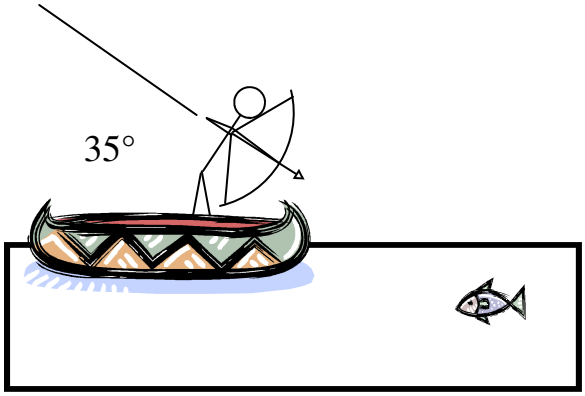
A-day: Due Thurs., Mar 12
B-day: Due Fri., Mar 13

2009 Light 6

Name: _____

From the "Refraction Notes":

1. What is the critical angle for light traveling from glass to a vacuum?

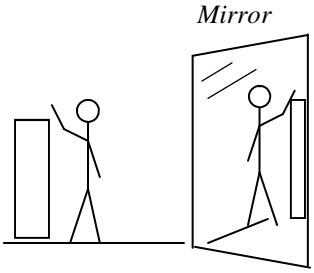


2. Slim Jim decides to go fishing. Fortunately for the fish, Jim forgets his physics. In his optical ignorance Jim aims exactly where he SEES the fish.
   A. Is the fish where Jim sees it?
   B. Why or why not.

   C. Draw where the fish may really be (approximately).

   D. What angle do we need to use for our equations?

   E. You know the indexes of refraction for air and water, so calculate the angle that the light will travels in water.



From the "Lens Equation Notes":

3. Slim Jim waves at himself in a flat mirror (don't ask).
   A. Is the mirror convex, concave, or neither?
   B. Is the image real or virtual?
   C. Why?
   Since it is not possible for light to really go into a mirror, the distance to the image (q) is negative. Because his image is upright, the height of the image (h') is +.

   D. So, for a v_____ i_____ q is _____ and h' is _____.
   E. Is his image magnified, reduced, or equal?
   F. A virtual image for a mirror is on which side?

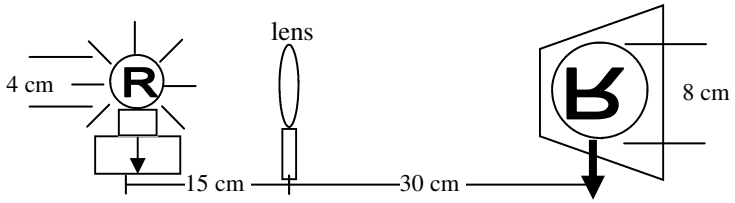
4. A magnifying glass happens to be convex.
   A. Since it is convex, which is thicker: the outside or inside of the lens?
   B. The image is on the same side as the object. Is this real or virtual?
   C. Is the image inverted or upright?
   Just like in the mirror example above, since the image is virtual q will be negative, but h' will be positive. p (the image to the distance) and h (object height) are always positive because the object is always real and on the left side.

   D. Is his image magnified, reduced, or equal?
   E. A virtual image for a lens is on which side?

5. Positive or negative?

   A. ____ q if the image is virtual.
   B. ____ p if the image is virtual.
   C. ____ h if the image is real.
   D. ____ h' if the image is virtual.
   E. _____ q if the image is real.
   F. _____ f for a concave mirror.
   G. _____ f for a convex mirror.
   H. _____ f for a convex lens.

Let's now learn more about magnification (M), image distance (q), and height of the image (h'). The equation for magnification: M = -q/p = h'/h can be split up into: M = -q/p and M = h'/h. h' is negative if inverted.



6. A. h' =
   B. h =
   C. M =

   D. Magnified, reduced, or same.
   E. Real or virtual image?
   F. q =

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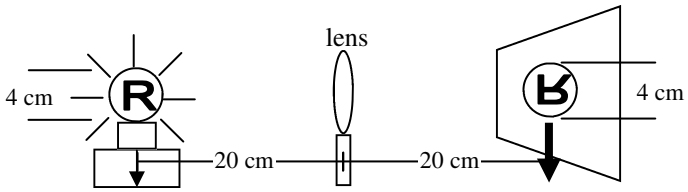
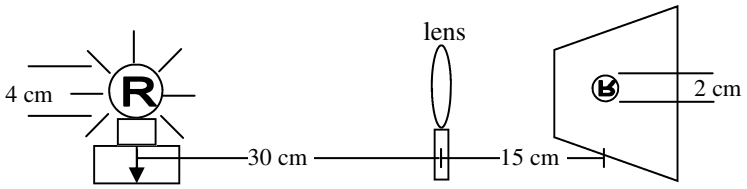
7. A. h' =
   B. h =
   C. M =

   D. Magnified, reduced, or same.
   E. Real or virtual image?
   F. q =





8. A. h' =
   B. h =
   C. M =

   D. Magnified, reduced, or same.
   E. Real or virtual image?
   F. q =

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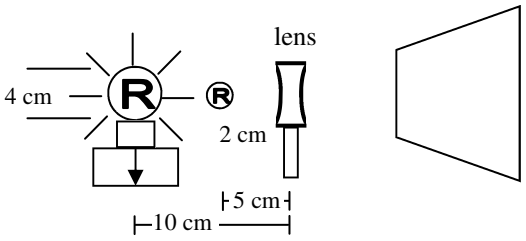
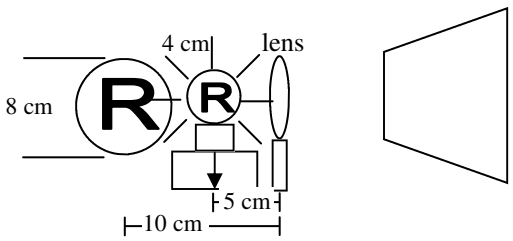
9. A. h' =
   B. h =
   C. M =

   D. Magnified, reduced, or same.
   E. Real or virtual image?
   F. q =





10. A. h' =
    B. h =
    C. M =

    D. Magnified, reduced, or same.
    E. Real or virtual image?
    F. q =

So, using all of the above. Answer the following magnification questions. They do not refer to the above examples.

11. For a lens M = 1.75. Is the image:
    A. Magnified or reduced? B. Real or virtual? C. On the right or left side?

12. For a lens M = −0.35. Is the image:
    A. Magnified or reduced? B. Real or virtual? C. On the right or left side?

13. For a lens M = −1 Is the image:
    A. Magnified or reduced? B. Real or virtual? C. On the right or left side?