

Unit 13 Traditional – Vocabulary and Equations – Refraction & Lenses

<p><u>Vocabulary:</u> previous vocabulary medium, interface index of refraction, optically dense medium total internal reflection, critical angle dispersion speed of light in a vacuum normal, light ray, wave front, Snell’s law angle of incidence, angle of refraction convex, converging concave, diverging myopia, near-sighted, hyperopia, far-sighted 20/20 vision real image, virtual image, enlarged image reduced image, upright image, inverted image principal axis, focal point, center * thin lens equation, * magnification equation</p>	<p><u>Symbols:</u> c, v, n</p> <p><u>Equations & constants:</u> You use a 3 x 5 index card on this test: $n = c/v \quad n_1 \sin(\theta_1) = n_2 \sin(\theta_2) \quad \sin(\theta_c) = n_2/n_1$ $V_{\text{light}} = c = 3 \times 10^8 \text{ m/s} \quad f = 1/T, \quad v = f\lambda \quad d = vt$ Lens/mirror: $1/d_o + 1/d_i = 1/f$ Magnification: $M = -d_i / d_o \quad M = h_i / h_o$</p>
<p>Unit Objectives - Williams</p> <ol style="list-style-type: none"> 1. I understand all the vocabulary & math of this unit and all demos, videos, equations, and class assignments. 2. I remember objectives & vocabulary from previous units. 3. I know the image properties both lens types produce depending on object position 4. I know why light speed slows down and how this causes refraction and dispersion 5. I can distinguish between refraction, reflection and diffraction 6. I understand various vision problems and how lenses correct these, and other lens applications 7. I reviewed the candle lab and understand what's covered in it, even if I was absent for it 8. I can compute light speed using tabulated index of refraction information 9. I can model why light bends using wavefronts and I know the two things necessary to make light rays bend 10. Relative to the normal I know which way light bends when going to or from a faster/slower medium 11. I know how water distorts an object’s depth and why divers have a reduce field of view looking up 12. I can use Snell's law to predict how much light bends, why there is a critical angle and how to find it 13. I know 3 ways lens ray tracing differs from mirrors: focal point not predicted by geometry alone, different center ray, opposite behavior (including why behavior is opposite) 14. I know why blurred images form in the eye or elsewhere 15. I understand refraction related phenomena like mirages, prisms, rainbows, fiber optics, TIR, etc. 16. I know lens ray tracing including 3 principal rays, special principal axis points and 3 image properties 17. I know how to use the lens and magnification equations ($d_o > 0, d_i >$ where light rays REALLY converge, $f > 0$ for converging lenses) <p>DuPage ROE Objectives</p> <ol style="list-style-type: none"> 801. I can distinguish between transverse or longitudinal waves. 802. I can identify waves as either mechanical or electromagnetic. 803. I can identify: wavelength, amplitude, crest, trough, and period, given a visual representation. 804. I can solve problems using the relationships between velocity, wavelength, frequency, and period. 805. I can recognize that the speed of a wave is dependent upon the material/medium through which the wave travels. 806. I can recognize that waves transfer energy and not matter. 807. I can analyze wave superposition in terms of the effects of constructive and destructive interference. 808. I can identify and describe refraction. 	