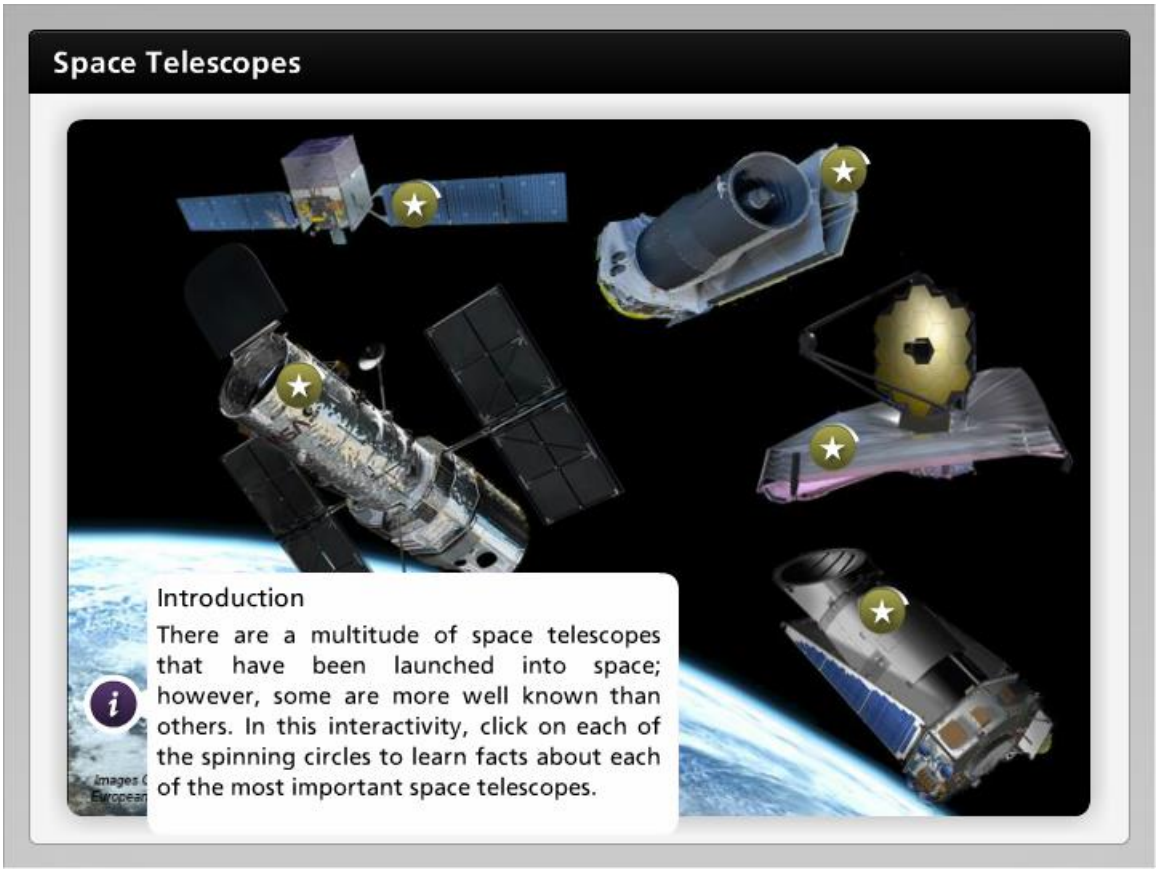
Module 5: Astronomical Tools
Topic 4 Content: Space Telescopes Notes

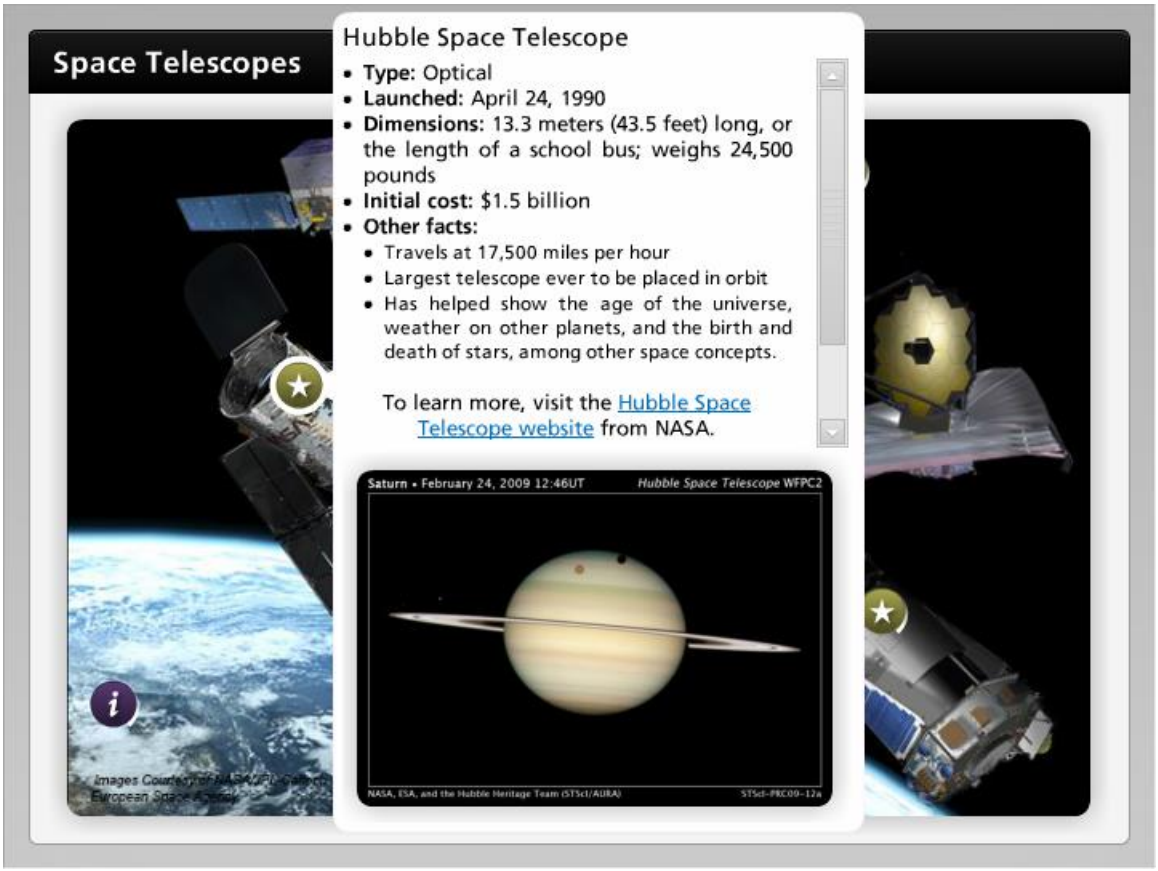
Introduction



There are a multitude of space telescopes that have been launched into space; however, some are more well-known than others. In this interactivity, click on each of the spinning circles to learn facts about each of the most important space telescopes.

Module 5: Astronomical Tools
Topic 4 Content: Space Telescopes Notes

Hubble Space Telescope



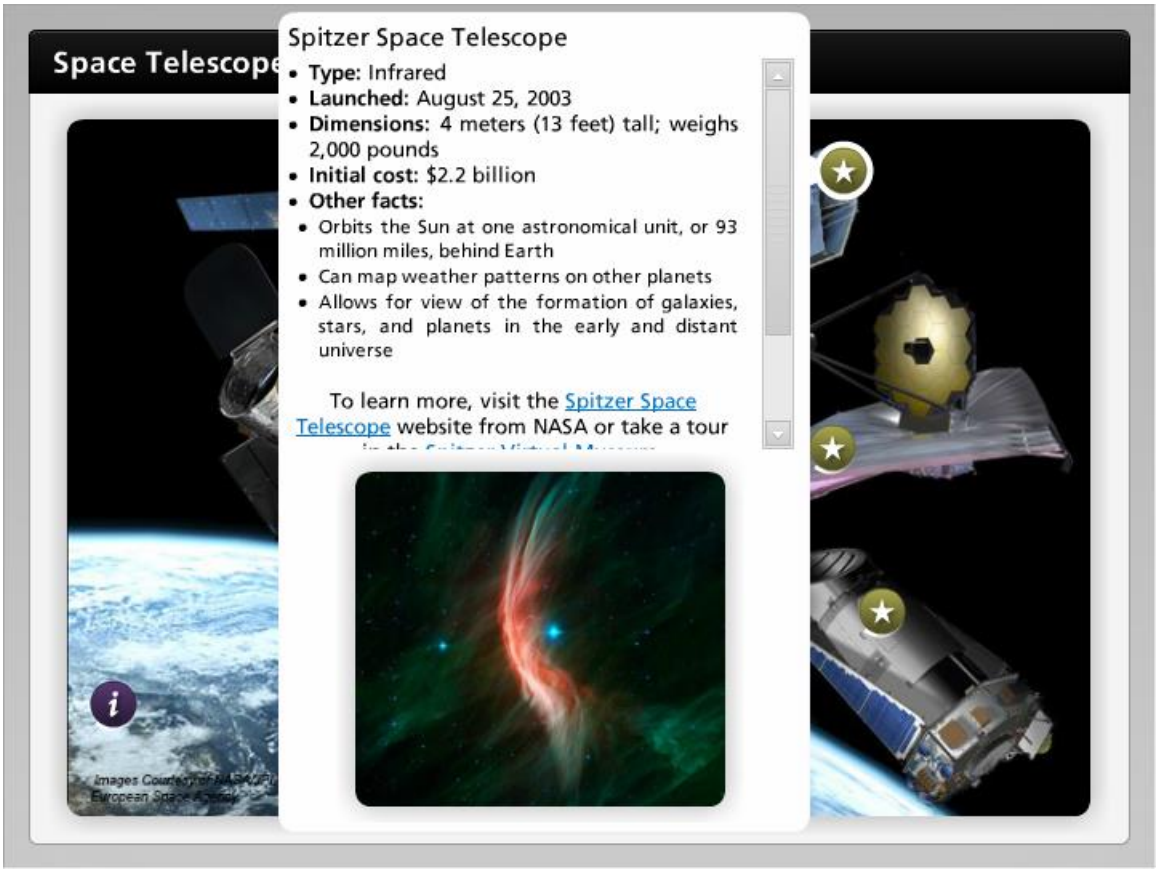
- **Type:** Optical
- **Launched:** April 24, 1990
- **Dimensions:** 13.3 meters (43.5 feet) long, or the length of a school bus; weighs 24,500 pounds
- **Initial cost:** $1.5 billion
- **Other facts:**
  - Travels at 17,500 miles per hour
  - Largest telescope ever to be placed in orbit
  - Has helped show the age of the universe, weather on other planets, and the birth and death of stars, among other space concepts.

To learn more, visit the Hubble Space Telescope website from NASA.

Image: Saturn with two of its moons captured by the Hubble Space Telescope
Courtesy of NASA, ESA, and the Hubble Heritage Team (STScI/AURA)

Module 5: Astronomical Tools
Topic 4 Content: Space Telescopes Notes

Spitzer Space Telescope



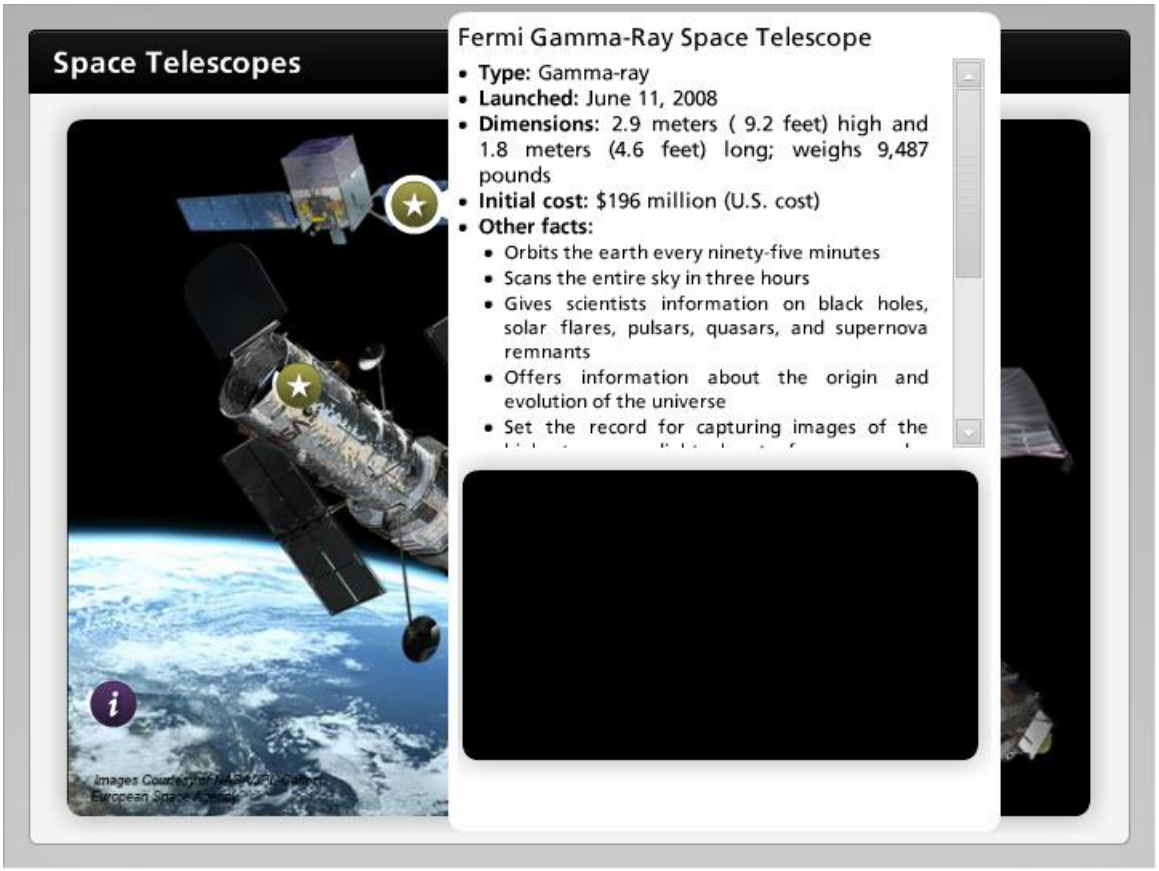
- **Type:** Infrared
- **Launched:** August 25, 2003
- **Dimensions:** 4 meters (13 feet) tall; weighs 2,000 pounds
- **Initial cost:** $2.2 billion
- **Other facts:**
  - Orbits the Sun at one astronomical unit, or 93 million miles, behind Earth
  - Can map weather patterns on other planets
  - Allows for view of the formation of galaxies, stars, and planets in the early and distant universe

To learn more, visit the Spitzer Space Telescope website from NASA or take a tour in the Spitzer Virtual Museum.

Image: Dust ripples formed from the stellar winds of the star Zeta Ophiuchi that sits almost 370 light-years away taken by the Spitzer Space Telescope.
Courtesy of NASA/JPL-Caltech

Module 5: Astronomical Tools
Topic 4 Content: Space Telescopes Notes

Fermi Gamma-Ray Space Telescope



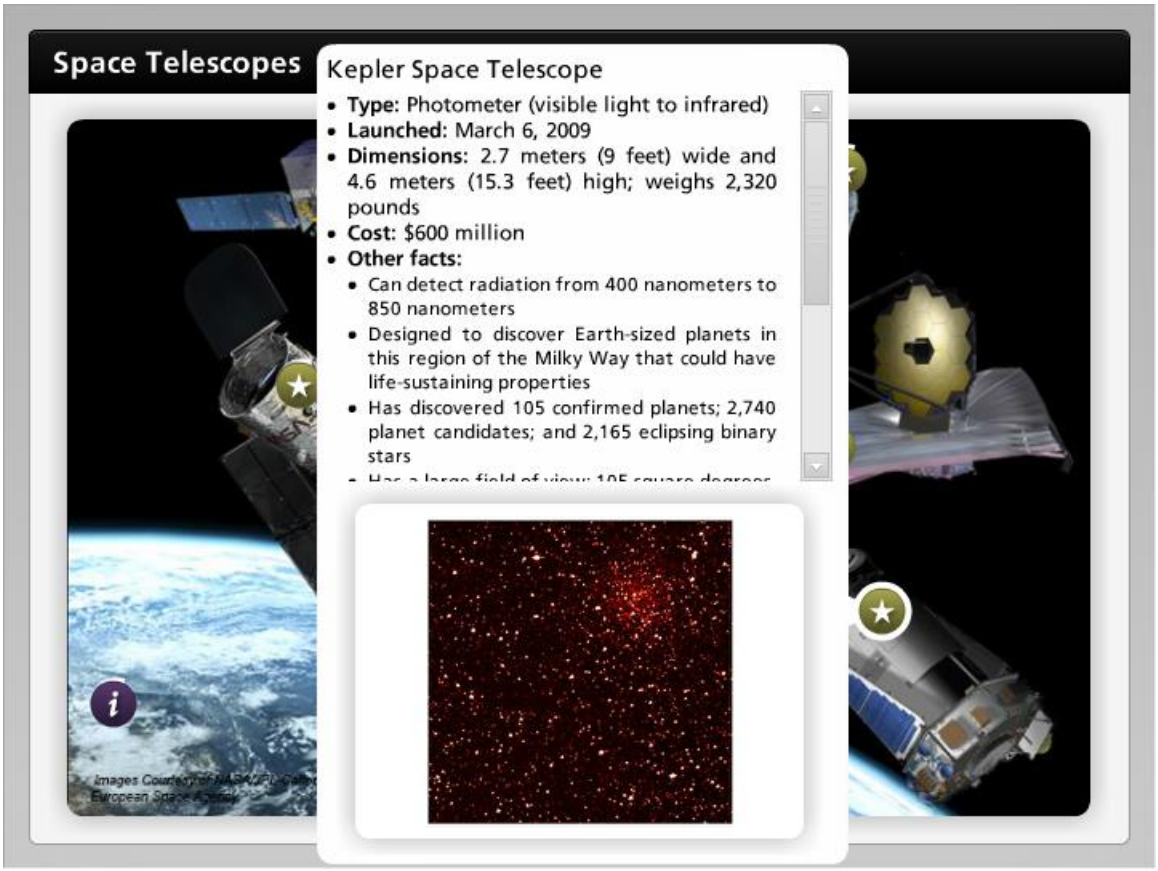
- **Type:** Gamma-ray
- **Launched:** June 11, 2008
- **Dimensions:** 2.9 meters (9.2 feet) high and 1.8 meters (4.6 feet) long; weighs 9,487 pounds
- **Initial cost:** $196 million (U.S. cost)
- **Other facts:**
  - Orbits the earth every ninety-five minutes
  - Scans the entire sky in three hours
  - Gives scientists information on black holes, solar flares, pulsars, quasars, and supernova remnants
  - Offers information about the origin and evolution of the universe
  - Set the record for capturing images of the highest-energy light burst from a solar eruption, measured at two billion times the energy of visible light

To learn more, visit the Fermi Gamma-Ray Space Telescope website from NASA or view how Fermi sees the sky through gamma rays by taking the Fermi on WorldWide Telescope tour.

Video: Fermi detecting the highest-energy light from a solar flare on March 7, 2012
Courtesy of NASA/Goddard Space Flight Center

Module 5: Astronomical Tools
Topic 4 Content: Space Telescopes Notes

Kepler Space Telescope



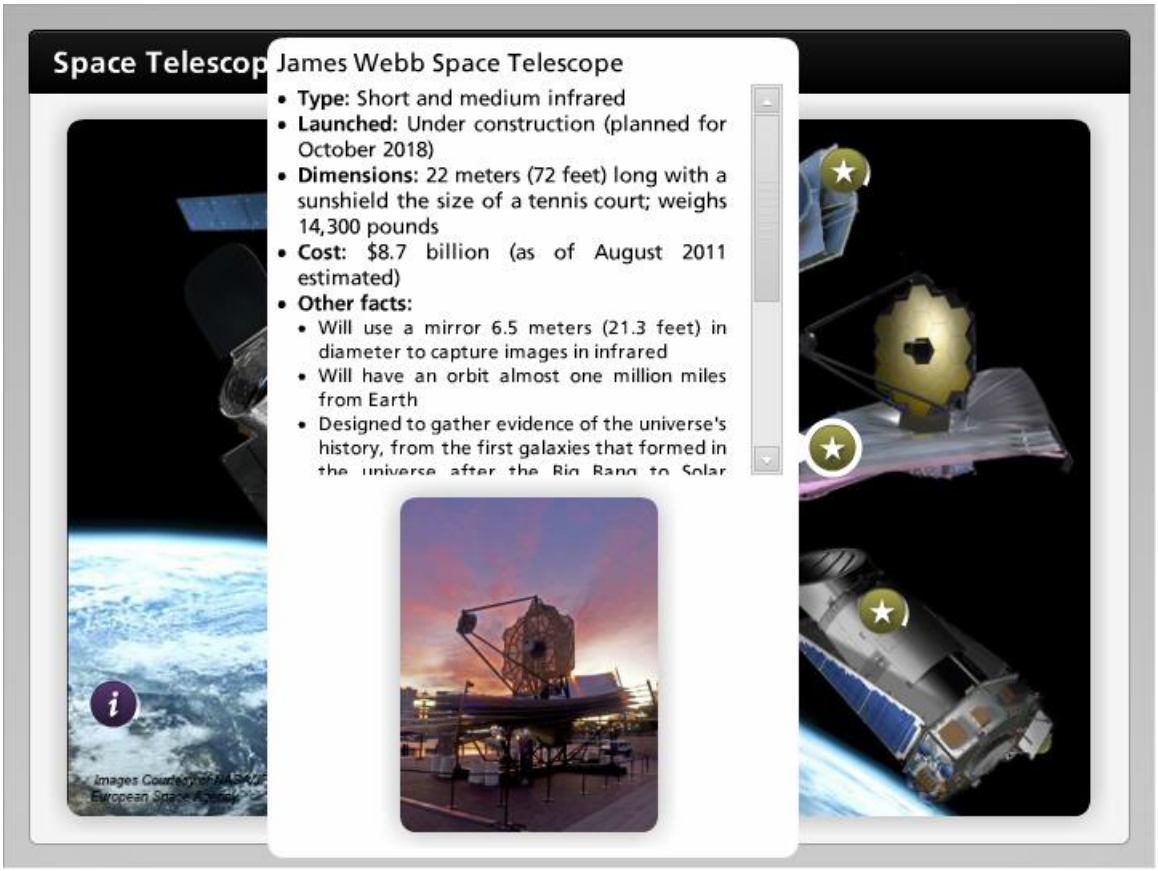
- **Type:** Photometer (visible light to infrared)
- **Launched:** March 6, 2009
- **Dimensions:** 2.7 meters (9 feet) wide and 4.6 meters (15.3 feet) high; weighs 2,320 pounds
- **Cost:** $600 million
- **Other facts:**
  - Can detect radiation from 400 nanometers to 850 nanometers
  - Designed to discover Earth-sized planets in this region of the Milky Way that could have life-sustaining properties
  - Has discovered 105 confirmed planets; 2,740 planet candidates; and 2,165 eclipsing binary stars
  - Has a large field of view: 105 square degrees, compared to other telescopes of less than one square degree
  - Maintains the same field of view to monitor the same stars for its entire mission
  - Completes an orbit every 371 days

To learn more, visit the Kepler Space Telescope website from NASA.

Image: A star field captured by the Kepler Space Telescope.
Courtesy of NASA/Ames/JPL-Caltech

Module 5: Astronomical Tools
Topic 4 Content: Space Telescopes Notes

James Webb Space Telescope



- **Type:** Short and medium infrared
- **Launched:** Under construction (planned for October 2018)
- **Dimensions:** 22 meters (72 feet) long with a sunshield the size of a tennis court; weighs 14,300 pounds
- **Cost:** $8.7 billion (as of August 2011 estimated)
- **Other facts:**
  - Will use a mirror 6.5 meters (21.3 feet) in diameter to capture images in infrared
  - Will have an orbit almost one million miles from Earth
  - Designed to gather evidence of the universe's history, from the first galaxies that formed in the universe after the Big Bang to Solar System formations and evolution
  - Unlike other telescopes like the Hubble, the James Webb will not be serviceable because of its distance from Earth

To learn more, visit the James Webb Space Telescope website from NASA. You can also take a 3-D tour of the telescope.

Image: A full-scale model of the James Webb Space Telescope
Courtesy of NASA/Ed Campion