

## Physics 221 – Spring 2013

### Quiz #1

Name: Solution

- 1) What makes sound?
  - a) **Something vibrating**
  - b) Sound Waves
  - c) Two objects moving in the same direction
  - d) Two objects moving towards one another
  
- 2) When you talk, sound travels through the air as
  - a) moisture from your mouth to the listener's ear
  - b) air currents from your mouth to the listener's ear
  - c) dust particles from your mouth to the listener's ear
  - d) **waves moving through the air from your mouth to the listener's ear**
  - e) as particles from your mouth to the listener's ear
  
- 3) The energy of sound waves is always very small and can only be detected by our ears or other sensitive instruments.
  - a) True
  - b) **False**
  
- 4) Which of the following is NOT a cause of vibration for musical instruments
  - a) plucking a string
  - b) buzzing your lips
  - c) **pressing a key on a flute**
  - d) sliding a bow on a violin
  
- 5) When an object is made to vibrate at its natural frequency of vibration we say the object is
  - a) **in resonance**
  - b) in pitch
  - c) in harmony
  - d) in the cochlea
  - e) wavelength
  
- 6) Why does a tuba have lower sounds than a trumpet?
  - a) The large bell the sound comes out of
  - b) The fat tubes the sound waves move through before coming out
  - c) **The long distance the sound waves have to travel before they get out**
  - d) The way the musician blows into the tuba
  
- 7) A violin is basically a hollow wooden box with strings across it. If the wooden box were replaced by a solid piece of wood the violin would sound
  - a) the same
  - b) higher
  - c) lower
  - d) louder
  - e) **quieter.**

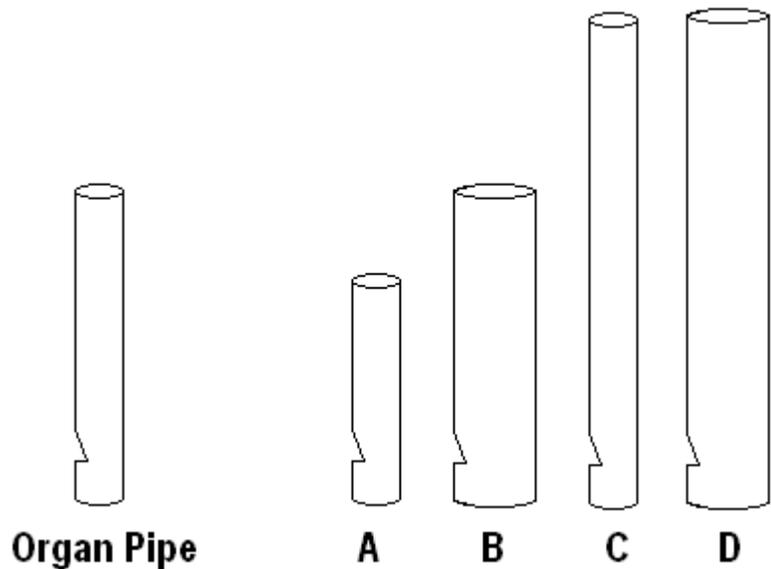


8) The organ pipe shown in the diagram produces a certain musical pitch. Which of the other four organ pipes shown would produce the same pitch?

- a) A
- b) B**
- c) C
- d) D

9) If a person blows over the top of the pipes shown in the diagram, which pipe will make a lower (pitch) sound?

- a) A
- b) B
- c) C
- d) D
- e) Both C & D**
- f) Both B & D
- g) Both A & C



10) Low pitch is

- a) a quiet sound
- b) a low sound (bass)**
- c) a loud sound
- d) a high sound (treble)

11) The pitch of sound depends on the

- a) frequency of the sound**
- b) loudness of the sound
- c) speed of the sound

12) Treble notes are high on the musical scale. The vibrations producing treble notes have

- a) low frequencies (vibrate at a low rate)
- b) high frequencies (vibrate at a high rate)**
- c) The note does not depend on the rate of the vibrations (# per second)

13) Humans can hear sound with wavelengths that range from half an inch and to 50 feet. Bass notes are low on the musical scale and have

- a) longer wavelengths**
- b) shorter wavelengths
- c) The note does not depend on the length of the wave

14) What part of the ear is used to collect and funnel sound down the ear canal?

- a) Eardrum
- b) Pinna**
- c) Cochlea
- d) Ossicles

15) Hair cells in different parts of the cochlea respond to different frequencies.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

16) Sound waves hit the eardrum and cause it to vibrate.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

17) The vibrations continue through the ossicles in the middle ear and travel to the cochlea.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

18) Sound that is too loud can damage the tiny hair cells of the inner ear.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

19) The hair cells turn the vibrations into electrical signals that are sent to the brain.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

20) Being around loud sounds a lot will help your ears get used to it and protect your hearing.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

21) The more time I spend around loud sound, the worse my hearing will be.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

22) Hair cells in the cochlea can be fixed after being damaged by loud sounds.

Strongly agree  Agree  Don't know  Disagree  Strongly disagree

23) Clearly explain the difference between resonance and sympathetic vibration.

*Sympathetic vibration is when an object is made to vibrate at a "driving frequency".*

*Resonance is when an object is made to vibrate at its "natural frequency". So that means resonance is a special case of sympathetic vibration. If the driving frequency matches the natural frequency of the object being driven, then it is considered resonance.*

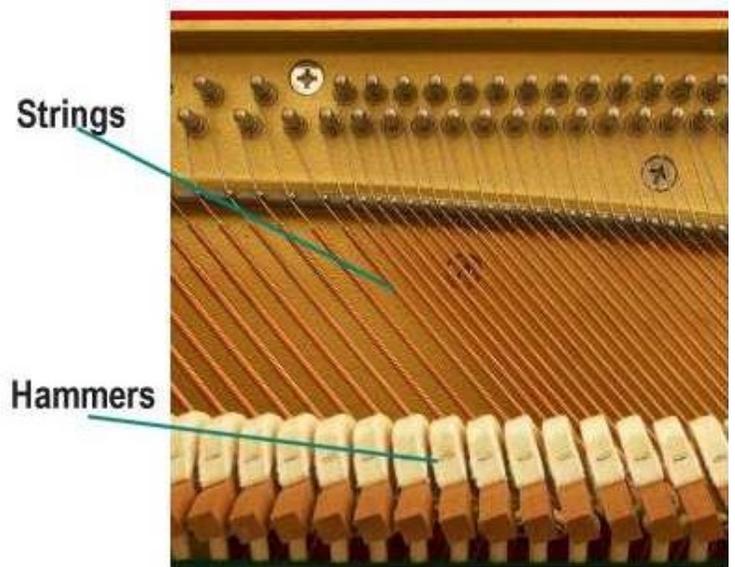
24) Consider a piano. The strings are shown to the right and are attached to the sound board. All of this is enclosed in the wooden piano body. Identify:

a) The source of sound

The hammer striking the strings.

b) The way pitch is changed

Different strings are struck



c) What amplifies the sound. Be specific about the *part* and with *what mechanism*.

The **part** is the sound board and the body of the piano. The strings are attached to the sound board so that it is driven by the strings when they vibrate. The **mechanism** is sympathetic vibration since the sound board will vibrate when driven by any of the different strings.



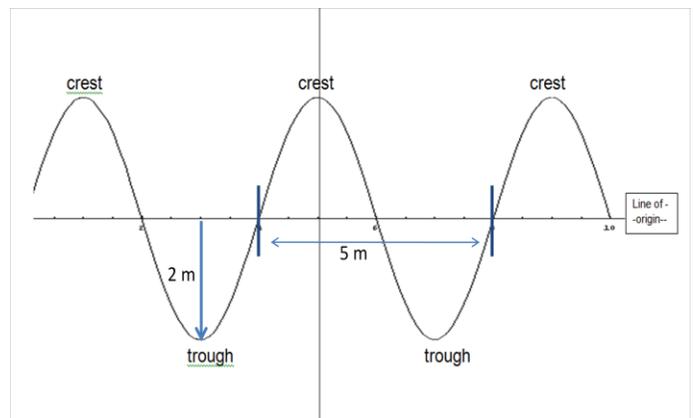
25) The sinusoidal wave shown is traveling in the positive x-direction and has a frequency of 66 Hz. Find the

a) Amplitude 2 m

b) Wavelength 5 m

c) Period  $1/66 = 0.015s$

d) Frequency 66 Hz



$$f = 1/T$$