Discussion Question 15B
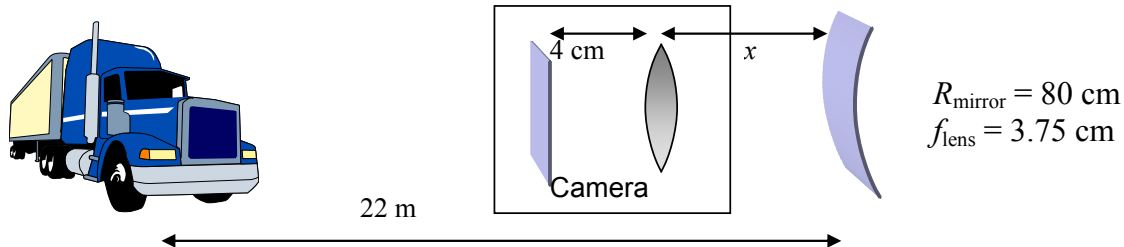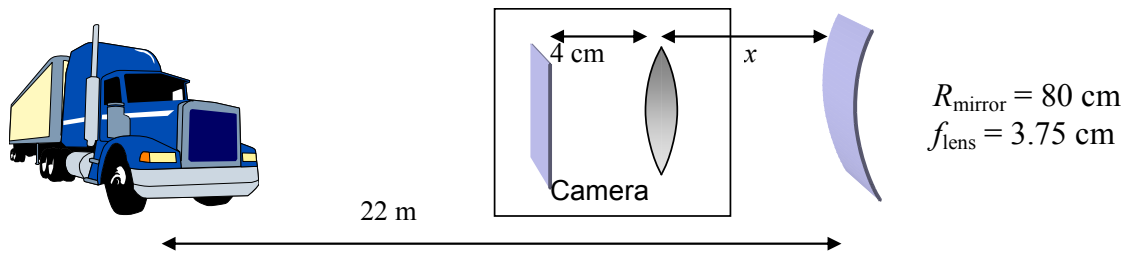## P212, Week 15
Convex Mirrors

A convex mirror is mounted in a loading dock in order to provide a wide field of view. This convex mirror is spherical, with an 80 cm radius of curvature. A simple camera is placed in front of this mirror to monitor the activity in the loading dock. The camera consists of a single converging lens of focal length 3.75 cm, placed 4.0 cm in front of a CCD array. A truck enters the loading dock and stops at a position 22 m in front of the mirror.

4 cm x Camera   22 m

$R_{mirror} = 80$ cm
$f_{lens} = 3.75$ cm

(a) Consider the image of the truck formed by the convex mirror. Where is this image located relative to the mirror?

First, use your knowledge of spherical mirrors to determine the focal length f of the mirror. What sign should you use for f?

(b) Could a person standing in front of the convex mirror see an image of the truck? If so, what sort of image would it be? (Upright or inverted? Magnified or diminished?)

$R_{mirror} = 80$ cm
$f_{lens} = 3.75$ cm

4 cm

x

Camera

22 m

(c) Where should the camera be placed to provide a focused image of the truck? Give the distance x between the convex mirror and the camera lens.

Sign conventions again. As in the first discussion question, the image created by the first optical element (the mirror) becomes the object for the second element (the lens). Just remember that all directions and sign conventions in optics are based on the direction in which *light travels* …

(d) If one half of the camera lens were covered up, what would happen to the image recorded by the camera? Would half of it disappear?