

Amateur Astronomers Educator Guide



Watch it online <http://www.kqed.org/quest/television/view/873>

QUEST SUBJECTS

Life Science **Biology**
Health
Environment

Earth Science **Geology**
Weather
Astronomy

Physical Science **Physics**
Chemistry
Engineering

CA SCIENCE STANDARDS

Grade 8 Earth Science

Earth in the Solar System
4 (e) the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets and asteroids

Grades 9-12 Earth Science

Earth's Place in the Universe

1. (a) differences and similarities exist between the Sun and planets

2. (d) various telescopes are used to collect data about stars.

Grades 9-12 Investigation and Experimentation

Scientific progress is made by asking meaningful questions and conducting careful investigations

1 (a) students select and use appropriate tools to collect, display data.

PROGRAM NOTES

Some of the most passionate astronomers don't ever need to leave their own backyards. QUEST meets the Bay Area's amateur stargazers who are making important observations about the cosmos while inventing tools at home to do it.

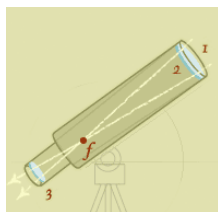
In this segment you'll find...



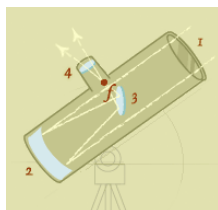
- What amateur astronomers are and what role they play in the field of astronomy.
- The kinds of telescopes used by astronomers.
- How telescopes work.
- How to get started in the growing field of astronomy.

TOPIC BACKGROUND

Amateur astronomy is a hobby whose participants enjoy observing and studying stars and other celestial objects. Both professional and amateur astronomers use telescopes. A telescope is an instrument that makes faraway objects look closer. They do this by collecting light from a distant object, focusing that light, and magnifying the image while bringing it to your eye. The two most common types of telescopes are refracting and reflector.



Refracting telescopes have an objective lens permanently attached to the front end of a tube. The light from stars or other celestial objects passes through the lens. As it does, the light gets bent so that it forms an image at a focal point near the back of the telescope. The image is made even clearer as it passes through the eyepiece. These telescopes don't use mirrors.



Reflector telescopes have a highly polished glass mirror inside. A beam of light from a star or other celestial object is reflected when it makes contact with this mirror. This type of telescope doesn't use lenses.

ADDITIONAL BACKGROUND RESOURCES

Galileo's Battle for the Heavens: <http://www.pbs.org/wgbh/nova/galileo/telescope.html>

Make Your Own Telescope <http://www.exploratorium.edu/exploring/space/activity.html>

JPL Education Gateway: Amateur Astronomy Page

<http://education.jpl.nasa.gov/amateurastronomy/index.html>

VOCABULARY

Astronomer

Scientist who studies the universe and the celestial bodies residing in it, including their composition, history, location and motion.

Solstice

The two times per year when the Sun is at its greatest distance from the celestial equator. Around June 21 the Sun reaches its northernmost point. About December 22, it reaches its southernmost point.

Stars

A huge ball of gas held together by gravity. The central core of a star is extremely hot and produces energy. Some of this energy is released as visible light, which makes the star glow. Stars come in different sizes, colors, and temperatures. The Sun, the center of our solar system, is a yellow star of average size and temperature.

Telescope

Instrument used to observe distant objects by collecting and focusing their electromagnetic radiation.

Refracting (or Refractor) Telescope

A type of telescope that uses a transparent convex lens to gather light and bend it to a focal point.

Reflector (or Reflecting) Telescope

A type of telescope that uses one or more polished, curved mirrors to gather light and reflect it to a focal point.

PRE-VIEWING / PRE-LISTENING

- What is astronomy?
- What are some of the objects that can be viewed in the nighttime sky?
- What is an astronomer? What do astronomers do? What is the difference between an amateur astronomer and a professional astronomer?
- What tools do astronomers use to view the nighttime sky?

VIEWING / LISTENING FOCUS

For any story, see the following student handouts.

- Segment Summary Student Sheet
http://www.kqed.org/quest/downloads/QUEST_SegSum_StudentSheet.pdf
- Personal Response Student Sheet
http://www.kqed.org/quest/downloads/QUEST_PersResp_StudentSheet.pdf
- How did the San Francisco Sidewalk Astronomers Club get started? Where do these sidewalk “star parties” take place?
- What kind of telescopes do amateur astronomers use?
- What is the difference between a reflecting and a refracting telescope?
- What can you see with a small telescope?
- What is astrophotography? Who is primarily doing astrophotography these days?
- Why is astronomy such a great science for people of all ages?
- What do you need to do to get started in amateur astronomy?

KQED CORNER

Astronomy Video & Audio

On **QUEST** <http://www.kqed.org/quest/radio/topics/8>

On **Forum** <http://www.kqed.org/epArchive/R206031000>

On **Spark** <http://www.kqed.org/arts/people/spark/profile.jsp?id=5824>

QUEST Telescope Blog Posts

“Producer’s Notes: Amateur Astronomers”

<http://www.kqed.org/quest/blog/2008/04/29/producers-notes-amateur-astronomers/>

“Oakland’s Observatory”

<http://www.kqed.org/quest/blog/2008/02/29/oaklands-observatory/>

“Beyond Edwin’s Wildest Dreams”

<http://www.kqed.org/quest/blog/2007/10/22/beyond-edwins-wildest-dreams/>

“Death Valley Nights”

<http://www.kqed.org/quest/blog/2008/01/04/death-valley-nights/>

“Hubble Space Telescope”

www.kqed.org/quest/blog/tag/hubble-space-telescope/

“Testing the Limits of Optical Telescopes”

www.kqed.org/quest/blog/2007/09/24/testing-the-limits-of-optical-telescopes/

More QUEST astronomy blog posts

<http://www.kqed.org/quest/blog/?cat=2>

VISIT OUR PARTNERS

The Bay Institute
www.bay.org

California Academy of Sciences
www.calacademy.org

Chabot Space and Science Center
www.chabot.space.org

East Bay Regional Park District
www.ebparks.org

Exploratorium
www.exploratorium.edu

Girl Scouts of Northern California
www.girlscoutsbayarea.org

Golden Gate National Parks Conservancy
www.parksconservancy.org

The J. David Gladstone Institutes
www.gladstone.ucsf.edu

Lawrence Berkeley National Laboratory
www.lbl.gov

Lawrence Hall of Science
www.lawrencehallofscience.org

Monterey Bay Aquarium
www.mbayaq.org

Monterey Bay Aquarium Research Institute
www.mbari.org

Oakland Zoo
www.oaklandzoo.org

The Tech Museum of Innovation
www.thetech.org

UC Berkeley Natural History Museums
<http://bnhm.berkeley.edu/>

U.S. Geological Survey
www.usgs.gov

LESSON PLANS / RESOURCES from PBS, TEACHERS' DOMAIN and NPR

NOTE: Resources from the Teachers' Domain collection require a fast and free registration.

Seeing in the Dark: Galaxy Sorting PBS

<http://www.pbs.org/seeinginthedark/for-teachers/>

- These teacher resources and lesson plans include star gazers describing their experiences looking through their telescopes.

Hubble Telescope: Looking Deep Teachers' Domain

<http://www.teachersdomain.org/resources/ess05/sci/ess/eiu/lookdeep/index.html>

- Learn how the Hubble Space Telescope creates pictures of the early universe.

Galileo: Discovering Jupiter's Moons Teachers' Domain

<http://www.teachersdomain.org/resources/ess05/sci/ess/eiu/galileomoon/index.html>

- This video segment adapted from NOVA describes some of Galileo's first discoveries with the telescope.

Astro-Madness Stardate

http://stardate.org/teachers/plans/plan.php?lp_id=16

- Students learn about the different telescopes and instruments available at the McDonald Observatory, and build two data tables about the telescopes and instruments. After reviewing a set of brief research "problem situations," students consult their data tables and then fill out their telescope and instrument recommendations for each proposed project.

Science in Paradise: Big Dish Scientific American Frontiers

http://www.pbs.org/safarchive/4_class/45_pguides/pguide_901/4491_dish.html

- Students experiment with a curved reflecting dish that will work like the radio telescope Arecibo. They will use their model to detect electromagnetic waves.

OTHER WAYS TO PARTICIPATE IN QUEST



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www.kqed.org/quest



LISTEN

KQED 88.5 FM San Francisco &
89.3 FM Sacramento
Mondays at 6:30am and 8:30am



WATCH

KQED Channel 9
Tuesdays at 7:30pm

IMAGE CREDITS

Homemade telescope Sheraz Sediq
Telescope diagrams PBS