

	Inventions in space	Exploring Space Telescopes	Discoveries from space
Objectives	Students in grade 4-6 learn about inventors, inventions and the invention process as it relates to space telescopes from the past, present and future.	Students will learn how technology has improved space telescopes and how these improvements have helped scientists make amazing new discoveries. Students will conduct research on space telescopes and brainstorm ideas on how to improve them.	Students will integrate science and art by viewing spectacular images of deep space made available with the latest advancements in technology and transforming it into art.
Supplies/Materials	<p>You will need:</p> <ul style="list-style-type: none"> • “Who invented the Astronomical Telescope” PowerPoint Presentation. • Chart Paper • Markers • “Clean trash” 	<p>You will need:</p> <ul style="list-style-type: none"> • Pictures of the COBE, Hubble Telescope, CGRO, Chandra Observatory and Spitzer Telescope. Images can be found in the “Era of Space Telescopes” found at: http://amazing-space.stsci.edu/resources/explorations/groundup/lesson/eras/space/index.php website (I also use a smaller classroom telescope as a talking point) • Chart Paper • Note Cards (larger size worked best) • Markers • Broken toys, appliances, electronics or machines 	<p>You will need:</p> <ul style="list-style-type: none"> • Pictures of deep space taken by Hubble Telescope. Images can be found at the website: http://hubblesite.org/gallery • Power point software • Scrapbook supplies, glue, scissors, construction paper, color pencils, markers; paint.
Teacher Instruction	Students should have some prior knowledge of inventions and the invention process in order to complete this activity. Students can work alone or in a team of 2 or more students.	I begin with an introduction to my telescope that I have in my classroom and let students take turns making observations. In teams of 2, students break off and independently read about space telescopes on their computers. Students break into teams of 2 and take notes on what they learned about the Space Telescopes. Each team will choose a Space Telescope and will brainstorm using “SCAMPER” to improve/innovate it.	Students are always amazed when viewing images taken from the Hubble Observatory. The most difficult thing about this activity is choosing which image they like the most.
Extensions	Engage students by viewing “ Who invented the Astronomical Telescope ” PowerPoint Presentation, provided by IYA 2009. Extend the lesson by having students invent their own telescope, draw their invention on chart paper and explain how it works. Students can also make a model of their telescope out of “clean trash”.	Engage students by viewing the website “ Telescopes from the Ground Up ” provided by Amazing Space at: http://amazing-space.stsci.edu/resources/explorations/groundup and click the star “ Era of Space Telescopes ”. Have students read/research the Era of Space Telescopes and learn about the advancements made in technology and how new innovations have helped scientists make new discoveries in space. Students will take research notes on note cards then break into teams. Extend the lesson by having the teams choose their favorite space telescope and brainstorm how they can improve it/innovate it. Using “SCAMPER” (Substitute, Combine, Adapt, Magnify, Put to Other Use, Eliminate, Rearrange) encourage them to be creative and think beyond the obvious. Teams will write their ideas on chart paper and share with class. Teams will draw and label their inventions on the chart paper. Students can make a model of their invention by using parts from broken toys, appliances, electronics or machines.	Engage students by viewing student collages (see ours from Curington) made of their favorite images taken by the Hubble Telescope found at http://amazing-space.stsci.edu/iya/collage . Extend the lesson by having students work in teams or alone and create their own collage (2 or 3D) of their favorite Hubble images in a power point, or on a poster paper or in a podcast.