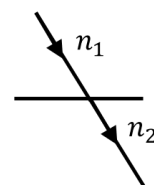
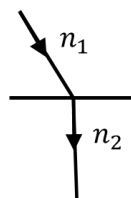
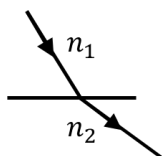


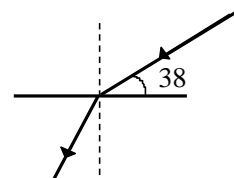
Name _____ Instructor name _____

You must show and explain all work neat and organized to receive credit. Please show each step for calculations. YOU MUST TURN IN THIS SHEET to have your assignment graded.

1. (a) What is the law of reflection? (b) What is the law of refraction? (c) What other name is sometimes given to it? (d) For the cases of refraction shown in the figures below, explain and state which is larger, n_1 or n_2 . (4 pts)



2. (a) For the situation shown in the figure on the right, what is the angle of incidence? (b) Starting with $n_1 \sin i = n_2 \sin r$, show that the value of i , when $r = 90$ degrees, is given by $\sin^{-1}(n_2/n_1)$. This value of i is usually designated as i_c , the angle for total internal reflection. (c) For what condition on n_1 and n_2 does this expression make sense? (d) What is meant by the critical angle for total internal reflection? (e) If the light shines from water ($n = 1.330$), calculate the critical angle for total internal reflection. (12 pts)



3. (a) Convert $\theta_1 = 10.0$ degrees, $\theta_2 = 20.0$ degrees, and $\theta_3 = 70.0$ degrees to radians. (b) Calculate the *sine* of each angle and compare it to θ measured in radians. (c) What conclusion do you draw concerning θ and $\sin\theta$ for small angles when θ is measured in radians? (d) For the equation, $\sin\theta = n \sin\phi + c$, assume that you plot a graph of $\sin\theta$ versus $\sin\phi$. What are the slope and intercept of the graph? (4 pts)