

Closed Column Resonance

$L_1 = \frac{1}{4}\lambda$   
 $L_2 = \frac{3}{4}\lambda$   
 $L_3 = \frac{5}{4}\lambda$   
 $\Delta L = \frac{1}{2}\lambda$  (spacing)

difference b/w two successive resonance lengths

Shortest tube:  $L_1 = \frac{1}{4}\lambda$   
 spacing:  $\Delta L = \frac{1}{2}\lambda$

Jun 3-10:14 AM

Open Column Resonance

$L_1 = \frac{1}{2}\lambda$   
 $L_2 = \frac{3}{2}\lambda$   
 $L_3 = \frac{5}{2}\lambda$   
 $\Delta L = \frac{1}{2}\lambda$  (spacing)

Shortest tube:  $L_1 = \frac{1}{2}\lambda$   
 spacing:  $\Delta L = \frac{1}{2}\lambda$

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Resonance Problems

$L_1 = 9.0\text{cm}$   
 $T = 20^\circ\text{C} \Rightarrow v = 343\text{m/s}$

a)  $\lambda = ?$   
 $L_1 = \frac{1}{4}\lambda$   
 $9.0\text{cm} = \frac{1}{4}\lambda$   
 $\lambda = 36\text{cm}$

b)  $L_2$  and  $L_3 = ?$   
 $L_2 = \frac{3}{4}\lambda$   $L_3 = \frac{5}{4}\lambda$   
 $L_2 = \frac{3}{4}(36\text{cm})$   $L_3 = \frac{5}{4}(36\text{cm})$   
 $L_2 = 27\text{cm}$   $L_3 = 45\text{cm}$   
 $\Delta L = 18\text{cm}$

c)  $f = ?$   
 $v = \lambda f$   
 $f = \frac{v}{\lambda}$   
 $f = \frac{343\text{m/s}}{0.36\text{m}}$   
 $f = 9.5 \times 10^2 \text{ Hz}$

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MP1425

open  $v = 344\text{m/s}$   
 $f_1 = 330\text{Hz}$

a)  $f_2 = ?, f_3 = ?$   
 $f_n = n f_1$   
 $f_2 = 2(330\text{Hz})$   
 $f_2 = 660\text{Hz}$   
 $f_3 = 3(330\text{Hz})$   
 $f_3 = 990\text{Hz}$

b)  $L_1 = ?$   
 $v = \lambda f$   
 $\lambda = \frac{v}{f}$   
 $\lambda = \frac{344\text{m/s}}{330\text{Hz}}$   
 $\lambda = 1.04\text{m}$   
 $L_1 = \frac{1}{2}\lambda$   
 $L_1 = \frac{1}{2}(1.04\text{m})$   
 $L_1 = 0.521\text{m}$

MP1426

closed  $v = 344\text{m/s}$   
 $f_1 = 330\text{Hz}$

$L_1 = \frac{1}{4}\lambda$   
 $L_1 = \frac{1}{4}(1.04\text{m})$   
 $L_1 = 0.261\text{m}$

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