

# Chapter 18

## Refraction and Lenses

Refraction means...

Conditions necessary for refraction

Toward or away from the Normal?

The bear goes fishing.

# Dispersion

## Refraction through plane glass

# The Convex (converging) Lens

## Ray Diagrams for the convex lens

1. A ray parallel to the axis is refracted through the focus.
2. A ray through the (near) focus is refracted parallel to the axis
3. A ray through the geometric center of the lens continues straight through.

The image is located at the intersection of the refracted rays.

**Formulae: same as with mirrors!**

Page 496

15. A 2.25 cm tall object is 8.5 cm to the left of a convex lens of 5.5 cm focal length. Find the image position and size.
16. An object near a convex lens produces a 1.8 cm tall real image that is 10.4 cm from the lens and inverted. If the focal point of the lens is 6.8 cm, what are the object position and height?
17. An object is placed to the left of a convex lens with a 25 mm focal length so that its image is the same size as the object. What are the image and object positions?
19. Calculate the image position and size when a 2.0 cm tall object is located 25 cm from a convex lens with a focal length of 5.0 cm. What is the orientation of the image?
20. A newspaper is held 6.0 cm from a convex lens of 20 cm focal length. Find the image position.
22. A convex lens with a focal length of 22.0 cm is used to view a 15.0 cm long pencil located 10.0 cm away. Find the size and orientation of the image.
24. A magnifier with a focal length of 30 cm is used to view a 1.0 cm tall object. Determine the location and size of the image when the magnifier is placed 10 cm from the object.

