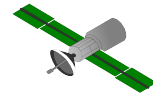


Satellites and CubeSats

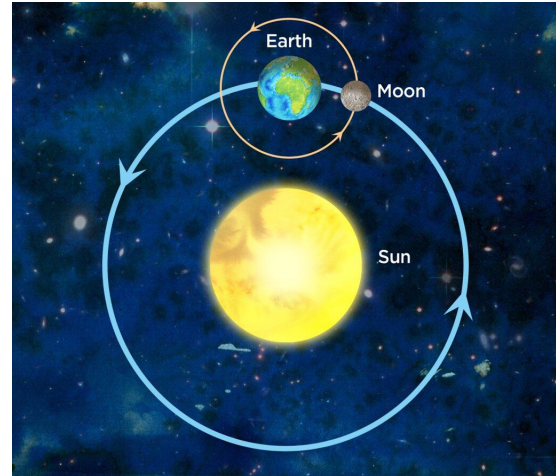
Teacher/Parent Guide



SCI.1.8.1, 1.8.2, 1.8.3, 1.8.4

What is a satellite? A **satellite** is an object that orbits, revolves, or flies around a larger object. The moon is a satellite because it flies around the Earth! And Earth is a satellite because it flies around the sun! But we can make satellites, too!

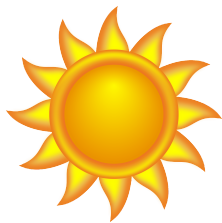
So what is a CubeSat? A **CubeSat** is a very small satellite. A single-unit CubeSat is only **10x10x10 centimeters**. However, many of these “units” can be **put together** to make one larger CubeSat. Common United States standard configurations range from one unit (or “1U”) to a **54U**!



SCI.1.8.1:

As seen in the photo to the top right, the moon is revolving around Earth while the Earth revolves around the sun. A good animation of this can be seen at <https://www.youtube.com/watch?v=QcgDiF1a14>. Show this to students and explain that a satellite, or CubeSat, revolves around the Earth like the moon does. Tell the students to notice how sometimes the moon is hiding behind the Earth and so the sunlight does not hit it. This is the same with a CubeSat or satellite. Have students do **Worksheet SCI.1.8.1 by UASPACE**. There is a key on pages 3 and 4 of the worksheet.

SCI.1.8.2:



The sun can be used to heat up and provide energy to satellites and CubeSats! However, because of the patterns of the earth, moon and Sun, sometimes the satellite may be in the shade. Have students do the **Sun Shadows Project** on Page 2. When they are finished or for homework, have students do **Worksheet SCI.1.8.2 by UASPACE**.

SCI.1.8.3:

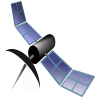
The moon is a satellite to the earth, but there can be satellites which revolve around and study the moon, too! Next, have your students do the **Cookie Moon Project** on Page 3. After they have completed this project, have the students do **Worksheet SCI.1.8.3 by UASPACE**. There is a key on pages 3 and 4 of the worksheet.



SCI.1.8.4:

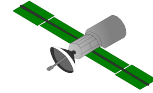


Satellites can be used to take photos of the stars that we see on Earth from up close and different views! For activities involving mapping and tracking the stars, visit <https://stardate.org/sites/default/files/pdfs/teachers/ModelTheNightSky.pdf>



Sun Shade Project

SCI.1.8.2



Supplies for teacher/guardian:

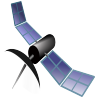
- Clock

Supplies needed for each student:

- A well-lit area outdoors without obstruction from trees or a building (like a sidewalk or the edge of a driveway)
- A sunny day
- A piece of paper
- 4 rocks, pebbles, or something else that is small but heavy (or tape if smooth surface)
- Marker
- Pencil
- Glue stick

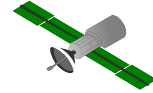
Steps:

1. Take the student(s) outside to the well-lit area at the time that school usually starts. Have them bring their paper, 4 rocks (or other small but heavy items), marker, pencil, and glue stick.
2. Have the student(s) put their paper on the ground in the clear area, then have them place the objects in the corner of the paper (or have them tape it down). Tell them that they are **not allowed to move the paper**.
3. Have them stand their glue stick up in the **center of the paper** and trace a circle around the bottom. This is their glue stick's new home!
4. Next, while the glue stick is standing on "home", have the student(s) trace the outline of the glue stick's shadow with the marker.
5. Give the student(s) the current time and have them write it on the shadow outline in pencil.
6. Leaving the paper and weights or tape outside, bring the student(s) in for other activities.
7. In about an hour, bring the students outside again with their markers, pencil and glue stick.
8. Have them stand the glue stick back up on "home" again.
9. Repeat steps 4-6 again until the end of the typical school day. At the end, the student(s) should have multiple shadow lines from throughout the day. This represents the shadow created as the sun moves through the sky.



Cookie Moon Project

SCI.1.8.1, 1.8.3

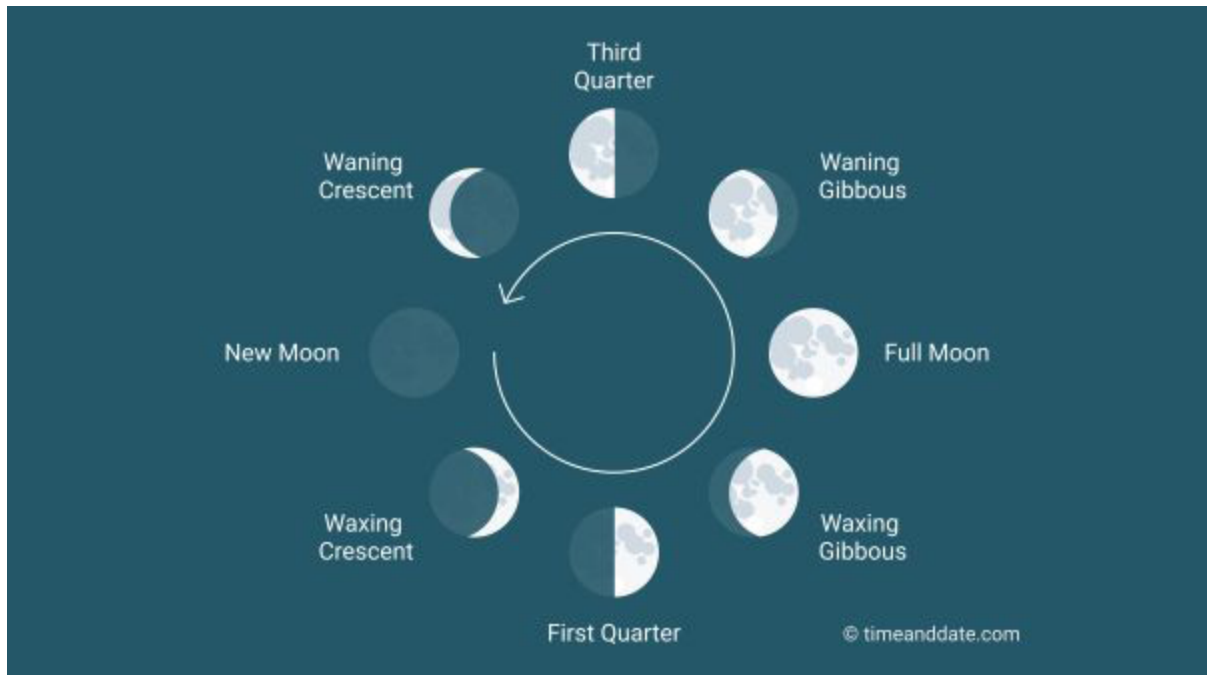


Supplies needed for each student:

- 4 cream filled cookies
- Plastic knife
- Paper (optional)
- Pencil (optional)

Steps:

10. Have all students wash their hands.
11. Pass out 4 cream filled cookies to each student. Instruct them to **not eat the cookies!**
12. Next start going through each phase of the moon beginning with New Moon; there are 8 total. As you go over a phase of the moon, have the students carefully open their cookies and cut the cream to match the phase of the moon (saving the rest of the cream because it will be used for another moon phase)! Make sure to explain that this is the specific order that they go in and that they occur due to the location of the Earth, sun and moon. The shadow on the moon is actually Earth's shadow! Also explain that it takes about 30 days (or one month) to go through a moon cycle. For reference, here are each of the moon's phases:

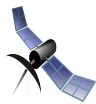


13. As they go through the phases, have them arrange the cookies on their paper and write the name of the moon phase on the paper next to their cookie.
14. At the end of the project, the paper should look like the photo above.
15. Parents or teachers, take a photo of the project and then let the students eat the cookies pending dietary restrictions!!

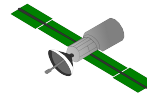
Name: _____

Teacher: _____

Date: _____



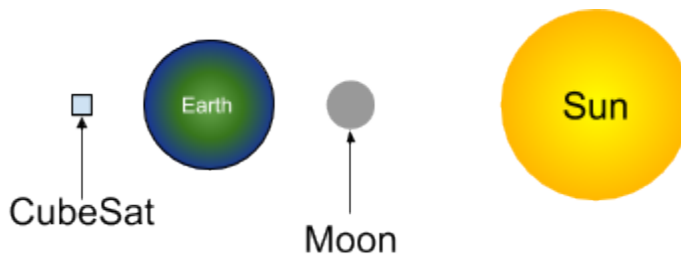
Place in the Universe



SCI.1.8.1

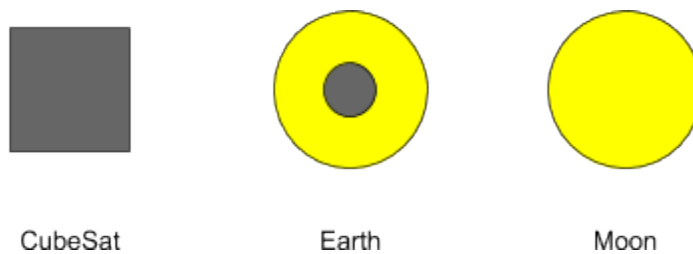
Write in the blank which of the satellites is the sunlight. Which is in a shadow? The first example is done for you. Then draw with yellow and gray what the sunlight or shade looks like on each of the three satellites (Earth, Moon, and the CubeSat). Remember, light comes from the sun!

1.

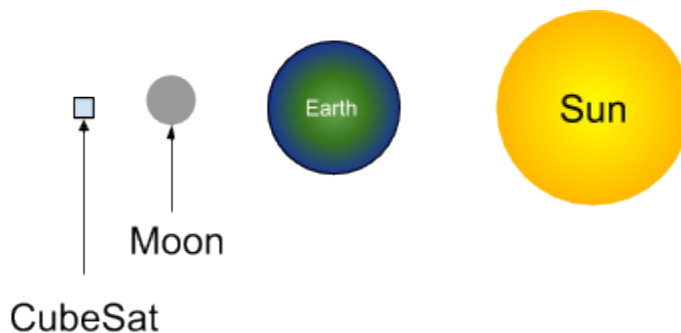


In the sunlight? Earth and Moon

In the shade? CubeSat



2.

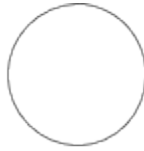


In the sunlight? _____

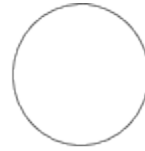
In the shade? _____



CubeSat



Earth



Moon

3.



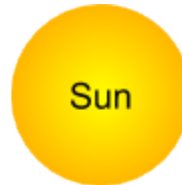
Moon



Earth



CubeSat



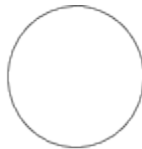
Sun

In the sunlight? _____

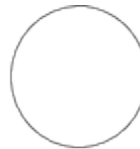
In the shade? _____



CubeSat



Earth



Moon

4.



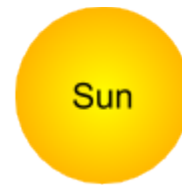
Earth



Moon



CubeSat



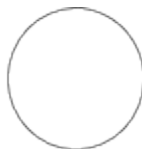
Sun

In the sunlight? _____

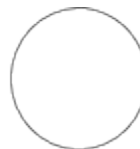
In the shade? _____



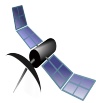
CubeSat



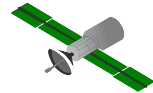
Earth



Moon



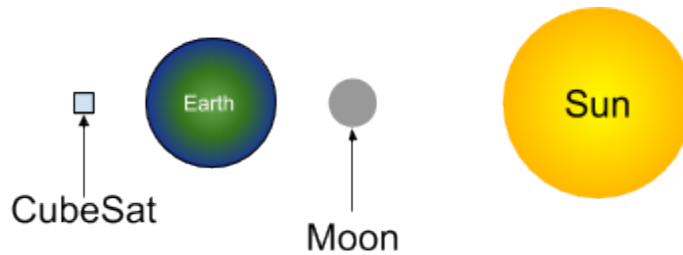
KEY: Place in the Universe



SCI.1.8.1

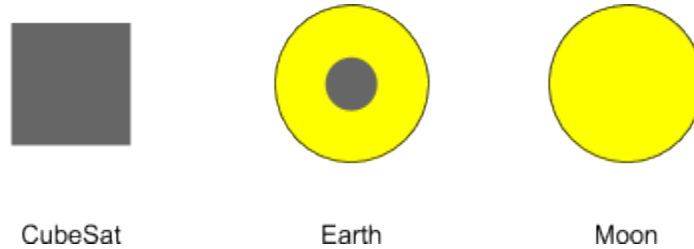
Write in the blank which of the satellites is the sunlight. Which is in a shadow? The first example is done for you. Then draw with yellow and black what the sunlight or shade looks like on each of the three satellites (Earth, Moon, and the CubeSat).

1.

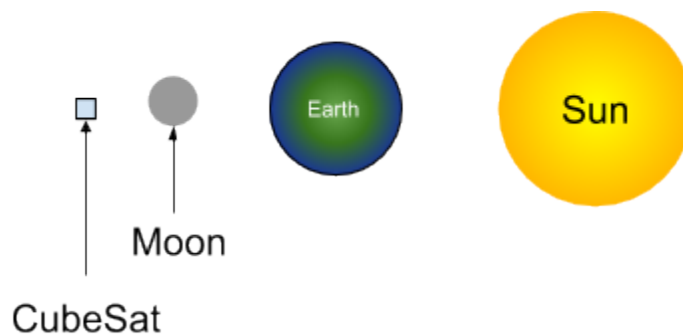


In the sunlight? Earth and Moon

In the shade? CubeSat



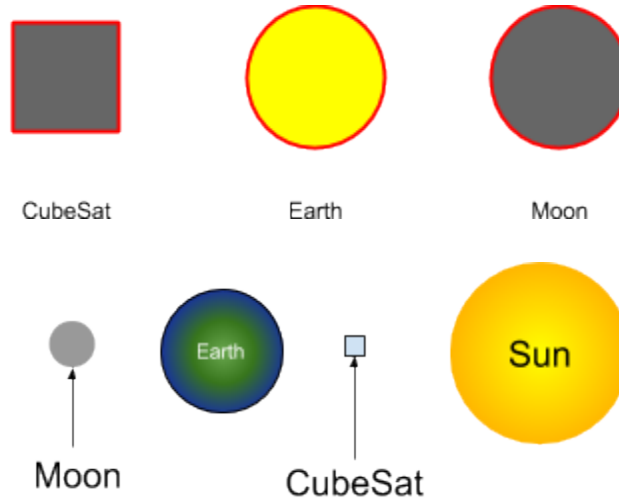
2.



In the sunlight? EARTH

In the shade? CUBESAT AND MOON

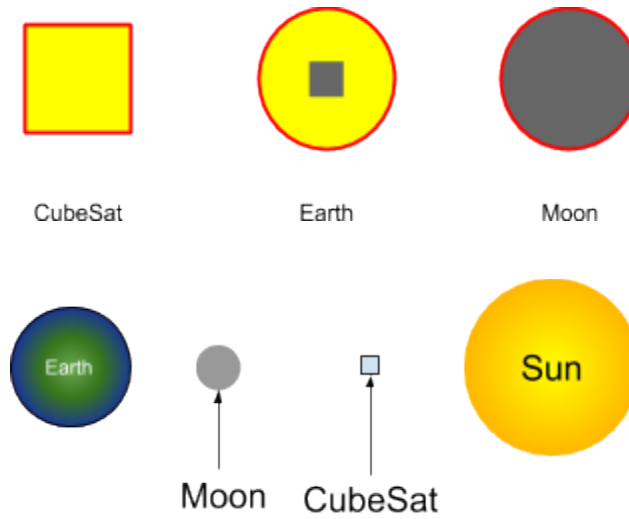
3.



In the sunlight? _____ CUBESAT AND EARTH _____

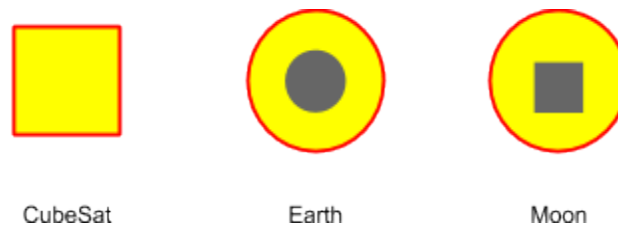
In the shade? _____ MOON _____

4.



In the sunlight? _____ EARTH, MOON AND THE CUBESAT _____

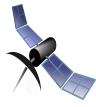
In the shade? _____ NONE _____



Name: _____

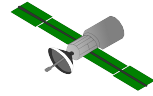
Teacher: _____

Date: _____



Sun Phases

SCI.1.8.2



Big Al™ wants to know how big his shadow will be throughout the day. Can you draw what his shadow will look like depending on what time it is? One example is already done for you.

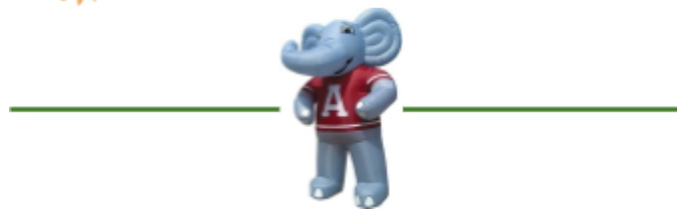
1. 8:00 AM



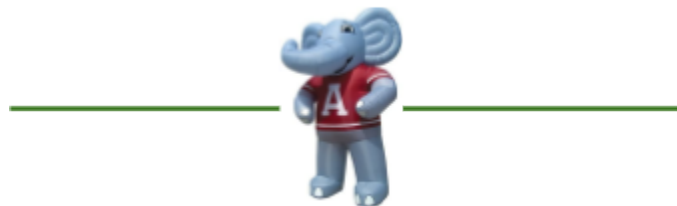
2. 6:30 AM



3. 4:00 PM



4. 12:00 PM



5. 2:00 PM



6. 6:00 PM



7. 10:00 AM



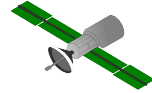
8. 11:00 PM





KEY: Sun Phases

SCI.1.8.2



Big Al™ wants to know how big his shadow will be throughout the day. Can you draw what his shadow will look like depending on what time it is? One example is already done for you.

1. 8:00 AM



2. 6:30 AM



3. 4:00 PM



4. 12:00 PM
(putting
nothing is
also ok)



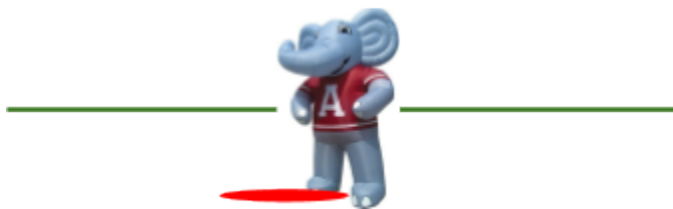
5. 2:00 PM



6. 6:00 PM



7. 10:00 AM



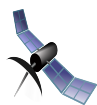
8. 11:00 PM (NO SHADOW)



Name: _____

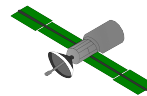
Teacher: _____

Date: _____

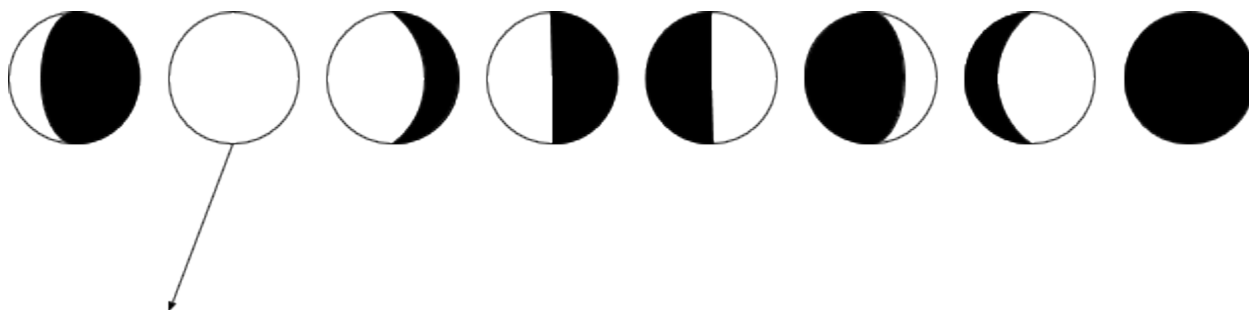


Moon Phases

SCI.1.8.3



1. Match each moon to the name of the phase that is in. One is done for you!

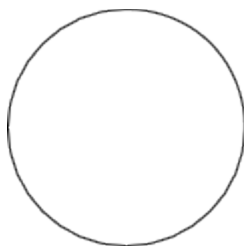


New Moon Full Moon Waning Gibbous Waxing Crescent Third Quarter First Quarter Waxing Gibbous Waning Crescent

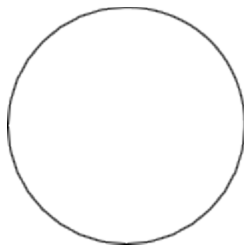
2. Draw the 8 phases of the moon in order starting with New Moon.



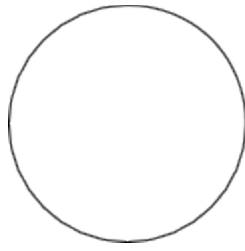
3. Go outside tonight see what phase the moon is in (remember, if you can't see it then it may be a New Moon!). Draw it in the circle and write the name of it in the blank.



4. What will the next phase of the moon be? Draw it in the circle and write the name of it in the blank.



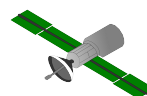
5. What was the moon phase before the current one? Draw it in the circle and write the name of it in the blank.



6. About how long will it be before you see the moon in this phase again?



KEY: Moon Phases

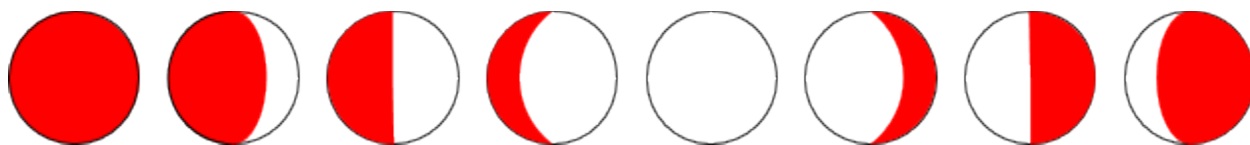


SCI.1.8.3

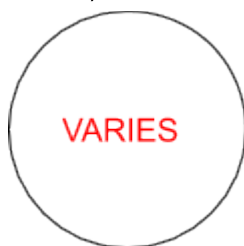
1. Match each moon to the name of the phase that is in. One is done for you!

New Moon Full Moon Waning Gibbous Waxing Crescent Third Quarter First Quarter Waxing Gibbous Waning Crescent

2. Draw the 8 phases of the moon in order starting with New Moon.

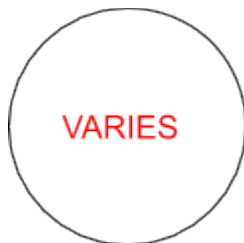


3. Go outside tonight see what phase the moon is in (remember, if you can't see it then it may be a New Moon!). Draw it in the circle and write the name of it in the blank.



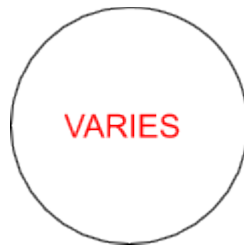
Check <https://www.timeanddate.com/moon/phases/>

4. What will the next phase of the moon be? Draw it in the circle and write the name of it in the blank.



Check <https://www.timeanddate.com/moon/phases/>

5. What was the moon phase before the current one? Draw it in the circle and write the name of it in the blank.



Check <https://www.timeanddate.com/moon/phases/>

6. About how long will it be before you see the moon in this phase again?

_____ ~30 Days or 1 Month _____