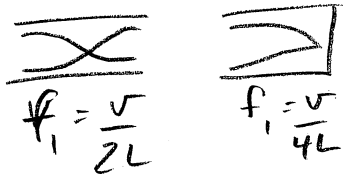
Chapter 14

1. A 2. B 6. B 7. B 12. C

14. C 15. C 19. B 22. D 23. A

24. D



$f_1 = \frac{v}{2L}$ $f_1 = \frac{v}{4L}$

25. D $v = f\lambda$

$= 17\,250(0.019)$

$= 328 \text{ m/s}$

31. D

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

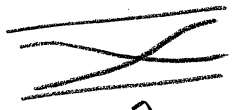
$\lambda = 2L$

$v = f\lambda$

$v = f(2L)$

$L = \frac{v}{2f} = \frac{331}{2(400)} = 0.4138 \text{ m}$

32. D



$L_A = \frac{\lambda}{2}$

$L_A = \frac{v}{2f_A}$

$= \frac{331}{2(250)}$

$= 0.662$

$L_B = \frac{\lambda}{2}$

$L_B = \frac{v}{2f_B}$

$= \frac{331}{2(300)}$

$= 0.552$

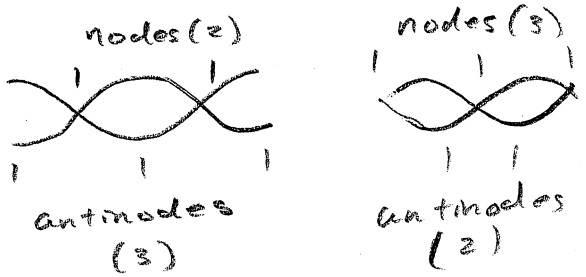
$\Delta L = 0.662 - 0.552 = 0.11 \text{ m}$

36. D 39. A 40. A 44. D

47. B 50. D 51. D 53. D

66. A 67. B 68. A 72. A

75. A



number of nodes ≠ number of antinodes.
The difference between nodes and antinodes can only ever be 1.

77. D

$\lambda = 2L$

78. D The second overtone is the third possible harmonic.

$$f_5 = \frac{5v}{4L} = \frac{5(331)}{4(.22)} = 1880.7$$

79. D

$$f_1 = \frac{v}{2L}$$

$$L = \frac{v}{2f_1} = \frac{331}{2(220)} = .75$$

$$f_1 = \frac{350}{2(.75)} = 233\ Hz$$

82. A 87. A 89. A 92. B

93. D

$f_{L_1} - f_{L_2} = 300\ Hz$

Higher frequency is shorter length.

$\frac{v}{2L_1} - \frac{v}{2(L_1 + x)} = 300\ Hz$

$L_1 < L_2$

$L_2 = L_1 + x$

where x is the distance between holes.

$L_1 = .2\ m$

assume $v = 331\ m/s$.

$\frac{331}{2(.2)} - \frac{331}{2(.2+x)} = 300$

$827.5 - \frac{165.5}{.2+x} = 300$

$+\frac{165.5}{.2+x} = +527.5$

$\frac{165.5}{527.5} = .2 + x$

$x = .11\ m$