2D Optics Unit Review

Required Equations

$n=\frac{c}{v}$ $\quad c=3.0\times10^{8}\frac{m}{s}$ $\quad \frac{1}{f}=\frac{1}{d_i}+\frac{1}{d_o}$ $\quad M=\frac{h_i}{h_o}=\frac{-d_i}{d_o}$

Main Topics

Topic 1: Properties & Production of Light	- 3 main properties of light - Electromagnetic spectrum - Luminous, non-luminous - Methods of production: incandescence, electric discharge, fluorescence, phosphorescence, chemiluminescence, bioluminescence, triboluminescence, LED, Laser	**Topic 4: Refraction**	- Refraction - Index of refraction (n) - Calculate n - Describe what happens to light as it passes into less or more dense medium - Apparent depth - TIR & critical angle - Dispersion
Topic 2: Reflection in Plane Mirrors	- Laws of Reflection - Specular & diffuse reflection - Describing images (SALT) - Real & virtual images - Drawing ray diagrams for plane mirrors - SALT for plane mirrors	**Topic 5: Lenses**	- Converging lens – draw ray diagrams, describe SALT - Diverging lens - draw ray diagrams, describe SALT - Thin lens equation & magnification equation - Use equations to describe image - Signs for concave & convex lenses (f, di, hi, M) - Applications of lenses
Topic 3: Reflection in Curved Mirrors	- Concave/converging – draw ray diagrams, describe SALT - Convex/diverging mirrors - draw ray diagrams, describe SALT - Curved mirror equation & magnification equation - Use equations to describe image - Understanding signs for concave & convex mirrors (f, di & hi)		

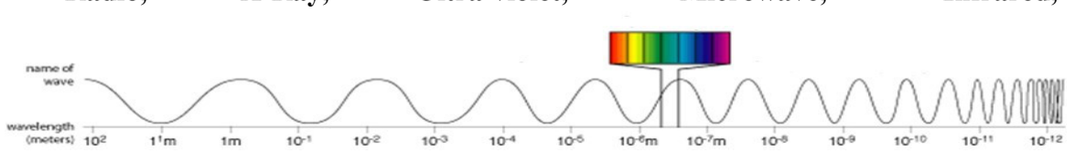
SAMPLE QUESTIONS

1. Define each of the following terms:

Source	Light produced by . . .
Chemiluminescence	
Bioluminescence	
Fluorescence	
Incandescence	

2. Put the following labels on the electromagnetic spectrum below:

Radio, X-Ray, Ultra-violet, Microwave, Infrared, Gamma



3. A source that emits light of all visible wavelengths will appear _____.

4. An object that absorbs light of all wavelengths will appear _____.

5. All electromagnetic (light) waves travel at a speed of _____ in a vacuum.

6. In which of the following mirrors can you always expect an image that is virtual and the same size as the object?
   a) Convex
   b) Concave
   c) Plane

7. How is a virtual image different from a real image?

8. State the 2 laws of reflection

9. Why can't the index of refraction be smaller than 1?

10. a) Define critical angle.
    b) How can the value of the critical angle be determined?

11. A concave mirror produces a virtual image of a flower petal 2.00 cm from the lens. Determine the magnification of the lens if the petal is 8.30 cm from the lens.

12. Light travels through a salt crystal that has a refractive index of 1.52. What is the speed of light in the crystal?

13. The image of an object in a mirror is farther from the mirror than the object, larger than the object, real, and inverted. Draw a ray diagram that fits these criteria.

14. While walking on a beach, you find a clear, colourless rock that may be quartz (n = 1.46) or a piece of glass (n = 1.52). Explain how you could use variations in the angles of refracted light and the index of refraction to determine whether the rock is glass or quartz.

15. Draw a ray diagram and write a short explanation to show why it is sometimes difficult to reach a coin that is underwater in a pond.

16. Draw a ray diagram of an object in a convex mirror.

17. Describe the differences between refraction and reflection as a way to change the direction of a light ray.

18. Draw a ray diagram of an object in a converging lens.