

# Sound and music

\* open

25.  $f = 262 \text{ Hz}$

$L = ?$

$v = 348 \text{ m/s}$

$$v = f\lambda$$

$$348 \text{ m/s} = (262 \text{ Hz})(\lambda)$$

$$\lambda = 1.33 \text{ m}$$

open fundamental

$$L = \frac{1}{2}\lambda$$

$$L = \frac{1}{2}(1.33 \text{ m})$$

$$L = .67 \text{ m}$$

26.  $L = .226 \text{ m}$  closed

$f = 384 \text{ Hz}$

$v = ?$

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

$$.226 = \frac{1}{4}\lambda$$

$$\lambda = .904 \text{ m}$$

$$v = f\lambda$$

$$v = (384 \text{ Hz})(.904)$$

$$v = 347.1 \text{ m/s}$$

27.  $L = ?$  open

$f = 1050 \text{ Hz}$

$v = 345 \text{ m/s}$

$$L = \frac{1}{2}\lambda$$

$$L = \frac{1}{2}(.329)$$

$$L = .164 \text{ m}$$

$$v = f\lambda$$

$$345 \text{ m/s} = 1050 \text{ Hz}(\lambda)$$

$$\lambda = .329 \text{ m}$$

28. closed  $L = \frac{1}{4}\lambda, \frac{3}{4}\lambda, \frac{5}{4}\lambda, \frac{7}{4}\lambda, \frac{9}{4}\lambda$   
 $5^{\text{th}}$  harmonic  $\Rightarrow \frac{9}{4}\lambda$

$$L = \frac{9}{4}\lambda \quad v = f\lambda$$

$$2.29\text{m} = \frac{9}{4}\lambda \quad 343\text{m/s} = f(1.017)$$

$$\lambda = 1.017\text{m} \quad \boxed{f = 337\text{Hz}}$$

29. Not responsible for

30.

31.  $f_{\text{Beat}} = |f_1 - f_2|$

$$f_{\text{beat}} = 2 = \frac{440}{\cancel{440}} - f_2$$

$f_2 = 438\text{Hz}$

$f_2 = 442\text{Hz}$   
 reject

problem asked for lower frequency

$$32. \frac{12 \text{ beats}}{4 \text{ sec.}} = 3 \text{ Hz} = f_B$$

higher pitch  $f_B = |f_1 - f_2|$

$$3 = |f_1 - 330|$$

$$f_1 = 333 \text{ Hz}$$

~~$$f_1 = 327 \text{ Hz}$$~~  
 reject