Name: _____ Date: _____ Class: _____

Refraction and Biosensors Quiz

Let's suppose you have in your possession a porous silicon thin film that has a strand of DNA in it that can sense a certain cancer-causing gene. How you came to have such a thing is a long story that's not important. What is important is that you know the film's index of refraction is 1.85. Use this one piece of information to answer the questions and problems below. Show all your work to receive full credit.

1. **Suppose you shine light from air (n = 1) into the film at an angle of 45° relative to the normal. At what angle would you expect the light to be refracted within the film?**

2. **Now suppose you use this film in an optical biosensing experiment, by exposing it to a solution containing your own DNA. After doing so, you notice that shorter wavelengths of light are reflected from the sample. What does this indicate about your own genetic make-up (that is, do you have the cancer-causing gene)? Explain your answer in complete sentences, or prove it mathematically.**