**Assignment 10 – Optics Name: …………………………………..**

**Refraction**

1. When green light (wavelength = 500 nm in air) travels through diamond (*n* = 2.5), what is its new wavelength? (2)
2. A beam of monochromatic light entering a glass window pane will experience a change in which variables: frequency, wavelength and/or speed? (2)
3. The laws of refraction and reflection are the same for sound as they are for light. The speed of sound in air = 340 m/s and 1,510 m/s in water. If a sound wave approaches the surface of some water at an angle of incidence of 12 degrees, what is the angle of refraction? (2)
4. An opaque cylindrical tank with an open top has a diameter of 3.0 m and is completely filled with water. When the afternoon Sun reaches an angle of 28 degrees above the horizon, it ceases to illuminate the bottom of the tank. How deep is it? (DRAW A DIAGRAM!) (3)

**Thin Lenses**

(you can draw diagrams if it helps)

1. An object of height 11 cm is placed 44 cm in front of a converging lens with a focal length of 24 cm. a) where’s the image? b) is it real or virtual? c) is it upright or inverted? d) what is the height of the image? (4)
2. An object of height 11 cm is placed 48 cm in front of a diverging lens with a focal length of -24 cm. a) where’s the image? b) is it real or virtual? c) is it upright or inverted? d) what is the height of the image? (4)
3. The image created by a converging lens is projected onto a screen that is 60 cm from the lens. If the height of the image is ¼ the height of the object, what is the focal length of the lens? (2)
4. A converging lens has a focal length of 20 cm. Locate the images for object distances of a) 40 cm, b) 20 cm and c) 10 cm. (3)
5. A diverging lens has a focal length of 20 cm. Locate the images for object distances of a) 40 cm, b) 20 cm and c) 10 cm (3)
6. Challenging Question: Two converging lenses, each of focal length 15 cm are placed 40 cm apart, and an object is placed 30 cm in front of the first lens. Where is the final image formed and what is the magnification of the system? (4)