M = FO/FE

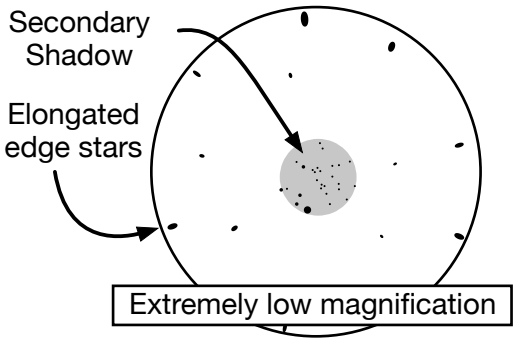
What magnification should I use?

Quick answer: As high of a magnification needed to compose an attractive scene in the eyepiece that shows meaningful detail while giving a bright, focused image with good contrast. The selected eyepiece must provide a comfortable viewing distance, i.e., the eye should not be too close to the eyepiece.

Magnification = Focal length of the objective lens or mirror (FO) ÷ focal length of the eyepiece (FE)

Too low of magnification

- In reflectors and SCTs, the shadow of the secondary mirror becomes distractingly apparent.
- Field curvature, due to optical imperfections and eyepiece design, can become noticeable and distracting. When stars near the center of the field are in focus, the ones closer to the edge are not.



Extremely low magnification

Maximum magnfication Rule of Thumb:

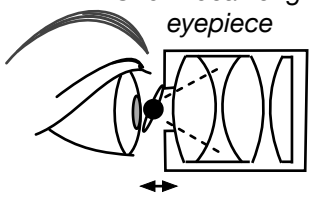
Maximum magnification for *bright objects* – such as lunar features, planets, double stars, and star clusters – is no more than 50 times the aperture expressed in inches. For instance, a 6 inch telescope would support a maximum magnification of 300 power.

- Best viewed when the object reaches its highest point in the sky.
- Realized only under ideal seeing conditions with little atmospheric distortion.
- Anything greater is known as "empty magnification." Detail is enlarged but becomes dimmer and less distinct.

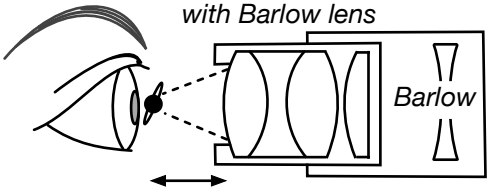
Small, dim objects with indistinct edges such as faint galaxies can stand much more magnification.

Eye relief = Distance between the eyepiece and the focal point.

Whatever magnification is used, comfortable viewing is obtained when an eyepiece has a good eye relief. Depending on design, a longer focal length eyepiece gives a longer eye relief. If, when using a short focal length eyepiece, the eye relief is uncomfortably short, then use a longer focal length eyepiece coupled with a *Barlow lens* to obtain the desired magnification.



Short eye relief – close to eye lens, high magnification



Long eye relief – far from eye lens, 2X magnification

Too great of magnification

- Reduces image brightness. The object becomes too dim for additional details to be discerned.
- Increases the effect of annoying scope vibration.
- Makes a sharp focus impossible to achieve. The object appears blurred.
- Atmospheric distortion prevents observing additional detail. (Severe atmospheric distortion affects lower magnifications, as well.)
- Because of the small true field, the target drifts across the field too quickly for a good view.
- Has a very short eye relief with the eye nearly touching the lens of the eyepiece.