**Moon Exploration Lessons (Lesson 2 of 2)**

**Building a Moon Phase Calendar**

**STEM Topics -** Learning the phases of the moon, building a device that calculates time cycles

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**Grade Level:** 6-8 Grade

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**Goals**: Learn how to construct a moon phase calendar and utilize it to predict the exact times a certain phase of the moon happens during the year.

**Learning Objectives:**

1. SWBAT know the different phases of the moon and how to draw them out on a piece of paper.
2. SWBAT construct a moon phase calendar with some simple instructions.
3. SWBAT predict the exact time of day that a certain moon phase rises and sets during certain time periods of the year.

**Materials:**

Videos :

1.STEMonstrations : Moon Phases - <https://www.youtube.com/watch?v=SDhlPEMkiOo>

- 4 min 31s

2.Learning Space : Make a moon phases calendar - <https://www.youtube.com/watch?v=9TNZLUGOuEk&feature=emb_logo>

- 5 min 54 s

3. Moonphase Calendar.mp4 – self made instructional video – 10 min 18 s

Documents:

Moon Phases Picture.doc

Moon Phase Calendar Activity.doc

Moon Phase Calendar Activity Answers.doc

Mooncalendar\_worksheet-2020.pdf (or whatever year – in place of 2020)

Activity Materials (for each student):

1-2 sheets of blank paper

Pen or pencil

1-2 brass fasteners

Hole punch (optional)

Scotch Tape

Scissors

Moon phase calendar pages (3 double sided or 6 single sided) from acrobat file

**Vocabulary:**

**Moon phase:** the shape of the Moon’s directly sunlit portion as viewed from Earth.

**Moon phases calendar:** a tool or calculator that allows one to find out the lunar phase for any given month and the time of moonrise and moonset for that particular phase.

**Setup:**

* Have the video **STEMonstrations : Moon Phases** available to show the students at the beginning of the lesson. Then make sure that they have some blank paper and a pen/pencil ready so that they can draw the phases of the moon. Have the file **Moon Phases Picture.doc** ready for them to download so they can do the drawings a little easier.
* Next, you should have the video **Learning Space : Make a moon phases calendar** ready for them to watch. After that be prepared to have the students get out and prepare all the materials they need to put together the moon calendar.
* Review the list of materials with them. They should have the materials listed under Activity Materials section above. These are the 3-6 page printouts of the calendar, scissors, tape, brass fastener, pen or pencil and perhaps a hole punch as well. Once they are ready with their materials have the video **Moonphase Calendar.mp4** ready for them to view as they go along and put together their calendar. You will go through periodically showing the video, then stopping it at places they need to accomplish certain steps in the process.
* Once they are done building their moonphase calendar they will do an activity that measures their comprehension to use the calendar to figure out exact dates and moonphase times so have the **Moon Phase Calendar Activity.doc** file ready for them to download as well as the **Moon Phase Calendar Activity Anwers.doc** to check their answers once they’ve completed the assignment.

**Lesson Plan Procedure:**

1.Introduce the project of making a moon phase calendar by watching the video **STEMontrations : Moon Phases**. At this point ask the students if they are familiar with the phases of the moon. They may or may not have seen this material before. Regardless, move on to the next step. [5 minutes]

2.Next have the students draw out the phases of the moon exactly how they appear in the document **Moon Phases Picture.doc**. Also iterate the importance of copying the picture exactly the way it appears. This will help them when they put together their Moon Calendar later on. [15 minutes]

3. Watch the video **Learning Space : Make a moon phases calendar** in preparation for them to construct their moon phase calendar. After the video is over have the students gather their materials together. Review the materials they should have. The materials are 3-6 page moon calendar printouts from a pdf file, brass fastener, scissors, tape, pen or pencil and hole punch perhaps. [10 minutes]

4. Start the video **Moonphase Calendar.mp4** that shows the more detailed instructions on making the calendar. However, stop the video at specific places while they are making the calendar. So you will periodically start and stop the video while they are building it. The steps for making the calendar are shown below. [45 minutes]

a. Draw out the phases of the moon on the Moon phase wheel. Iterate the importance of having the phases point in the direction of the up arrows on the wheel (not discussed in the video).

b. Cut out all the pieces of the calendar as is shown by the spaced lines on the back of each page. This includes the calendar wheel, the moon phase wheel, the viewing wheel and the moonset and moonrise panels. If the pages are single sided as demonstrated in the video, then they will need to group the front and back sides of each wheel and panels together. They then will tape the front and back sides together of each wheel and panels. If the pages are double sided tell them to ignore this portion of the video.

c. Use the hole punch to make a hole from the backside of the Viewing wheel where it points out to punch the hole. If they don’t have a hole punch they can use their pen or pencil to make a hole and then cut it out more with the scissors.

c. Next have them tape the moonrise and moonset panels in the correct areas on the back of the Viewing Wheel. The places where the panels and tape belong are outlined in gray on the backside of the viewing wheel. Make sure the panel leaves an inner space like shown by the outline.

d. Poke a hole through the Viewing, Moon phase and Calendar Wheels at the very center of them as indicated on the back side of each wheel. Next position the Calendar wheel at the bottom, the Moon phase wheel in the center and the Viewing wheel on the top. Put a brass fastener from the bottom through all the wheels and fold it down once it is in place. You are done with constructing the calendar

5. Show the students how to use the Moon phase calendar to figure out a particular moon phase that goes with a date of a certain month. The calendar should also show when the moonset and moonrise times for that particular moon phase is. [5-10 minutes]

a. Rotate the moon phase wheel until you come to the particular moon phase you are interested in. Next, rotate the calendar wheel to show the month of the year with the dates on it that you are interested in as well.

b. Match the up and down arrows to the exact space on the calendar that corresponds to the particular phase of the moon that you have on your Moon phase wheel. Position the S (or south) letter directly underneath the time the moon phase occurs on the Moon phase wheel. The times for the moonrise and moonset for that particular phase of the moon should show up just outside these panels underneath the Viewing wheel.

6. The next activity is an assignment that allows the students to demonstrate that they understand how the Moon phase calendar works. Have them download the **Moon Phase Calendar Activity.doc** file. Next you should review what they are expected to do. They will need to fill out the specific date(s) of a particular moon phase within a certain month of the year. They should also fill out the moonrise and moonset times corresponding to that phase at that time of the year. There are five moon phase periods that should be filled in. The first one is already filled out but is there as an example that you do for the class. Go through the process with them for the first one and perhaps the second one too. Then they should be able to do the rest on their own. Review the answers once they are finished from the **Moon Phase Calendar Activity Answers.doc** file and find out if they have any questions regarding the process. Remember some entries only require 1 day, one date range or two date ranges depending on the phase of the moon [30 minutes].