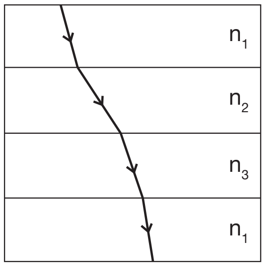
Name____

AP Physics 2 Review Questions

Integrating Content, Inquiry and Reasoning

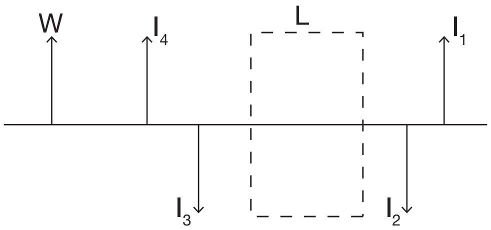


1. Examine the diagram of a light ray as it passes between multiple media.

   a. Rank the indices of refraction, from smallest to largest.

   b. Explain how you made your determinations.

2. The figure below shows an object, arrow W, in front of a thin, symmetric lens that can be mounted within the dashed space, L. The lens extends above and below the central axis. The four arrows, I_1–I_4, represent possible images formed by the mirror. The image distance and size are not drawn to scale.



   a. Which image(s) could not possibly be formed by either a concave or convex lens? Cite evidence from the experiment to support your answer.

   b. Which image(s) would be caused by a convex lens? Identify the image(s) as real or virtual. Justify your answer.

   *c.*Which image(s) would be caused by a concave lens? Identify the image(s) as real or virtual. Justify your answer.

   d. There is one image that is shared between the concave and convex lenses. Based on your answers to parts *b* and *c*, is additional information needed in order to determine if that image was formed by a concave or convex lens? Use evidence from the experiment to support your answer.

3. A human eye has a lens that can be reshaped by the contraction and relaxation of muscles surrounding it. The effect of doing this allows objects at varying distances to be brought into focus on the retina (light-sensing organ in the rear of the eye). The distance between the center of the lens and the retina is 2.4 cm on average.

   a. A student predicts that the human eye contains a convex lens. Do you agree or disagree with this prediction? Justify your answer.

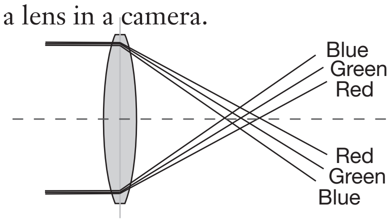
   b. The eye described above is staring off at a very distant object. What is the focal length of the lens? Explain.

   The object is repositioned to be 30.0 cm away from the eye. The muscles surrounding the lens respond and change its shape.

   c. Using Equation 3, qualitatively predict whether the focal length of the lens increases or decreases when the object is brought closer. Confirm your prediction with a calculation of the new focal length.

   d. A student states, "The lens doesn't change shape and therefore the focal length remains the same. The length of the eye increases or decreases based on where the object is located." Do you agree or disagree with this statement? Justify your answer by explaining an analogous setup from the experiment.

4. Chromatic aberration can sometimes be seen in photographs around the edges of the picture. Objects in the photograph will often have a colored silhouette surrounding them. The figure below demonstrates what occurs when white light refracts through the outer edge of a lens in a camera.



   a. Propose a hypothesis of what causes chromatic aberration when light passes through a thin lens.

   b. Using the figure, rank the indices of refraction for the blue, green and red light in increasing order.