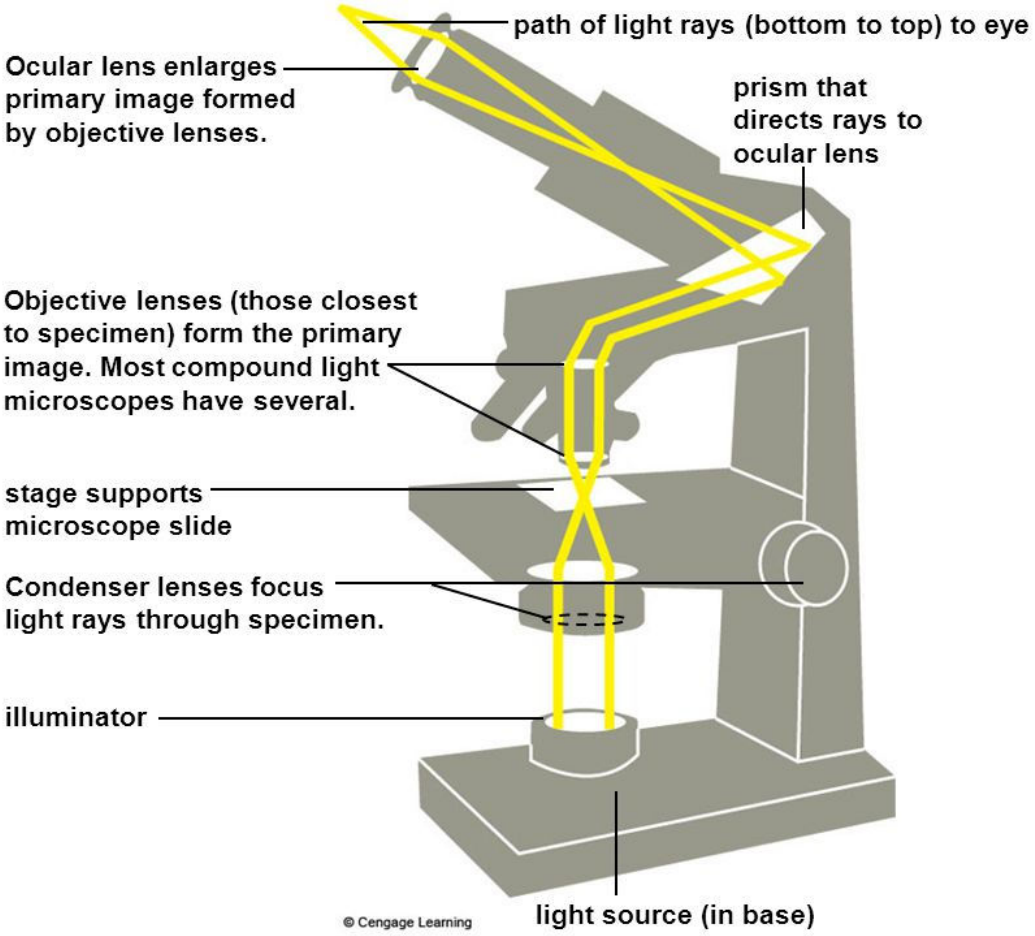
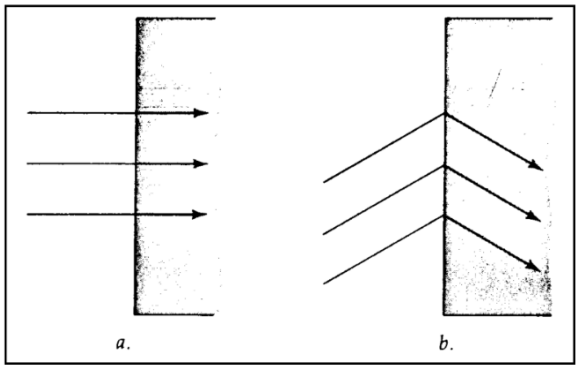
Overview

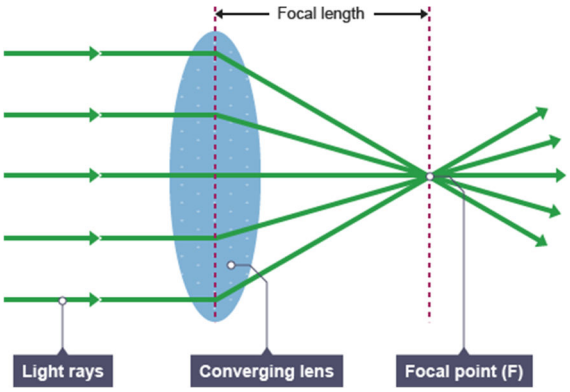


https://slideplayer.com/slide/2497996/

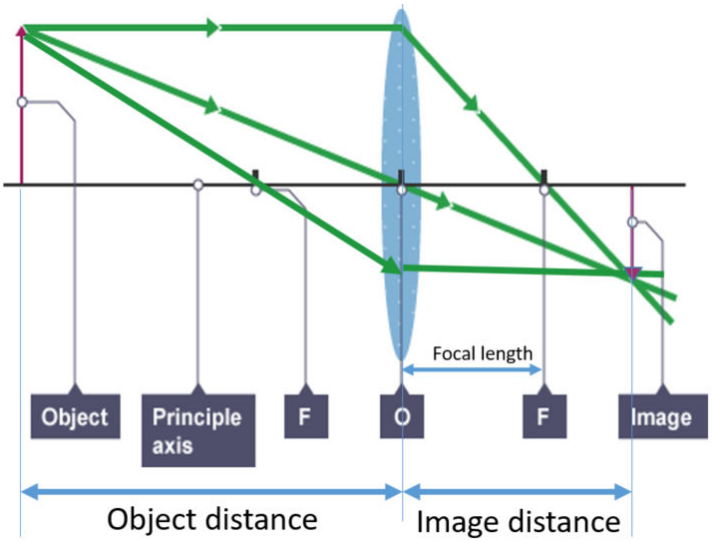
Refraction

Wolfe, S.L. 1972. Biology of the Cell. Wadsworth Publishing Company, Inc. Belmont, CA



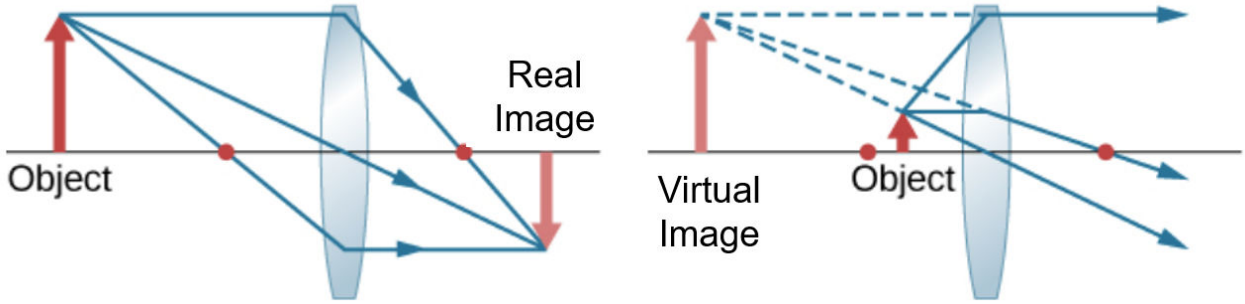


http://www.polkfiction.net.au/html/html-5271921-ID46639133-v1.htm

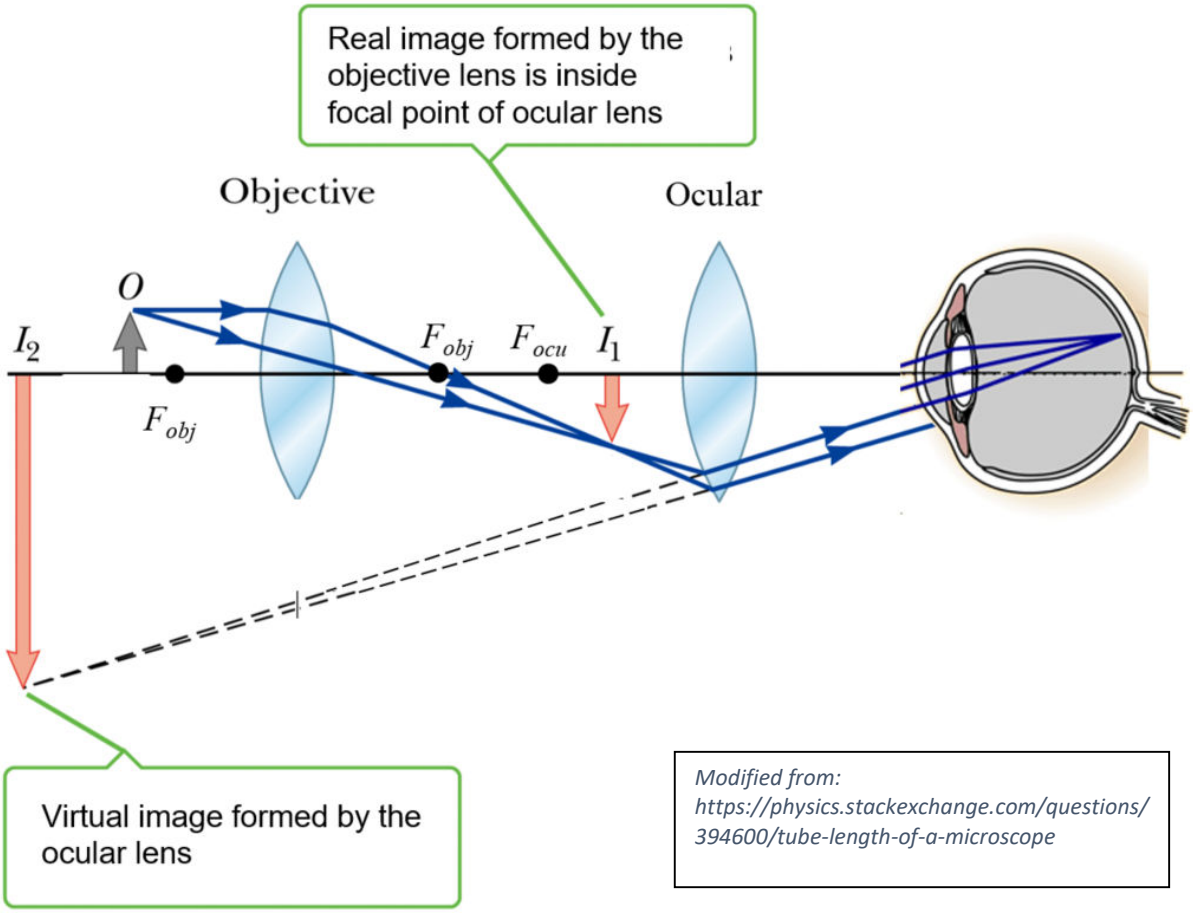


Based on http://www.a-levelphysicstutor.com/optics-convx-lnss.php and http://www.polkfiction.net.au/html/html-5271921-ID46639133-v1.htm

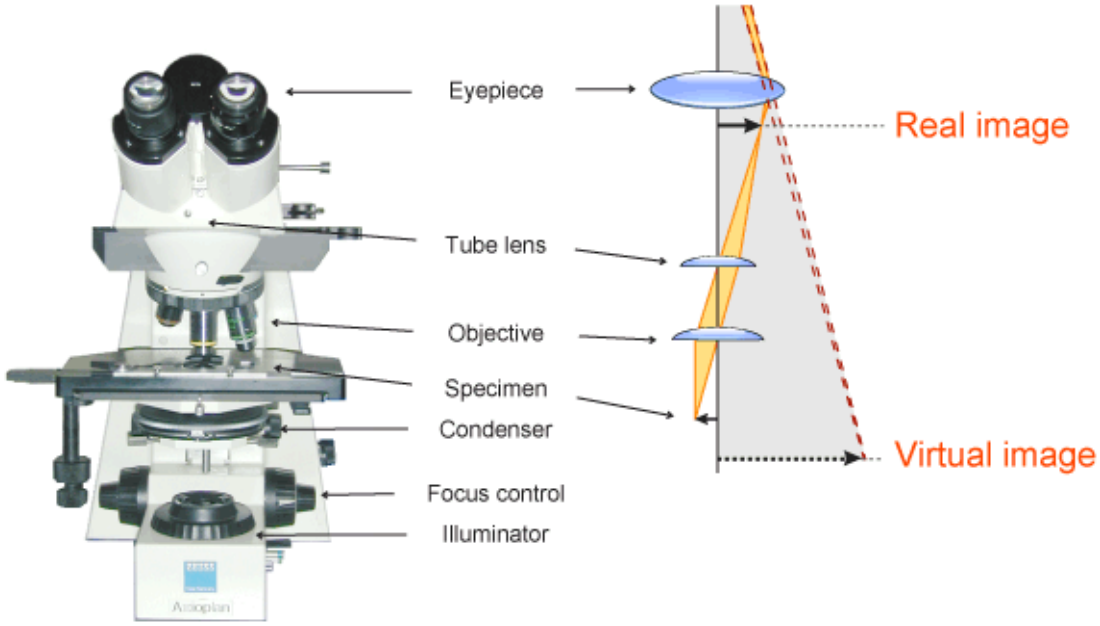
https://physics.stackexchange.com/questions/334208/ray-diagram-of-focussing-on-a-compound-microscope



Modified from https://phys.libretexts.org/Bookshelves/University_Physics/Book%3A_University_Physics_(OpenStax)/Map%3A_University_Physics_III_-_Optics_and_Modern_Physics_(OpenStax)/2%3A_Geometric_Optics_and_Image_Formation/2.4%3A_Thin_Lenses

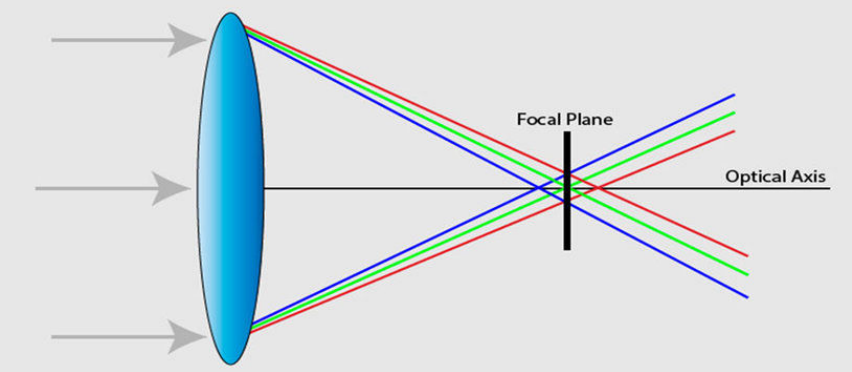


Modified from: https://physics.stackexchange.com/questions/394600/tube-length-of-a-microscope



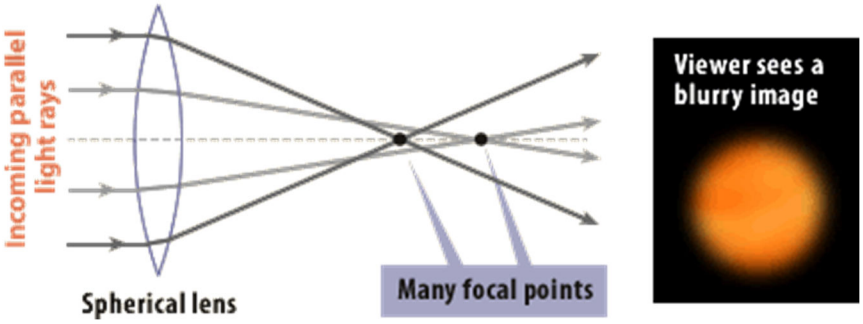
https://myscope.training/index.html#/LMlevel_2_1

Chromatic aberrations



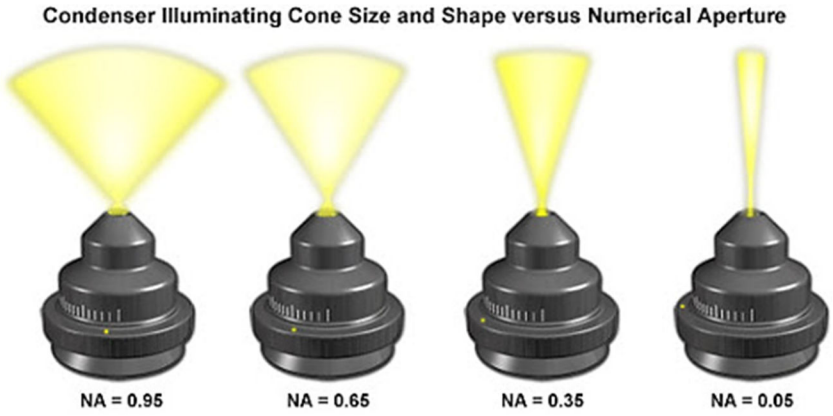
https://www.researchgate.net/figure/Longitudinal-chromatic-aberration-is-due-to-wavelength-dependent-differences-in_fig6_325525930

Spherical aberrations



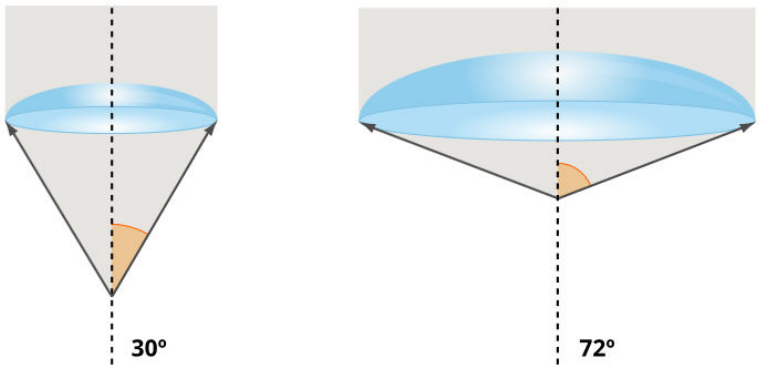
https://amazing-space.stsci.edu/resources/explorations/groundup/lesson/basics/g11/

The condenser



http://zeiss-campus.magnet.fsu.edu/print/basics/opticaltrain-print.html

Cone of light produced by the condenser



https://myscope.training/index.html#/LMlevel_2_2

Immersion oil

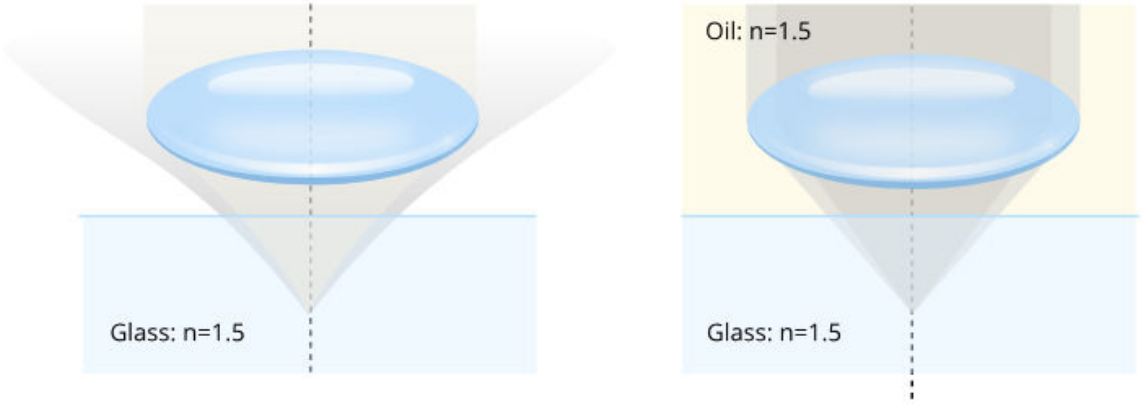
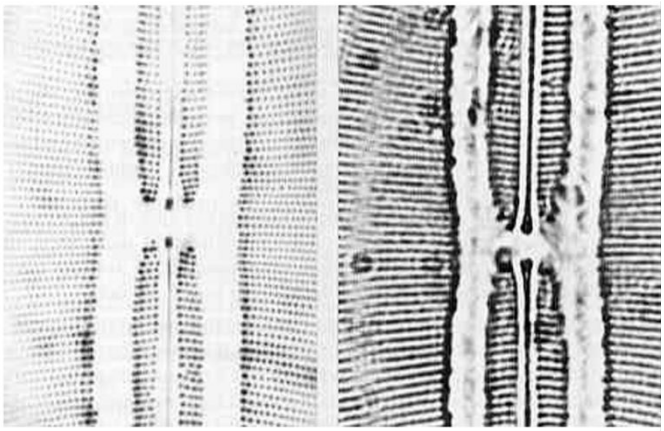


Figure 1https://myscope.training/index.html#/LMlevel_2_2

Resolution power

$$d = \frac{0.6\lambda}{n \sin \alpha}$$

Koehler illumination



Optimal resolution vs optimal contrast. www.gek.org.

Copied, with modifications, from: Olympus Transmitted Light microscope
https://www.olympus-lifescience.com/en/microscope-resource/primer/anatomy/transkohler/

1. Focus the specimen at which ever lens you are using. Repeat for each change in magnification.

2. "Slowly close the field diaphragm (above the light source) to its smallest setting until only a fuzzy outline shows in the viewfield."

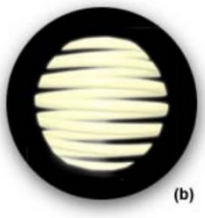
3. "The substage condenser is mounted on a rack that is controlled by a knurled knob for up and down movement with respect to the stage. Adjust this knob until the leaves of the field diaphragm are in sharp focus on top of the already-focused specimen."

4. "Use the condenser centering screws to move the image of the field diaphragm to the center of the viewfield."

5. "The field diaphragm is now opened until about three-quarters of the viewfield is visible and the condenser is then refocused. Check alignment of the condenser and re-adjust if necessary."

6. "Now open the field diaphragm until it is just beyond the field of view (for observation), or in the case of photomicrography, just beyond the reticle markings that define the area captured in the view field. Opening the field diaphragm any farther is unnecessary and will cause excessive glare and a loss of contrast."

7.



8.

9. "The next step is to remove one of the eyepieces and peer down the tube of the microscope as shown in Figure (a). As you view down the tube, open and close the condenser aperture diaphragm to see its image at the back focal plane of the objective. If there is a frosted diffuser filter built into the light path in the base of the microscope, an evenly lighted circle of

light will be visible. If there is no such filter in the light path, you will instead see an image of the lamp filament as, illustrated in Figure (b).