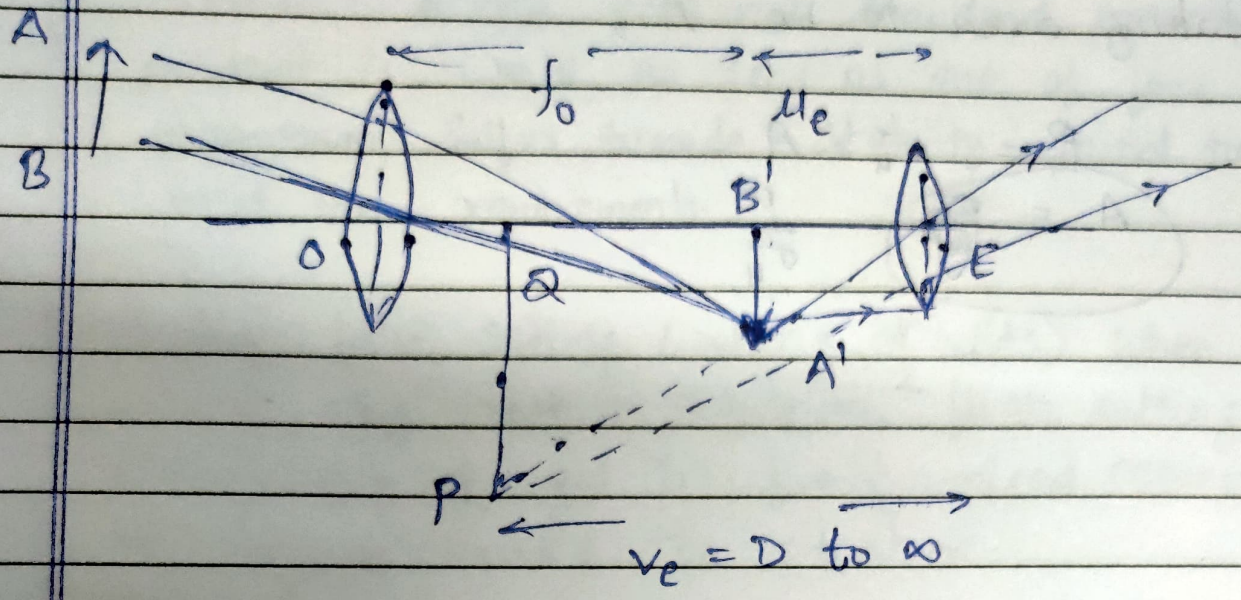
Astronomical Telescope



- used to see heavenly bodies
- $f_{objective} > f_{eye\ lens}$ and $d_{objective} > d_{eye\ lens}$
- Intermediate image is real, inverted and small.
- final image is virtual, inverted and small.
- Magnification : $m_D = -\frac{f_o}{f_e}\left(1 + \frac{f_e}{D}\right)$

  and $m_\infty = -\frac{f_o}{f_e}$

- length : $L_D = f_o + u_e = f_o + \frac{f_e D}{f_e + D}$

  and $L_\infty = f_o + f_e$

Date __/__/____

Saathi

Simple microscope

- Single Convex lens of lesser focal length
- also called magnifying glass or reading lens
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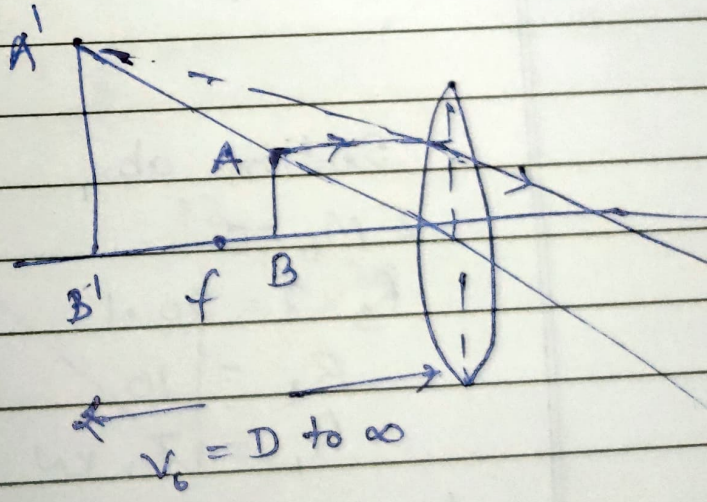
$$m_D = \left(1 + \frac{D}{f}\right)_{max}$$

$$m_\infty = \left(\frac{D}{f}\right)_{min}$$

- If lens kept at distance 'a' from eye,

$$m_D = 1 + \frac{D-a}{f}$$

$$m_\infty = \frac{D-a}{f}$$



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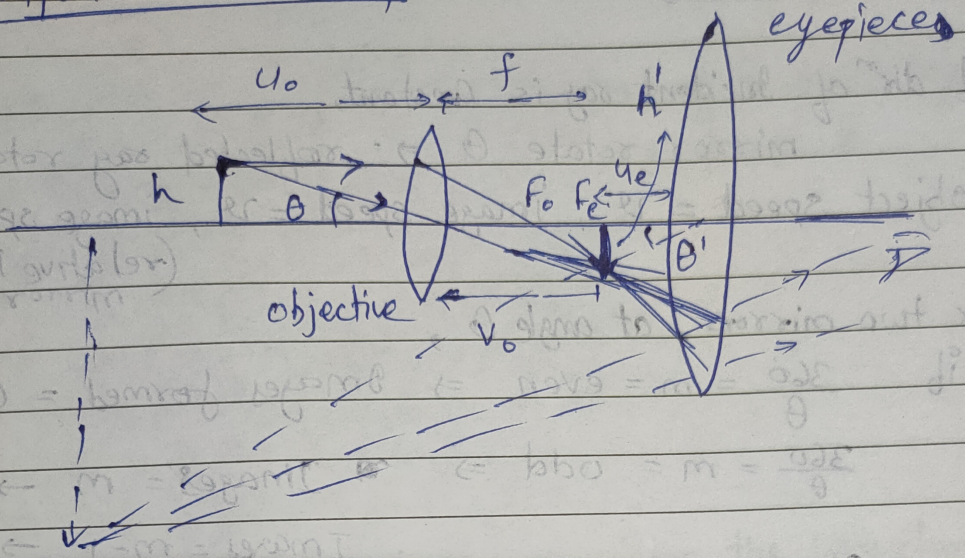
Date ___/___/_____

Compound Microscope



$$M.P. = \frac{\text{Visual angle with instrument}}{\text{max. Visual angle with eye}} = \frac{\theta}{\theta_0}$$

$$\theta_0 = \frac{h}{D}, \quad \theta = \frac{h_1}{u_e}$$

$$M.P. = \frac{h_1}{u_e} \times \frac{D}{h}$$

Since for objective $m = \frac{I}{O} = \frac{v}{u} \Rightarrow \frac{h'}{h} = \frac{-v}{u}$

$$M.P = \frac{-v}{u} \cdot \left(\frac{D}{u_e}\right)$$

Image at Least Distance of Vision $\Rightarrow$ $\boxed{M = \frac{v_o}{u_o}\left(1 + \frac{D}{f_e}\right) = M_o \times M_e}$

Image at ∞ $\Rightarrow$ $\boxed{M = \frac{-v_o}{u_o}\left(\frac{D}{f_e}\right)}$