

## Quiz.

1. The fundamental frequency of a violin string is 440 hertz. The frequency of its second harmonic is
  - a) 220 hertz.
  - b) 440 hertz.
  - c) 880 hertz.
  - d) None of the above choices are correct.
  
2. Fourier discovered that periodic waves can be represented by
  - a) a series of non-periodic waves.
  - b) the summation of a series of simple sine waves.
  - c) a binary code.
  - d) pulses of the same amplitude.
  
3. Given what you know about thermal expansion, under what conditions would be ideal for tuning a guitar?
  - a) When the strings are at room temperature.
  - b) When the strings are cooler than room temperature.
  - c) Once you've warmed up the strings by playing a bit.
  - d) The temperature does not matter.
  
4. Which of the following characteristics enables you to differentiate between different instruments by sound?
  - a) pitch
  - b) fundamental frequency
  - c) intensity
  - d) quality
  
5. Musical notes can be found in
  - a) music only.
  - b) noise only.
  - c) music always and sometimes noise.
  - d) music sometimes and sometimes noise.
  
6. Who is credited with discovering the relationship between frequency and harmonics?
  - a) James Clerk Maxwell
  - b) Isaac Newton
  - c) Pythagoras
  - d) Heinrich Rudolf Hertz
  
7. What type of wave is musical sound? (Circle all that apply.)
  - a) electromagnetic
  - b) radio
  - c) longitudinal
  - d) transverse

8. Music loudness is most closely associated with (Circle all that apply.)
- a) wavelength.
  - b) intensity.
  - c) frequency.
  - d) quality
  - e) amplitude.
9. Waves with frequencies lower than 20 hertz are called \_\_\_\_\_ while waves with frequencies higher than 20,000 hertz are called \_\_\_\_\_.
- a) subsonic, hypersonic
  - b) subsonic, supersonic
  - c) infrasonic, hypersonic
  - d) infrasonic, ultrasonic

Answer Key.

1. c)

Multiples of a fundamental frequency are called harmonics. Also, multiples of two of the frequency of a musical tone is called an octave, so in this case 880 hertz is one octave higher than the fundamental frequency.

2. b)

The Fourier analysis of a periodic wave form disassembles it into a combination of sine waves.

3. c)

Playing the guitar warms up the strings, so you should tune the guitar when it is about the temperature it will be when you are playing it so that you do not have to keep retuning it as frequently as if you tuned it cold.

4. d)

No instrument can play a perfect musical tone, but overlays several frequencies which combined form the sound of a musical tone. Each instrument and voice does this utilizing different frequencies, and this combination is like a fingerprint that allows the hearer to recognize the instrument or person from which the sounds are coming from.

5. d)

Both music and noise may use musical notes, but neither requires them. Music and noise can be made solely from percussion, for example.

6. c)

The legend goes that Pythagoras recognized the harmony of hammers in a blacksmith's shop and was even able to determine the hammers' masses by their relative frequencies.

7. c)

This was a trick question, unless you knew the answer well. Remember that radio waves are not sound waves.

8. b) & e)

Both the physiological phenomenon of loudness and the physical property of intensity depend on the amplitude of the variation of pressure within a sound wave. Frequency and wavelength do not affect loudness or intensity, and neither does quality.

9. d)

This terminology is similar to the infrared and ultraviolet waves we are more familiar with.