

Problems for chapter 12

1, 2, 3, 6, 8, 9, 10, 12, 14, 15, 16, 24, 27, 28, 31, 33, 34, 35, 38, 39, 41, 42, 43, 48, 49, 52, 56, 65, 67, 70, 73, 75, 77, 80, 83, 86

Answers to even-numbered problems:

Chapter 12

2. 1950
4. 0.64 s, 2.92 s
6. 427 m
8. 1 W/m^2 , $1 \times 10^{-10} \text{ W/m}^2$
10. 92 dB
12. 6.31×10^5 , 3.16×10^9
14. $5 \times 10^{-12} \text{ W}$, 6300 years
16. 985 W, 280 m
18. Increase by factor of 9, 9.5 dB
20. 131.2 dB
22. 150 Hz, 20000 Hz
24. 87 N
26. 480 Hz, 710 Hz
28. 300 Hz
30. 0.656 m, 262 Hz, 1.312 m, 262 Hz, 1.312 m
32. 0.583 m
34. Closed, 88 Hz
36. Open, 4.3 m
38. 3430 Hz, 10290 Hz, 17150 Hz
40. 15 Hz, 3.75 Hz
42. 346 Hz
44. 9 beats/s
46. 343 Hz, 1029 Hz, 1715 Hz
48. 5.65 Hz
50. 1710 Hz, 1420 Hz
52. 120 Hz
54. 30.9 kHz
56. 91 Hz
58. (a)-(d) 570 Hz, (e) 594 Hz, (f) 595 Hz
60. 26 degrees, 21 s
62. 2.3 degrees, 11 degrees
64. 37 degrees, $M = 1.7$
66. 10 octaves
68. 30 dB
70. 57.2 W
72. 0.13 W
74. $0.44 \mu_A$, $0.20 \mu_A$, $0.039 \mu_A$
76. 635 Hz
78. Resonant freq is 8.0 Hz
80. 2.41 m/s
82. 114 m/s
84. No beats, 12 Hz, no beats
86. 54.9 kHz
88. 50 Hz, 6th overtone
90. 2833 Hz, 1.80 m, 0.12 m
92. 36 km