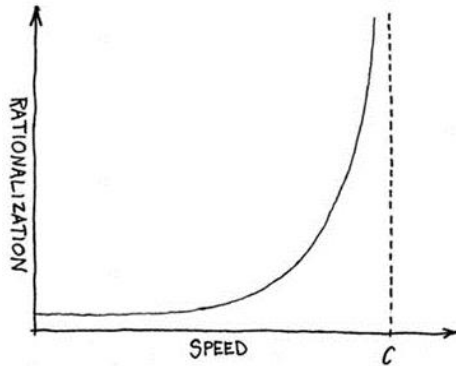


AP 2 Optics: Thin Lenses WS 3

Name: _____ Period: _____

MORAL RELATIVITY



RELATED TO MORAL RELATIVISM, IT STATES THAT ETHICS BECOME SUBJECTIVE ONLY WHEN YOU APPROACH THE SPEED OF LIGHT. THAT IS, IT'S OK TO BE SELF-SERVING, STEAL, AND MURDER AS LONG AS YOU'RE GOING REALLY, REALLY FAST.

(NOTE: THIS IS WHY RAP SOUNDS BETTER ON THE HIGHWAY AT 90 MPH)

In the far, far future, essentially all matter will have returned to energy. But because of the enormous expansion of space, this energy will be spread so thinly that it will hardly ever convert back to even the lightest particles of matter. Instead, a faint mist of light will fall for eternity through an ever colder and quieter cosmos. --Brian Greene

1. A diverging lens (a) must have at least one concave surface, (b) always produces a virtual image, (c) is thinner at its center than at the periphery, or (d) all of the preceding.
2. The image produced by a diverging lens is always (a) virtual and magnified, (b) real and magnified, (c) virtual and reduced, or (d) real and reduced.
3. Can a converging lens ever form a virtual image of a real object? If yes, under what conditions? Prove it by sketching a ray diagram.

4. How can you quickly determine the focal length of a converging lens? Will the same method work for a diverging lens?
5. An object is placed 50.0 cm in front of a converging lens of focal length 10.0 cm. What are the image distance and the lateral magnification?
6. An object placed 30 cm in front of a converging lens forms an image 15 cm behind the lens. What is the focal length of the lens?
7. A converging lens with a focal length of 20 cm is used to produce an image on a screen that is 2.0 m from the lens. What is the object distance?

8. An object 4.0 cm tall is in front of a converging lens of focal length 22 cm. The object is 15 cm away from the lens. (a) Use a ray diagram to determine if the image is (1) real or virtual, (2) upright or inverted, and (3) magnified or smaller than the object. (b) Calculate the image distance and lateral magnification.
9. An object is placed in front of a biconcave lens whose focal length is 18 cm. Where is the image located, and what are its characteristics, if the object distance is (a) 10 cm and (b) 25 cm? Sketch ray diagrams for each case.
10. An object 5.0 cm tall is 10 cm from a concave lens. The resulting image is one-fifth as large as the object. What is the focal length of the lens?
11. An object is placed 40 cm from a screen. (a) At what point between the object and the screen should a converging lens with focal length of 10 cm be placed so that it will produce a sharp image on the screen? (b) What is the lens's magnification?
12. With a magnifying glass, a biology student on a field trip views a small insect. If she sees the insect magnified by a factor of 3.5 when the glass is held 3.0 cm from it, what is the focal length of the lens?