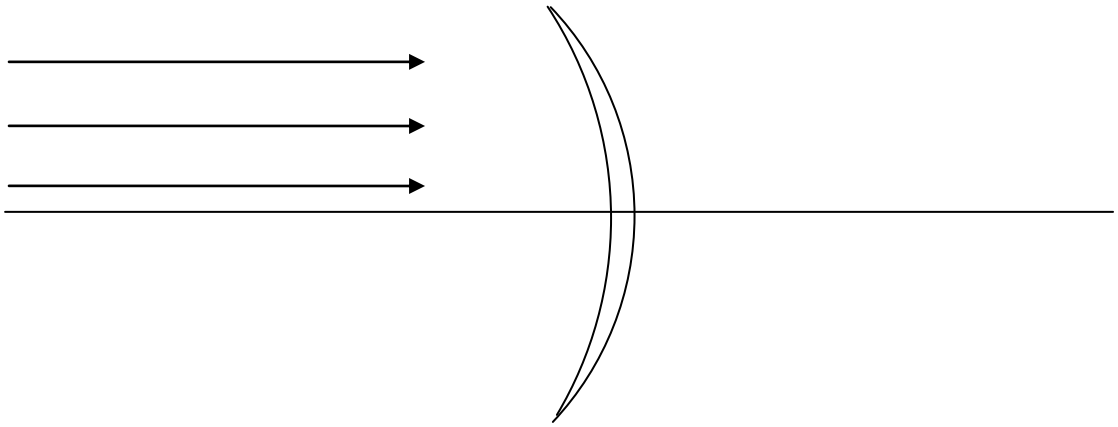
WS 14b Physics 322

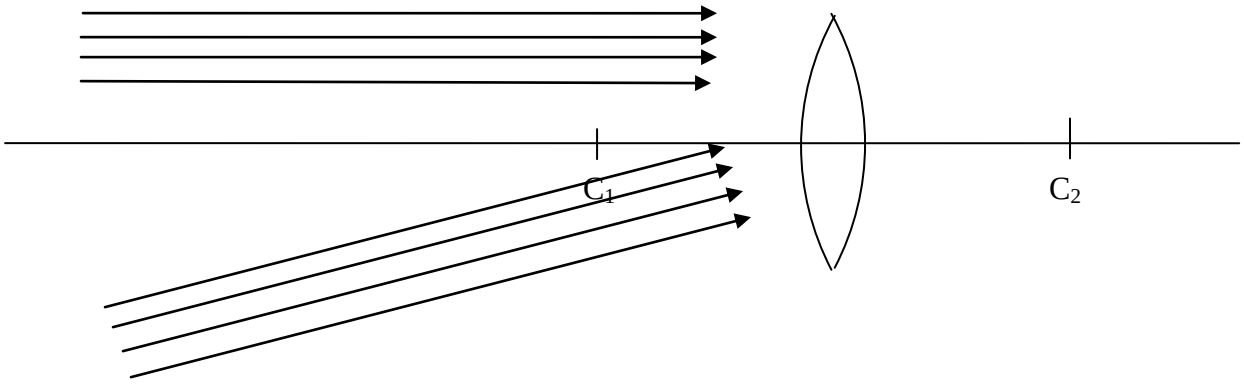
Consider a lens made of material of n = 2.5. The first surface is concave to the incident light with a radius of 5 cm. The second surface is also concave the incident light, but with a radius of 4 cm. What will light that starts from a distance point source on the optic axis do after passing through the lens? Explain. Sketch the wavefronts entering and leaving the lens.



Suppose that you flipped the lens over, would it cause light to behave any differently? Explain your answer.

Suppose you placed the lens in water with an index of refraction of 1.3. What would that do to path the light follows after leaving the lens? Explain.

Consider the symmetric biconvex lens made of a material with an index of refraction n=1.5 shown below. Where do the images form in this case?



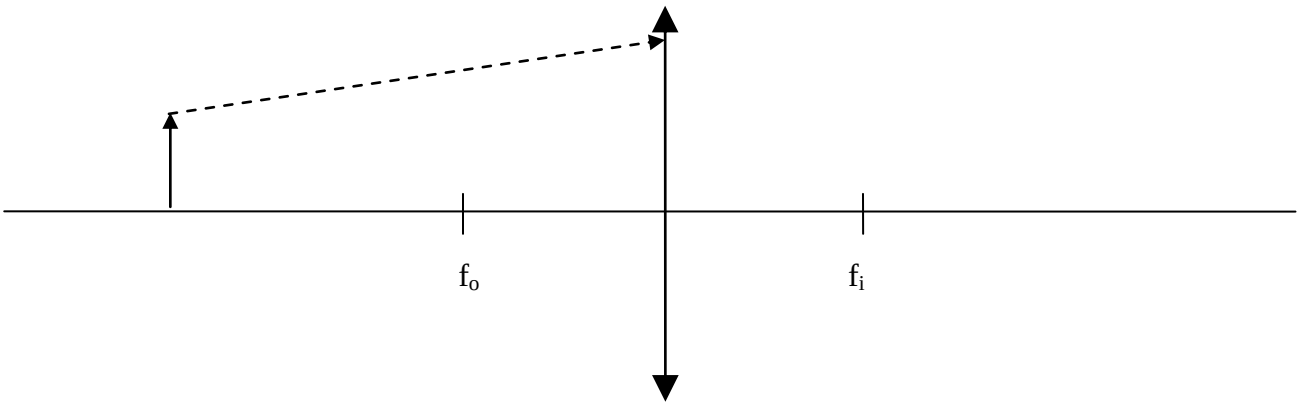
1. Light which is parallel to the optic axis must cross the optic axis at the image _____

_____

2. Based on the principle of optical reversibility, light that appears to start at object focal point must leave the lens _____

3. Light that passes through the center of the lens is essentially _____ because the _____ is very _____

Based on these rules, determine the location of the image of a single point on the object through ray tracing.

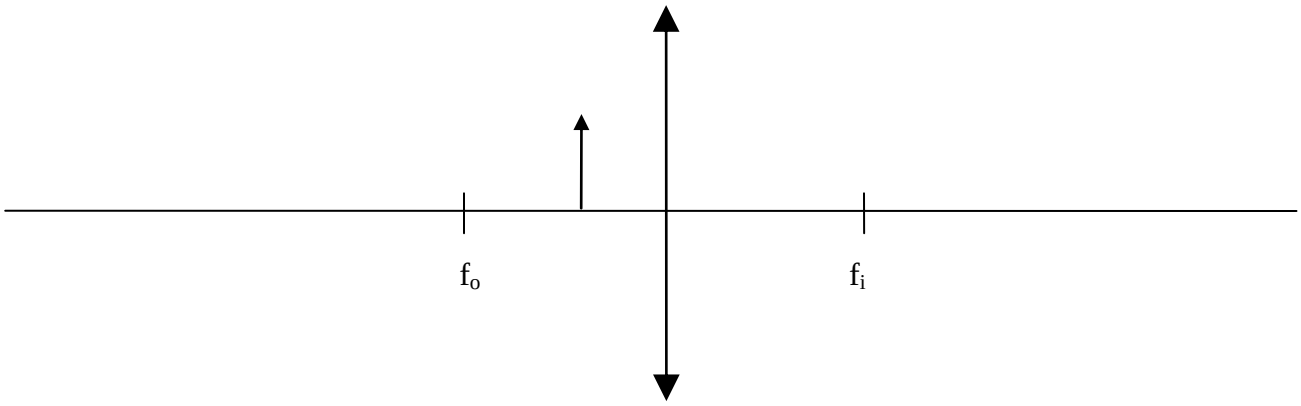


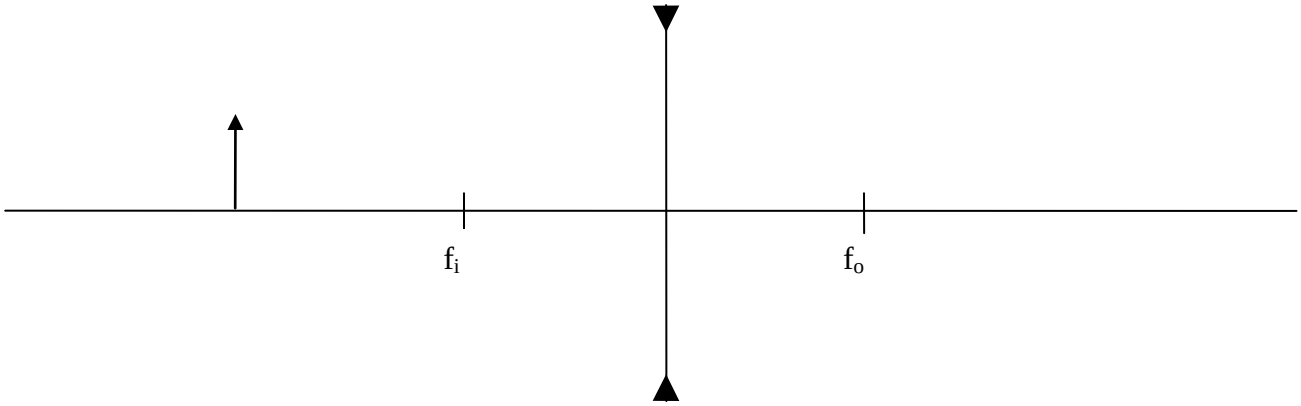
Determine the path of the ray that is drawn on the diagram.

Use the thin lens equation to determine the location of the image. How does it compare with the ray traced image?

The lateral magnification could be determined by the ratio of the height of the image to the height of the object and including a sign to indicate orientation. Based on the diagram above, relate the magnification to the image and object locations.

Complete the ray diagrams shown below to determine the image location and size. Compare with calculated image locations and magnifications.





Multiple lenses

Consider two thin lenses of focal length f_1 and f_2 in contact. Using the thin lens equation, calculate the location of the image from the pair of lenses. Is it possible to find an "effective" focal length for the pair of lenses?

When raytracing multiple lenses, it is important to find the appropriate principle rays coming "from" the image