Introduction to Telescopes

Telescope Rules

- Never look directly at the sun.
- Never touch the glass surfaces of a telescope or eyepiece.
- Always ask permission before looking through or touching someone else's telescope.

What is a telescope?

- An optical telescope is a device that gathers and focuses light.

- We can see much dimmer objects using a telescope than we can using our eyes alone. This is because telescopes gather and focus light into a beam small enough to fit through the pupil of our eye.

What does a telescope do?

A telescope does two things.

- A telescope gathers light and focuses it to form an image.
- A telescope magnifies the image formed, so you can see things that are far away.

The bigger the telescope, the more light it catches and the sharper the image it forms.

Parts of the telescope

- The main lens or mirror is called the *primary objective*.
- Any other lenses or mirrors are called *secondary objectives*.
- The framework that holds the lenses and mirrors in place is called the *tube*.
- The stand that holds the telescope is called the *mount*.
- The *finder scope* helps point the telescope at the right place in the sky.
- The *focuser* adjusts the length of the telescope to bring objects in to focus.
- The *diagonal* and *eyepiece* are what you look through.

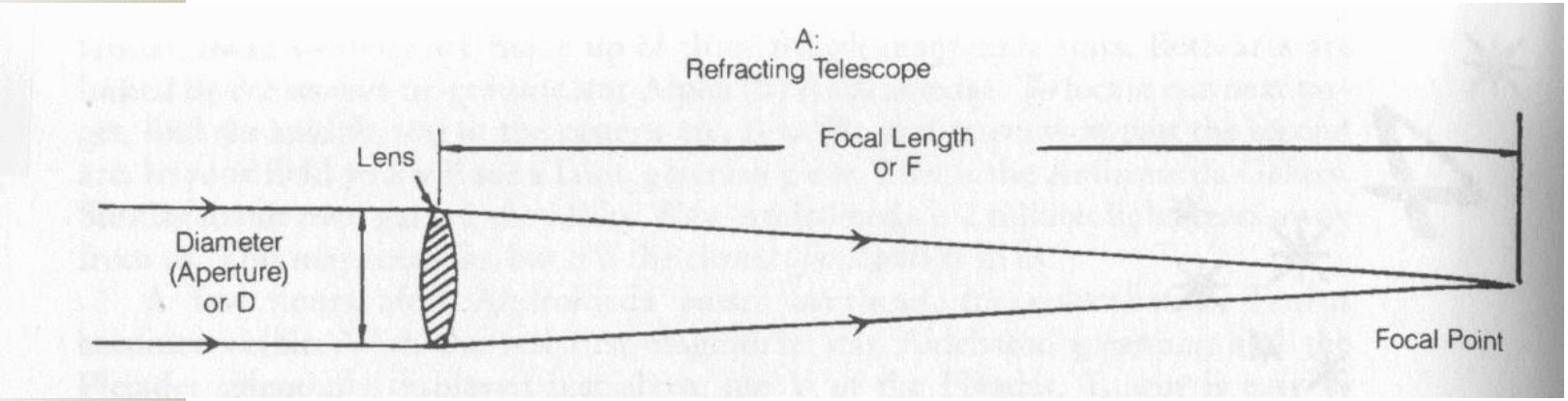
How does a telescope work?

There are three basic types of telescopes:

- Refractors
- Reflectors
- Compound telescopes

The Refractor

- A refractor uses glass lenses to bend, or refract, light to form an image.

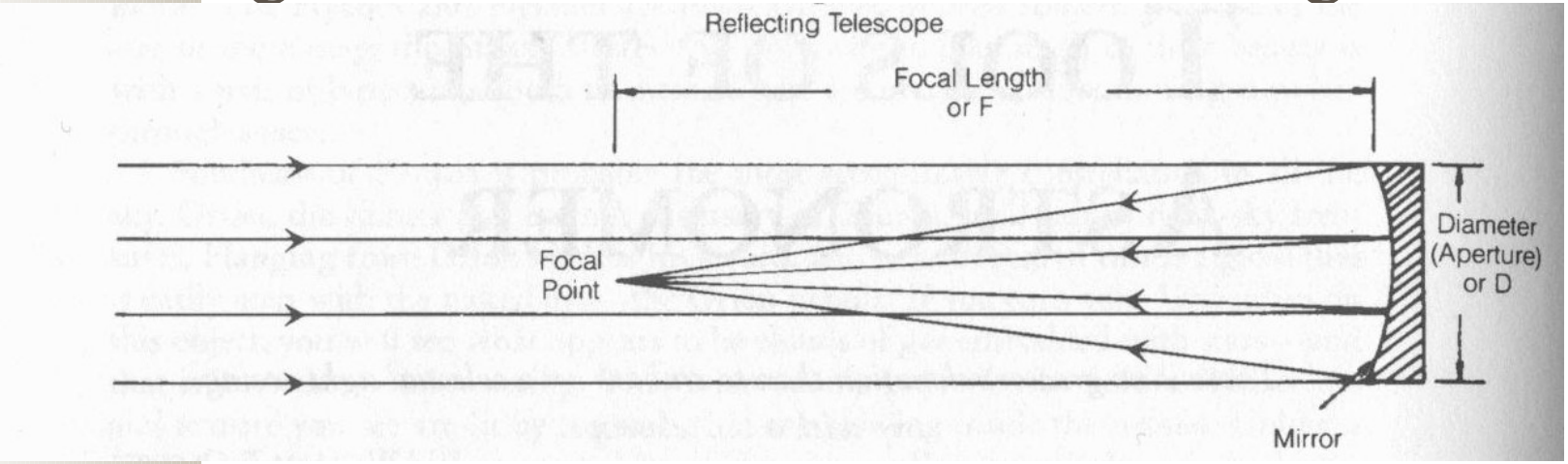


Parts of the telescope - refractor

Refractors

The reflector

- A reflector uses curved mirrors to gather light and reflect it to form an image.



Parts of the telescope – reflector

Finder scope

secondary

tube

eyepiece

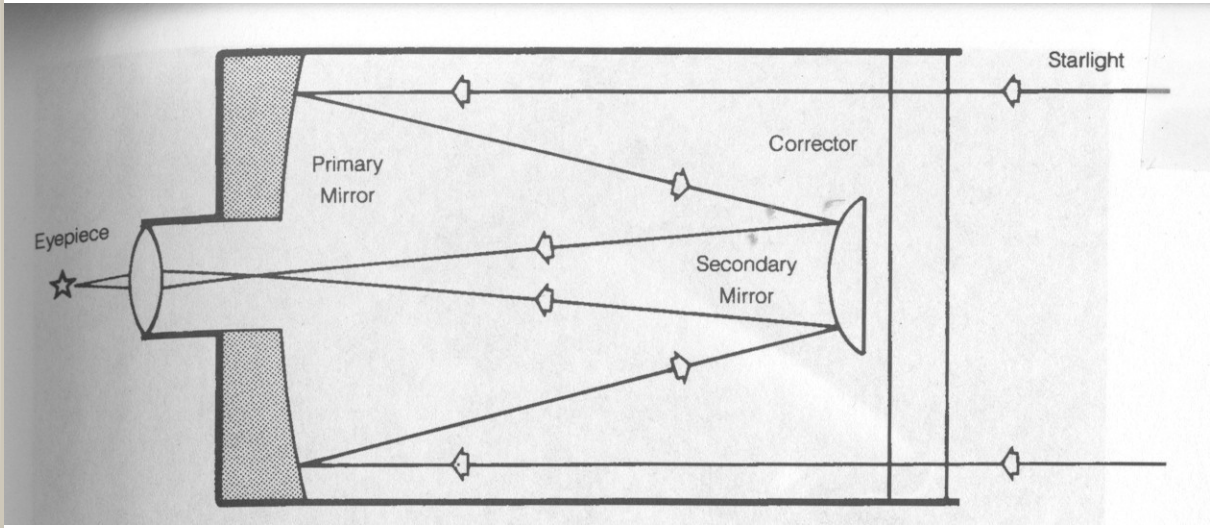
mount

primary

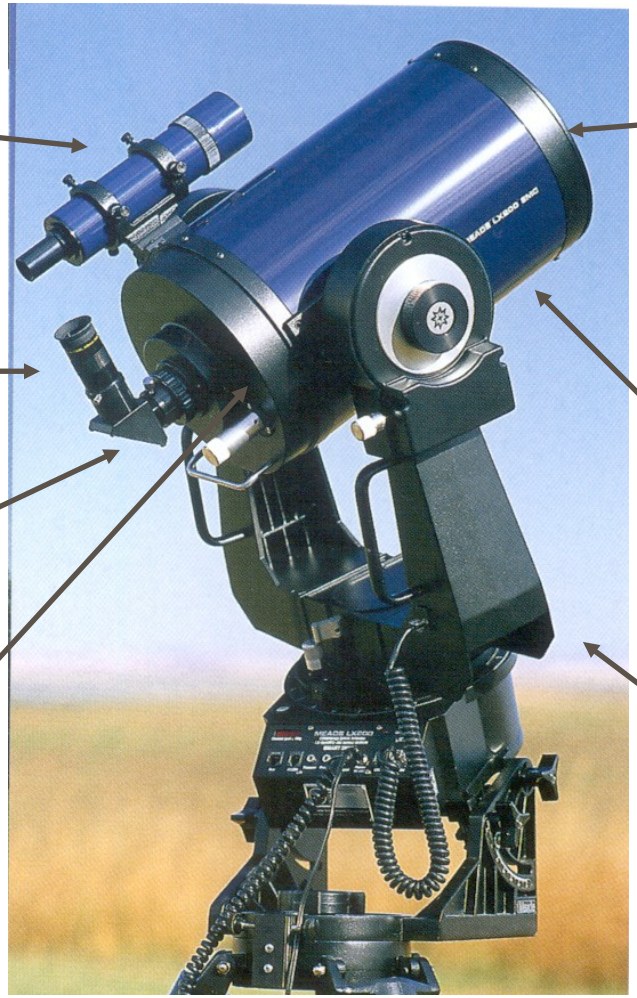
Reflectors

The compound (catadioptric) telescope

- All other telescopes use some combination of lenses and mirrors to form an image. The lens is usually at the front of the tube, while the primary mirror is usually at the back.



Parts of the telescope – compound



Finder scope

secondary

eyepiece

diagonal

tube

primary

mount

Compound telescopes

What can you see through a telescope?

- Earth's moon
- *With proper filters*, features of our sun
- Planets of our solar system
- Stars
- Deep Space Objects
  - Open clusters
  - Globular clusters
  - Galaxies
  - Nebulae

Earth's Moon

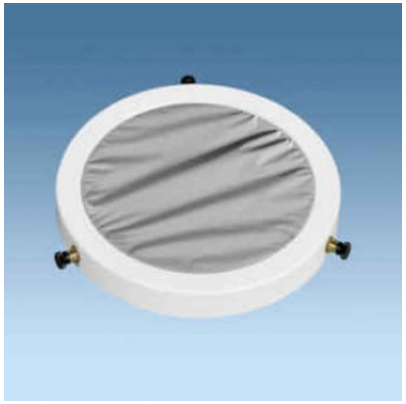
Photo by SMAS member Shawn Harrison

Lunar Features

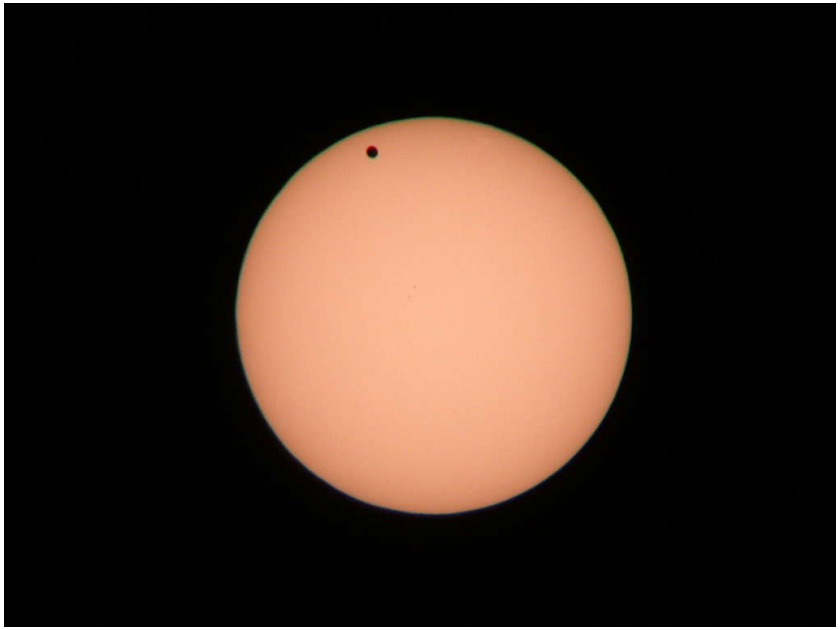
Lunar Eclipse

With a proper filter,

Partial Solar Eclipse



Sun Spots or Transits of Mercury



Planets in our Solar System

Open Clusters

Globular Clusters

Omega Centauri Taken from Unicoi Crest, Lee Erickson

Nebulae

- However, no color visually
- Use a camera (and special mount) for color

Galaxies

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