TERMS

Be able to define or discuss the following terms with their SI units, if any.

1. mechanical wave
2. transverse wave
3. longitudinal wave
4. wave speed v
5. wavelength λ
6. angular frequency ω
7. wave number k
8. wave function $y(x,t)$
9. amplitude A
10. phase $(kx \mp \omega t)$
11. wave equation Eq. (15.12)
12. traveling wave
13. principle of superposition
14. constructive interference
15. destructive interference
16. node
17. antinode
18. standing wave

EQUATIONS

Understand the meaning and know the SI units of all the symbols in these equations—and be able to use the equations to solve problems.

1. Eq. (15.1)
2. $f = \dfrac{1}{T}$
3. Eq. (15.5)
4. $\omega = 2\pi f$
5. $v = \dfrac{\omega}{k}$
6. $y(x,t) = A\cos(kx - \omega t)$ or $y(x,t) = A\cos(kx + \omega t)$
7. Eq. (15.14)
8. Eq. (15.25)
9. $y = (2A\sin kx)\sin \omega t$

SKILLS

Use the material in these sections to be able to:

1. determine the amplitude A, wave number k, wavelength λ, angular frequency ω, frequency f, period T, wave speed v, and direction of the wave propagation from a given wave function.
2. write down the wave function given a sufficient number of the values of quantities listed in Skill 1.
3. (for a particle of the medium) find its velocity and acceleration components v_y and a_y by taking first and second partial derivatives with respect to time of the appropriate wave function.
4. solve problems with the μ in Eqs. (15.14) and (15.25), understanding that this μ stands for the mass per length (that is, m/L) of the string, wire, … and, therefore, that this μ is **not** the metric prefix for 10^{-6}, **not** the magnetic dipole moment, and **not** the permeability.
5. for a standing wave, use that nodes and antinodes alternate.
6. for a standing wave, use that the distance from a node to its nearest antinode is one-quarter wavelength.
7. for a standing wave, use that the distance from a node to its nearest node (or from an antinode to its nearest antinode) (if they exist) is one-half wavelength.

Pages 476, 483, and 484: As the mass per length of the "clothesline" is about 50 times too large, don't take the wave speed in Example 15.2 too seriously, nor the average power in Example 15.4.

Page 477, above Eq. (15.11): Change "tells us" to "is related to" before "the *curvature*".

Page 485, in the last paragraph: It's an "*algebraic sum*" because it's the sum of the transverse *components* of the two vector displacements.

Page 486, in the last paragraph: It's an "algebraic sum" because it's the sum of the longitudinal *components* of the two vector displacements (sound in air is a longitudinal pressure wave).