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Physics 2C, Winter 2020

Reading Assignment due Thursday 1/16: Submit via Gradescope by 11:30am

1. A source and an observer are moving relative to one another. One is at rest and the other is moving at some speed less than the speed of sound. The goal of this problem is to figure out who is moving. The source emits sound waves at frequency f_0, but the observer detects the sound at frequency $3f_0$.

   (a) Who is moving – the observer, or the source? Are they moving towards the other body, or away from it?

   (b) What is the speed of the moving body, in terms of the speed of sound v?

   (c) What is the wavelength of the sound waves, as measured by a third person who is at rest and is located somewhere between the source and receiver? Your answer will have v (the speed of sound) as well as f_0. Check to make sure that the combination you write down has the right dimensions/units for length/meters.

2. "Stop to Think 17.1" on page 457 of the textbook. As always, provide some justification for your answer (don't just write a single letter).

3. Suppose you have a string of length L clamped down on both sides. Is it possible for the wavelength of a standing wave on this string to equal $L/3$? If yes, then draw a picture and give the value of the fundmental mode m (like in Figure 17.9 on page 461). If this situation is not possible, explain why not, with both a picture as well as some words explaining the picture.

For extra practice (not due): From Chapter 16 of Knight, 4th edition: Conceptual Questions: 11-12. Exercises: 40, 41, 42, 44.
From Chapter 17: Conceptual Questions: 1-3. Exercises: 3-13.