

ANSWERS CIRCLED BELOW

**MULTIPLECHOICE. "nota" means none of the above.**

1. A solid box of volume  $1.0 \text{ m}^3$  is completely submerged and sits firmly at rest on the bottom of a pond of water. The density of water is  $1000 \text{ kg/m}^3$ . What is the magnitude of the buoyant force on the box?

- a. 98 N
- ☒ b. 9800 N
- c. 980000 N
- d nota

2. What is the direction of the buoyant force on the box of the previous problem?

- a. downward
- ☒ b. upward
- c. leftward
- d rightward

3. In the previous problem, the normal force magnitude on the box from the pond floor is

- a. greater than the magnitude of the box's weight.
- ☒ b. less than the magnitude of the box's weight.
- c. equal to the magnitude of the box's weight.

4. True or False. Waves on a string are longitudinal waves. (a) True ☒ (b) False

5. You wish to triple the speed of a wave in a string by increasing the tension. By what factor must you increase the tension in the string?

- (a) 3 ☒ (b) 9 (c)  $\sqrt{2}$  (d)  $\sqrt{8}$  (e) nota

6. What is the formula for the natural frequencies for a stretched string (fixed at both ends) with length  $L$  and with wave speed  $v$ ?

- (a)  $v/2nL$  ☒ (b)  $nv/2L$  (c)  $n^2v/L$  (d) nota

7. In the previous problem,  $n$  equals

- (a) 0, 1, 2, 3,... (b) 2, 4, 6, 8,... (c) 1, 2, 3, 4,... (d) 0, 1, 3, 5,... (e) nota

8. A stretched string is fixed at both ends with length  $L = 2.0$  m. What is the wavelength of a standing wave in the fundamental (first) mode ( $n = 1$ ) ?

- (a) 2.0 m (b) 1.0 m (c) 4.0 m (d) nota

9. True or False. Sound waves in air are transverse waves. (a) True (b) False

#### EXTRA CREDIT

10. A railroad locomotive is at rest with its whistle blowing and starts moving away from you . The frequency that you hear will

- (a) increase (b) decrease (c) remains the same

11. In the previous problem, the wavelength reaching your ear will

- (a) increase (b) decrease (c) remains the same