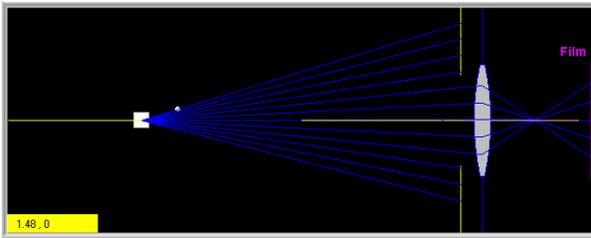


## Worksheet for Exploration 36.1: Camera



This animation can be used to demonstrate the basic operation of a camera (**position is given in arbitrary units and angle is given in degrees**). Various lenses and light sources can be added by clicking on the appropriate links. The camera is "focused" by dragging the lens to change the lens to film distance.

- a. Click on the link for "Normal Lens" and add a near source. What is the closest position an object could be and still be focused on the film?
  - i. Where must the lens be located in order to focus the light on the film when the source is very close to the camera (as close to the film as possible, as close to the front of the camera as possible, or somewhere in between)?
  - ii. With the lens at the location you propose above, drag the point source to the closest position where the rays focus on the film? What is this position?

$$x = \underline{\hspace{2cm}}$$

- b. Remove the near source and add an object source. When the object source is at its original location ( $x = 2.3$ ,  $h = 1.2$ ), where must a normal lens be placed to focus this object?

$$x = \underline{\hspace{2cm}}$$

Where should a telephoto lens be placed?

$$x = \underline{\hspace{2cm}}$$

Where should a wide-angle lens be placed?

$$x = \underline{\hspace{2cm}}$$

- c. Rank the height of the images from (b), from smallest to largest.
- d. Based on your answer for (c), which lens would you use if you wanted to take a picture in which the object took up most of the photographed area (zoom in)? Explain.
- e. Based on your answer for (c), which lens would you use if you wanted to take a picture of the object and much of its surroundings (zoom out)? Explain.
- f. Rank, from smallest to largest, the focal lengths of the three lenses. (Hint, you can easily find the focal point of each lens using a far source)