1. (c) By using $m_\infty = \frac{(L_\infty - f_o - f_e).D}{f_o f_e}$

$\Rightarrow 45 = \frac{(L_\infty - 1 - 5)\times 25}{1\times 5} \Rightarrow L_\infty = 15\,cm$.

2. (b) For a compound microscope $m \propto \frac{1}{f_o f_e}$

3. (d) Magnification of a compound microscope is given by $m = -\frac{v_o}{u_o}\times\frac{D}{u_e} \Rightarrow |m| = m_o \times m_e$.

4. (a) $L_\infty = v_o + f_e \Rightarrow 14 = v_o + 5 \Rightarrow v_o = 9\ cm$

Magnifying power of microscope for relaxed eye

$m = \frac{v_o}{u_o}.\frac{D}{f_e}$ or $25 = \frac{9}{u_o}.\frac{25}{5}$ or $u_o = \frac{9}{5} = 1.8\ cm$

5. (c) If nothing is said then it is considered that final image is formed at infinite and $m_\infty = \frac{(L_\infty - f_o - f_e).D}{f_o f_e} \simeq \frac{LD}{f_0 f_e}$

$\Rightarrow 400 = \frac{20\times 25}{0.5\times f_e} \Rightarrow f_e = 2.5\ cm.$

6. (d) $m_{\max} = 1 + \frac{D}{f} = 1 + \frac{25}{2.5} = 11$.

7. (a) $|m| \propto \frac{1}{f_o f_e}$

8. (c) $m = m_o \times m_e \Rightarrow m = m_o \times \left(1 + \frac{D}{f_e}\right)$

$\Rightarrow 100 = 10\times\left(1 + \frac{25}{f_e}\right) \Rightarrow f_e = \frac{25}{9}\ cm$

9. (d) In general, the simple microscope is used with image at *D*, hence

$m = 1 + \frac{D}{f} = 1 + \frac{25}{5} = 6$

10. (a) $m = 1 + \frac{D}{f} \Rightarrow 6 = 1 + \frac{25}{f} \Rightarrow f = 5\ cm = 0.05\ m$

11. (d) R.P. $\propto \frac{1}{\lambda} \Rightarrow \frac{(R.P.)_1}{(R.P.)_2} = \frac{\lambda_2}{\lambda_1} = \frac{5}{4}$

12. (b) Resolving limit (minimum separation) $\propto \lambda$

$\Rightarrow \frac{P_A}{P_B} = \frac{2000}{3000} \Rightarrow P_A < P_B$

13. (d) Resolving power $= \frac{d}{1.22\,\lambda} = \frac{0.1}{1.22\times 6000\times 10^{-10}}$

$\cong 1.36\times 10^5\ radian$

14. (a) By formula $m = \frac{f_o}{f_e}$

15. (c) $f_o = \frac{1}{1.25} = 0.8\ m$ and $f_e = \frac{1}{-20} = -0.05\ m$

$\therefore |L_\infty| = |f_o| - |f_e| = 0.8 - 0.05 = 0.75\ m = 75\ cm$

and $|m_\infty| = \frac{f_o}{f_e} = \frac{0.8}{0.05} = 16$

16. (a)

17. (b) $R.P. \propto \frac{D}{\lambda}$

18. (b) Resolving power $\propto$ Aperture

19. (b) Final image formed by astronomical telescope is inverted not erect.

20. (a) $m = -\frac{f_o}{f_e} = -\frac{100}{2} = -50.$

21. (a) $m = -\frac{f_0}{f_e}$.

22. (d)

23. (c) $m = \frac{f_o}{f_e}\left(1 + \frac{f_e}{D}\right) \Rightarrow m = \frac{90}{6}\left(1 + \frac{6}{30}\right) \Rightarrow m = 18$

24. (d) To make telescope of higher magnifying power, f_o should be large and f_e should be least.

25. (b) Resolving power $= \frac{d}{1.22\,\lambda} = \frac{1.22}{1.22\times 5000\times 10^{-10}} = 2\times 10^6$

26. (b) By using $m = \frac{f_o}{f_e} \Rightarrow f_e = \frac{100}{50} = 2\ cm$

Also $L = f_o - f_e = 100 - 2 = 98\ cm$

27. (c) Minimum angular separation $\Delta\theta = \frac{1}{R.P.} = \frac{1.22\,\lambda}{d}$

$= \frac{1.22 \times 5000 \times 10^{-10}}{2} = 0.3 \times 10^{-6}\ rad$

28. (c) $m = 1 + \frac{D}{f_e} \Rightarrow 10 = 1 + \frac{25}{f_e} \Rightarrow f_e = \frac{25}{9} \simeq 25\ mm$

29. (a)

30. (a) $m = \frac{f_o}{f_e} \Rightarrow \frac{100}{f_e} = 50 \Rightarrow f_e = 2\ cm$

Normal distance $f_o - f_e = 100 - 2 = 98\ cm.$