ASTRONOMY MERIT BADGE

Through live webinars with NASA engineers, exploring the Launch Pad, and observing the night sky, complete this worksheet to demonstrate your knowledge of the stars. This worksheet will not be turned in and for your own use to demonstrate knowledge of astronomy.

SAFETY

List the most likely hazards you may encounter while participating in astronomy activities.

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_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

What should do to anticipate, mitigate and prevent, and respond to the hazards listed above?
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Describe the appropriate clothing and other precautions for safely observing the night sky and in cold weather.
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_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
List first aid and prevention for the types of injuries below that could occur while observing the sky.

Heat Reactions –

_______________________________
_______________________________
_______________________________

Cold Reactions –

_______________________________
_______________________________
_______________________________

Damage to Your Eyes–

_______________________________
_______________________________
_______________________________

Dehydration –

_______________________________
_______________________________
_______________________________

Bites & Stings –

_______________________________

Explain how to safely observe the Sun, objects near the Sun, and the Moon.

_________________________________________________________________
_________________________________________________________________

What is light pollution and how does air pollution affect astronomy?

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_________________________________________________________________
_________________________________________________________________

TOOLS OF THE TRADE

Why are binoculars and telescopes important astronomical tools?

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_________________________________________________________________
_________________________________________________________________
Demonstrate to your family or explain below how these tools are used.

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Describe the similarities and differences of several types of astronomical telescopes, including at least one that observes light beyond the visible part of the spectrum (i.e., radio, X-ray, ultraviolet, or infrared).

   Telescope Type #1 = _________________________________
   Telescope Type #2 = _________________________________
   Telescope Type #3 = _________________________________

   Similarities –
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________

   Differences –
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________
   _________________________________

Explain the purposes of at least three instruments used with astronomical telescopes.

   Instrument #1 = _________________________________________________________
   Purpose = ______________________________________________________________

   Instrument #2 = _________________________________________________________
   Purpose = ______________________________________________________________

   Instrument #3 = _________________________________________________________
   Purpose = ______________________________________________________________
Describe the proper care and storage of telescopes and binoculars both at home and in the field.

Identify in the sky at least 10 constellations, at least 4 of which are in the zodiac.

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________

Identify in the sky at least eight conspicuous stars, five of which are of magnitude 1 or brighter.

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________

On the next page, make two sketches of the Big Dipper. In one sketch, show the Big Dipper’s orientation in the early evening sky. In another sketch, show its position several hours later. In both sketches, show the North Star and the horizon. Record the date and time each sketch was made.
TIP: Choose a clear night when you will have time and the ability to make observations some hours apart. Looking north, draw the position of the Big Dipper with relation to the North Star. Note the time next to it. Several hours later (6 hours are best but at least 4 hours and preferably more than 5 hours) draw the position of the big dipper with relation of the North Star and note the time next to it. (Be sure to clearly identify which diagram represents which observation).
Explain what we see when we look at the Milky Way.

List the names of the five most visible planets. Explain which ones can appear in phases similar to lunar phases and which ones cannot, and explain why.

**Planet #1** = ___________________  Phases = ___________________
Explanation = __________________________________________________

**Planet #2** = ___________________  Phases = ___________________
Explanation = __________________________________________________

**Planet #3** = ___________________  Phases = ___________________
Explanation = __________________________________________________

**Planet #4** = ___________________  Phases = ___________________
Explanation = __________________________________________________

**Planet #5** = ___________________  Phases = ___________________
Explanation = __________________________________________________
Using the Internet (with your parent's permission), books, and other resources, find out when each of the five most visible planets that you identified above will be observable in the evening sky during the next 12 months. Simply put an X on each month will be observable.

<table>
<thead>
<tr>
<th>Planet Name</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
</table>

Describe the motion of the planets across the sky.
__________________________________________________________

Observe a planet and describe what you saw.
__________________________________________________________
Sketch the face of the Moon and indicate at least five seas and five craters. Label these landmarks.
Sketch the phase and position of the Moon, at the same hour and place, for four nights within a one week period. Include landmarks on the horizon such as hills, trees, and buildings.

Date = __________   Time = __________      Date = __________   Time = __________
Date = __________   Time = __________      Date = __________   Time = __________

TIP: First check to see whether it is a morning or evening moon and chose a time to view the moon. Avoid an observation period when there will be a new moon. Choose a time and place you are going to be able to observe the moon each day. On the first day, sketch the relative position of the moon across the southern horizon noting its height and shape (phase). Draw some landmarks on the sketch as points of reference. On the same drawing, repeat this at the same time each day for the next three days, showing the height and shape of the moon for each observation. **Note the date and time of your observation next to each sketch of the moon.** If the sky is overcast and the moon is not visible, either extend the observations until you can make four of them, and/or using the other observations, estimate where the moon would have been and what shape it would have been on the overcast day(s) and indicate that what is an estimate due to overcast sky.
Explain the changes you observe when sketching the phases of the moon each day for four days.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

List the factors that keep the Moon in orbit around Earth.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

With the aid of diagrams (found in the LaunchPad), explain the relative positions of the Sun, Earth, and the Moon at the times of lunar and solar eclipses, and at the times of new, first-quarter, full, and last-quarter phases of the Moon.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

THE SUN

Describe the composition of the Sun and its relationship to other stars.
__________________________________________________________________________
__________________________________________________________________________

Describe some effects of its radiation on Earth’s weather and communications.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Define sunspots and describe some of the effects they may have on solar radiation.

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Identify at least one red star, one blue star, and one yellow star (other than the Sun).
Red = ________________   Red = ________________   Yellow  = ________________

Explain the meaning of these colors.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

STARGAZING

Plan and participate in a three-hour star party and observation session that includes using binoculars or a telescope. List the celestial objects you want to observe, and find each on a star chart or in a guidebook.
What are three career opportunities in astronomy?
1. ________________________________________________________________
2. ________________________________________________________________
3. ________________________________________________________________

Pick one and find out the education, training, and experience required for this profession.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Why does this profession interest you?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

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