PHYS-1800 **Homework 13** **Due Thursday : 29 April 2010**

Name:_____ **(Show all your workings)**

1. Visible light is made of electromagnetic waves which span the wavelength range _____ to _____ nanometers. (1 point)

2. Parallel light incident on a positive lens will _____ as it emerges. (1 point)

3. In a given transparent medium light rays are straight lines and are always drawn _____ to the wave fronts. (1 point)

4. When white light passes through a prism which color is bent the most? _____. (1 point)

5. (a) Sketch the condition for a nearsighted person: (2 points)

(b) Sketch how it is easily corrected for:

6. (a) You are a fish looking up through the smooth surface of the water (n = 1.33) at a hungry bear on the shore of the lake. The bear appears: (2 points)

A. Further from the point directly above you than it really is
B. In exactly the location that it real is.
C. Closer to the point directly above you than it really is.

(b). Draw a sketch to explain your answer:

7. (a) A light ray traveling in water (n = 1.33) passes directly into a rectangular glass block (n =1.5). Explain with the aid of a sketch what happens to the light ray at the interface (i.e. is it bent towards or away from the normal), and explain why this bending happens. (4 points)

Name:_____ **(Show all your workings)**

7. (b) If the angle of incidence at the water-glass interface was 15 deg (as measured from normal incidence) determine the corresponding angle of refraction in the glass block.

8. (a) A woman 1.8 m in height wants a plane mirror so that she can view her full height. The minimum length of such a mirror is: (4 points)

A. 3.6 m
B. 1.8 m
C. 0.9 m
D. 0.45 m
E. Impossible to say, not knowing the viewing distance

(b) Draw a sketch to explain your answer:

9. A positive lens has a focal length of 10 cm. An object is located on the optic axis of the lens at a distance of 5 cm to the left of the lens. Determine: (4 points)

(a) How from the lens is the image?
(b) Is the image real or virtual, erect or inverted?
(c) Carefully trace three rays from the top of the object to confirm your results.

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Two additional questions worth up to 5 points each:

1. With the aid of a clear sketch describe in words the phenomena of total internal reflection:

2. (a) Using a ray diagram describe how a simple camera works and indicate the **three basic properties of the image** formed.

(b) Compare this result with the image formed by a concave lens.