

1. The intensity of a spherical wave 4.0 m from the source is  $120 \text{ W/m}^2$ . What is the intensity at a point 9.0 m away from the source?  
A)  $11 \text{ W/m}^2$   
B)  $24 \text{ W/m}^2$   
C)  $53 \text{ W/m}^2$   
D)  $80 \text{ W/m}^2$   
E)  $270 \text{ W/m}^2$
2. During a typical workday (eight hours), the average sound intensity arriving at Larry's ear is  $1.8 \times 10^{-5} \text{ W/m}^2$ . If the area of Larry's ear through which the sound passes is  $2.1 \times 10^{-3} \text{ m}^2$ , what is the total energy entering each of Larry's ears during the workday?  
A)  $1.8 \times 10^{-5} \text{ J}$   
B)  $2.2 \times 10^{-4} \text{ J}$   
C)  $7.4 \times 10^{-4} \text{ J}$   
D)  $1.1 \times 10^{-3} \text{ J}$   
E)  $4.1 \times 10^{-3} \text{ J}$
3. The decibel level of a jackhammer is 130 dB relative to the threshold of hearing ( $1 \times 10^{-12} \text{ W/m}^2$ ). Determine the sound intensity produced by the jackhammer.  
A)  $1.0 \text{ W/m}^2$   
B)  $10 \text{ W/m}^2$   
C)  $13 \text{ W/m}^2$   
D)  $130 \text{ W/m}^2$   
E)  $10^{13} \text{ W/m}^2$
4. The decibel level of a jackhammer is 130 dB. Determine the decibel level if two jackhammers operate side by side.  
A) 65 dB  
B) 130 dB  
C) 133 dB  
D) 144 dB  
E) 260 dB
5. A person is talking in a small room; and the sound intensity level is 60 dB everywhere within the room. If there are eight people talking simultaneously in the room, what is the sound intensity level?  
A) 60 dB  
B) 79 dB  
C) 74 dB  
D) 64 dB  
E) 69 dB

6. According to US government regulations, the maximum sound intensity level in the workplace is 90.0 dB. Within one factory, 32 identical machines produce a sound intensity level of 92.0 dB. How many machines must be removed to bring the factory into compliance with the regulation?
- A) 2
  - B) 8
  - C) 12
  - D) 16
  - E) 24
7. At a distance of 5.0 m from a point sound source, the sound intensity level is 110 dB. At what distance is the intensity level 95 dB?
- A) 5.0 m
  - B) 7.1 m
  - C) 14 m
  - D) 28 m
  - E) 42 m
8. A car moving at 35 m/s approaches a stationary whistle that emits a 220 Hz sound. The speed of sound is 343 m/s. What is the frequency of sound heard by the driver of the car?
- A) 198 Hz
  - B) 220 Hz
  - C) 242 Hz
  - D) 282 Hz
  - E) 340 Hz
9. A train moving at a constant speed is passing a stationary observer on a platform. On one of the train cars, a flute player is continually playing the note known as concert A ( $f = 440$  Hz). After the flute has passed, the observer hears the sound as a G which has a frequency of 392 Hz. What is the speed of the train? The speed of sound in air is 343 m/s.
- A) 26 m/s
  - B) 12 m/s
  - C) 42 m/s
  - D) 7.3 m/s
  - E) 37 m/s
10. A source moving through water at 10.0 m/s generates water waves with a frequency of 5.0 Hz. The speed of these water waves relative to the water surface is 20.0 m/s. The source approaches an observer who is at rest in the water. What wavelength would be measured for these waves by the stationary observer?
- A) 1.0 m
  - B) 2.0 m
  - C) 4.0 m
  - D) 6.0 m
  - E) 8.0 m