Name: _____   Hour: _____

Unit 10 Review

In addition to completing this review sheet, you should review your notes, homework assignments, labs, and quizzes in order to properly prepare for this exam.

1. Explain how light behaves as both a wave and a particle.
2. What is an electromagnetic wave? How is it different than a mechanical wave?
3. What is the electromagnetic spectrum?
4. What are the three different ways that light can interact with matter?
5. Why would an opaque object appear white? Why would a translucent object appear black?
6. What are the three primary colors of light addition and what colors are created when you add them?
7. What is the difference between luminous flux and illuminance? What are their units?
8. What is the difference between polarized and unpolarized light? What happens when light hits a polaroid (polarization filter)?
9. What is the speed of light in a vacuum? How does it relate to the wavelength, frequency, and energy of light?
10. Why is the sky blue? Why does the sun appear to be yellow? Why are sunsets red?
11. What is the difference between specular and diffuse reflection? What kind of materials make good specular reflectors?
12. What is the law of reflection and when does it apply?
13. What is a ray diagram? Sketch an example ray diagram for a plane mirror.
14. What did you discover about the size of the mirror required to form an image during the "draw your face" activity?
15. What are five characteristics that are always true for plane mirror images?
16. What is the difference between a real and a virtual image? Which is positive in the mirror equation?
17. What is the difference between a concave and a convex mirror? Where is the focal point for each?
18. What does a magnification of 1 mean? A magnification greater than 1? Less than 1?
19. What is the difference between an upright and an inverted image?
20. What are the two rules of reflection for curved mirrors? How are they related to ray diagrams?
21. What is the difference between the focal point and the center of curvature of a curved mirror? What is the principal axis?
22. What are the 5 possible images that can be formed by a concave mirror?
23. What is the 1 possible image formed by a convex mirror? Can you ever project an image on a screen using a convex mirror?
24. Be sure you know how to draw a ray diagram for both a concave and a convex mirror.
25. Define refraction. When does refraction occur?
26. What is the equation for the index of refraction? What is the index of refraction of a vacuum? Of air?
27. Which way does light bend when it enters a slower medium? A faster medium?
28. What did you graph in order to determine the index of refraction of water in the "refraction in water" lab?
29. Define "critical angle". What happens to light incident upon a faster medium when it hits the boundary at an angle lesser than the critical angle? Equal to the critical angle? Greater than the critical angle?
30. What is total internal reflection? How does it relate to the "water stream" demo, and to fiber optics? How does it relate to diamonds?
31. What is dispersion? How/when does it happen?
32. Because the index of refraction varies for different colors/frequencies of light, red light and violet light are different speeds in glass. Which color travels faster? Bends more? Has the higher index of refraction? How do you know?
33. What three conditions must be met in order for a rainbow to be visible?
34. What does a converging lens look like? A diverging lens?
35. How are lens ray diagrams similar and dissimilar to curved mirror ray diagrams? Where is a "real" image for a curved mirror? Where is a "real" image for a lens?

Work-Out Problems

1. What is the frequency of microwave radiation with a wavelength of 0.085 m?

2. Suzie has grown accustomed to the amount of light that hits her book as she reads sitting on her living room couch. a) If she sits 0.8 m away from her lamp, with a luminous flux of 1250 lumens, what is the illuminance at her location? b) If she moves to her bedroom, she must sit 0.3 m from her lamp in order for her pages to have the same brightness as they do in the living room. What is the luminous flux of the lamp in her bedroom?

3. An object is located 4 cm in front of a <u>concave</u> mirror with a focal length of 1.5 cm. Where is the image formed?

4. An image is formed 1.5 cm behind a <u>convex</u> mirror with a focal length of 2 cm. Where must the object be located to form this image?

5. A beam of light is incident from an unknown medium into a plane of glass (n=1.52) at an angle of 35°. If the beam of light refracts across the boundary with an angle of 30.2°, what is the index of refraction of the original medium?

6. A light beam traveling through zircon (n=1.93) is incident upon glass (n=1.52) at its critical angle. What is this angle?