
A.4.3 When investigating a science-related problem, decide what data can be collected to determine the most useful explanations
C.4.2 Use the science content being learned to ask questions, plan investigations*, make observations*, make predictions*, and offer explanations*
C.4.3 Select multiple sources of information to help answer questions selected for classroom investigations*
C.4.6 Communicate the results of their investigations* in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers
C.4.8 Ask additional questions that might help focus or further an investigation*
E.4.4 Identify* celestial objects (stars, sun, moon, planets) in the sky, noting changes in patterns of those objects over time

Process Standards:
Evidence
Explanation
Identification
Model
Communicate

Integrated Subject: Literature

Objectives:
Students will:
- Be able to create an informative poster about their planet
- Be able to work well with their partners to complete the task.

Materials:
- Poster board
- Construction paper
- Glue
- Crayons, markers
- Scissors
- Computers

Time: 90 min.

Procedure:
- Have the students get into their pairs and continue their research.
- Have a supply table out with materials.
- Have them write about this process in their journals.

Assessment:

I will be informally assessing the students and I walk around and listen to their conversations and observe them researching and making their projects. I will assess their journals.