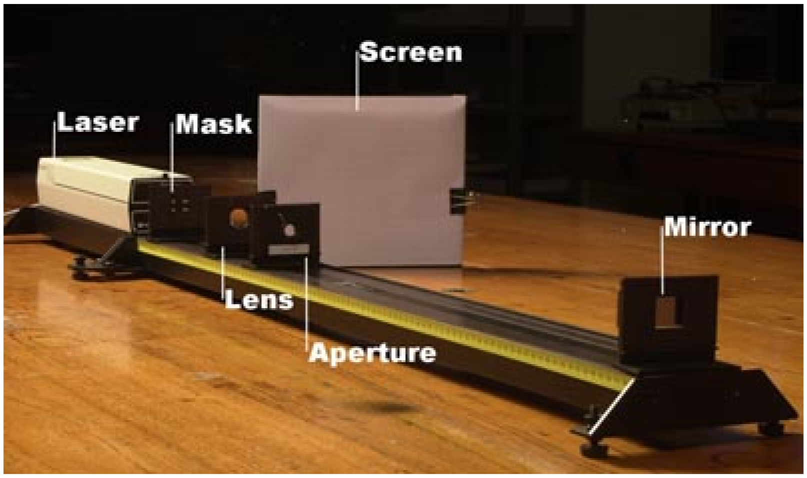
Image formation

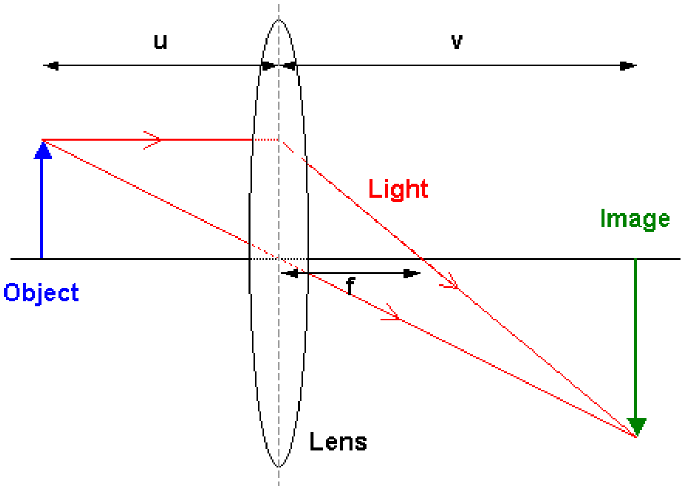
When a convex lens is placed between the mask and the screen, the optical bench can form magnified images of the mask onto the screen. Use of a mirror can simply extend the effective screen distance. Note: caution should be taken when using a mirror to reflect laser light.

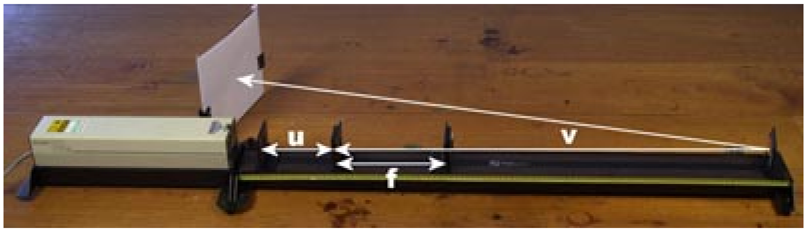


Optical bench set up for image formation (Click on image to view larger version.)

The distance between the object and lens (*u*), the distance between the image and lens (*v*) and the focal length of the lens (*f*) are related by the equation

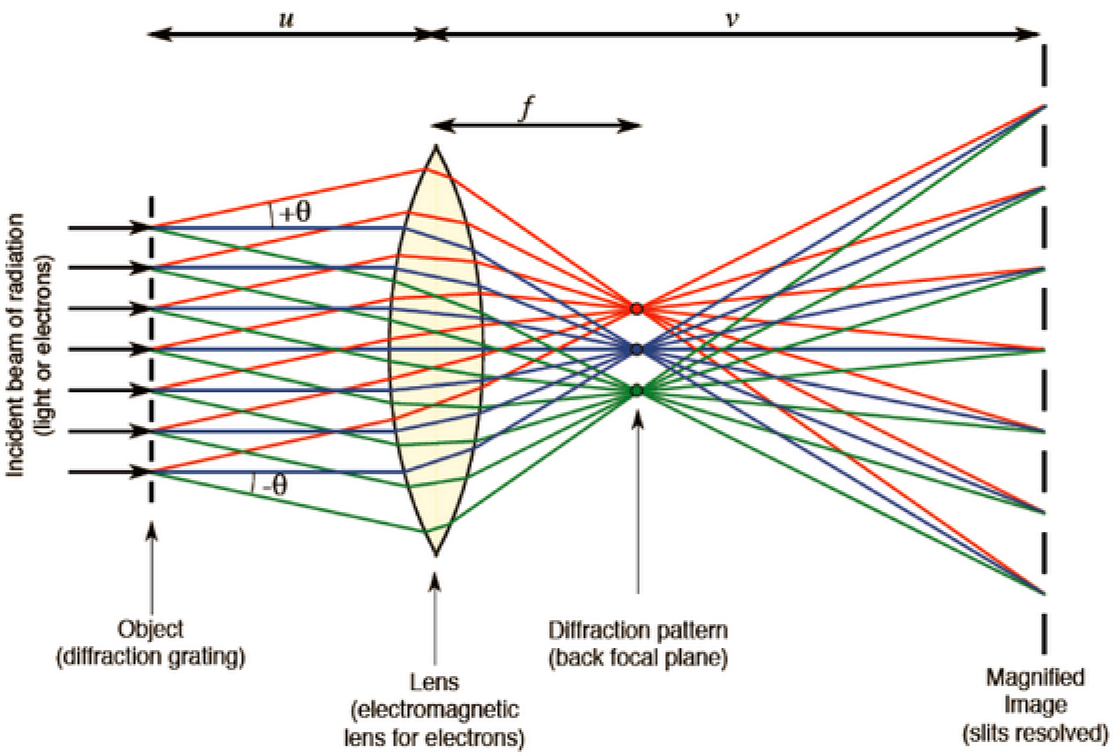
$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$





Distances involved (Click on image to view larger version.)

A lens will focus light from infinity to the 'focal point', at a distance from the lens known as the focal length, *f*. Located at the focal point, is the*back focal plane of the lens* where the diffraction pattern is visible (by using a screen). The diffraction pattern acts as a source of light that propagates to the screen where the image is formed. This theory was first described by Ernst Abbe in 1872.



The diffraction pattern of a mask without a centre of symmetry will still be symmetrical. This can be seen in the mathematics of calculating the pattern. The non-centrosymmetric nature of the mask will however cause non-centrosymmetric variations in the phase.

Source: http://www.doitpoms.ac.uk/tlplib/diffraction/image.php