Physics 2C(B), 11/27/19

1. Hard Clicker Q's
2. 3 Situations all Lenses
3. Easy Clicker Q's
4. Lens Eq. & Magnification
5. Medium Problem

Survey #3
Fill out today!
No problem
Session tonight.

2a. Converging lens, S > f

Real, Inverted, Reduced
Image

2b. Converging lens, S < f

Virtual, Upright, Enlarged Image

2c. Diverging lens

Virtual, Upright, Reduced Image
A lens is used to make an image; three light rays are drawn out of the infinite number coming from the arrowhead. The image given in this sketch could be seen:

1. By placing a screen at the image point.
2. Without a screen by looking back at the lens.
3. By both techniques (1) and (2).
4. Only if the lens is big enough.
5. None of the above answers is 100% correct.

A screen is placed at the position of the image, and a "sharp" image appears on the screen. Next, Jennifer moves the screen a **SHORT** distance **TOWARD** the lens. The image would appear:

1. Smaller and "sharper".
2. Smaller and "fuzzier".
3. Larger and "sharper".
4. Larger and "fuzzier".
5. Would disappear.
Finally, Jennifer blocks half the lens, as shown, with a piece of paper. What happens to the image?

1. It disappears.
2. Only half of it is still seen.
3. It looks the same, but gets slightly dimmer.
4. It gets fuzzy.
5. It depends on what part of the lens is blocked.

A lens has been hidden behind a blue curtain, but you’ve been given three light (red) rays used to construct an image. Your task is to determine the type of lens and the type of image.

1. Convex (converging) lens, real image
2. Convex (converging) lens, virtual image
3. Concave (diverging) lens, real image
4. Concave (diverging) lens, virtual image
For the figure below, determine the lens and type of image.

1. Convex (converging) lens, real image
2. Convex (converging) lens, virtual image
3. Concave (diverging) lens, real image
4. Concave (diverging) lens, virtual image
Two Eq:

Lens Eq.

\[ \frac{s}{5} + \frac{1}{s'} = \frac{1}{f} \]

- \( s > 0 \) is obj. distance (obj on left)
- \( s' \) is image distance
  - \( s' < 0 \) if same side as obj. (left)
  - \( s' > 0 \) if opp. side (right)

Magnification:

\[ m = -\frac{s'}{s} \]
Suppose a lens produces an image w/ \( m = -2.0 \) when an object is 15 cm from the lens.

(a) What kind of lens is this?
(b) What's the focal length of the lens?
(c) Draw a ray diagram of the situation

(a) \( m < 0 \) \( \Rightarrow \) (real, inverted image) \( \Rightarrow \) converging lens

(b) \( m = -2.0 = \frac{-s'}{s} \Rightarrow s' = +2s = +2(15\text{ cm}) \)
    \[ s' = +30\text{ cm} \]

\[ \frac{1}{f} = \frac{1}{s} + \frac{1}{s'} = \frac{1}{15\text{ cm}} + \frac{1}{30\text{ cm}} = \frac{3}{30\text{ cm}} = \frac{1}{10\text{ cm}} \]

\[ f = 10\text{ cm} \]

(c)

[Ray diagram of a lens with an object at 15 cm and an image at 30 cm]