

Prelab 3: Resonance

PHYS 1320

Fall 2017

Due at the beginning of class.

1) The speed of sound in air depends on the temperature, T . The “accepted speed” for sound in air is given by the formula (NOTE: the parenthesis contain units.)

$$v = 332 \left(\frac{\text{m}}{\text{s}} \right) + 0.6 \left(\frac{\text{m}}{\text{s} \cdot ^\circ\text{C}} \right) T$$

Fill in the following table:

T (°C)	v (m/s)
-20	
-10	
0	
+10	
+20	

2) Now we will do a similar exercise with English units. Use:

$$v = 1087 \left(\frac{\text{ft}}{\text{s}} \right) + 1.1 \left(\frac{\text{ft}}{\text{s} \cdot ^\circ\text{F}} \right) (T - 32^\circ\text{F})$$

CAUTION: Remember the base temperature in English units is 32° F, not zero!!!

Fill in the following table:

T (°F)	v (ft/s)
-20	
-10	
0	
+10	
+20	

3) You are given an $L = 8$ ft long OPEN organ pipe. Compute the frequencies and wavelengths for the lowest three resonant modes. Sketch the wave pattern in the figures. (Assume the temperature is such that $v = 1200$ ft/s.)

		$f =$
		$\lambda =$
		$f =$
		$\lambda =$
		$f =$
		$\lambda =$

4) You are given an $L = 8$ ft long CLOSED organ pipe. Compute the frequencies and wavelengths for the lowest three resonant modes. Sketch the wave pattern in the figures. (Assume the temperature is such that $v = 1200$ ft/s.)

(You may use the back of the page, if necessary.)

		$f =$
		$\lambda =$
		$f =$
		$\lambda =$
		$f =$
		$\lambda =$