Sun, Earth, and Moon Interactions

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Date 1-23-15 Period 4

For each of the entries include the following:

1. A detailed written definition/description which explains the cause and effect for each of the events.
2. A detailed drawing with captions which explain the interaction between the Sun, Earth, and/or Moon which creates the event.
3. A detailed account including drawings and captions which describe the in-class demonstrations and how they help improve your understanding of the event.

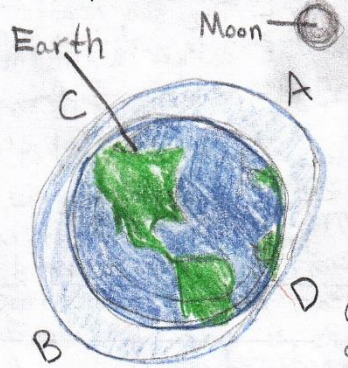
Day Length and Temperature Data Table on back

Tides

Definition/description:

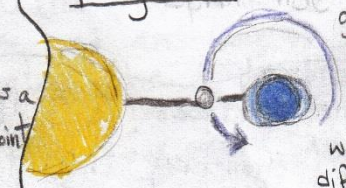
-Tides are the rise and fall of water every 12.5 hours or so.

Drawing with captions which shows how the position of the moon causes a change in water level. The drawing should show deeper water levels on the side of the earth closer to the moon AND the side opposite the moon.



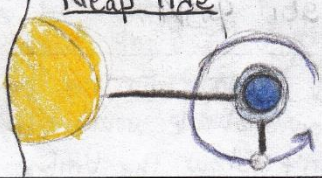
A- Closest to the moon, the moon pulls on water at Earth's surface more strongly than on Earth as a whole. Water flows to this point.
B- Earth is pulled away from this point, leaving water behind
C + D - Low tides occur between the two high tides.

Spring Tide



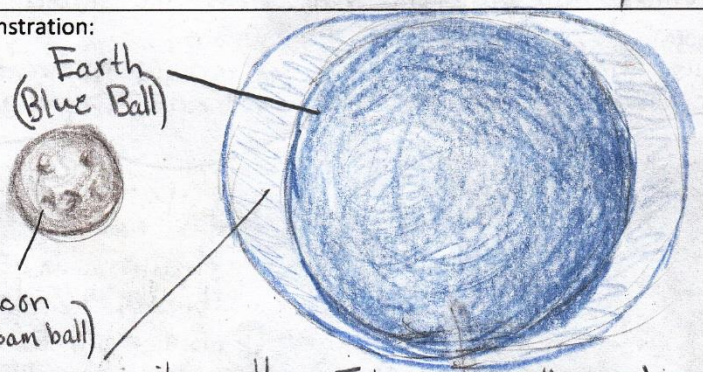
•Sun's and moon's gravity pull on earth's water as they line up, producing a tide with the greatest difference between high and low.

Neap Tide



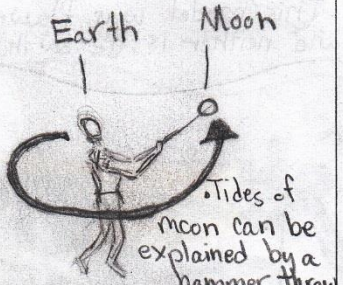
•Sun's pull is at a right angle to the moons, producing a tide with the least difference between high and low

Demonstration:



The moon's gravity pulls water to form high tide

Tides on earth can be explained by the moon's gravity pulling on Earth's water.



•Tides of moon can be explained by a hammer throw

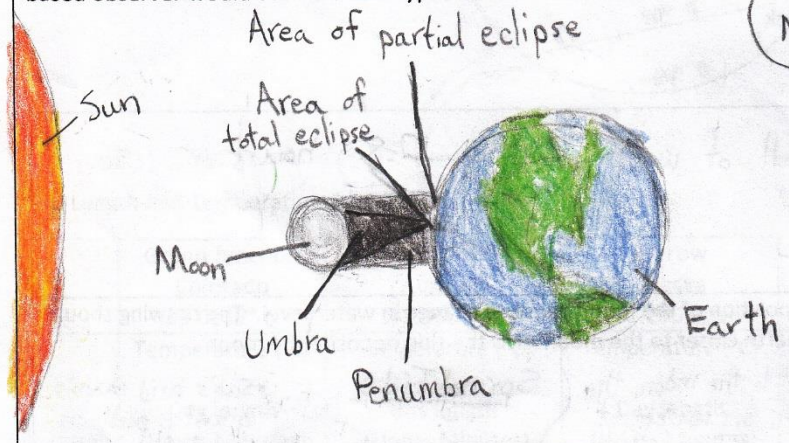
•Water on Earth pulls back on the opposite side of the moon, forming a high tide

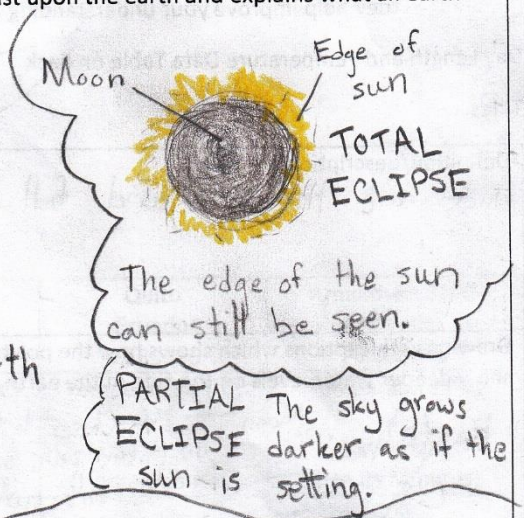
Solar Eclipse

Definition/description:

- A solar eclipse occurs when the moon moves directly between the Sun and Earth, casting its shadow over part of Earth.

Drawing with captions which fully shows how the moons shadow is cast upon the earth and explains what an earth-based observer would see. Shadow types are identified.

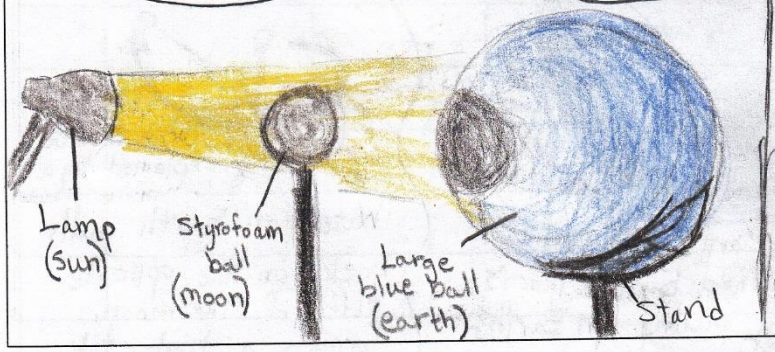


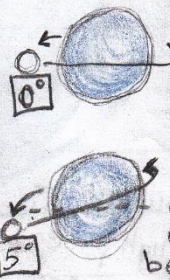


During a solar eclipse, there is a darker shadow (umbra) and lighter shadow (penumbra) that fall on Earth. During a total solar eclipse, only the pearly white glow of the sun can be seen around the edge of the eclipsing moon. The sky would appear dark.

Demonstration:

- The lamp shined a light on the moon, and a shadow appeared on the earth. The shadow probable wouldn't be as big in a real solar eclipse, though.
- This model doesn't show the Umbra and penumbra very well. The shadow falling on the Earth doesn't appear to be darker in the middle.
- This model was flawed because the moon's orbit isn't flat around the earth and neither is the earth's orbit around the sun. Solar eclipses don't occur every 14 days.





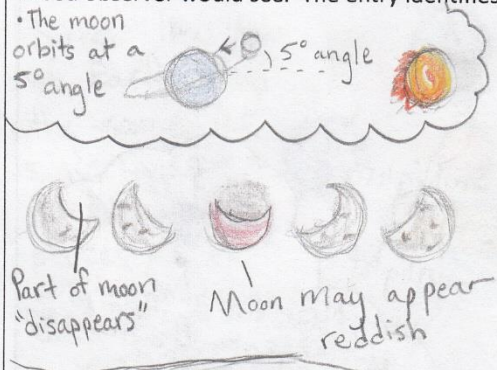
- On the model, the moon orbited straight around Earth. However, the actual moon orbits Earth at a 5° angle, which makes it rarely go between Earth and the sun.

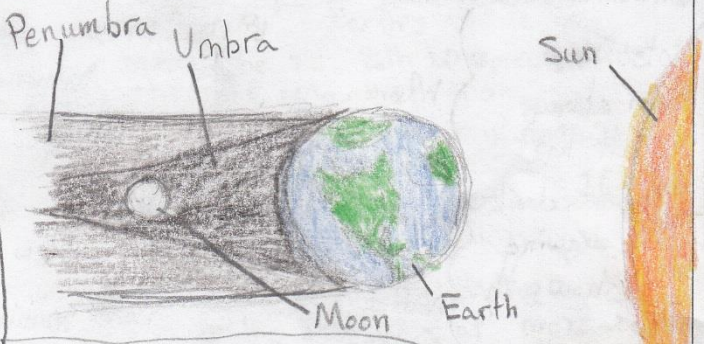
Lunar Eclipse

Definition/description:

- A lunar eclipse occurs when Earth's shadow falls on the moon.

Drawing with captions which fully shows how the earth's shadow is cast upon the moon and explains what an earth-based observer would see. The entry identifies the difference between a lunar phase and a lunar eclipse.





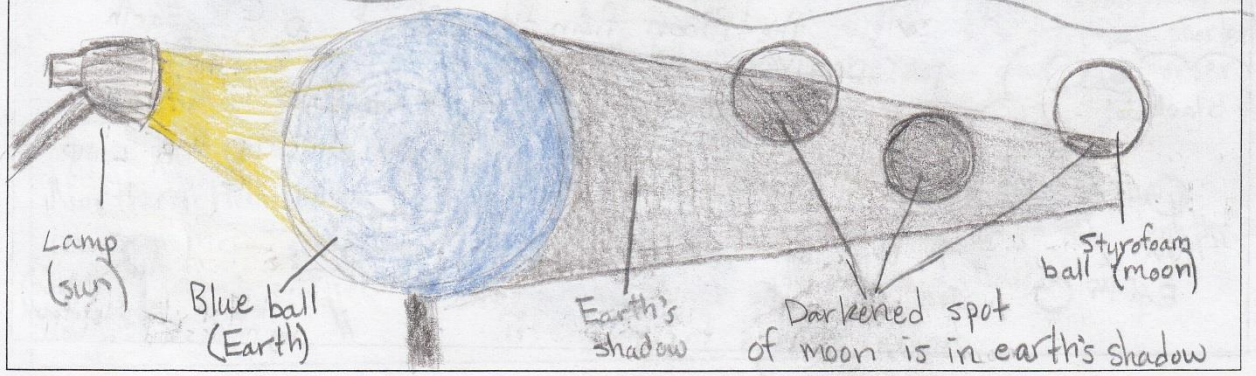
When the moon moves into earth's umbra, part of it appears black from the curved shadow, unlike the movement and phases of the moon.

The earth's shadow consists of a penumbra and an umbra. If the moon enters the penumbra completely, it is called a penumbral eclipse. It is hard to tell if one occurs because some light is being reflected back to our eyes.

Demonstration:

- Below, the lamp is shown shining a light on Earth. Earth's shadow then falls on the moon behind it, causing part of the moon (or the whole moon) to disappear.

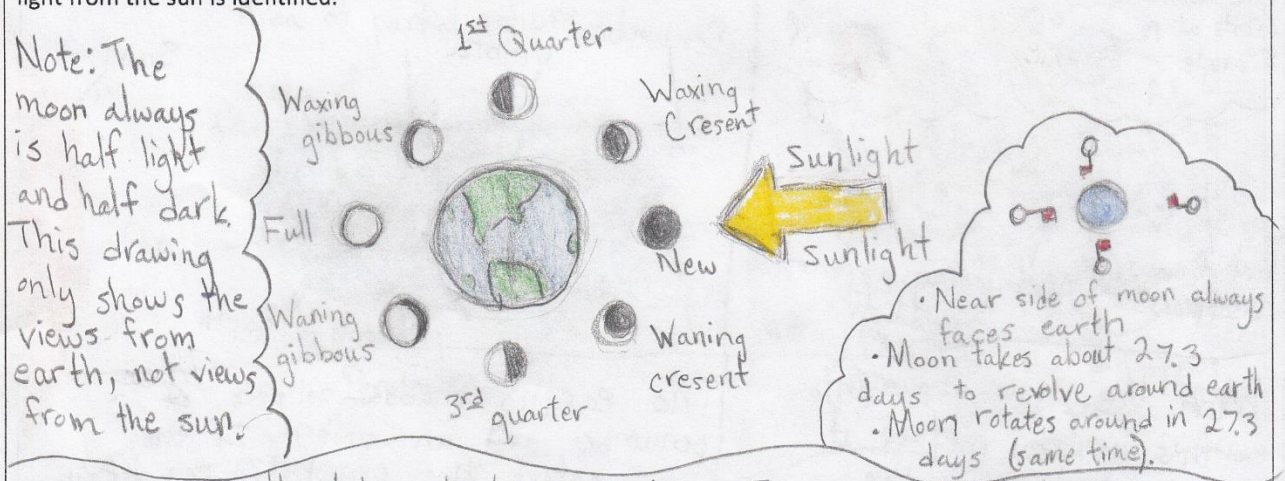
- This model was flawed because the moon and earth don't orbit flat around the sun. If this was the case, a lunar eclipse would occur every 15 days.



Lunar (Moon) Phases

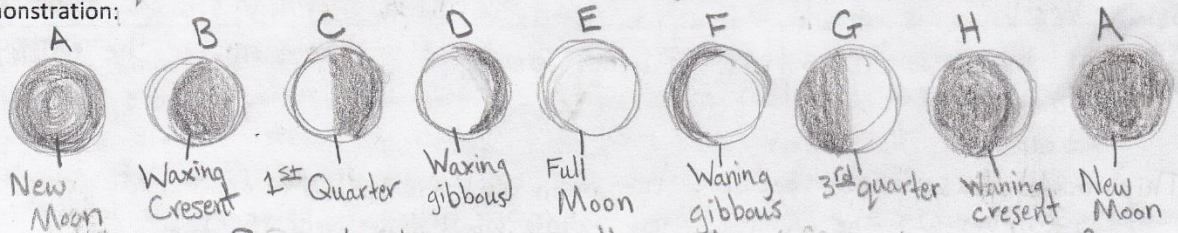
Definition/description:
•Moon phases are the different forms that the moon takes in its appearance from earth

Drawing with captions which clearly identifies how the appearance of the moon changes and how the phases are identified. A lunar month is explained as well as defining waxing, waning, gibbous, and crescent. The direction of light from the sun is identified.

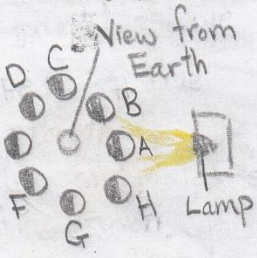


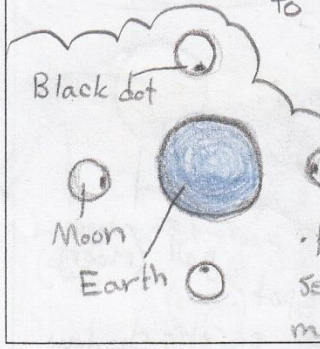
A lunar month takes about 29.5 days. The moon reflects sunlight off its surface so that one side is light while the other is dark. When the moon waxes, more of the illuminated half can be seen each night. When less of the illuminated half can be seen, the moon is waning. When more than one quarter can be seen, it is called gibbous. The opposite is a cresent.

Demonstration:

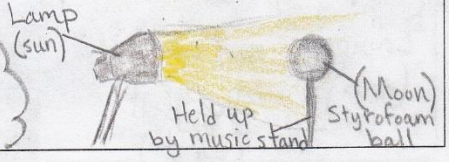


• By standing as earth and moving to view the moon from the different perspectives, we were able to accurately see the phases of the moon.





• A black dot made it easy to see that the same side of the moon always faces earth.

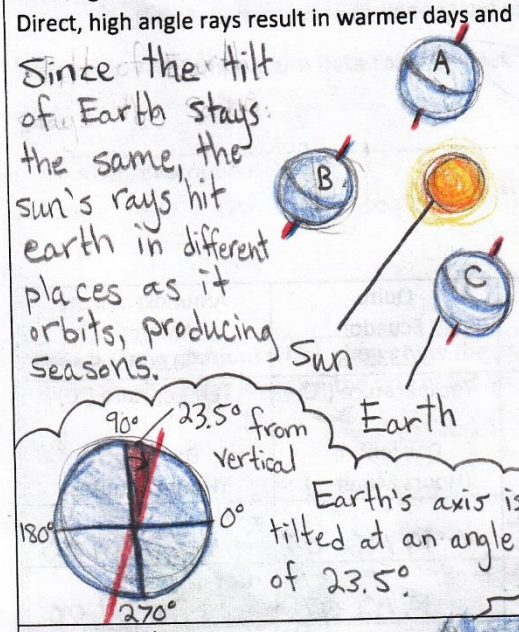


Seasons

Definition/description:

• Earth has seasons because its axis is tilted as it moves around the sun.

Drawing with captions which clearly shows how the angle of the earth affects the angle of the rays that hit the earth. Direct, high angle rays result in warmer days and longer days. Indirect, low-angle rays result in cooler, shorter days.



Since the tilt of Earth stays the same, the sun's rays hit earth in different places as it orbits, producing seasons.

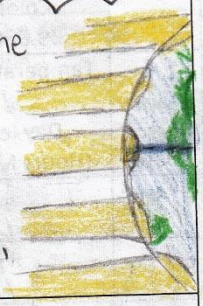
Earth's axis is tilted at an angle of 23.5°.

A-March Equinox C-September Equinox
• Neither end of Earth's axis is tilted toward the sun. Both hemisperes receive the same amount of energy.

B-June solstice - Summer in Northern hemisphere + winter in the south

D-December Solstice - Summer in Southern hemisphere + winter in North

• Rays of sunlight hit the earth the most direct at the equator. This makes it warmer in that area.
• Rays of sunlight spread out more along the poles, making them colder.



Demonstration: