



Lesson Title	Homemade Telescopes
Length of Lesson	50 minutes
Created By	Claire Babineaux
Subject	General Science
Grade Level	8th
State Standards	4.e-g
DOK Level	2,3
DOK Application	2: cause/effect, construct, organize, make observations, modify, predict 3: explain phenomena in terms of concepts, investigate, construct, critique, revise
National Standards	A, D, E, F
Graduate Research Element	Although the graduate student does not use telescopes in her research, she does use a microscope to look at the sand. Microscopes and telescopes both have lenses and mirrors in them to focus on objects.

Student Learning Goal:

The learning goal for the students in this lesson is to gain an understanding of space exploration through the use and study of telescopes.

State Standards:

4. Describe the Earth's System in terms of its position to objects in the Universe, structure and composition, climate, and renewable and nonrenewable Resources.

- e. Explain how the tilt of Earth's axis and the position of the Earth in relation to the sun determine climatic zones, seasons, and length of the days. (DOK 2)
- f. Describe the hierarchical structure (stars, clusters, galaxies, galactic clusters) of the universe and examine the expanding universe to include its age and history and the modern techniques (e.g., radio, infrared, ultraviolet and X-ray astronomy) used to measure objects and distances in the universe. (DOK 2)
- g. Justify the importance of continued research and use of new technology in the development and commercialization of potentially useful natural products, including, but not limited to research efforts in Mississippi. (DOK 3)
 - The Thad Cochran National Center for Natural Products Research, housed at the University of Mississippi
 - The Jamie Whitten Delta States Research Center in Stoneville, MS
 - The Mississippi Polymer Institute, housed at the University of Southern Mississippi

National Standards:

A: (Understandings about scientific inquiry) Technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.



D: (Earth in the solar system) most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

E: (Understandings about science and technology) Science and technology are reciprocal. Science helps drive technology, as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and techniques.

Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size and speed. Technology also provides tools for investigation, inquiry, and analysis.

F: (Science and technology in society) scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.

Materials Needed (supplies, hand-outs, resources):

Websites, telescope (personal or borrowed), ‘pretend’ telescope instructions, Hubble telescope instructions

Lesson Performance Task/Assessment:

The task/assessment for the students will be a PowerPoint lesson/review about telescopes, a guided discussion on the types of lenses used in telescopes, and uses of telescopes in nature and research. The students will be building pretend telescopes and will write a paragraph on how they would improve the telescopes.

Lesson Relevance to Performance Task and Students:

Being in the Southeastern United States in Central Mississippi, the students are in a region where the influence of Mississippi State University’s Physics and Astronomy Department is within a short driving distance. There is also an observatory in which the University is associated. The use of telescopes helps the astronomers to discover new phenomena.

Anticipatory Set/Capture Interest:

In order to capture the interest of students, the teacher can show a video about telescopes or the teacher can show the students images of what a telescope can help the observer to see (see Teacher’s Notes for list of possible websites). The teacher can also bring in a telescope or have the students make a telescope.

Guided Practice:

Depending on the stopping point of the lesson, whether this is a continuation of a lesson or the first day of the lesson, the teacher will lead the students in a discussion about telescopes and the following questions may be considered:

1. What is a telescope?
2. What can they see?



3. Describe observatory.
4. What is space?
5. What is the importance of telescopes?

After the discussion, the teacher will guide the students through the directions and then allow them to complete the activity.

Independent Practice:

For independent practice, the students will either be making:

- A handheld model of the Hubble Space Telescope. The students will build the model using the pattern provided on the HubbleSite and write a brief summary about the Hubble Space Telescope.
- A ‘pretend’ telescope out of cardboard tubes, in which they would do a write up of how they could improve it.

For homework or lesson extension, the students will then describe what they can do to improve the telescopes they made.

Instructions and websites for guidance in these activities can be found in the Teacher’s Notes section.

Remediation and/or Enrichment:

Remediation: Individual IEP will be followed. Additionally, the teacher may have the students work together in pairs.

Enrichment: The teacher may implement an extra credit assignment for the students to present their models and what they have learned about telescopes.

Check(s) for Understanding:

In order to check for a thorough understanding of the concepts presented in this lesson, the following questions can be considered:

1. What are telescopes?
2. What are they used for?
3. What are the different types of lenses found in a telescope?
4. What is the largest reflecting telescope?
5. Briefly describe the history of the telescope.

Closure:

The closure for this lesson can be a teacher led discussion on information telescopes are able to gather, how the application of telescopes to geology and other sciences can aide in the discovery of new information in those fields, and how telescopes are being utilized at Mississippi State University in various applications.



Possible Alternate Subject Integrations:

This lesson was written for an 8th grade general science class. The possible subject integrations for this lesson and activity could be:

Mathematics: To study parallax

Physics: a lab can be designed to study/demonstrate parallax.

Teacher Notes:

Hubble Site

Learn360→Hubble Space Telescope

Pretend Telescopes:

Materials:

- 1 cardboard tube (from a paper towel roll)
- Tape
- 1 sheet brown construction paper
- ½ sheet black construction paper
- 2 plastic rings from milk or juice jugs
- White craft glue
- Scissors
- Pen
- Twine or yarn

How to make it:

1. Cut 2" off the end of the cardboard tube, set aside.



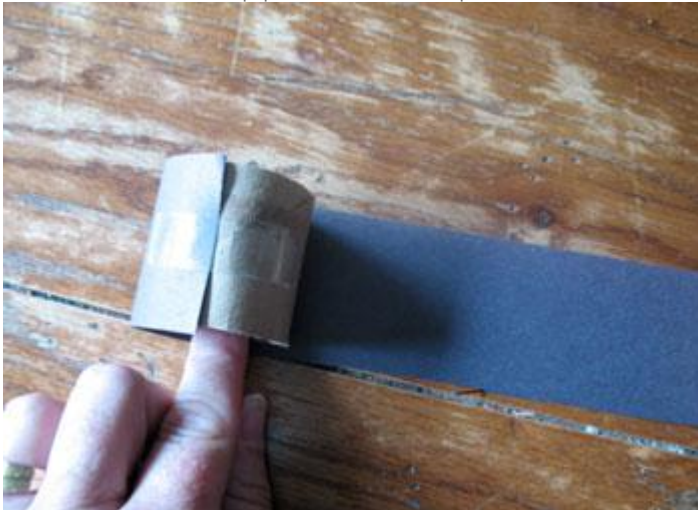
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2. Cut the longer remaining piece of the cardboard tube open lengthwise.



3. Use tape to close the tube back up, overlapping the edges just enough so that its circumference is about $\frac{1}{4}$ " or so smaller than it was originally. It should now be slightly smaller than the width of the plastic ring.
4. Cover the long roll with brown construction paper, securing with tape.
5. Cover the 2" roll with black paper and secure with tape.



6. Insert the long, brown tube inside the small black tube. Push the black tube to the center of the brown tube.

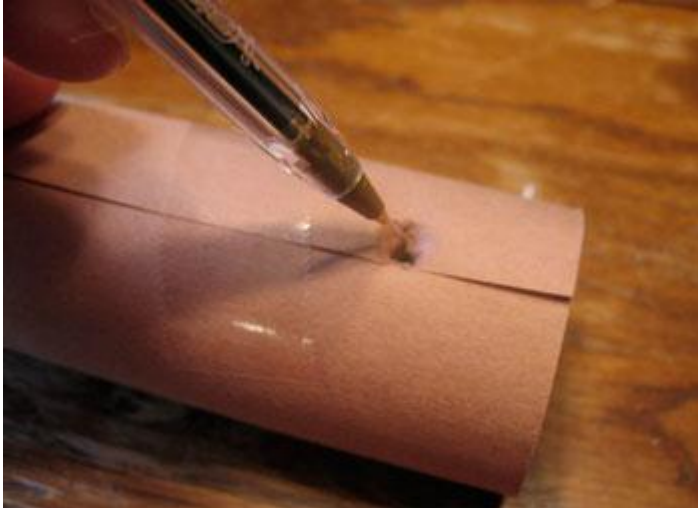
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7. Pipe white glue around one end of the brown tube. Slide a plastic ring onto the end of the tube, securing it with the glue.



8. At the other end of the tube, use a pen to poke a hole, about an inch from the end. Thread twine or yarn through the hole.



9. Pipe glue around that end of the tube and slide the second plastic ring onto the glue.
10. Tie the ends of the yarn into a knot.
11. Hang the telescope around your child's neck. The black tube at the end can be turned to "focus" the pretend telescope.

Tips:

1. The plastic rings that we used came from plastic milk jugs. They are the rings that detach from the lid the first time you open the jug. We used them to keep the black focus tube from falling off the end of the telescope.
2. If you like, decorate your telescope using glitter glue, rick rack, stickers, or markers.
3. Make a ship from a large cardboard box and kids can pretend they are Columbus sailing across the ocean!