Physics 432 Name Key

Date

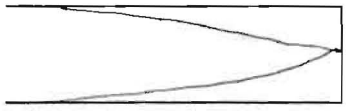
$V_{sound} = 345 m/s$

Interference and Resonance

Review WS

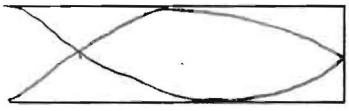
Directions: Show all your work, include proper units, and box your final answer.

1. Draw the first three resonant patterns and indicate the corresponding frequencies of a closed pipe that is .6m long.



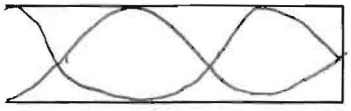
$f = \frac{V}{4L}$ $f = \frac{345 m/s}{4(.6)}$

$f = 143.75 Hz$



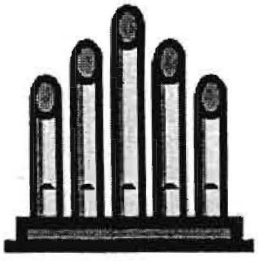
$f = \frac{3V}{4L}$ $f = \frac{3(345 m/s)}{4(.6m)}$

$f = 431.25 Hz$



$f = \frac{5V}{4L}$ $f = \frac{5(345 m/s)}{4(.6m)}$

2. The second harmonic of an open organ pipe is 2,400 Hz. What would the ~~second~~ third harmonic be in the same pipe if one end were closed? (Include a drawing of each)



$\lambda = L$

$f = \frac{V}{L}$

$2400 Hz = \frac{345 m/s}{L}$

$L = .14375 m$

$\frac{3}{4}\lambda = L$

$\lambda = \frac{4}{3}L$

$f = \frac{3V}{4L}$

$f = \frac{3(345 m/s)}{4(.14375 m)}$

$f = 1800 Hz$

3. What is the fundamental frequency of a closed organ pipe 35 cm long when ~~the temperature is 18 degrees Celsius~~? $V_{sound} = 343 m/s$

$L = .35$

$\frac{1}{4}\lambda = L$ $f = \frac{V}{4L}$

$f = \frac{345 m/s}{4(.35 m)}$

$f = 246.43 Hz$

1400m

4. A lost boy yells for help in a cave that is 700 meters long. He hears his echo 4.25 s later.
   a. Calculate the speed of sound in air.

$V = \frac{d}{t}$

$v = 329.4 \text{ m/s}$

b. If the wavelength of sound is 0.75 m then what is the frequency?

$V = f\lambda$

$329.4 \text{ m/s} = f(.75\text{m})$

$f = 439.2 \text{ Hz}$