SNC2DI Review: Optics

1. Properties of light
2. State and explain the electromagnetic spectrum
3. Explain the properties of waves (e.g. wavelength, amplitude, frequency, ROYGBV)
4. Compare colour theories of light
5. Explain or show models of light – wave and ray
6. List with examples the sources of light (e.g. incandescent, fluorescent, LED, LCD, etc.)
7. Explain the terminology associated with light (e.g. transparent, translucent, opaque, umbra, penumbra, regular and diffuse reflection)
8. State the Law of Reflection. If an angle of incidence is 43^{o} what is the angle of reflection?
9. Compare a virtual and real image.
10. Explain the following curved mirror terms: focal point, vertex, focal length
11. Draw a concave and convex mirror.
12. Be prepared to draw ray diagrams for concave mirrors and convex mirrors
13. List uses of concave mirrors
14. Be prepared to calculate using magnification formulas. If an object has a height of 2 cm and is magnified 7x, what is the image height?
15. What is refraction? What is the speed of light?
16. Be prepared to calculate using the index of refraction. If the index of refraction is 1.51 what must the speed of light be through it?
17. State Snell's Law. When light passes from water into diamond at an angle of 45^{o} from the normal, what is the angle of refraction?
18. What is a mirage? Give an example
19. Draw a convex and concave lens and show what happens to light rays going through them.
20. Draw a ray diagram for a concave lens and a convex lens.
21. State the thin lens equation. If a magnifying glass produces a virtual image 4 mm from the convex lens with the object 2.5 mm away, what is the focal length of the lens?
22. Draw and label an eyeball. State the functions of the parts.
23. Explain the role of the rods and cones in vision.
24. What is colour blindness, what is astigmatism?
25. What is near and far sightedness and how can they be corrected?
26. Explain how the following work: cameras (film and digital), telescopes (refracting and reflecting), microscopes, binoculars.

Formula Sheet:

$\theta_1 = \theta_2$ $M = h_i / h_o$ or $M = d_i / d_o$ $n = c/v$ $n_1 \sin\theta_1 = n_2 \sin\theta_2$

$1/f = 1/d_o + 1/d_i$ concave: $-f$, $-d_i$ (virtual) convex: $+f$, $-d_i$ (virtual) or $=d_i$ (real)