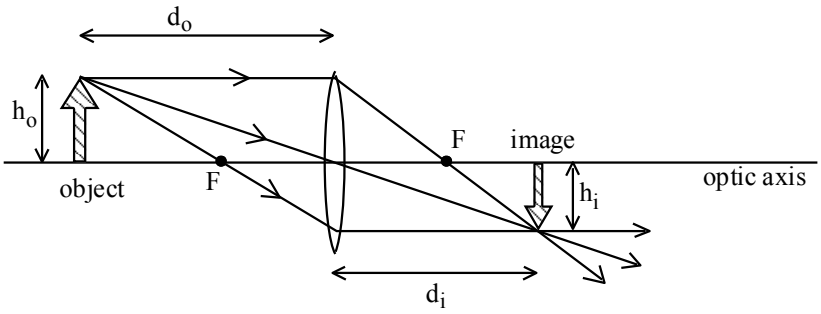
REVIEW: POTENTIAL EXAM QUESTIONS

On more recent topics!

The following questions are not part of your lab grade, ***you won't be graded on the answers****. Questions like these – but not identical – may appear on the final. You are welcome to discuss the questions and your answers with your fellow students or the instructors during your recitation/lab section.*

1. Consider the following diagram, in which a single lens is used to form an image of an arrow-shaped object. Which of the following statements is true?



A) If the object is moved slightly to the right, the image will also move to the right.

B) If the object is moved slightly to the right, the image will move to the left.

C) If the object is moved slightly to the right, the image will not move since the focal length of the lens has not changed.

D) If the top half of the lens is blocked, only the bottom half of the image will form.

E) If the bottom half of the lens is blocked, the whole image will disappear.

2. In the above figure, is there any place you could put the object and have an image which is *virtual?*

A) Yes, it is already a virtual image as shown!

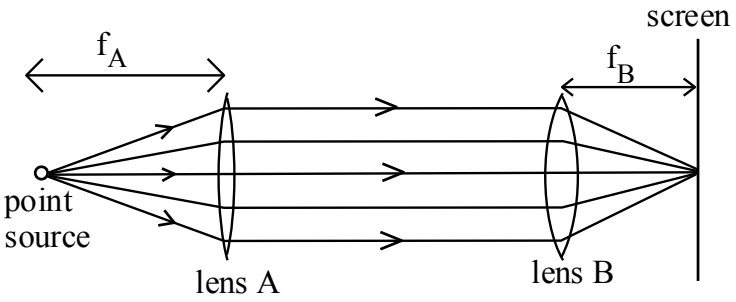
B) Yes, you must put it on the right side of the lens.

C) Yes, you can keep it on the left of the lens, but move it "inside" the focal length

D) Yes, you must move it much further to the left than it is now

E) No, there is not any such place!

3. Consider the following diagram, in which light from a point source is converted into a collimated beam, then re-focused to a point on a screen. Which of the following statements are true?



A) If the point source is moved to the left, the spot on the screen will become larger.

B) If the point source is moved to the left, the spot on the screen will stay the same.

C) If the point source *and* lens A are moved *together* to the left, the spot on the screen will become larger and dimmer.

D) If lens B *and* the screen are moved *together* to the right, the spot on the screen will become smaller.

E) None of the above is correct.

4. A two-slit interference pattern is viewed on a screen. The separation of the slits, d, is slowly decreased. What happens to the pattern on the screen?

A) The fringes move closer together.

B) The fringes move further apart.

C) There is no change in the fringe pattern.

D) Something entirely different!.

5. If the wavelength of a light wave in vacuum is doubled, what happens to the velocity of the wave v_{wave}?

   A) It doubles.

   B) It halves.

   C) It stays the same.

   D) It squares.

   E) None of the above is true.

6. A lens with index of refraction n_1 is used to image a distant point onto a screen. The lens is replaced with a second lens with a *smaller* index of refraction ($n_2<n_1$). Only the index is changed, the size and the diameter of the lens is kept the unchanged. With the new lens in place, then, in order for the image to remain in focus, the screen …

   A) has to be moved closer to the lens.

   B) has to be moved farther from the lens.

   C) must not be moved.

   D) can be placed at any distance from the lens; the point source will always stay in focus

   E) There is no way to get the image in focus now!

7. Consider a diffraction pattern produced by a laser shining through two slits separated by a distance d. Now suppose the slit-separation d is **decreased** a little, while everything else is kept fixed. In order to maintain the same pattern on the screen (i.e. with the same peak separation), which of the following statements is true?

   A) The wavelength of the light should be increased.

   B) The wavelength of the light should be decreased.

   C) The pattern didn't change when d changed, so nothing needs to be done.

   D) Changing the wavelength of the light cannot return the old pattern.

   E) None of the above is true.