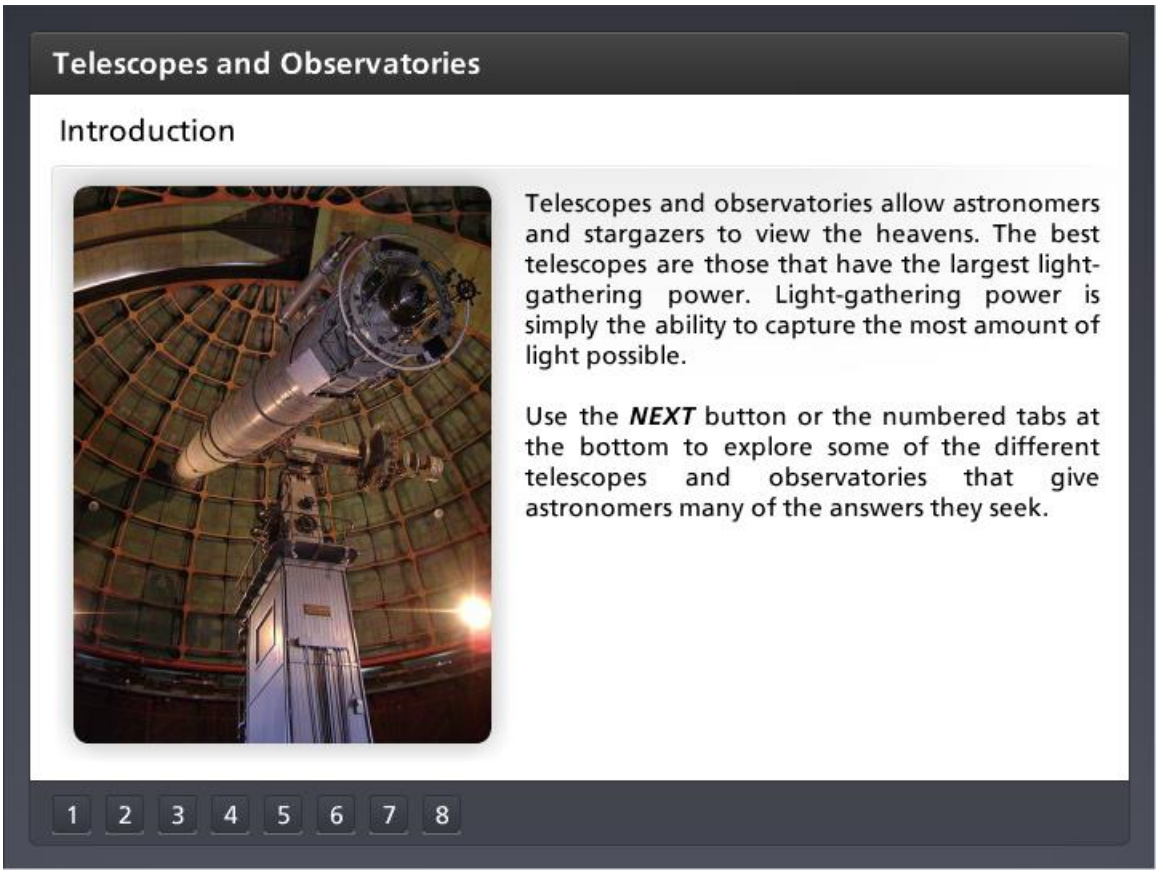
Module 5: Astronomical Tools
Topic 2 Content: Telescopes and Observatories

Introduction



Telescopes and observatories allow astronomers and stargazers to view the heavens. The best telescopes are those that have the largest light-gathering power. Light-gathering power is simply the ability to capture the most amount of light possible.

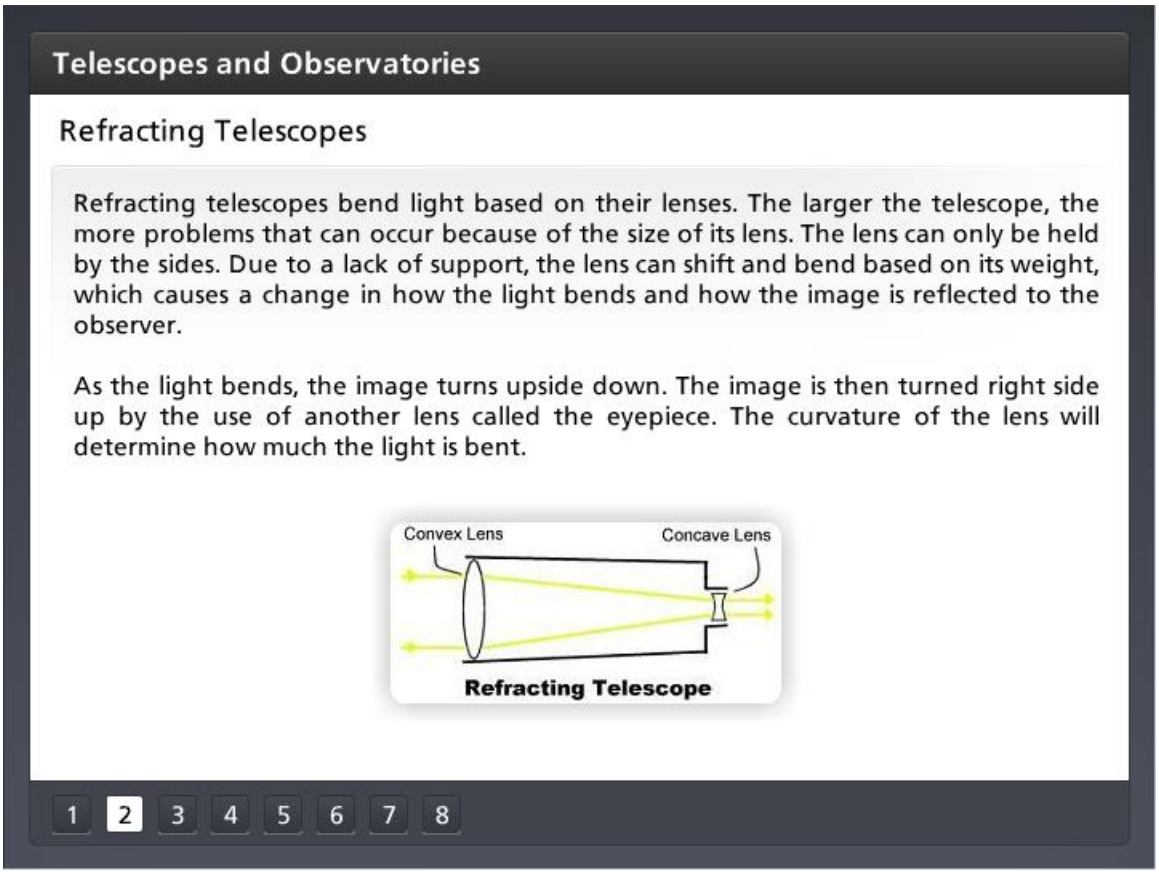
Use the ***NEXT*** button or the numbered tabs at the bottom to explore some of the different telescopes and observatories that give astronomers many of the answers they seek.

Module 5: Astronomical Tools
Topic 2 Content: Telescopes and Observatories

The Optical Telescope

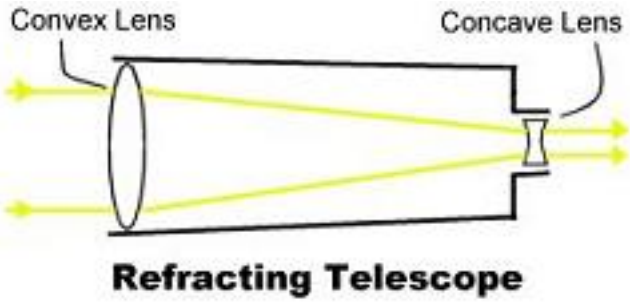
An optical telescope is a device that is used to gather light from the visible spectrum. The various optical telescopes all work in the same basic way. The main idea behind any optical telescope is to gather as much light as possible. The easiest way to gather light is to have the largest opening.

Refracting Telescopes

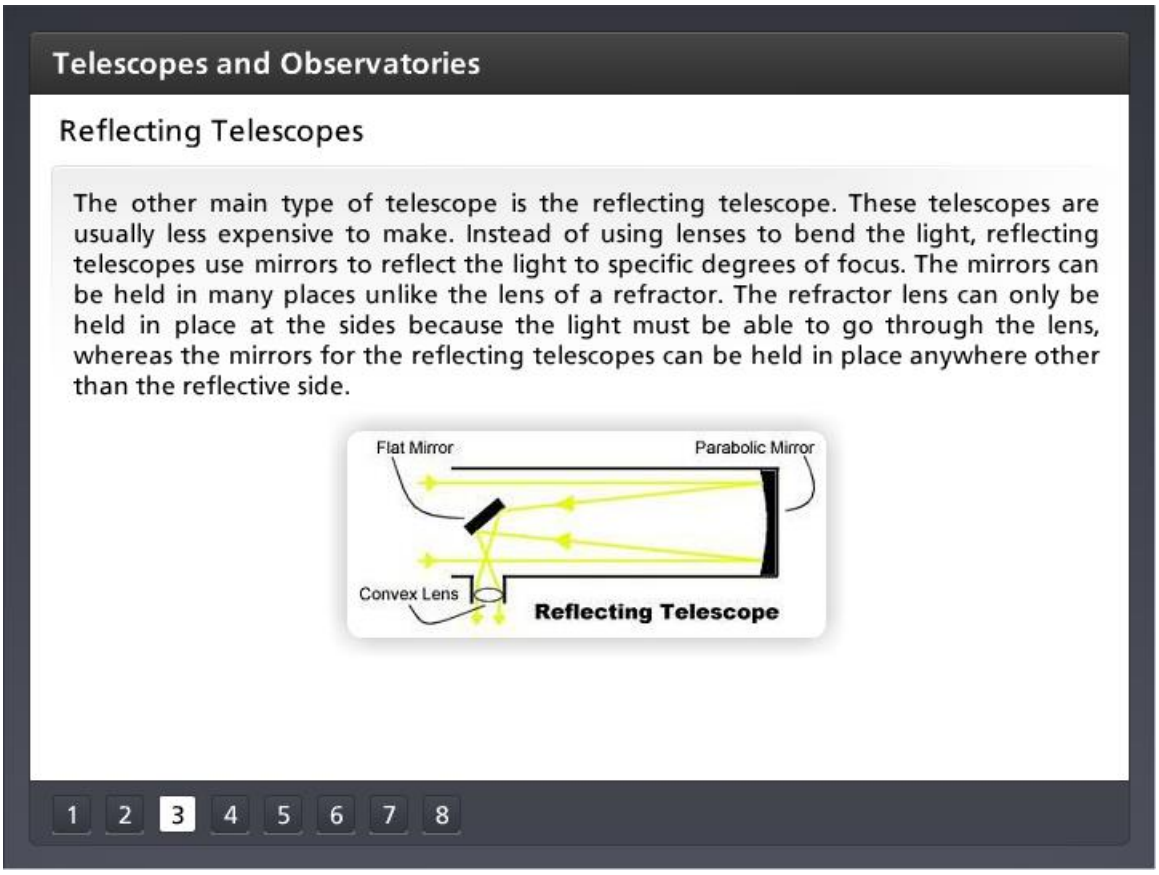


Refracting telescopes bend light based on their lenses. The larger the telescope, the more problems that can occur because of the size of its lens. The lens can only be held by the sides. Due to a lack of support, the lens can shift and bend based on its weight, which causes a change in how the light bends and how the image is reflected to the observer.

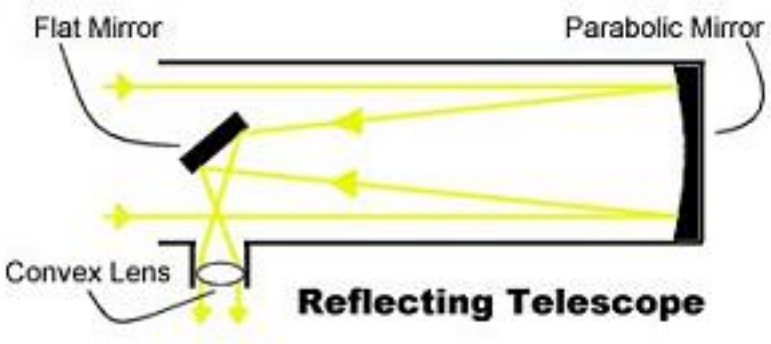
As the light bends, the image turns upside down. The image is then turned right side up by the use of another lens called the eyepiece. The curvature of the lens will determine how much the light is bent.



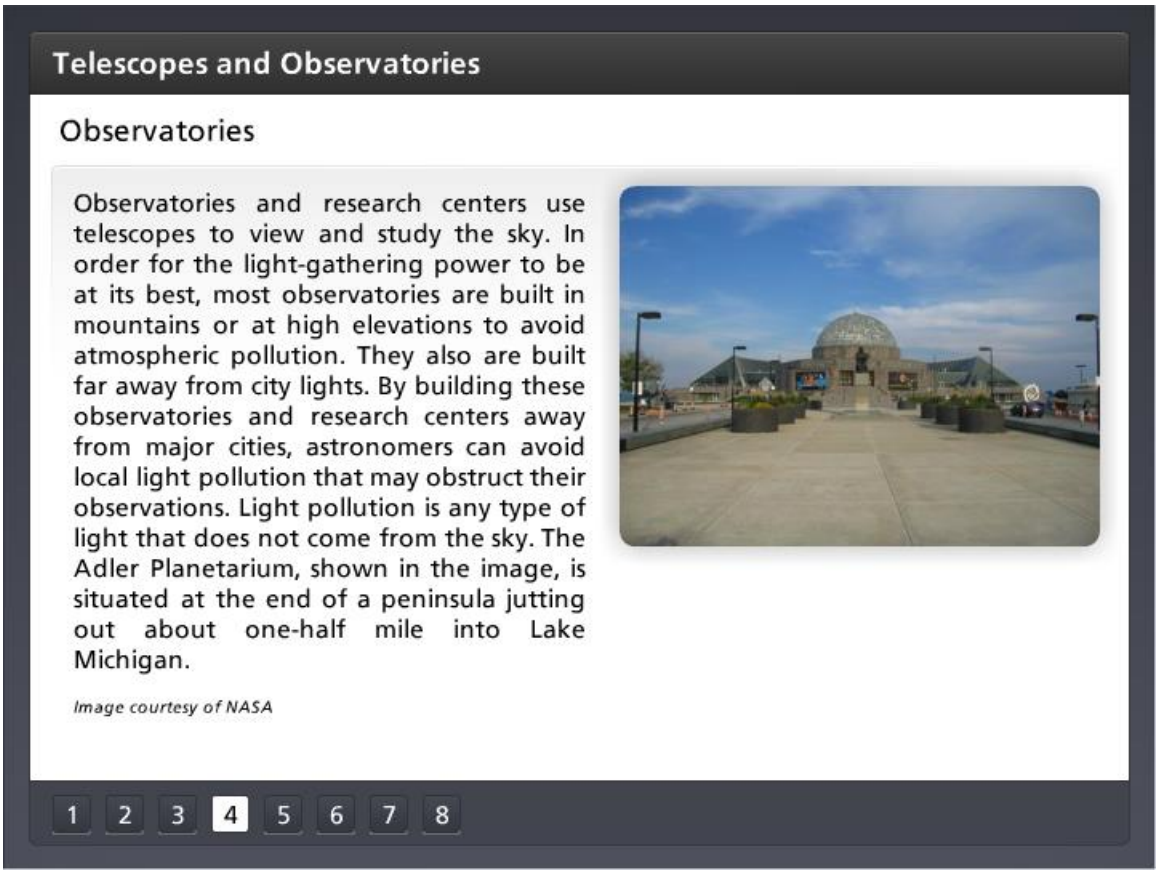
Reflecting Telescopes



The other main type of telescope is the reflecting telescope. These telescopes are usually less expensive to make. Instead of using lenses to bend the light, reflecting telescopes use mirrors to reflect the light to specific degrees of focus. The mirrors can be held in many places unlike the lens of a refractor. The refractor lens can only be held in place at the sides because the light must be able to go through the lens, whereas the mirrors for the reflecting telescopes can be held in place anywhere other than the reflective side.



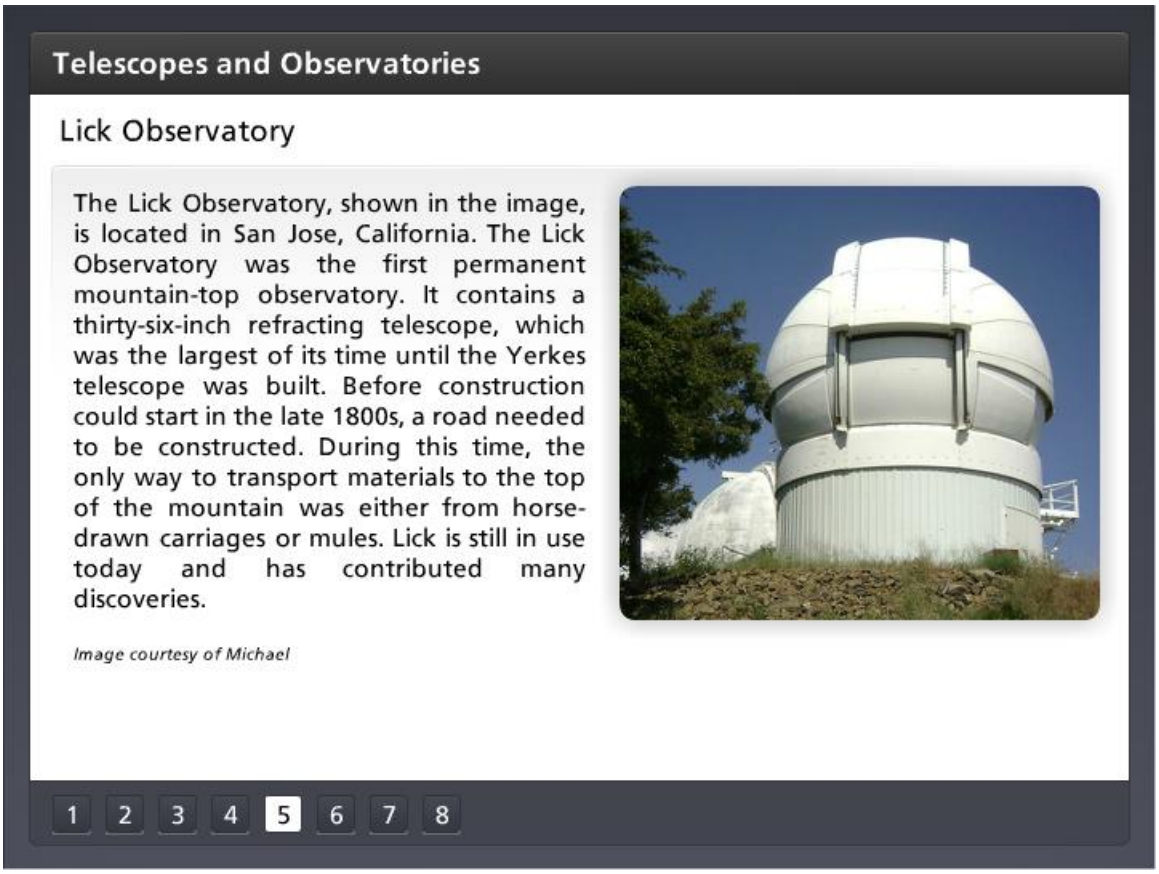
Observatories



Observatories and research centers use telescopes to view and study the sky. In order for the light-gathering power to be at its best, most observatories are built in mountains or at high elevations to avoid atmospheric pollution. They also are built far away from city lights. By building these observatories and research centers away from major cities, astronomers can avoid local light pollution that may obstruct their observations. Light pollution is any type of light that does not come from the sky. The Adler Planetarium, shown in the image, is situated at the end of a peninsula jutting out about one-half mile into Lake Michigan.

Image courtesy of NASA

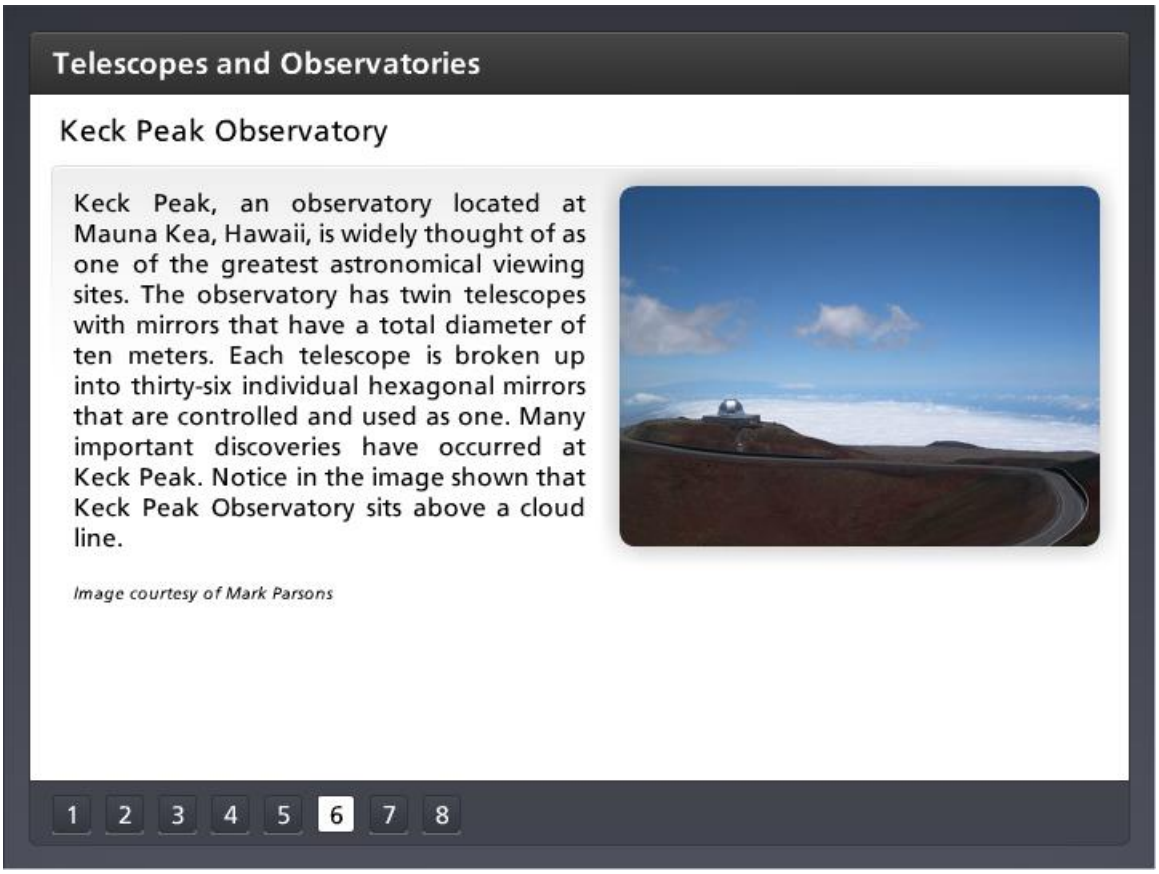
Lick Observatory



The Lick Observatory, shown in the image, is located in San Jose, California. The Lick Observatory was the first permanent mountain-top observatory. It contains a thirty-six-inch refracting telescope, which was the largest of its time until the Yerkes telescope was built. Before construction could start in the late 1800s, a road needed to be constructed. During this time, the only way to transport materials to the top of the mountain was either from horse-drawn carriages or mules. Lick is still in use today and has contributed many discoveries.

Image courtesy of Michael

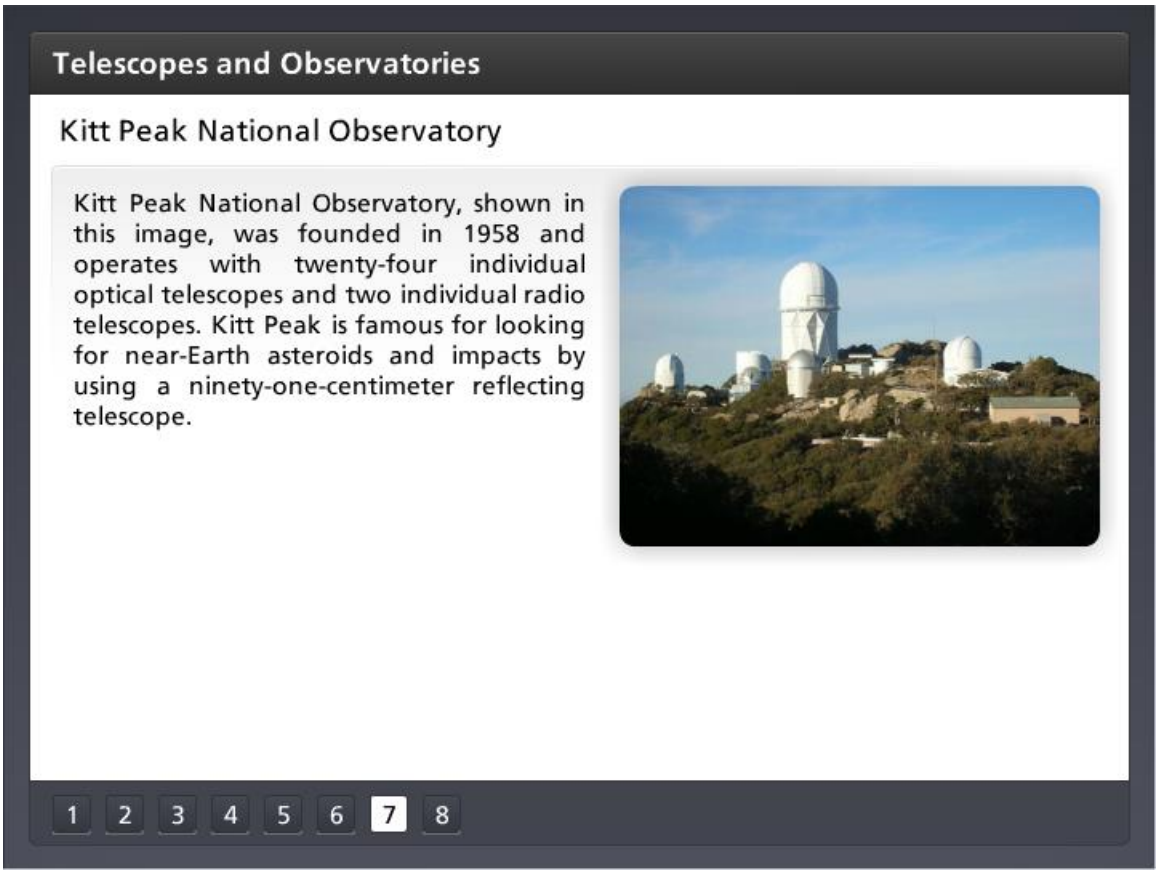
Keck Peak Observatory



Keck Peak, an observatory located at Mauna Kea, Hawaii, is widely thought of as one of the greatest astronomical viewing sites. The observatory has twin telescopes with mirrors that have a total diameter of ten meters. Each telescope is broken up into thirty-six individual hexagonal mirrors that are controlled and used as one. Many important discoveries have occurred at Keck Peak. Notice in the image shown that Keck Peak Observatory sits above a cloud line.

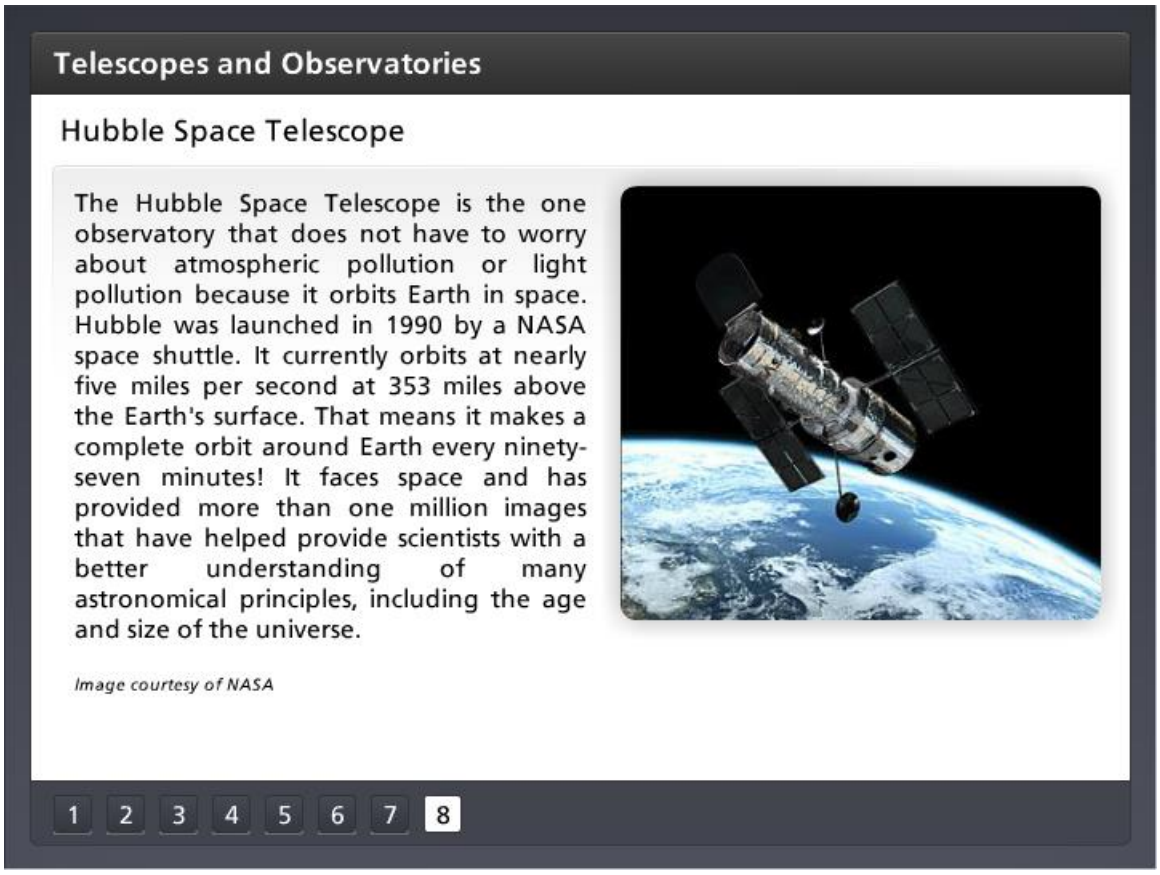
Image courtesy of Mark Parsons

Kitt Peak National Observatory



Kitt Peak National Observatory, shown in this image, was founded in 1958 and operates with twenty-four individual optical telescopes and two individual radio telescopes. Kitt Peak is famous for looking for near-Earth asteroids and impacts by using a ninety-one-centimeter reflecting telescope.

Hubble Space Telescope



The Hubble Space Telescope is the one observatory that does not have to worry about atmospheric pollution or light pollution because it orbits Earth in space. Hubble was launched in 1990 by a NASA space shuttle. It currently orbits at nearly five miles per second at 353 miles above the Earth's surface. That means it makes a complete orbit around Earth every ninety-seven minutes! It faces space and has provided more than one million images that have helped provide scientists with a better understanding of many astronomical principles, including the age and size of the universe.

Image courtesy of NASA