

Unit Plan

Name: Stephanie Scheldt

Unit Topic: Sun, moon, and earth

Grade Level: 3rd grade

Content GLCEs

E.ST.E.1 Characteristics of Objects in the Sky- Common objects in the sky have observable characteristics.

- **E.ST.04.11** Identify the sun and moon as common objects in the sky.
- **E.ST.04.12** Compare and contrast the characteristics of the sun, moon and Earth, including relative distances and abilities to support life.

E.ST.E.2 Patterns of Objects in the Sky- Common objects in the sky have predictable patterns of movement.

- **E.ST.04.21** Describe the orbit of the Earth around the sun as it defines a year.
- **E.ST.04.22** Explain that the spin of the Earth creates day and night.
- **E.ST.04.23** Describe the motion of the moon around the Earth.
- **E.ST.04.24** Explain how the visible shape of the moon follows a predictable cycle which takes approximately one month.
- **E.ST.04.25** Describe the apparent movement of the sun and moon across the sky through day/night and the seasons.

Sources Used:

Badders, W., Bethel, D. L. J., Fu, V., Peck, D., & Sumners, D. C. (2000). *Houghton mifflin science discovery works teaching guide*. Boston, MA: Houghton Mifflin.

This teacher's guide accompanies our student science textbooks. I will be using it for some instructional resources and ideas as well as handouts and worksheets. We will also be doing some reading from the textbook.

Branley, F. (1998). *Day light, night light where light comes from*. New York, New York: Harper Collins.

This children's book describes where light comes from. It does a great job of illustrating that the sun creates its own light and some things that appear to create the own light are merely reflecting the sun's light.

Nebraska Astronomy Applet Project. (2010, October 11). *Lunar phase simulator*. Retrieved from <http://astro.unl.edu/naap/lps/animations/lps.swf>

This moon simulator illustrates how the moon phases change over time as the moon is revolving around the earth and the earth is rotating on its axis.

Turnbull, S. (2003). *Sun, moon, and stars*. Safron Hill, London: Usborne.

This child friendly non-fiction text explains the sun and moon in kid friendly terms and is accompanied with informative diagrams and real pictures.

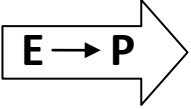
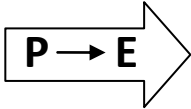
RELATED KNOWLEDGE AND SKILLS:

<p>What prerequisite knowledge and skills do students need BEFORE your unit to engage with these GLCEs?</p>	<ul style="list-style-type: none">- After reviewing the GLCEs for k,1, 2 it appears that this will be the first time students are formally learning about the sun, moon, and earth and the movement. However, in first grade they did learn that the sun is the most important source of heat. So students will have quite a bit to learn. They need to know that the sun, moon, and earth are all objects in space that have their own physical characteristics and properties. I am hoping that students will know a little bit about these objects for example that we live on the earth or that the sun is a star. I will find out much more about what they know after my pres-assessment.
<p>What building block knowledge and skills do students need to get FROM your unit lessons to master these GLCEs?</p>	<ul style="list-style-type: none">- Students will need to be able to compare the sun, moon, and earth including their relative sizes, distances, and ability to support life. They will need to know that the sun is the center of the universe and earth's revolution around it takes one year. The earth also rotates on its axis every 24 hours, this creates day and night. This makes it appear that the sun is moving across the sky. Rising in the East and setting in the West, when in reality we see the sun at different heights in the sky because of Earth spinning on its axis. The moon revolves around the Earth, this revolution takes about 28 days. This revolution allows the sun to shine on different parts of the moon giving the illusion that the moon is getting smaller and larger. Throughout this unit the terms of revolution and rotation are very prevalent. Students will need to understand these patterns of movement and explain how they move.

DRIVING QUESTION:

What things do we see in the sky and why do they look the way they do?

EXPERIENCES, PATTERNS & EXPLANATIONS:

<p>Experiences</p> <p>Opportunities to collect observations or “data” about the world; may involve in-class activities as well as recollection of students’ everyday experiences</p>	 <p>Sharing and representing data to facilitate pattern-recognition</p>	<p>Patterns</p> <p>Relationships and generalizations across experiences that clarify and represent “what happened”</p>	 <p>Making generalizations from specific phenomena to “how the world works”</p>	<p>Explanations</p> <p>Grade-level appropriate statements that generalize beyond specific objects or experiences described in the patterns to answer questions about “how or why” phenomena occur in the natural world</p>
<ul style="list-style-type: none"> - Observe location of sun throughout the day paying attention to height and direction. Also think about what happens when we do not see it. - Keep a moon journal and record the shape of the moon for 3 weeks. - Give students a variety of different sized balls and ask them to pick the two that most accurately represent the size of the sun, earth and moon. 	<ul style="list-style-type: none"> - Make a graph of the location of the sun throughout a 24 hour day. - Compare moon journals to see how the amount of the moon we see changes over time. - Create a chart to compare and contrast the sun, moon, and earth. 	<ul style="list-style-type: none"> - Sun appears to move from east to west shown by sunrise and sunset. - The sun does not disappear at night; it is shining on other parts of the world. - Sun is highest in the sky around noon. - We see different parts of the moon from a new moon to a full moon through its cycle. 	<ul style="list-style-type: none"> - Investigate a model of the sun and earth to explore the relationship between the earth’s rotation and sun’s apparent motion across the sky. - Simulate and compare size and distance of the sun, moon, and Earth. - Use objects such as an exercise ball, baseball and bouncy ball as well students themselves to view simulated movements of the earth, sun, and moon. - View computer simulation of how the moon’s revolution about the earth defines moon phases. 	<ul style="list-style-type: none"> - The sun, moon, and earth move in predictable patterns and these patterns of revolution and rotation are used to define a day, year, and moon phases.

MODEL RESPONSE TO THE DRIVING QUESTION:

Type a model student response to your driving question here. The model response should be written in age-appropriate, “kid friendly” language and draw on and connect to the experiences, patterns and explanations described in the EPE table you created.

When we look up we see many things in the sky like stars, clouds, the sun, and the moon. We learned about why the sun and the moon look the way they do in the sky. First thing we learned was that the Earth revolves around the Sun and it is the closest star to us, even though it is very far away. Sometimes it seems like the earth is bigger than the sun but that is because the sun is so far away, the sun is actually much larger than the earth. So even though it looks like it the sun doesn't really move. The reason the sun appears to move across the sky is because Earth rotates on its axis once every 24 hours or once a day. So when it looks light outside it is because the sun is shining on our part of the Earth. So the sun doesn't really move the earth just rotates so different parts of it see light at different times. For example if its 8:00 AM in Michigan and its light outside its still night time in California and its dark there. In addition to rotating the earth also revolves around the sun. This revolution takes 365 days or one year.

Another thing in the sky that looks different sometimes is the moon. The moon is earth's only satellite and it is smaller than the earth. The moon can be a full moon, a new moon, or a crescent moon. We think the moon gets smaller or bigger, but really it's always the same size. The reason it looks different is because as the moon revolves around the earth and the sun shines on different parts of the moon. We always see the same side of the moon because the moons rotation exactly matches its rotation about the earth. The moon's rotation takes about a month. It starts as a new moon where we cannot see the moon. As it revolves around the earth it appears the moon is growing from a crescent to a full moon. Then the moon gets smaller again until the cycle starts again.

Instructional Sequence:

The table below should lay out at least one complete I-AIM instructional sequence. Use the I-AIM handout and instructional sequence example as a guide. Remember that activities are not one day's worth of science. A typical science class session is comprised of 2- 5 activities, depending on their function. You will need to **add rows to represent 10 days' worth of science lessons.**

Date	Activity Description and Date	Activity Function	Activity Modifications
Mon. 3/4	<p>Descriptions for each activity should be <u>extremely detailed and should include question prompts and probes you plan to use during the lesson activities as well as how you plan to scaffold small and large group discussions to enable students to share and respond to one another's thinking and ideas.</u> Your instructional sequence chart should represent approximately 10 days worth of science lessons. Remember that for each "lesson," or day of teaching, you may have several activities planned – experiences and collecting data and/or observations, comparing/contrasting and discussing data in small and whole groups to identify large-scale patterns, discussing possible explanations for patterns, testing explanations or ideas, etc.</p> <ul style="list-style-type: none"> - Ask students "Why do we see things in the sky and why do they look the way they do?" Introduce unit about sun, moon, and earth. Tell them I know some of you know a lot about the sun, moon, and earth and some have a lot to learn. In this unit we are going to learn characteristics of these three objects, how they move, and how they affect our lives. Have them do a think, pair, share with a partner to tell one thing they know about the moon. - Introduce moon journal. Model to students how to fill out journal. Tell them it is important to draw the moon just like you see it in the sky. Make sure you shade the correct side of the 	<p>What I-AIM function is this? Functions should be taken from the I-AIM chart and should match the function descriptions and order.</p> <p style="text-align: center;">Question</p>	<p>Explain how you modified or created this activity to best fit:</p> <ul style="list-style-type: none"> • your learning goals • the I-AIM/EPE model of science teaching • your students' naïve or misconceptions about the topic • your students' previous experiences • your students' funds of knowledge • the learning, linguistic, or social needs of specific students <ul style="list-style-type: none"> - A think, pair, share choosing only one thing to share gives students confidence that they at least know one thing about the topic and will not feel intimidated by telling the whole group. - Modeling how to fill out the moon journal will help students who do not have

	<p>drawing and record the time. Stress that it is important for them to observe the moon at least 4 nights a week</p>		<p>adults available to help them with homework.</p>
<p>Tues. 3/5</p>	<ul style="list-style-type: none"> - Ball activity: Students will be split into groups of 4. I will give the students a variety of sphere shaped objects, such as a number of different sports balls and some smaller objects like a bead or a candy. I will ask if the students see anything that all these objects have in common, hopefully they say they are all the same shape. I will make sure all students know what the word sphere means. I will then introduce the activity that we will be doing. I will tell students that the sun, moon, and earth are all sphere shaped. They will have to pick the three sphere shaped objects they think best represent the sun, moon, and earth based on size. - We will then talk about why each group chose what then I will reveal the correct objects. Students do not need to know the exact size just that the sun is the largest and moon is the smallest. We will use these objects throughout the unit as a reference. - Students will be reminded to keep up with their moon journals. 	<p>-Explore and investigate</p>	<p>- I will be creating thoughtfully groups of students who work well together. I will be pairing low students with mid level students, and high students with mid level students. This will prevent one student from dominating the group.</p>
<p>Thurs. 3/7</p>	<ul style="list-style-type: none"> - We will connect to the previous day's activity. Using these objects to have students guess about how far away the sun and the moon are from the earth using a scale of 100,000 miles =1 foot. We will mark off locations in the hallway, talk about student guesses and find out the real information. - We will then make a tree map about characteristics of the sun, moon, and earth we have learned so far. I will also ask them a few more questions for group discussion like can people live there, does it move, location, can it produce its own light, what kind of landforms does it have? 	<ul style="list-style-type: none"> - Explore and investigate - Explain 	<ul style="list-style-type: none"> - Before this activity I will give explicit directions about how to act in the hallway. Many students in my class have trouble with being noisy. I will need to reward good behavior so students will understand expectations. - The tree map will provide

			students with a way to organize their information. I will create an anchor chart that will stand as a visual representation in our class throughout the unit.
Mon. 3/11	<ul style="list-style-type: none"> - We will finish our tree map about the sun, moon, and earth. We will next focus on the part of the map about whether the objects move or not. - We will go outside and observe the height and angle of the sun. Each group will have their own set of tools to make this measurement. I will ask them to choose one person in the group to take the supplies home and measure the angle and height of the sun at night and record the time. (Before school the next day I will have students who not measure the height at night join me to measure the angle and height of the sun in the morning. I will have a different group of students join me during lunch recess to measure the height and angle of the sun during this time) 	<ul style="list-style-type: none"> - Explain - Explore and Investigate 	
Tues 3/12	<ul style="list-style-type: none"> - We will take all of our data from the previous class, at home, and morning and afternoon measurement and create a graph. Students will be asked if they notice any patterns in the graph. - I will ask students if this graph would always look the same no matter when we measured the height and angle of the sun. I will then show them a simulation of the different path of the sun across the sky in the different seasons. I will explain this concept to them. - Students will write a paragraph about the path of the sun across the sky and how it may change at different parts of the year. 	<ul style="list-style-type: none"> - Explain - Apply 	<ul style="list-style-type: none"> - This data may be difficult to understand simply based on a graph. Creating the sunspotter will help visual and kinesthetic learners them to see how the sun is at a different height and location in the sky at different times of the day.

	<ul style="list-style-type: none"> - Create <i>The day goes by, sunspotter</i> project. This project shows the sun moving across the sky over the course of the day rising in the East and setting in the west. 		
Thurs 3/14	<ul style="list-style-type: none"> - Ask students "If we know the sun doesn't move, why does it appear to move across the sky?" - View simulation computer of earth rotating on its axis. - Practice with globe earth rotating on its axis. - Guide students' inquiry process to explain that this rotation defines 24 hours in a day. 	<ul style="list-style-type: none"> - Question - Explain 	<ul style="list-style-type: none"> - It is hard to conceptualize the earth rotation because we are on the earth and do not feel this movement. Giving students the computer simulation and watching the globe will hopefully make it more relevant to them. These simulations will also help my ESL learners who may get confused talking about this topic.
Mon. 3/18	<ul style="list-style-type: none"> - Review earth's rotation on its axis. Help students to discover how its rotation defines day and night and how when we don't see the sun it is shining on other parts of the earth. - Ask students if earth moves in any other ways. Watch simulation of earth's revolution about the sun. Have student's act out earth's revolution and rotation around the sun. Explain to students that this revolution around the sun takes one year or 365 days. 	<ul style="list-style-type: none"> - Explain - Apply 	<ul style="list-style-type: none"> - Moving throughout a lesson will help the kinesthetic learners. It will also benefit my ADHD students who have trouble sitting still and listening.
Tues 3/19	<ul style="list-style-type: none"> - Talk about movement of sun and earth and ask students how the moon moves. Hopefully they will know that the moon revolves around the earth. - Gather data from student moon observations. Talk about the patterns we see. 	<ul style="list-style-type: none"> - Question - Explore and Investigate 	

<p>Mon 3/25</p>	<ul style="list-style-type: none"> - Use two color moon bouncy balls to explain moon phases. One student will stand in the center while the other partner will revolve around the other student. They will then switch places. - View simulation of moon phases. - Talk about the pattern of moon phases from new moon, crescent, to full moon, back to crescent, and back to new moon. - Students will draw and label a picture of the moon phases and give a short description of why this happens. 	<ul style="list-style-type: none"> - Explain - Apply 	<ul style="list-style-type: none"> - Visually seeing these shapes of the moon will help give meaning to these names. Also it is strange to believe that the moon is always the same shape it just appears to change because of the portion that receives sunlight at any given time. I think the moon ball activity will help all students to understand this difficult content.
<p>Tues 3/26</p>	<ul style="list-style-type: none"> - Review for test and hope students can give explanation to driving question. - Go over the characteristics of the sun, moon, and earth chart. Ask if there is anything we should add. - Revisit computer simulations and student simulations of the movement of the sun, moon, and earth. 	<ul style="list-style-type: none"> - Explain - Apply 	<ul style="list-style-type: none"> - Providing students with information to study and a study guide will help students who have poor study habits and focus on the important content.

Assessment Plan:

Your assessment plan will consist of a minimum of three carefully planned assessment tasks: one given early in the unit, one towards the middle of the unit, and one at end of your unit. In this section, you will provide a detailed description of each assessment task and describe the features you will look for in your students' responses. Assessment tasks should meet the requirements discussed in our seminar sessions and course readings.

FORMATIVE Assessment Task #1: Describe the sun's path across the sky.

GLCE/Learning Goal this task addresses:

- **E.ST.04.25** Describe the apparent movement of the sun and moon across the sky through day/night and the seasons.
- **E.ST.04.22** Explain that the spin of the Earth creates day and night.

Assessment Task Rationale:

I believe that this is a good assessment to see deeper into student thinking. It will help me to see what students know about the sun's path across the sky and what they are having trouble understanding. It directly relates to my GLCEs that ask students to describe the apparent movement of the sun and moon across the sky through day and night and to explain that the spin of the earth creates day and night. I have allowed students to write and draw pictures so students who have trouble answering this question in words may draw a picture to show their level of knowledge or understanding. Student responses will allow me to discover what they have learned from our experiences and patterns we have developed. It will help me to understand what concepts are unclear and what ideas most students understand fully. I believe asking students to provide a written response to this question will really demonstrate their level of knowledge on the content. Whereas a multiple choice test or labeling a picture may give me a false confidence about their mastery of the content.

Task Detailed Description:

This assessment will be a check for understanding of a difficult concept. I will ask students to write a paragraph describing the sun's path across the sky and explain why it appears to move across the sky. I will tell them they can draw a picture to help explain their paragraph. I will simply put the question up on the board and ask them to answer it on a piece of paper. I will collect their writing sample and use their responses to guide my further instruction.

Exemplary Assessment Response Features:

Type a list of features you expect to see in exemplary student responses to this assessment task.

- 1. The sun appears to move across the sky because of earth's rotation on its axis.*
- 2. The sun moves across the sky rising in the east and setting in the west, reaching its highest point at midday.*
- 3. Student draws a picture of the sun's path, showing the sun rising in the east and getting higher in the sky until midday and then falling until it sets in the west.*

FORMATIVE Assessment Task #2: Moon phases.**GLCE/Learning Goal this task addresses:**

- **E.ST.04.23** Describe the motion of the moon around the Earth.
- **E.ST.04.24** Explain how the visible shape of the moon follows a predictable cycle which takes approximately one month.

Assessment Task Rationale:

This task will help me to see what the students understand about moon phases and what causes them. This task asks students to provide the visible shape of the predictable pattern the moon follows. It also requires student to explain how the motion of the moon causes moon phases. This task allows students to demonstrate their knowledge through both written response and drawing labeling. Providing two ways to show knowledge will help different learning styles. I will be able to see gaps in understanding if the moon cycle is not complete, doesn't follow a circular pattern, or is in the wrong order. From the written response I will be able to see student thinking through their reasoning and what they determine to be important.

<p>Task Detailed Description:</p> <p><i>Students will be given a piece of paper with the question 1. Draw and label the moon phases beginning with new moon. A space will be provided to answer the questions. 2. Explain why we see the different moon phases in the sky. Students will draw and label a response to the first question and the second question will be a written response.</i></p>	<p>Exemplary Assessment Response Features:</p> <p><i>Type a list of features you expect to see in exemplary student responses to this assessment task.</i></p> <ol style="list-style-type: none"> <i>1. The moon phases drawn correctly beginning with a new moon, to first quarter, to full moon, to third quarter, and back to new moon.</i> <i>2. Students reasoning for moon phases includes the moons revolution about the earth and a shadow created by sunlight.</i> <i>3. Students correctly labeled new moon, first quarter, last quarter, and full moon.</i> <i>4. Their model illustrates the moon phases as a circular representation.</i>
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<p>End-of-Unit SUMMATIVE Assessment Task: <i>Sun, Moon, and Earth assessment</i></p> <p>GLCE/Learning Goal this task addresses:</p> <ul style="list-style-type: none"> • <i>Type the GLCE/learning goal(s) from your unit that this task addresses here.</i> <ul style="list-style-type: none"> • E.ST.04.11 Identify the sun and moon as common objects in the sky. • E.ST.04.12 Compare and contrast the characteristics of the sun, moon and 	<p>Assessment Task Rationale:</p> <p>This is not the ideal test I would give students to see their thinking because I believe multiple choice does not give much insight into students thinking. However, I have to give this assessment to all three 3rd grade classes during a</p>
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Earth, including relative distances and abilities to support life.

- **E.ST.04.21** Describe the orbit of the Earth around the sun as it defines a year.
- **E.ST.04.22** Explain that the spin of the Earth creates day and night.
- **E.ST.04.23** Describe the motion of the moon around the Earth.
- **E.ST.04.24** Explain how the visible shape of the moon follows a predictable cycle which takes approximately one month.
- **E.ST.04.25** Describe the apparent movement of the sun and moon across the sky through day/night and the seasons.

time other than science and I do not want to take up a large portion of their day. This task however will demonstrate students' knowledge of the concepts we have been studying it simply will not give me a deeper look into why do or do not understand something. It will help me to see their misconceptions if there are commonly selected answers for multiple choice questions but it will be more difficult to find the exact point where students have a gap in their knowledge. Also filling out the chart about characteristics of the sun, moon, and earth and drawing the moon phases will allow me to see the depth and accuracy of their knowledge on this content. It will give me an opportunity to see what aspects of this difficult content students have understood from our experiences and patterns and what ideas they needed more experiences or support to gather these explanations.

Task Detailed Description:

Name _____ # _____

Science Test Unit B: The Sun, Moon and Earth

1. To us the Sun looks bigger than the other stars because the Sun is

- a. smaller than the Earth
- b. the closest star to Earth
- c. closer to Earth than the Moon
- d. the farthest star from Earth

2. What is a ball of hot gases that gives off energy called?

- a. moon
- b. planet
- c. star
- d. solar system

3. The Sun is

- a. about the same size as the moon
- b. about the same size as Earth
- c. much smaller than the moon
- d. much larger than Earth

4. The side of the Earth that faces the sun has

- a. daytime
- b. summer
- c. nighttime
- d. winter

5. Saturn, Mars, Sun, and Earth are

- a. planets
- b. moons
- c. part of our solar system
- d. stars

Exemplary Assessment Response Features:

Type a list of features you expect to see in exemplary student responses to this assessment task.

- 1. Students will be able to accurately represent and label the moon phases in a circular image.*
- 2. Students will understand the unique characteristics of the sun, moon, and earth including what it is, its size, its shape, how it moves, and its ability to create light.*
- 3. Students will correctly answer the multiple choice questions providing evidence of their knowledge about the sun, moon, and earth including: information about Solar system, duration of the Earth's revolution and rotation as well as the duration of the Moon's revolution, the cause of day and night, components of a solar system, and the ability to land on the moon and Earth.*

6. How long does it take the Earth to make one complete revolution around the Sun?

- a. 24 days
- b. 365 days
- c. 24 hours
- d. one day

7. The cycle of day and night on Earth occurs because

- a. the sun is rotating
- b. Earth is rotating
- c. the Sun revolves around Earth
- d. the moon revolves around the Earth

8. What is the name of the nearest star to the Earth?

- a. moon
- b. Saturn
- c. north star
- d. sun

9. How long does it take for the Earth to revolve around the sun?

- a. one year
- b. 3 months
- c. 24 hours
- d. one month

10. It looks like the Sun is moving across the sky because

- a. Earth rotates
- b. the sun rotates
- c. it has solar storms

11. Which of the following is a planet?

- a. moon
- b. earth
- c. sun
- d. moon and earth

12. People can land on the _____

- a. the sun b. the moon c. the earth d. the moon and earth

13. How long does it take the Earth to rotate once on its axis?

- a. one year b. 365 days c. 24 hours d. one week

Fill in the table.

	SUN	MOON	EARTH
Description:			
Give the size and shape of each:			
Describe the movement:			
Does it			

produce its
own light?

Draw a picture of the moon phases. Label full moon, new moon,
last quarter, and first quarter.

