Introduction to Telescopes

Objectives:

Students will study telescope optics and assemble a simple telescope. Students will also learn how to set up and properly align a tripod–mounted telescope for nighttime viewing.

Checklist:

- Complete the pre-lab quiz with your team (if required).
- Compile a list of resources you expect to use in the lab.
- Work with your team to complete the lab exercises and activities.
- Record your results and mark which resources you used.
- Share and discuss your results with the rest of the class.
- Determine if your team’s answers are reasonable.
- Submit an observation request for next week (if required).
Pre-Lab Quiz

Record your group's answers to each question, along with your reasoning. These concepts will be relevant later in this lab exercise.

1. 

2. 

3. 

4. 

Part 1: The Galileoscope

1. What are some of the differences between a refracting telescope and reflecting telescopes? (Drawing a diagram may be helpful)
2. Is the Galileoscope a refracting or reflecting telescopes? What kinds of celestial objects would you be able to see with it? What kinds of objects would not be ideal for observing with the Galileoscopes?

3. Why does the objective lens of the Galileoscope consist of two separate lenses fused together? You may need to research this answer.

4. Find and explain your method for determining the focal length of the objective lens. You will need this answer for later.
5. Describe the view using the Galilean eyepiece. How do you think this would have affected Galileo’s observations?

6. Describe the view using the modern lens.

7. Compare the view using the Barlow lens to that when using the other two lenses. Explain the differences you find.
8. The telescope with the Galilean eyepiece has a magnification of 25. Based on your observations, what is the magnification of the telescope with the Modern eyepiece? What about the Barlow eyepiece?

9. Using the observed magnifications, calculate the focal length of the Galilean, Modern, and Barlow eyepieces.

<table>
<thead>
<tr>
<th>Eyepiece</th>
<th>Focal length in m</th>
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<tbody>
<tr>
<td>Galilean</td>
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<tr>
<td>Modern</td>
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<td>Barlow</td>
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10. Compare your observed magnifications with the real magnifications as given by the TA. How accurate were you?
Part 2: Aligning an Equatorial Telescope

1. Equatorial telescopes have two axes, which one is aligned with the Earth’s rotation axis.

2. Explain the purpose of the mounting wedge for this telescope.

3. Why is it better to choose a star near the celestial equator when aligning the right ascension axis of the telescope? (Hint: Draw a globe with lines representing right ascension and declination)

4. When you have properly set up and aligned your telescope, your instructor will give you an object on which to align your telescope. Once you have calibrated the right ascension axis of your telescope, find the right ascension of a different object provided by your instructor.