Name:_____   **(Show all your workings)**

1. Mechanical wave motion is a phenomenon in which there is a transport of _____
with no net motion of the medium.   (1 point)

2. The product of the frequency of a periodic wave times its wavelength gives the _____
of the wave   (1 point)

3. Points at which standing waves on a string have a maximum displacement are called
_____.   (1 point)

4. The list which is in order of increasing wavelength is: (1 point)
A.   microwave, visible light, X-ray.
B.   visible light, microwave, X-ray.
C.   visible light, X-ray, microwave.
D.   X-ray, visible light, microwave.

5. You hear a musician playing a series of notes of increasing frequency. As the frequency
increases, the wave speed: (1 point)
A.   decreases.
B.   stays the same.
C.   increases.

6. A fast train approaches a vehicle waiting at a grade crossing and sounds its horn. To a passenger
in the vehicle: (1 point)
A.   the wavelength appears to be longer than it would be if the train were at rest
B.   the frequency appears to be higher than it would be if the train were at rest
C.   the frequency appears to be lower than it would be if the train were at rest
D.   wavelength appears to be the same as it would be if the train were at rest.

7. Waves in a water tank have a wavelength of 1.6 m and a period of 0.4 sec. Determine their
velocity?   (1 point)

8. A guitar string has a length of 0.8 m. a mass of 0.16 km, and a tension of 80 N. Determine:
(a) The mass per unit length of the string: (2 points)

(b) The velocity of a wave on the string:

9. A student observes a bolt of lightning from a thunderstorm at a distance of 4.5 km and then counts off 14 sec before he hears the clap of thunder. Assuming that the light arrives instantaneously determine whether he counted seconds fast, slow or exactly right (use speed of sound = 340 m/s).   (3 points)

10. (a) Make a clear sketch illustrating the Doppler effect: (4 points)

(b) You are standing by the side of the road when a car traveling at a speed of 42 m/s passes by sounding its horn (of rest frequency 2000 Hz). Determine the apparent frequency of its horn as it approaches you and then after it passes by.

11. (a) List two main differences between light and sound waves: (4 points)

(b) Describe how light can propagate in a vacuum (Use a sketch to illustrate your answer)

Name: **(Show all your workings)**

One additional questions worth up to 10 points:
(Best t read the text on standing waves to answer this question.)

(a) Describe in your own words what a standing wave is and how it is made:

(b Sketch the first **four harmonics** of a standing wave pattern of length L.
On each pattern indicate the nodes and antinodes and the fractional wavelength separation between nodes.

(c) If L = 0.5 m calculate the frequency of **each harmonic** assuming a wave velocity of 120 m/sec.