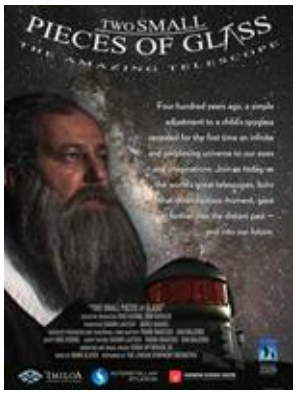
KIDSPACE
A CHILDREN'S EXPLORATION CENTER

Educator Viewing Guide



Two Small Pieces of Glass (2016)
23 minutes

Beautifully photographed in 4K digital cinematography, the film is a visually stunning chronicle of the history of the telescope from the time of Galileo, its profound impact upon the science of astronomy, and how both shape the way we view ourselves in the midst of an infinite universe.

The film features interviews with leading astrophysicists and cosmologists from the world's renowned universities and observatories, who explain concepts ranging from Galileo's act of revealing the cosmos with a simple telescope, to the latest discoveries in space, including startling new ideas about life on other planets and dark energy - a mysterious vacuum energy that is accelerating the expansion of the universe.

Topics covered:

Astronomy, history of the telescope, types of telescopes

Interdisciplinary connections: history of science, spectroscopy

Key Terms and Concepts:

Adaptive Optics, Aperture Telescope, Atmosphere, Big Bang, Doppler Effect, Galaxy, Light Years, Refractor Telescope, Reflector Telescope, Resolution, Space Telescope

Combine with these KidSpace Activities:

Ballistics Lab
Take aim with space-themed ball blasters, jump, and climb while exploring science concepts: forces, gravity, resistance, energy, and more.

Engineering Lab
Discover the six simple machines and other engineering principles used in designing spacecraft while operating wheels, levers, pulleys, and more.

PlaySpace!
Science begins with imagination. The space-themed playground offers many opportunities for space-themed play, space-related discoveries, and demonstrations of science concepts: gravity, friction, force, laws of motion, and more.

Learning Resources and Activities:

Create learning units designed around a visit to KidSpace! These web resources and activities are designed to illustrate concepts and ideas presented in the show. Many of these can be adapted to various age groups.

Two Small Pieces of Glass: Teacher's Guide; Kendall Planetarium
This teacher's guide contains glossary, post-show quiz, and classroom activities: *Telescopes Around the World*, *Telescopes and Time Machines*, and *Make a Moon Model*. Includes learning objectives and science standards (Oregon).
https://www.raritanval.edu/sites/default/files/aa_PDF%20Files/6.x%20Community%20Resources/two_small_pieces_of_glass_teacher_guide%20OMSI.pdf

Two Small Pieces of Glass: Teacher Resource Guide; Wayne State University
This teacher's guide includes links to several educator lesson plans, activities, and web resources related to the topics in the show.
https://planetarium.wayne.edu/shows/tspog_teachers_guide.pdf

Two Small Pieces of Glass: Teacher Packet; Morehead State University
This teacher's packet contains vocabulary, references, and classroom activities: *Making Light Bounce* (primary), *The Soundinator* (middle grades), and *Kinesthetic Big Bang* (high school). Includes science standards reference.
https://www.moreheadstate.edu/getattachment/College-of-Science/Earth-and-Space-Sciences/Star-Theater/K-12-School-Shows/Two-Small-Pieces-of-Glass-Show-Packet2.pdf.aspx?lang=en-US

Exploring the Universe: Pack a Space Telescope; NISE Network
This resource contains all downloads needed for participants to design, build, pack, and deploy their own model space telescopes (Spanish and English available). Includes learning goals and how-to videos.
http://www.nisenet.org/catalog/exploring-universe-pack-space-telescope-2018

NASA Space Place: Classroom Activities; NASA
This resource contains several space-related activities for the classroom. Must scroll down to find link to downloadable pdf of activity. Related activities include: *Telescope as Time Machine*, *De-twinkling the Stars*, *Taking Apart the Light*, *Blinded by the Light,* and more.
https://spaceplace.nasa.gov/classroom-activities/en/

Seeing the Invisible: Dust in the Universe; McDonald Observatory
This site includes resources and activities exploring astronomical research of dust in space. Inquiry based activities include: *Dust Hunt* (K-2), *How is the Mystery Substance Like Interstellar Dust?* (3-5), and *Properties of Dust* (6-8). Some resources in Spanish. Includes national science standards.
http://mcdonaldobservatory.org/teachers/classroom/SeeingTheInvisible.html

Comprehension Questions:

Help learners process the concepts and ideas presented in the show with these questions.

1. Name at least three different types of telescopes and describe the characteristics of each.
2. How do scientists decide which type of telescope is best to use for their observations?
3. What beliefs did people have about the universe prior to the invention of telescopes?
4. What discoveries about the solar system did Galileo make with the telescope?
5. Why do different stars show as different colors?
6. What discoveries did the Hubble space telescope make?
7. How is a telescope like a time machine?

Further Research and Discussion

Ask learners to discuss the following: Galileo presented evidence that the Sun is the center of our solar system. Why was this an important discovery at the time? What cultural shifts were made based on this discovery? Discuss other scientific discoveries that changed cultural ways of thinking.

This show covers content that addresses Colorado Academic Standard in Science (Physical Science and Earth Systems Science). See Planetarium Show Academic Standard Chart for details by grade.