WS Chapter 4
Waves and Sound
Enriched
2006 - 2007

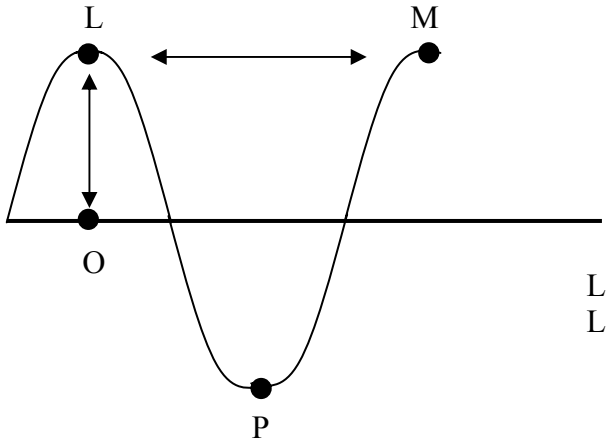
Possible Points	Points Earned
60	

Name: _____
Hour: _____
Due Date: _____

1. Explain the difference between a transverse and longitudinal wave, draw a diagram of each and then give one example of each.

	Explanation	**Diagram**	**Example**
Transverse			
Longitudinal			

2. Using the following terms, label this wave diagram. You might not have to use all terms.



Terms: frequency
wavelength
amplitude
trough
crest

L ⟷ M = _____
L ⟷ O = _____
L = _____
P = _____

3. Determine the frequency of the waves. SHOW WORK.

# of waves	**Time**	**Frequency**
20	10 sec	
45	5 sec	
3200	15 sec	
12000	2 sec	
1000	25 sec	
36000	12 sec	

4. The crest of a water wave in a ripple tank moves 14 cm in 3.0 seconds.

   a) How far does it move in meters (m) during the 3.0sec? SHOW ALL WORK.

   b) What is the speed of the wave? (m/s)

   c) If the depth of the water in the tank was increased by adding more water, how would the wave speed change?

5. A wave arrives at a surface and bounces off it. What is the name given to this "bouncing off?"

6. A wave travels through water. The right-hand end of the wave arrives at an area of water which is shallower.

   a. What happens to the speed of the wave in the shallower area?

   _____

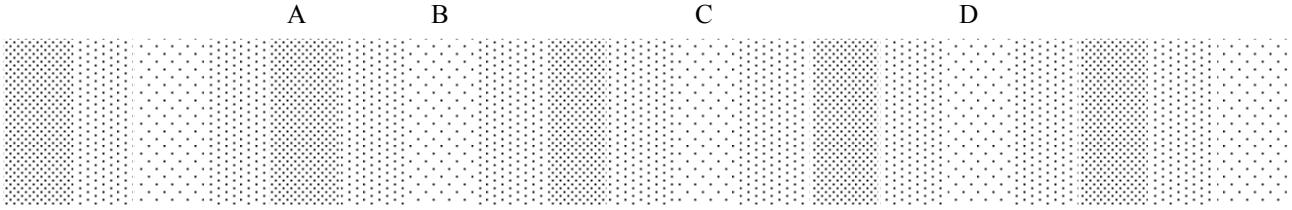
   b. What shape wave will you see?

   _____

   c. What is the name of the process?

   _____

7. The following wave represents a sound wave.



   a) What kind of a wave is this? _____
   b) Which part of the wave is:
      i. A? _____
      ii. B? _____
      iii. C to D? _____

   c) How many cycles of the wave are shown? _____
   d) Draw a compression wave which would represent a **louder** sound.

      i. Which part of the wave changes? _____

      ii. What is the name given which describes how loud or soft a sound is?

   b) Draw a compression wave that could represent a higher pitched sound.

      i. Which part of the wave changes? _____

      ii. What is the term used to describe how high or low the pitch of a sound is?

      _____

8. A train is approaching you and is sounding its whistle.
    a. As it passes you, you should observe two things happening to the sound. What are they?

        -

        -

    b. What is the name of the process that describes the decrease in frequency?

        _____

9. A tuning fork of frequency 256 hertz was held above a water tube. The water level adjusted to 35.0 cm and then a reinforced sound was heard. The diameter of the tube was 2.11 cm.

    a. What is the diameter of the tube in meters?

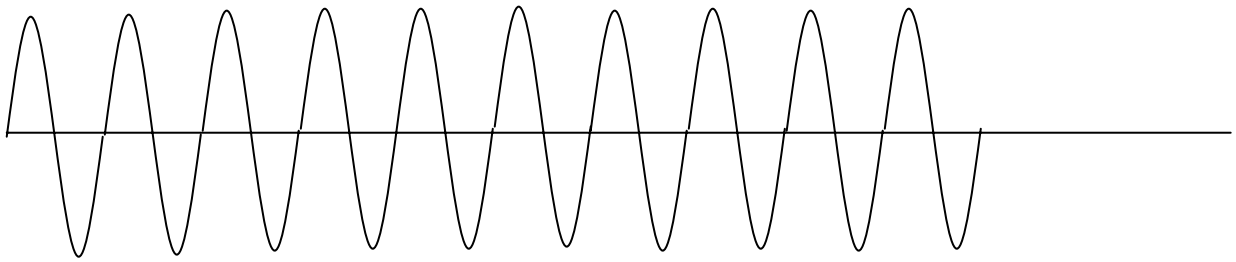
    b. Calculate the wavelength of the sound when heard. Use the formula:
        wavelength = 4 (air column length + 0.4 x tube diameter) SHOW WORK.

        Answer: _____

    c. Calculate the speed of the sound wave. Use the formula:
        speed = wavelength x frequency SHOW WORK.

        Answer: _____

10. A tuning fork is held 2 cm from a microphone connected to a computer. The wave pattern observed on the computer screen is:



The **same tuning fork** is now moved to a distance 6 cm from the microphone. Draw a diagram which could represent the wave pattern on the computer screen. Remember, only amplitude changes, not the frequency.

11. A student sent a sound down a tube and timed how long it took for the echo to return. The length of the tube was 1.30 m. The following readings were obtained:

Trial #	T1 (time sound sent)	T2 (time sound returned)	time for round trip (T2 – T1)
1	0.0000 sec.	0.0080 sec.	
2	0.00464 sec.	0.01300 sec.	
3	0.00020 sec.	0.0082 sec.	

a. What is the distance that the sound has to travel? _____

b. Why? _____

c. For each trial, calculate the time the sound took to make the round trip ($T_2 - T_1$) and record these in the data table above.

d. Calculate the average time for the round trip) value. _____
SHOW YOUR WORK.

e. Calculate the average speed of sound. (Remember, speed = distance ÷ time) _____

12. Two wooden blocks were clapped together outside a building, 60m from a wooded area and the time needed for an echo to return was measured. The experiment was repeated several times. The following values were obtained.

Time
0.31 sec.
0.40 sec.
0.30 sec.
0.39 sec.
0.40 sec.
0.32 sec.
0.33 sec.
0.41 sec.
0.33 sec.
0.32 sec.

_____ a) What is the average value for the time taken by the sound to make the round trip?

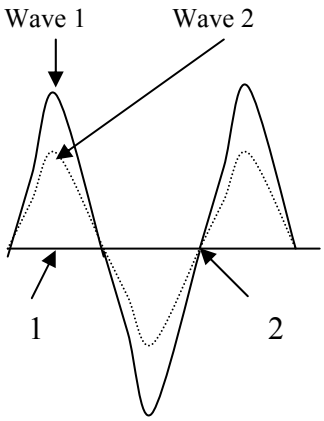
SHOW WORK.

_____ b) What is the distance the sound traveled?

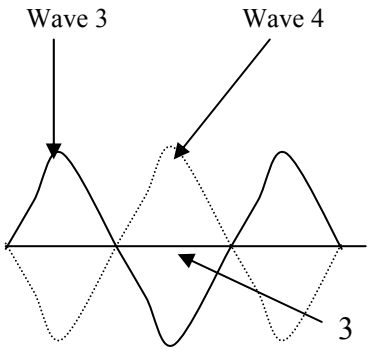
_____ c) What is the speed of sound obtained from this data? SHOW WORK.

13. Each of the diagrams below show pairs of sound waves that are traveling together.

A



B



In each case, what will happen to the two waves? Remember what was discussed with constructive and destructive interference.

Draw what the wave produced by the combination of the two waves would look like.

A B

_____ _____

What would be heard at each of the times indicated along the horizontal axis? (Refer to the places where the numbered arrows point on the two diagrams.)

1 _____

2 _____

3 _____