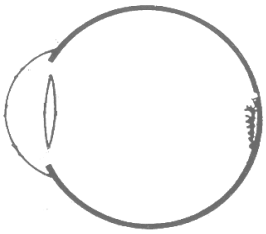
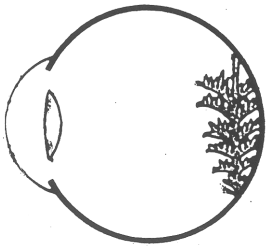
1. Looking at a tree first from far and then from near, the lens of your eye must accomodate to adjust the focal length.

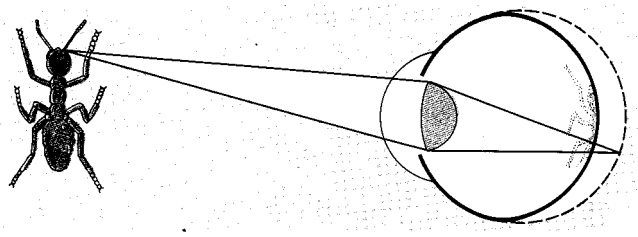
a) Draw the principal axis and the center plane of the lens. Use ray tracing to construct the image formed on the retina. Draw two light rays coming from the top of the tree and two light rays coming from the bottom of the tree (using different colors for the top and the bottom).

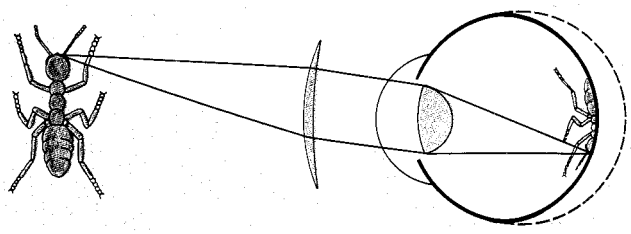
b) Measure the image distance and the object distance. Also measure the focal length of the lens – cornea combination. Verify your measured values by substituting them into the thin lens equation.





2. Look at the pictures below of an eye with a common vision defect. Fill in the gaps.

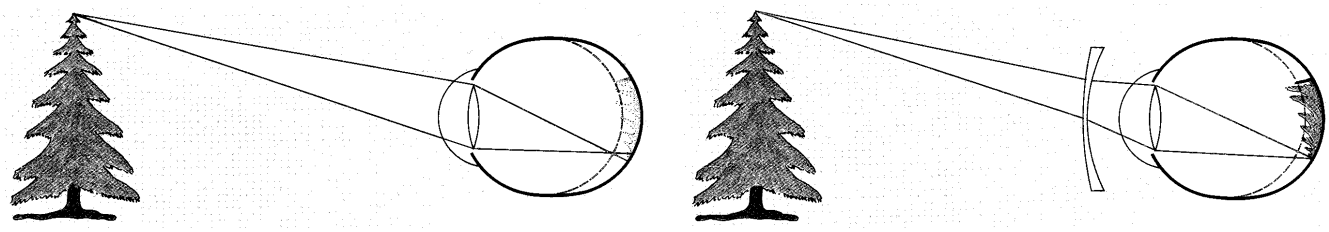




If the eyeball's length is too …… (*short*/*long*), light converges to a point ……. (*in front of*/*behind*) the retina. …….. (*close*/*distant*) objects cannot be seen clearly while …….. (*close*/*distant*) objects might be clear. This is called ……. (*farsightedness*/*nearsightedness*) or ……. (*myopia*/*hyperopia*).

Correction of this vision defect requires a ……..…… (*diverging*/*converging*) lens to ……..…….. (*increase*/*decrease*) the power of the cornea – lens combination, causing the light to converge to a point on the retina instead of ……. (*in front of*/*behind*) it.

3. Look at the pictures below of an eye with a common vision defect. Fill in the gaps.



If the eyeball's length is too …… (*short*/*long*), light converges to a point ……. (*in front of*/*behind*) the retina. …….. (*close*/*distant*) objects cannot be seen clearly while …….. (*close*/*distant*) objects might be clear. This is called ……. (*farsightedness*/*nearsightedness*) or ……. (*myopia*/*hyperopia*).

Correction of this vision defect requires a …….....…… (*diverging*/*converging*) lens to ……..…….. (*increase*/*decrease*) the power of the cornea – lens combination, causing the light to converge to a point on the retina instead of ……. (*in front of*/*behind*) it.

4. Fred's glasses are lenses of focal length 25.0 cm.
a) Are the lenses diverging or converging?
b) Is he far sighted or near sighted?
c) Calculate the refractive power of the lenses.

5. Berta's prescription for her glasses reads as follows: left: – 1.25 D; right: – 2.00 D.
a) Are the lenses diverging or converging?
b) Is she far sighted or near sighted?
c) Calculate the focal lengths of both lenses.

Solutions:
4. c) 4.00 D
5. c) left: - 80.0 cm, right: - 50.0 cm