



GRADES 9-12

Telescopes: Through the Looking Glass

Uncover the extraordinary beauty and technology of some of the world's most important telescopes, which enable us to discover information about the Universe.

Guide Overview

This guide includes suggestions for how to engage your students and facilitate an age-appropriate learning experience in the **Telescopes** exhibit.

Highlights & Related Questions



- FIND** There are lots of real antique telescopes on display in cases around this gallery. Have students find one they like!
- DO** Encourage students to make observations about the telescope and compare and contrast it to others nearby.
- ASK** Can you identify any specific parts of the telescope? **Answers can include tube, lenses, eyepiece.** How do you think a telescope works? **It uses lenses to gather light, making images of objects appear brighter and more detailed.** What problems might there have been with using early telescopes? **Answers can include problems with making lenses, size of image.**

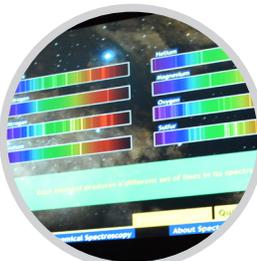


- FIND** Have students find the interactive table with mirrors, lenses and light.
- DO** Encourage students to play with the light using different combinations of mirrors and lenses to see how it creates different results.
- ASK** How does the light bend differently when you aim it at different shapes and materials? Why do you think the light moves that way? What happens when you use both a lens and a mirror to focus the light?

- FIND** Have students locate the Hershel telescope, a large wooden telescope in a glass case across from the light and mirrors station.
- DO** Encourage students to read the information panels about the telescope. Have them make observations about the telescope. Also have them compare and contrast it to other telescopes they have seen in the exhibit.



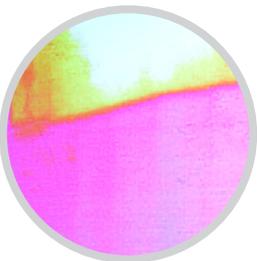
ASK Compare similarities and differences to other telescopes you can find in the gallery. What does this telescope use to collect light? **Mirrors, not lenses.** Why do you think a reflecting telescope (mirror) is better than a refracting one (lenses)? For clues, reference the information panels to the left of the telescope titled “Why Mirrors”. Also remember what happened when you played with the lenses and mirrors at the light station.



FIND Have students find the spectroscopy interactive around the corner from the Herschel Telescope.

DO Instruct students to investigate the interactive prompts.

ASK What is spectroscopy? **The study of how light and matter interact.** How can scientists identify elements in outer space? **By looking at how atoms of each element emit and absorb characteristic frequencies of light.**



FIND Have students find the infrared camera.

DO Instruct students to stand in front of it and find themselves in the screen. They can also experiment with the props in the bin under the camera: a clear plastic square and an opaque tarp square.

ASK Is this like a normal camera? **No.** How is it similar or different? **It shows different colors than a visible light camera, but still depicts the person in the camera’s view.** What do you think the colors this camera is showing you represent? **Infrared light, indicating where objects are warm.** What is infrared light and how is it different from visible light? **Infrared light has a lower frequency than visible light. Humans cannot see Infrared light with their eyes.** What do you notice on the screen when you hold the plastic and tarp props between yourself and the camera? Which one is transparent in infrared light, letting some heat through? **The blue tarp.** Which one is opaque, letting no heat through? **The clear, hard plastic.** How does this compare to visible light?



FIND At the end of the gallery, look at the large circular picture near the exit. This image is called the Hubble Deep Field.

DO Have students read the information panel about the picture. Encourage them to stand in front of it and make observations.

ASK Can you distinguish what the specks of light are in the picture? **Galaxies, not stars.** How big an area is covered in this picture? **Answer on wall panel.** Based on this one picture, what can you infer about how many galaxies there are in the Universe? How does this information about size and scale of the Universe impact or change your thoughts?