

Telescope Basics

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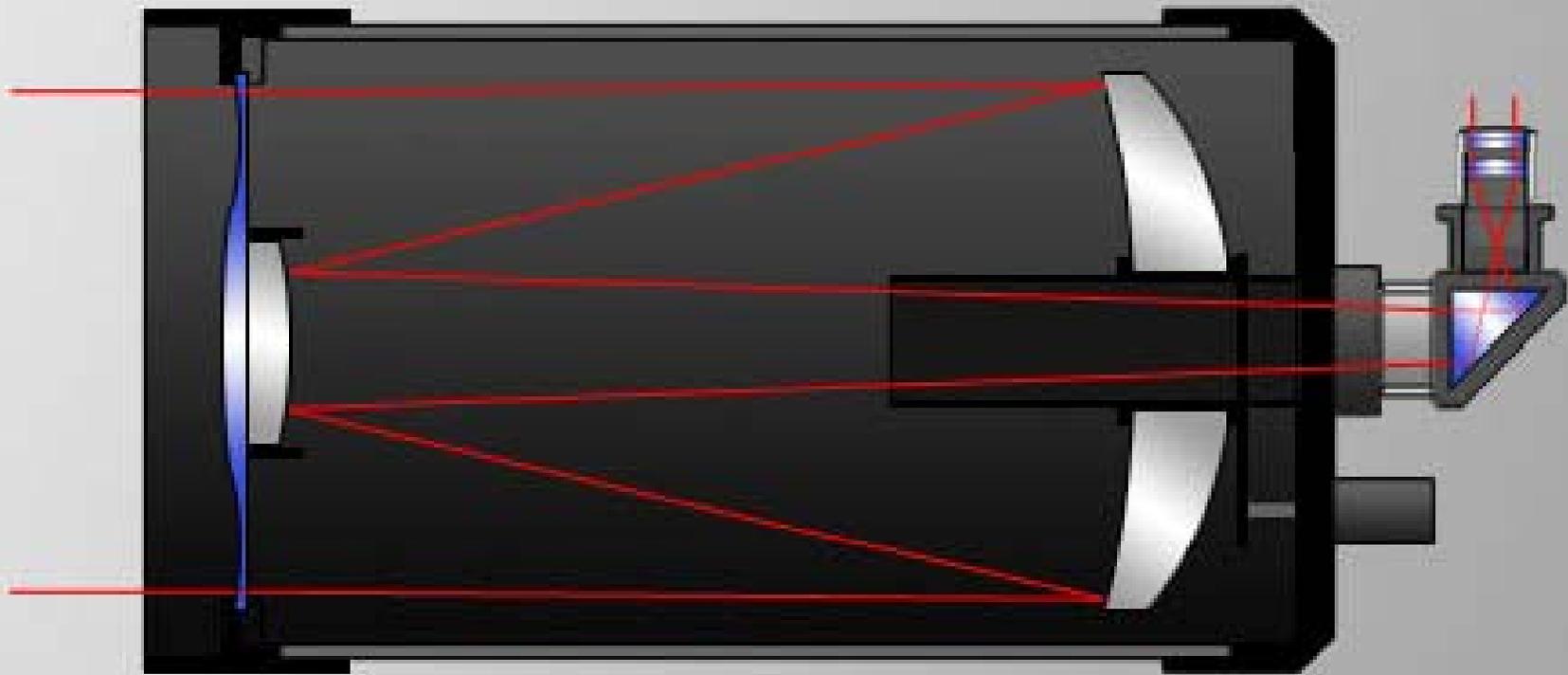
Telescope Types - Refractor



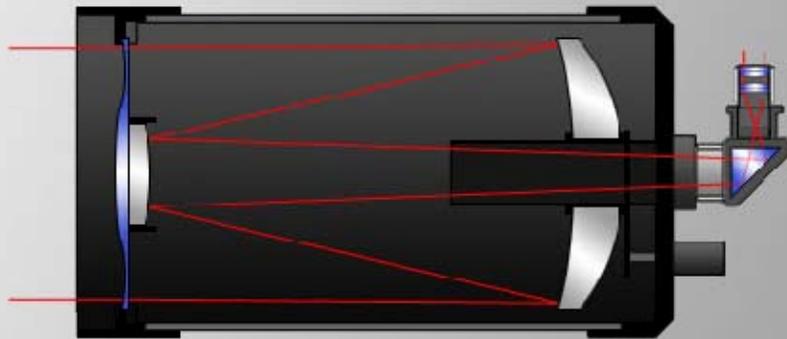
Telescope Types - Reflector



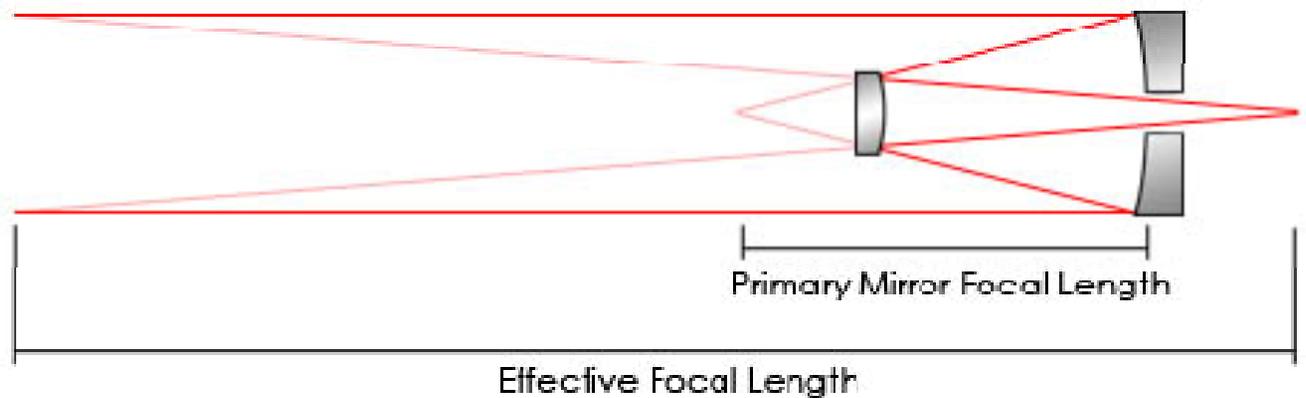
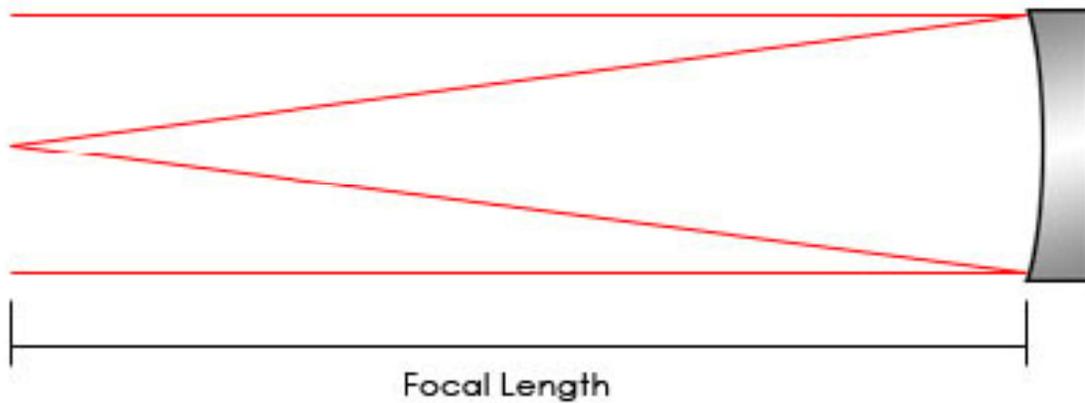
Telescope Types - Catadioptric



Telescope Specifications – Aperture (a)



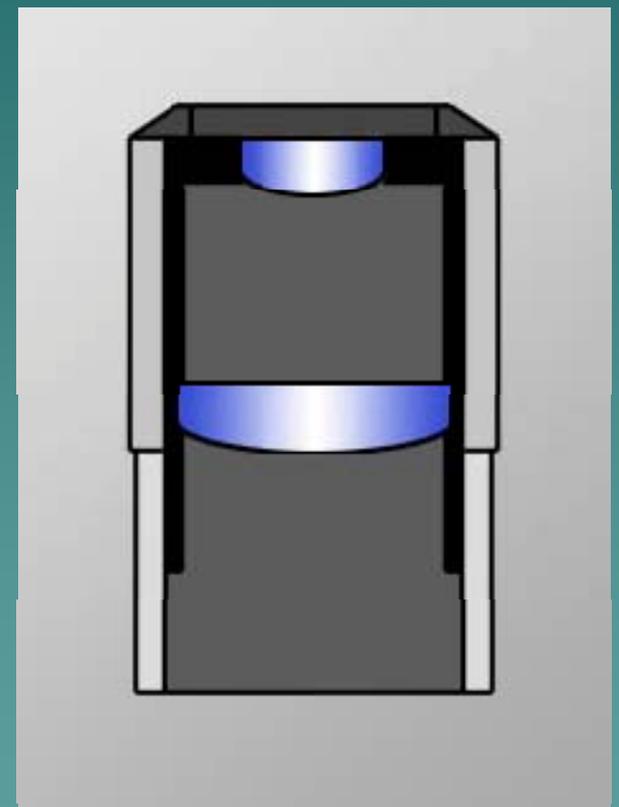
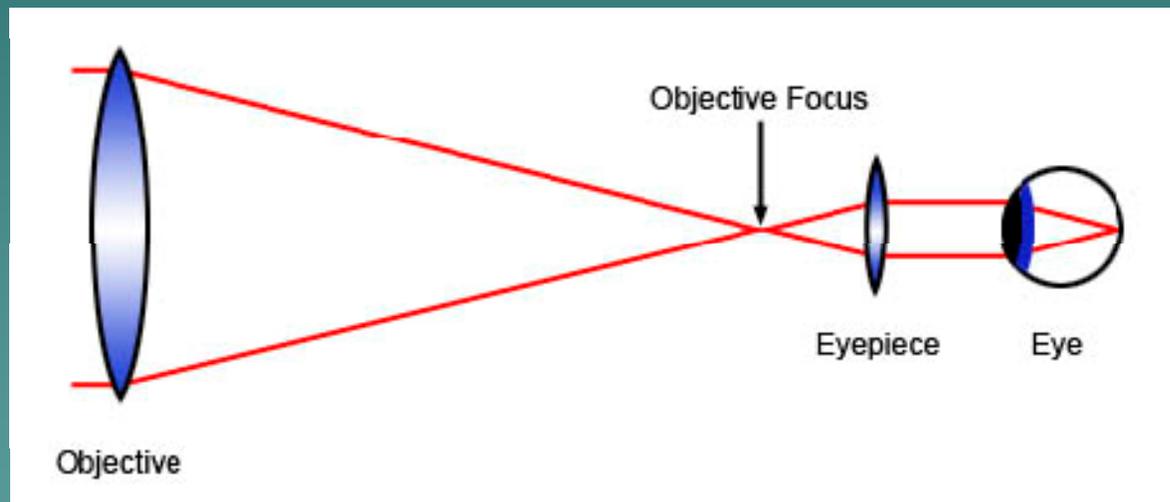
Telescope Spec – Focal Length (fl)



Telescope Spec – Formula

- ◆ The only other common term you will hear about a telescope is the focal ratio or F-ratio or how “fast” is this scope
- ◆ The F-ratio is expressed like this $f/\#$ and the $\#$ is simply the telescopes focal length (fl) divided by aperture (a)
- ◆ So an 8” telescope with a focal length of 48” has an F-ratio of $48/8 = 6$ and is specified as $f/6$
- ◆ Other examples:
 - $a=6"$, $fl=24"$, $f/\#?$
 - $a=12"$, $f/5$, $fl=?$
 - $a=4"$, $fl=400\text{mm}$, $f/\#?$

The Other End of the Telescope – The Eyepiece



Eyepiece – Typical Terms and Specs

- ◆ Size (.965", 1 ¼" or 2")
- ◆ Focal length (typically are 4mm to 40mm)
- ◆ Apparent field of view (typically 40 to 100 deg)
- ◆ Eye relief (typically 2mm to 20mm)

Eyepiece – Apparent Field of View

- ◆ Field of view is measured in degrees (40 – 100)
- ◆ This is important if you want that “spacewalk” feeling when looking into your telescope
- ◆ It is also important if you do not have a telescope that can track



Eyepiece - Eye Relief

- ◆ This is the distance away from eyepiece that you need to put your eye to properly see the entire field of view
- ◆ Eye relief is measured in mm (typically 2 – 20)
- ◆ If you wear glasses for anything other than near or far sightedness you will need to keep your glasses on when you use the telescope and eye relief will be very important
- ◆ This is also important when you get into short focal length eyepieces (like 4 - 10mm) so that you do not have to bury your eye into the eyepiece

Eyepiece - Formula

- ◆ **Magnification = Telescope fl / Eyepiece fl**
- ◆ Example: You own an 8" f/6 telescope that came with two eyepieces (26mm and 10mm)
- ◆ Remember the telescope focal length is 8" x 6 = 48" or 1,200mm
- ◆ Your eyepieces will give you a magnification of:
 - $1200 / 26 = 46x$
 - $1200 / 10 = 120x$
- ◆ **True Field of View (FOV) = Apparent FOV / Magnification**
- ◆ In our example above if our eyepieces have an Apparent FOV of 60 degrees then the True FOV is:
 - $60 / 46 = 1.3$ degrees
 - $60 / 120 = 0.5$ degrees