

## AP Physics 1 Review Questions

### *Integrating Content, Inquiry and Reasoning*

1. Compare the accuracy of the two methods for determining the speed of sound in air—timing echoes and achieving resonance in a closed tube. How might the accuracy of each method be improved?
2. How would the slope of graphed data for the guided-inquiry activity change if hot water were used instead of room temperature tap water?
3. The PVC tube used in the guided-inquiry activity is 61 cm long. Of the eight tuning forks available in this activity, what is the lowest frequency tuning fork that would be able to resonate in the PVC tube at the next higher harmonic? Explain your reasoning.
4. A boat on Lake Michigan is outfitted with an echo sounder—a type of sonar unit that sends a wave pulse downward and then detects the pulse reflected from the lake bottom. If the time between the incident pulse and the detection of the reflected pulse is 0.27 seconds, how deep is the lake bottom, assuming the speed of sound in the water is 1500 m/s?
5. Most orchestras tune to concert pitch, which is 440 Hz.
  - a. A clarinet is considered a closed tube, since the musician's mouth covers the vibrating reed on the mouthpiece. What is the length of the air column in the clarinet when it is in tune at concert pitch? Assume the temperature of the room is 20 °C.
  - b. A flute is an open tube. What is the length of the air column in the flute when it is in tune at concert pitch in the same room?
  - c. A piccolo is like a small flute, just 32 cm long. Can the piccolo tune to the fundamental frequency of concert pitch in the same room? If not, how can a piccolo tune with the orchestra?