Physics 203 Ecampus
Individual Quizbit | Wave Optics

Hints:
PLD = m λ
PLD = (m + ½) λ
PLD = d sin(θ)
v = f λ
v = c / n

Timed Quizbit | Work individually to produce a handwritten solution on paper or a tablet to **questions 1 and 2** of this Quizbit during the timed 30-minute Gradescope assignment ***Timed Quizbit***. The quality of your solution and communication is far more important than the final answer!

1. Alexander Joseph (Lex) Luthor would like to create an anti-reflective coating for x-ray light for absolutely no foreseeable reason. He plans to use it to cover the glass windows on his car. The coating is to be made from a material with index of refraction n = 1.85. The specific frequency he wishes to not reflect is 3.0×10^{16} Hz. What is the minimum thickness of material that should be used? Make sure to show your work.

2. Which of the following statements are true? (more than one may or may not be true)
   (a) Light travels faster in materials with lower index of refraction.
   (b) When determining whether constructive or destructive interference is happening, path length difference is not important.
   (c) The small angle approximation says that the values of Sine and Cosines are approximately equal when angles are smaller than about 10 degrees.
   (d) Decreasing the slit separation will spread apart the neighboring fringes created by a double slit apparatus.
   (e) When shining white light through a diffraction grating the blue side of each resulting rainbow will appear further from the central maximum than the corresponding red side.

Final Solution and Sensemaking | After you've completed and submitted questions 1 and 2 to the timed Gradescope assignment, take more time to create a final solution set to all the questions, including the sensemaking follow-up below. Use any of the course support systems (LAHHH, Teams, WormHole, … etc.) to produce the best solutions. Submit your work to the ***Final Solution*** Gradescope assignment by Sunday. Your final work will be graded on both completeness and correctness.

3. **Sensemaking follow-up** | An example of limiting cases sensemaking is to test some maximum or minimum boundary of a system by taking something to it's limit. Consider a case where 475 nm wavelength laser produces a diffraction pattern using a diffraction grating of slit spacing d. We want to know the minimum d which will produce exactly 15 bright spots on a really wide (assume infinite) screen 10.0 meters away. To answer this, take one of our variables to the maximum value it could be and then solve for d. What variable can we maximize to answer this question and what is the minimum d that would produce exactly 15 bright spots?