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**Waves and Sound Quiz – 30 pts**

**Multiple Choice (2 pts each)**

1. A wave with a large amount of energy will have a large
   1. amplitude c. compression
   2. wavelength d. speed
2. If the frequency of a wave is 50 Hz and the wavelength is 5 m, the speed of the wave is
   1. 10 m/s c. 55 m/s
   2. 25 m/s d. 250 m/s
3. A transverse wave
   1. compresses and spreads the molecules in matter.
   2. vibrates particles perpendicular to the direction of the wave’s motion.
   3. vibrates particles parallel to the direction of the wave’s motion.
   4. all of the these answers.
4. An increase in the number of Hertz means that the
   1. wavelength has increased
   2. amplitude has increased
   3. frequency has increased
   4. amplitude has decreased
5. Interference occurs when
   1. a crest and a trough meet
   2. two crests meet
   3. two troughs meet
   4. all of these answers are correct
   5. none of these answers are correct
6. If a wave’s speed stays the same but its frequency increases
   1. reflection will increase
   2. wavelength will decrease
   3. two troughs meet
   4. wavelength will increase
7. Waves provide a means for transferring
   1. matter c. sound
   2. particles d. energy
8. Sound waves cannot travel through
   1. metal c. vacuum
   2. water d. wood
9. The speed of any mechanical wave depends upon
   1. the medium through which it travels
   2. its amplitude
   3. its frequency
   4. its reflection off a boundary
10. A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_ is produced during constructive interference of standing waves.
    1. antinode c. lower crest
    2. node d. higher trough
11. The period of a wave and its frequency are
    1. unrelated c. equal
    2. reciprocals d. directly proportional
12. Sound is a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wave.
    1. transverse c. electromagnetic
    2. longitudinal d. non-mechanical
13. Compared to the speed of light, the speed of sound is
    1. faster
    2. slower
    3. the same
14. Sound waves in air are a series of
    1. high and low pressure regions
    2. periodic disturbances
    3. periodic compressions and rarefactions
    4. all of these
15. Standing waves can be set up
    1. in organ pipes.
    2. by blowing across the top of a soda bottle.
    3. on strings of musical instruments.
    4. all of the above.

**Open Ended (5 pts each):** Show all calculations, givens, and formulas. Circle your answer with units.

1. A 3.5 m long organ pipe that is open at both ends is used on a day when the speed of sound is 345 m/s. What are the first three harmonic frequencies of the pipe?
2. A wave has a length of 12m and a period of 2.0 s. Compute the velocity of the wave.
3. Draw a standing wave with three antinodes.
   1. What is the wavelength of the wave you drew if the length of the string it’s on is 6.0 m?
   2. If the speed of the wave is 2 m/s, what is the wave’s frequency?

**Extra Credit (5 pts):** If you drop a stone into a well that is 122.5 m deep, as illustrated below, how soon after you drop the stone will you hear it hit the bottom of the well? Assume the speed of sound in air that day is 345 m/s.

