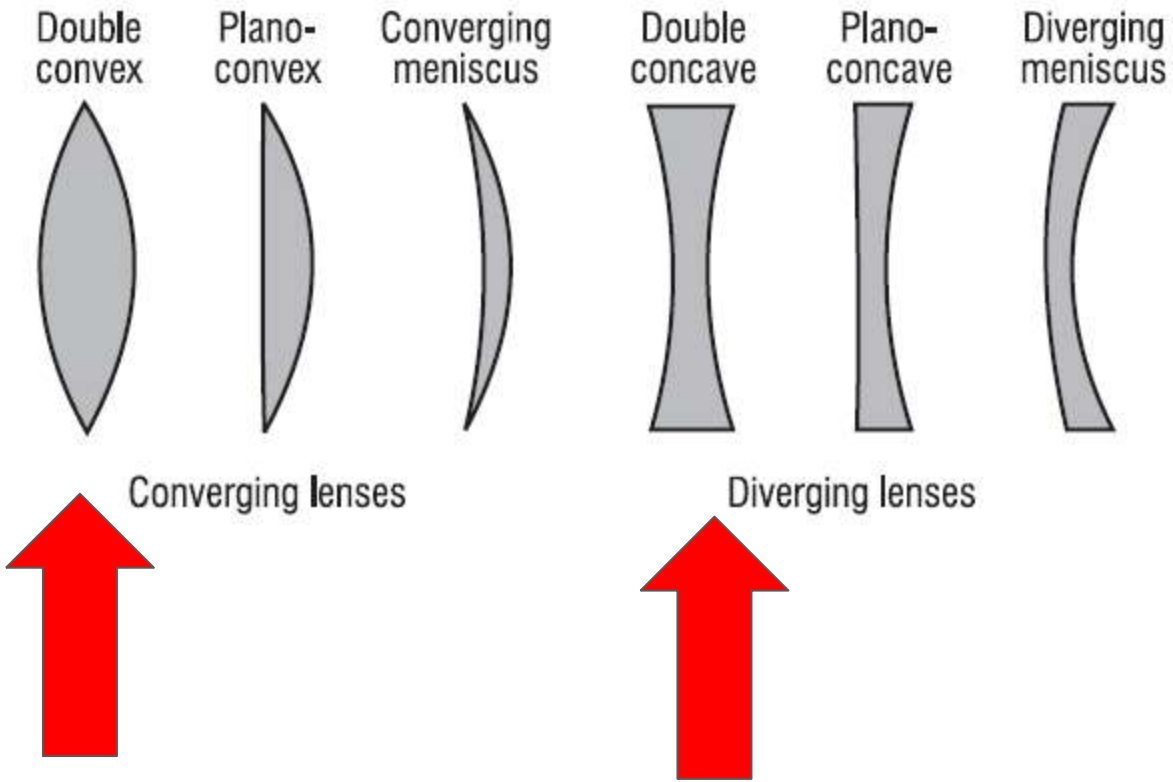
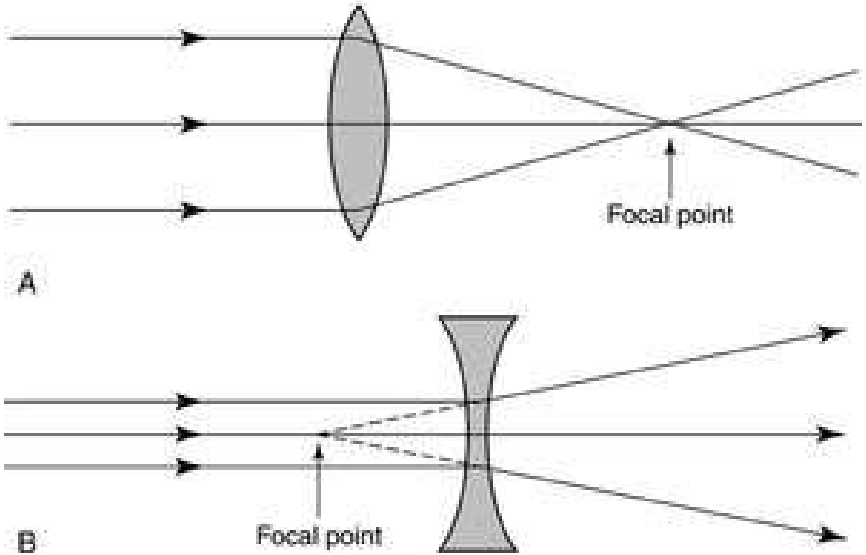
Physics Honors: Lenses

Types of Lenses



Converging and Diverging Lenses



Convex lens, also called a converging lens

Concave lens, also called a diverging lens

Is the focal point in front or behind the lens?

Calculating Image Position

$$\frac{1}{f} = \frac{1}{x_i} + \frac{1}{x_o}$$

f = focal length

X_i = image distance

X_o = object distance

Magnification

$$m \equiv \frac{h_i}{h_o} = -\frac{x_i}{x_o}$$

m = Magnification

h_i = image height

h_o = object height

X_i = image distance

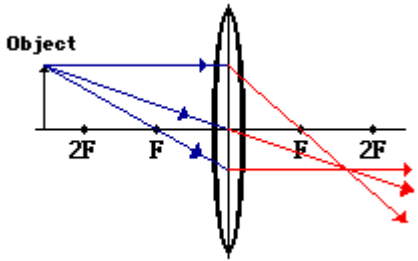
X_o = object distance

An object is placed 30 cm in front of a converging lens and then 12.5 cm in front of a diverging lens. Both lenses have a focal length of 10 cm. For both cases, find the image distance and the magnification. Describe whether the images are real or virtual, and upright or inverted

Ray Diagrams

Ray diagrams are used for both lenses and mirror to determine the location, distance, and size of an image without using math.

However, in order to get these correct, you must be precise and follow specific rules



Ray Diagrams

1. Use graph paper and ruler. Your lines must be straight to correctly determine object location
2. Draw the lens and the object where indicated by the problem.
3. Draw the principal axis, and label the foci
4. Draw the rays according the box below

Ray Name	Before Lens	After Lens
Parallel Ray	Parallel to the principal axis	Through the focal point
Central Ray	To the center of the lens	From the center of the lens