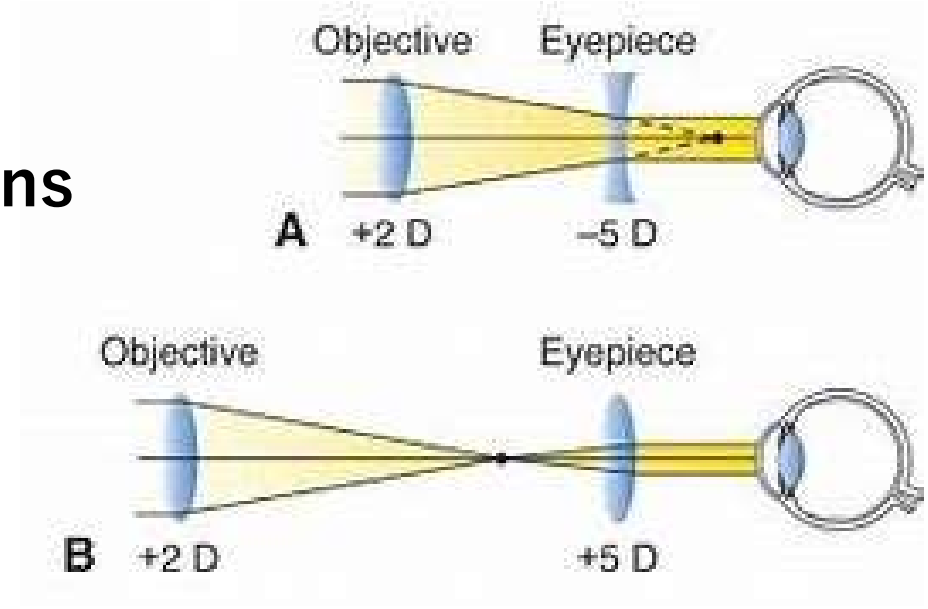
1 Explain the underlying principle of the telescopes used by Galileo and Kepler. Why were telescopes from this era all very long? When Newton developed a reflecting telescope why was this design not adopted immediately?

Refractive telescope:
① Galilean
Parallel light from objects is refracted by convex lens, and backed to parallel by concave lens



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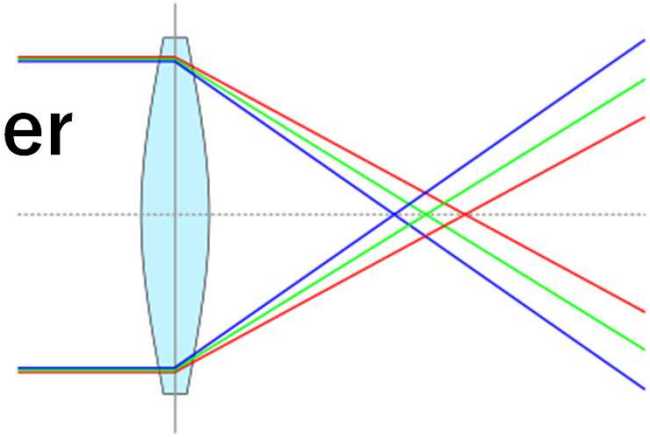
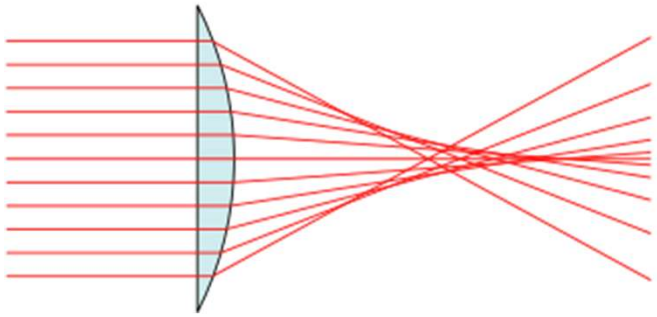
②Kepler
Use convex lens as eyepiece
⇒image is inverted

Chromatic aberration:
Different refractive index between other wavelength bands
⇒focal length is not constant



Spherical aberration:
Different optical path length
⇒The rays don’t focus on a point



We can solve these problems with high F-number = long telescope

Reflecting telescope: focus with mirrors

Problem:
They must be grinded mirrors of regular curvature, and re-polished every few month (mirrors tarnished easily)

7 Summarize the advantages and disadvantages of completely remote observing for ground-based astronomy. Why is it harder to come to a clear-cut decision for optical/IR telescopes than for radio telescopes and space telescopes?

Advantage:

・Reducing the cost of observer's labor

・Improve the efficiency of observation

Disadvantage:

・We have to give up the interactive operation

・The cost of observation is expensive, especially with huge telescope

"queue scheduling" observation in opt/IR telescope:

・Changing targets when the condition (like dryness, cloud) is not so good for observation