

# BOY SCOUT ASTRONOMY MERIT BADGE WORKSHOP

The session is from 8:00am-12:30pm. All pre-requisite questions must be done on your own or with your troop BEFORE 8am on workshop day.



School District U-46  
Planetarium

Name \_\_\_\_\_

Troop \_\_\_\_\_ Leader \_\_\_\_\_

Date \_\_\_\_\_

Be sure to bring a blank blue card to the session to get it signed after the session. I do not give out badges or blue cards, but I will sign your blue card for all requirements completed provided you had the prerequisite questions (listed below and marked in bold) done as you enter. If you do not have them all done before the workshop, you will not get your blue card signed at the end of the session.

Most of this workshop will take place in the planetarium chamber. Part of this workshop will take place in the 106 year old observatory that is not heated, so dress accordingly. Each activity is preceded by the requirement number as listed in the *Merit Badge Workbook*, so they will be out of order, but they are all in here.

**\*Questions #1a-c, #9, #5a (1<sup>st</sup> column only) and #5b, & #6a must be completed** before arrival. Charts can be looked up online and copied (with adult supervision as needed). Other questions just need a little research online and can be done without direct instruction. Please use a pencil to complete the packet.

There will be several short breaks with bottled water and a small snack available at these times or you may bring your own. Please no eating or drinking (except water) during the work sessions. Please eat breakfast before coming to the workshop.

# PART #1

<http://www.scouting.org/licensing/Home/OutdoorProgram/Safety.aspx>

Search *outdoor-safety-scout* in your browser if the link above does not work.

\*[#1a-c] Before we “go outside” to observe, how should we prepare? What clothing or other needs should you consider if we’re going out in the country to view the sky?

Winter: \_\_\_\_\_  
\_\_\_\_\_

Summer: \_\_\_\_\_  
\_\_\_\_\_

How can you safely observe the Sun?

\_\_\_\_\_  
\_\_\_\_\_

Explain how you might treat reactions to the cold/heat or a bee sting.

\_\_\_\_\_  
\_\_\_\_\_

<https://aas.org/learn/careers-astronomy>

Search *American Astronomical Society careers* if the link above does not work.

\*[#9] What kinds of jobs can you have as an astronomer or in the astronomy field?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Which one interests you the most? \_\_\_\_\_

How would you prepare for a career in astronomy (helpful high school classes, training, experience)?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

[#8a] How is a planetarium different from an observatory? What sorts of activities happen in a planetarium? What displays did you see?

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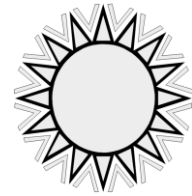
[#2] What is "light pollution and how does it affect how we see the sky? What are possible solutions?

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[#7a-b] The Sun consists of primarily two gases, which are:

\_\_\_\_\_ & \_\_\_\_\_



How does the Sun compare in size and brightness to the other stars (Sirius and Arcturus for example)?

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What are sunspots?

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What effects does solar radiation have on the Earth's weather & communications?

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\*[#5 a] Complete the chart below.

Five visible (naked eye) planets *	Phases? Y or N (in class)	Why? (in class)

\*[#5 b] Complete this chart showing naked eye planet visibility for the next 12 months.

Use: M=Morning      E=Evening      AN= All night      \*= very close to sunrise or sunset

If the links below don't work, enter manually or search, *planet visibility 2020 OR planet visibility 2020*  
<http://www.nakedeyeplanets.com/visibility.htm#2020>

(List them in order from the Sun)

Visible Planet →					
Month ↓					
February 2020					
March 2020					
April 2020					
May 2020					
June 2020					
July 2020					
August 2020					
September 2020					
October 2020					
November 2020					
December 2020					
January 2021					

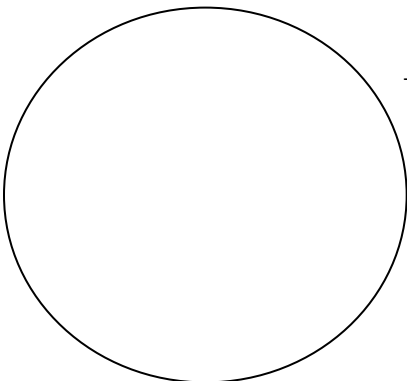
[#5c] The planetarium operator will show you the motion of a planet in the sky. Describe the motion you see.

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[#5d] Make a drawing of a planet in the current sky and describe what you are looking at.




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## PART #2 – Observatory (upstairs)

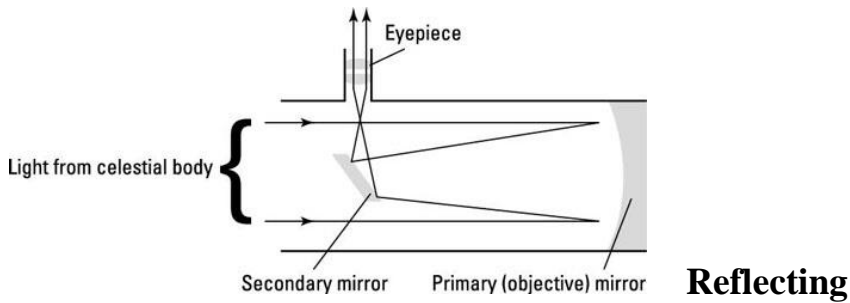
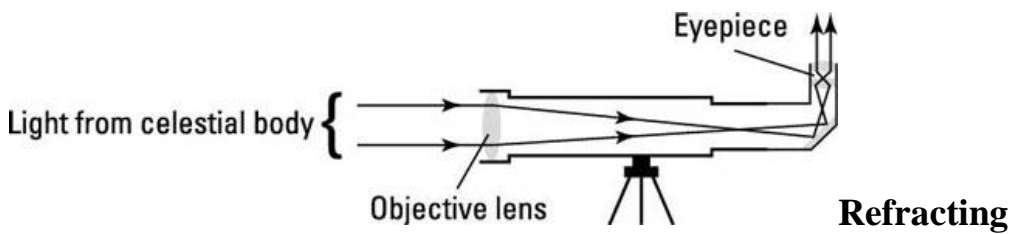
☐ [#3a-d] What is the basic purpose of a telescope? Why are they important?

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What's the difference between reflecting and refracting telescopes?

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What other instruments can be used with telescopes and what do they do?

- 1) \_\_\_\_\_
  - 2) \_\_\_\_\_
  - 3) \_\_\_\_\_
- Others? \_\_\_\_\_

What are some ways to best take care of binoculars or a telescope at home and in the field?

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Describe other telescopes that don't observe light in the visible spectrum.

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[#7c] Why are some stars red (Betelgeuse) and some stars blue (Rigel)?

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[#4d] Explain what we see when we look at the Milky Way?

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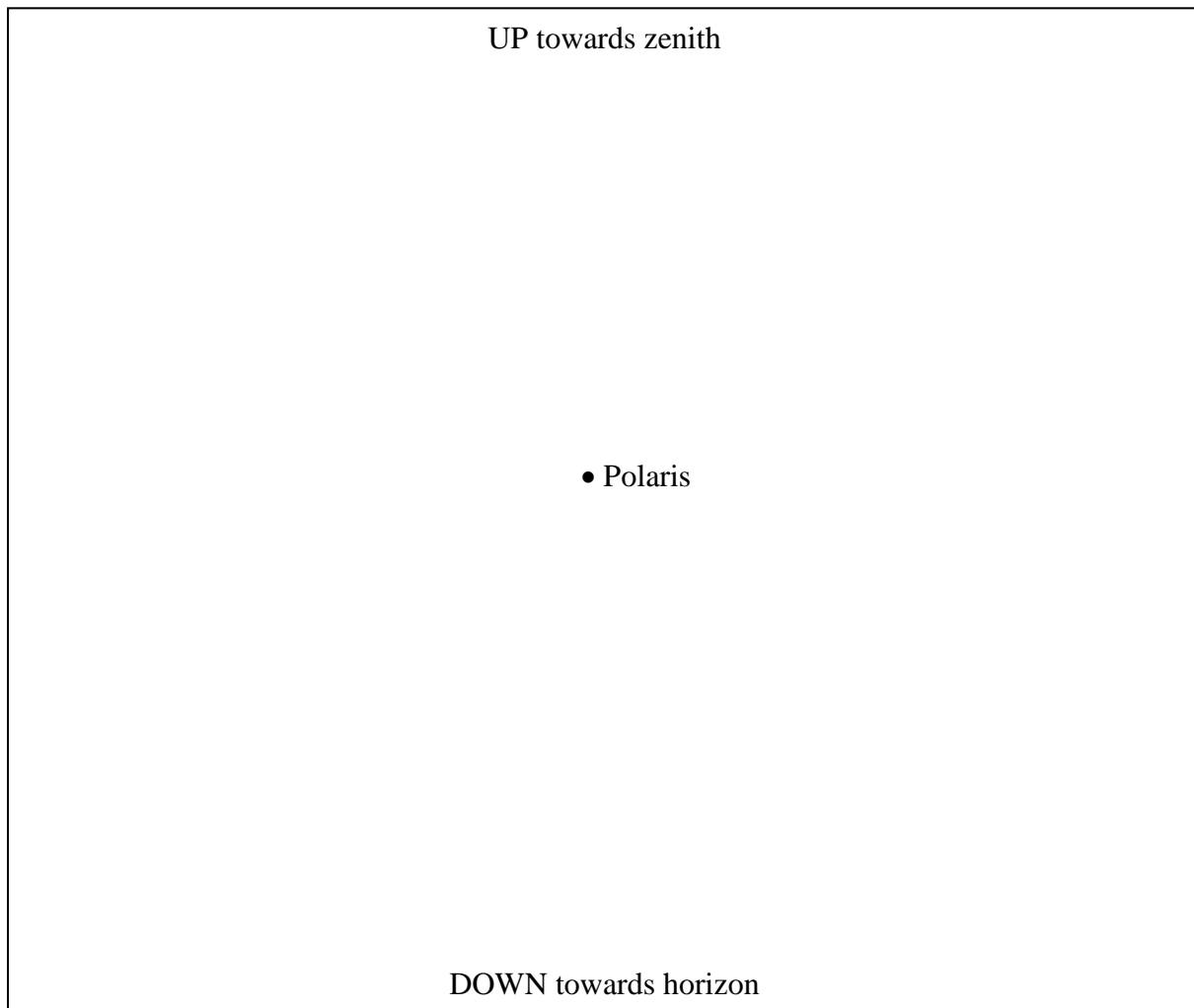
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### **PART #3 – Planetarium Chamber under the sky**

[#4a & b] You will be given instruction as to how to read a star chart. Using your star chart and the planetarium night sky, identify the following constellations. Circle the constellations on the Zodiac (4). Put a star next to the magnitude "1" or brighter stars (5). Show them to a partner.

- |   |   |
|---|---|
| <input type="checkbox"/> Ursa Major ("Big Dipper")    | <input type="checkbox"/> Sirius           |
| <input type="checkbox"/> Ursa Minor ("Little Dipper") | <input type="checkbox"/> Regulus          |
| <input type="checkbox"/> Cassiopeia                   | <input type="checkbox"/> Betelgeuse       |
| <input type="checkbox"/> Leo                          | <input type="checkbox"/> Capella          |
| <input type="checkbox"/> Capricorn                    | <input type="checkbox"/> Procyon          |
| <input type="checkbox"/> Cancer                       | <input type="checkbox"/> Aldebaran        |
| <input type="checkbox"/> Perseus                      | <input type="checkbox"/> Rigel            |
| <input type="checkbox"/> Pisces                       | <input type="checkbox"/> Polaris          |
| <input type="checkbox"/> Canis Major (Big Dog)        | <input type="checkbox"/> Castor           |
| <input type="checkbox"/> Gemini                       | <input type="checkbox"/> Pollux           |
| <input type="checkbox"/> Taurus                       | <input type="checkbox"/> Pleiades Cluster |
| <input type="checkbox"/> Orion                        | <input type="checkbox"/> Procyon          |
| <input type="checkbox"/> Auriga                       |   |

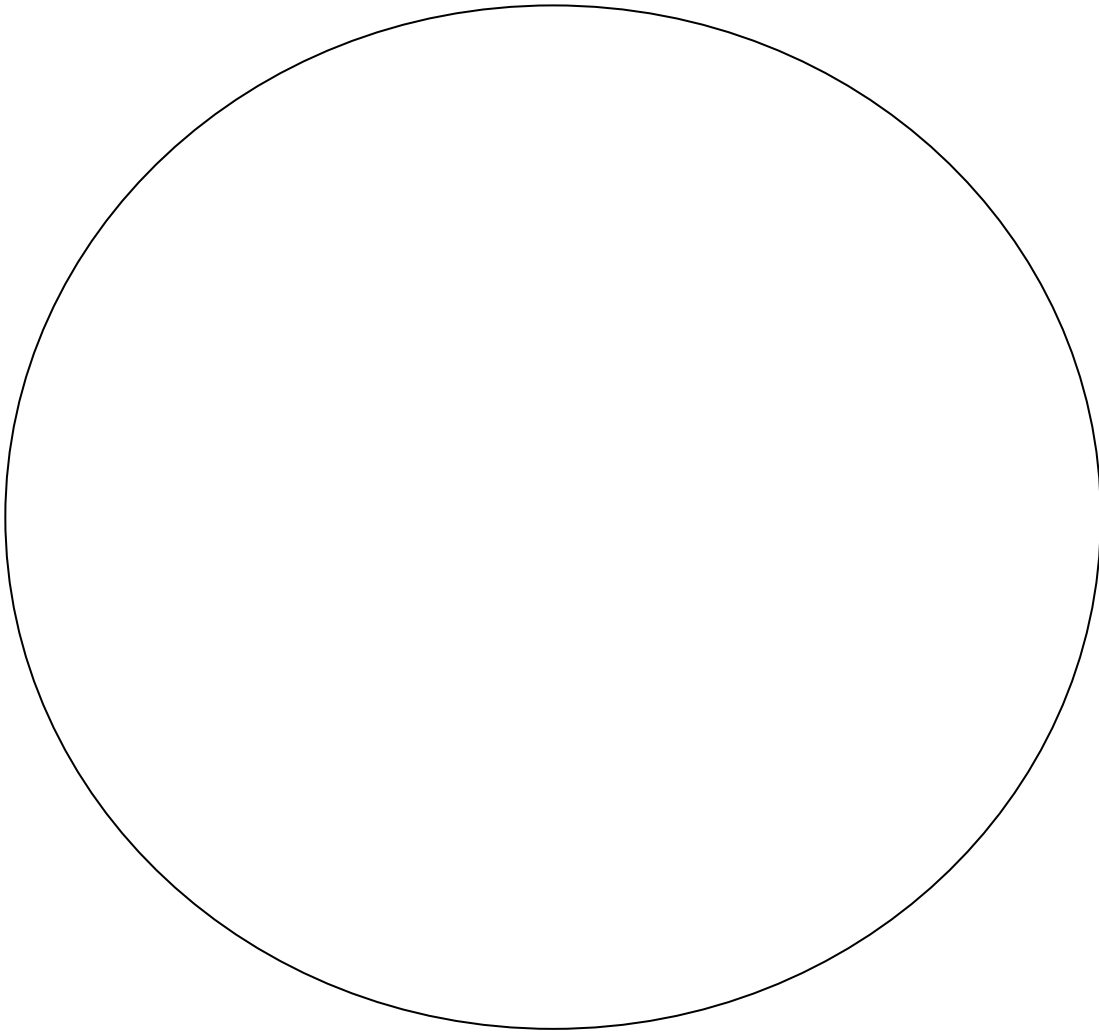
[#4c] In the box below, draw the position Big Dipper as compared to the North Star, Polaris as you look northward. Then, the planetarium operator will move the sky to a spot six hours later. Now draw the position of the Big Dipper again in the same box. Use a colored pencil (if possible) for the first position.



**Looking NORTH**

\* [#6a] – Sketch the Moon below. Label at least five maria or seas, and five craters. Use a diagram from any of these websites or a book from the library.

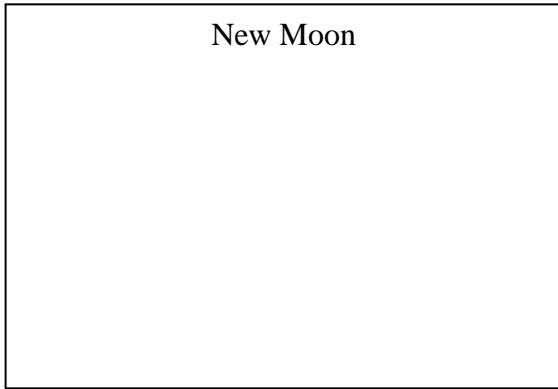
<http://www.planetsforkids.org>    <https://owlcation.com/stem/AstronomyBeginnersGuideMoon-Greensleeves>  
[http://en.wikipedia.org/wiki/Lunar\\_mare](http://en.wikipedia.org/wiki/Lunar_mare)    [http://en.wikipedia.org/wiki/Lunar\\_craters](http://en.wikipedia.org/wiki/Lunar_craters)



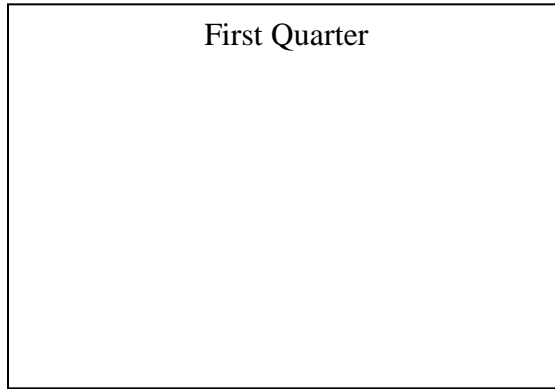


[#6d] Moon phases will be demonstrated in the planetarium show. In the boxes below, draw a diagram showing the positions of the Sun, Earth and Moon from way above the solar system for the following phases:

New Moon

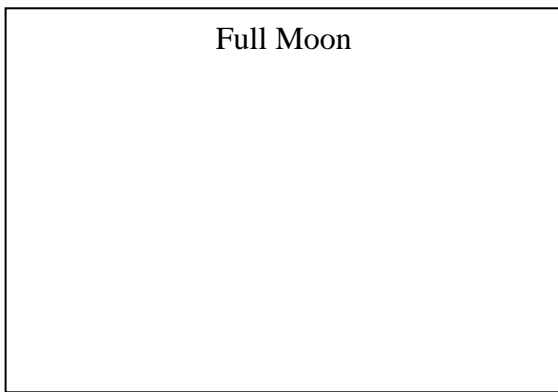


First Quarter

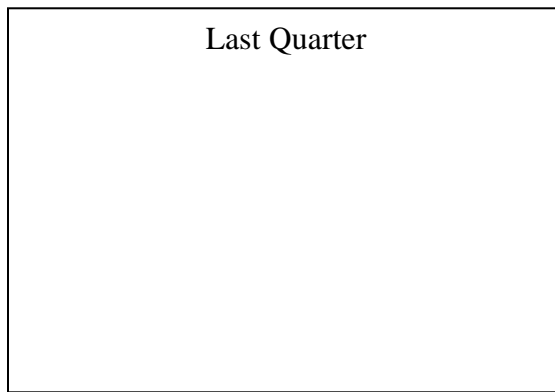


Do not start this drawing until the instructions are given in session.

Full Moon



Last Quarter



*Lunar eclipses* always occur during what lunar phase? \_\_\_\_\_

*Solar eclipses* always occur during what lunar phase? \_\_\_\_\_

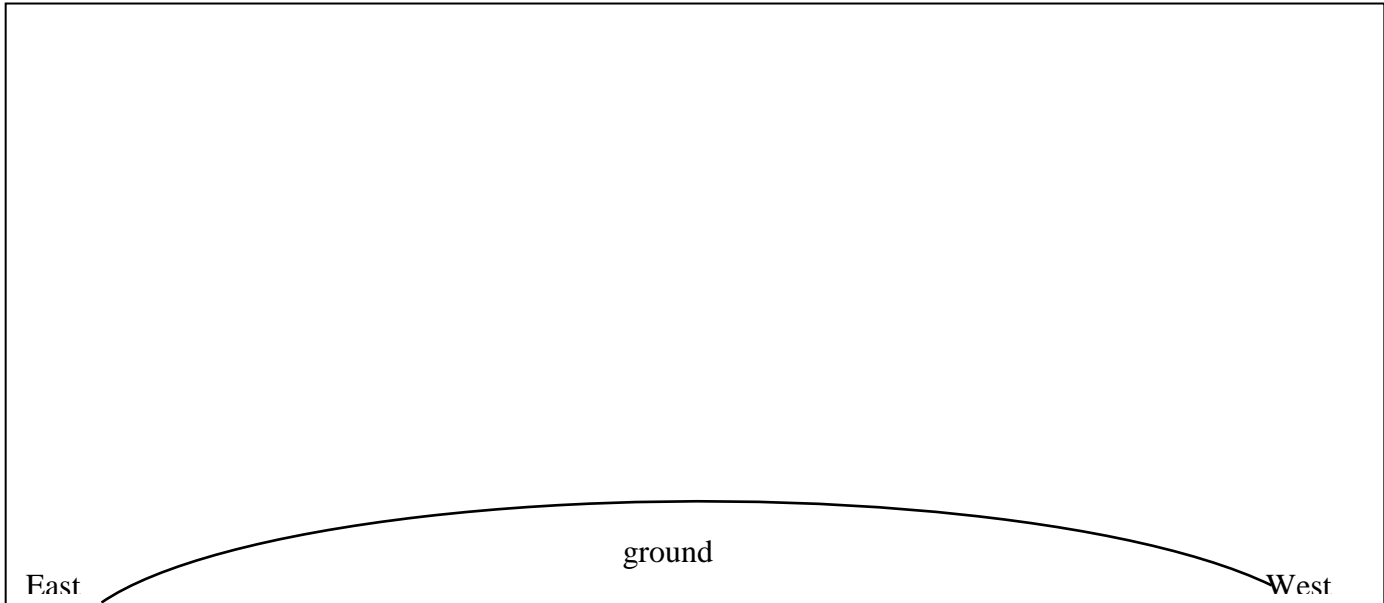
[#6c] What factors keep the Moon in orbit around the Earth?

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Do not complete the next drawings ahead of the class

[#6b] In the box below, sketch the approximate position and appearance of the Moon on four consecutive nights at the same time. Be sure to label your drawings “night #1,” “night #2,” “night #3,” and “night #4.”



Explain why we see the changes you drew in the box above. What’s happening?

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Check that you have answered every question. Ask now if you have questions!

Submit your booklet to your scoutmaster or other designated adult leader for check-off. Completely fill out your blue card, and then bring both your packet and blue card to Mrs. Hernandez for signing.

### Other Resources:

Astronomy merit badge requirements

<http://www.usscouts.org/usscouts/mb/mb022.html>

Orion Telescope & Binoculars

<http://www.telescope.com>

NASA

<https://www.nasa.gov/>

Sun & northern lights

<http://www.spaceweather.com>

Helpful animations

<http://astro.unl.edu/animationsLinks.html>