

MCDONALD OBSERVATORY STUDENT FIELD EXPERIENCE PROGRAM

POST VISIT ACTIVITIES

Observatory, Domes, and Telescopes

Grades 6-12

Introduction

Students revise their pre-visit models and definitions of *observatory*, *dome*, and *telescope* based on their Student Field Experience. Each student group presents what they learned to the class.

TEKS and NSES

Related TEKS 6.2, 6.3, 6.5, 7.2, 7.3, 8.2, 8.3, 8.5, IPC 3d, 4a, and 4d

Related NSES: Physical Science: motions and forces, transfer of energy; Science and Technology: understanding about science and technology.

Activity

Students explain the relationship between *observatory*, *dome*, and *telescope* by producing a presentation to the class. They may include pictures or drawings that clearly illustrate the relationships that they discovered at McDonald Observatory. Use the list of questions below to guide students as they prepare their presentations and reflect on their field trip.

Guiding questions

1. The observatory is a system that includes telescopes and domes. What other components of the observatory system can you identify?
2. Why do you think that the telescopes need domes?
3. What would happen to the observatory system if:
 - a. all the telescopes broke down?
 - b. the domes could not turn, or open up
 - c. scientific instruments failed
 - d. Could astronomers do their jobs? Who could fix these parts?
4. Explain how the telescope you investigated gathers light and brings it to a focus. Where was the light reflected or refracted?
5. What was the telescope tube made of? What property of that material do you think is most important for the telescope to do its job?
6. Do astronomers "look" through modern research telescopes? Why or why not?
7. Describe tools that astronomers use to record light. Where are they mounted on the telescope? What kind or form of data do they produce?
8. Describe the simple machines and systems of simple machines that you saw at McDonald Observatory.
9. Newton's Laws, Force and Motion: When you saw the telescope dome move, why did it start up so slowly and stop slowly?
10. Recommend improvements to the Observatory facilities, domes, or telescopes based on its science mission.

Assessment

The post-visit student presentations should be an improvement over the pre-visit activity that relate *observatory*, *dome*, and *telescope*. Look for the following characteristics:

General relationships among *observatory*, *dome*, and *telescope*:

Domes enclose telescopes. Domes and telescopes, as well as the TQ, physical plant, water tanks, and residential houses are collectively called McDonald Observatory and operate as a system. These facilities extend across two mountaintops: Mt. Locke and Mt. Fowlkes.

Specific characteristics of *observatory*, *dome*, and *telescope* that students may show in their drawings:

Dome: Encloses the telescope. HJS 2.7-m and Struve 2.1-m telescope domes have curved elevator-like doors. HET dome has huge side-sliding hexagon door. Domes turn so that the telescope can locate and track celestial objects in the sky.

HJS 2.7-meter Telescope and mount: Primary and secondary mirrors. The telescope is mounted on two perpendicular axes running east-west and north-south. Two tall concrete piers support the right ascension (RA) axis that lies north-south at an angle of about 30 degrees (the same as the Observatory's latitude). This telescope axis is parallel with Earth's rotation axis.

HET and mount: The primary mirror is a hexagonal array of 1-meter hexagonal mirrors, primary mirror tetrahedron truss, tracker and instrument at prime focus, optical fiber cable, HET fixed at a 55 degree angle, tall and thick concrete ring supports HET, HET has four feet that "stand" on the ring, each foot surrounded by two inflatable rubber ring "air bearings". The telescope floats on the air bearings as it turns to locate a new celestial target.

Observatory: Four telescope domes on Mt. Locke, HET and Laser Ranging Telescope on Mt. Fowlkes, resident houses, TQ, physical plant, and water tanks are facilities of McDonald Observatory.