

# **Astro-Madness - Teacher Guide**

## **Introduction**

In this activity, students learn about the different telescopes and instruments that are available at McDonald Observatory. They use this information to assist a group of scientists in deciding which of McDonald Observatory's resources will best suit their projects. Each "problem situation" requires critical thinking. We recommend following this activity with TAC.

## **Objectives**

As students explore the telescopes and instruments at McDonald Observatory, they complete two data tables, and a table of their telescope and instrument recommendations for the hypothetical observing projects.

## **Texas Essential Knowledge and Skills, Grades 9-12**

### **Astronomy**

112.33(c)-2I: use astronomical technology such as telescopes, binoculars, sextants, computers, and software.

112.33(c)-3E: describe the connection between astronomy and future careers.

112.33(c)-14C: analyze the importance of ground-based technology in astronomical studies.

112.33(c)-14D: recognize the importance of space telescopes to the collection of astronomical data across the electromagnetic spectrum.

112.33(c)-14E: demonstrate an awareness of new developments and discoveries in astronomy.

## **Materials:**

Computers, Internet connection, WWW browser (Internet Explorer, Netscape, Safari).

Astro-Madness student handouts. Optional handouts: pictures of domes, telescopes and instruments from the "What Are Astronomers Doing?" website.

Optional software: spreadsheet, word processing, presentation.

Optional hardware: video projector.

## Preparation

Download, print, and photocopy for each team of students:

1. Astro-Madness: Introduction
2. Astro-Madness: Problem Situations
3. Astro-Madness: Telescope Information (blank form)
4. Astro-Madness: Instrument Information (blank form)
5. Astro-Madness: Telescope & Instrument Recommendations (blank form)

Computers:

Make sure you have enough computers for each student, or each group to use. Students will explore the "What Are Astronomers Doing" WWW site online using a WWW browser.

Software:

Instead of printing and photocopy paper, you may want students to make up their own data sheets using a word processor (Microsoft Word, AppleWorks), spreadsheet program (Microsoft Excel, AppleWorks), or presentation program (Microsoft PowerPoint, KeyNote, AppleWorks).

## Engage

Browse the research projects on the "What Are Astronomers Doing" WWW site. Pick out a project that you think your students will find interesting, or is related to topics that you are currently teaching. Print out copies of the project page to pass out to students. If you can project an image on a screen using a video projector and computer, go online and pick out an interesting project with the students.

After reviewing one project, summarize it: target object, telescope, instrument, and the kinds of data the astronomer will gather (image, spectrum, etc.)

## Explore

Students may work individually, or in small groups of two or three. Pass out the introduction, problem situation sheet, and the three tables:

1. Astro-Madness: Introduction
2. Astro-Madness: Problem Situations
3. Astro-Madness: Telescope Information (blank form)
4. Astro-Madness: Instrument Information (blank form)
5. Astro-Madness: Telescope & Instrument Recommendations (blank form)

Circulate around the room / computer lab to help students collect information and reason through their telescope and instrument recommendations.

## **Explain**

Students fill in the data tables "Telescope Information", "Instrument Information", then fill in and explain their telescope and instrument recommendations on the "Telescope & Instrument Recommendations" table. For each recommendation, students must justify (explain their reasoning concerning) their recommendations for each Principle Investigator.

## **Elaborate**

1. Students suggest new instruments and telescopes for McDonald Observatory.
2. Students design their own observing project based on their own interest.
3. Students research an ongoing project on the "What Are Astronomers Doing" site that interests them. They should explain how they think the research project relates to what they have learned in Integrated Physics and Chemistry, and to everyday life.

## **Evaluate**

See the "Keys to the students' tables (Telescope Information, Instrument Information, Telescope & Instrument Recommendations). These are possible answers, but other answers may be correct.

## **Closure:**

Ask students if astronomers can do all kinds of astronomical research at McDonald Observatory. Why might someone want a different telescope or facility? For example, the Observatory has no radio telescopes. Earth's atmosphere blocks wide parts of the electromagnetic spectrum like gamma rays, x-rays, and most ultraviolet wavelengths. Some observatories, such as the Chandra X-Ray Observatory, Hubble Space Telescope, or Spitzer Space Telescope, are in orbit above Earth's atmosphere.