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Physics 2C, Winter 2020

Reading Assignment due Tuesday 3/10: Submit via Gradescope by 11:30am

1. Answer the following questions related to Example 35.1 and effective focal length:

   (a) Redo Example 35.1, but this time with the two lenses separated by 10 mm rather than 60 mm. You should still assume that a 10-cm-tall object is 500 mm from the first lens. What is the effective focal length of this double-lens system?

   (b) Prove the following statement: If the distance separating two lenses is zero, then the effective local length of the system is f, where

   $$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$$

   To prove this, basically redo the same problem as part (a), but don't plug in numbers.

2. Suppose you have a picture that is very underexposed (too dark). How would you improve the image under the following conditions?

   (a) You are allowed to change the focal length, but not the aperture size nor shutter speed.

   (b) You are allowed to change the aperture size, but not the focal length nor shutter speed.

   (c) You are allowed to change the shutter speed, but not the focal length nor aperture size.

   (d) What happens to the magnification of the picture in each of the three cases above?

3. Your aunt just turned 50 and now needs glasses to read.

   (a) What is the name of this condition? ("-opia")

   (b) Does your aunt need converging lenses or diverging lenses?

   (c) Your aunt goes to the store and buys glasses which say $+0.75$ (meaning, $+0.75$D). What is the focal length of these glasses?

   (d) Assuming these glasses (from part (c)) bring your aunt's near point to 25 cm, what is her near point without corrective lenses?

For extra practice (not due): From Chapter 35 of Knight, 4th edition: Conceptual Questions: 1-3, 8. Exercises: 1-13,