**1) If a wave has a wavelength of 25.4 cm and a frequency of 1.63 kHz, its speed is closest to**

**A) 0.414 m/s B) 15.6 m/s C) 414 m/s**

**D) 41,400 m/s E) 41.4 m/s**

**2) If a wave has a speed of 362 m/s and a period of 4.17 ms, its wavelength is closest to**

**A) 1510 m B) 86,800 m C) 1.51 m**

**D) 86.8 m E) 0.0115 m**

**3) The speed of sound in steel is 5000 m/s. What is the wavelength of a sound wave of frequency 660 Hz in steel?**

**A) 2.41 m B) 0.829 m C) 1.21 m**

**D) 0.132 m E) 7.58 m**

**4) Crests of an ocean wave pass a pier every 10.0 s. If the waves are moving at 5.6 m/s, what is the wavelength of the ocean waves?**

**A) 64 m B) 48 m C) 28 m D) 56 m**

**5) Transverse waves propagate at 43.2 m/s in a string that is subjected to a tension of 60.5 N. If the string is 15.9 m long, what is its mass?**

**A) 0.515 kg B) 0.366 kg C) 0.597 kg**

**D) 0.216 kg**

**6) A 4.0 g string, 0.36 m long, is under tension. The string produces a 500 Hz tone when it vibrates in the third harmonic. The speed of sound in air is 344 m/s. In this situation, the wavelength of the standing wave in the string, in SI units, is closest to:**

**A) 0.24 B) 0.54 C) 0.36**

**D) 0.72 E) 0.90**

**7) What is the frequency of the fundamental mode of vibration of a steel piano wire stretched to a tension of 440 N? The wire is 0.600 m long and has a mass of 5.60 grams.**

**A) 234 Hz B) 295 Hz C) 366 Hz**

**D) 312 Hz E) 180 Hz**

**8) A 0.588 m string is clamped at both ends. If the lowest standing wave frequency in the string is 326 Hz, what is the wave speed?**

**A) 724 m/s B) 582 m/s C) 383 m/s**

**D) 475 m/s**

**9) A fisherman fishing from a pier observes that the float on his line bobs up and down, taking 2.4 s to move from its highest point to its lowest point. He also estimates that the distance between adjacent wave crests is 48 m. What is the speed of the waves going past the pier?**

**A) 1.0 m/s B) 20 m/s C) 5.0 m/s**

**D) 10 m/s E) 120 m/s**

**10) An organ pipe open at both ends has a length of 0.80 m. If the velocity of sound in air is 340 m/s, what is the frequency of the second harmonic of this pipe?**

**A) 425 Hz B) 638 Hz C) 850 Hz D) 213 Hz**

**11) A whistle produces sound of frequency of 1.00 kHz. If a listener moves with a speed of 30 m/s away from the whistle, what frequency does this person hear if the sound speed is 340 m/s?**

**A) 919 Hz B) 1000 Hz C) 1090 Hz D) 912 Hz**

**12) A police car has an 800-Hz siren. It is traveling at 35.0 m/s on a day when the speed of sound through air is 340 m/s. The car approaches and passes an observer who is standing along the roadside. What change of frequency does the observer hear?**

**A) 82 HZ B) 0 Hz C) 166 Hz D) 249 Hz**

**1) C**

**2) C**

**3) E**

**4) D**

**5) A**

**6) A**

**7) B**

**8) C**

**9) D**

**10) A**

**11) D**

**12) C**