The Speed of Sound

Read from **Lesson 2** of the **Sound and Music** chapter at **The Physics Classroom:**

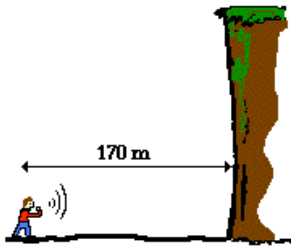
http://www.physicsclassroom.com/Class/sound/u11l2c.html

1. When the C4 key on a piano keyboard is pressed, a string inside the piano is struck by a *hammer* and begins vibrating back and forth at approximately 260 cycles per second.
   a. What is the frequency in Hertz of the sound wave?

   b. Assuming the sound wave moves with a velocity of 345 m/s, what is the wavelength of the wave? **PSYW**

2. An automatic focus camera is able to focus on objects by use of an ultrasonic sound wave. The camera sends out sound waves that reflect off distant objects and return to the camera. A sensor detects the time it takes for the waves to return and then determines the distance an object is from the camera. If a sound wave (speed = 345 m/s) returns to the camera 0.115 seconds after leaving the camera, how far away is the object? **PSYW**

3. Miles Tugo is camping in Glacier National Park. In the midst of a glacier canyon, he makes a loud holler. The sound (v = 345 m/s) bounces off the nearest canyon wall (which is located 170 meters away from Miles) and returns to Miles. Determine the time elapsed between when Miles makes the holler and the echo is heard. **PSYW**



4. Suppose that sound travels at a speed of 345 m/s on the evening of a thunderstorm. There is a lightning strike some distance from your home. The light reaches you nearly immediately. Yet the thunder is heard 3.5 seconds later. How many miles from your home did the lightning strike? (1609 meters = 1 mile) **PSYW**

5. A male vocalist with a bass voice can sing as low as 85 Hz. Given that the speed of sound is 345 m/s, what is the wavelength of the sound waves? **PSYW**

6. A female vocalist with a soprano voice can sing as high as 1000 Hz. Given that the speed of sound is 345 m/s, what is the wavelength of the sound waves? **PSYW**