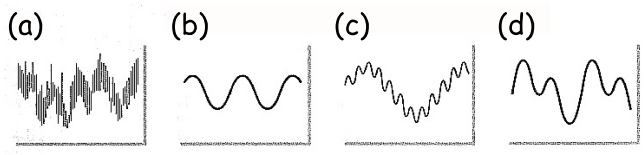
PART A: MULTIPLE CHOICE (10 MARKS)

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

1. Which one of the following properties of a wave is independent of all the others?
   (a) amplitude (b) frequency
   (c) period (d) velocity

2. The following diagrams show four sets of waveforms observed on an oscilloscope screen. Which diagram represents the waveform for a pure tone?



3. What is the frequency of a note that is two octaves higher than 440 Hz?
   (a) 110 Hz (b) 220 Hz
   (c) 880 Hz (d) 1760 Hz

4. If the speed of sound in air is 330 m/s, the wavelength of the note E (320 Hz) is closest to:
   (a) 0.970 m (b) 1.03 m
   (c) 10.3 m (d) 650 m

5. If the fundamental frequency of a standing wave is 100 Hz, the frequency of the second harmonic is:
   (a) 100 Hz (b) 200 Hz
   (c) 300 Hz (d) 400 Hz

6. A guitar string has a fundamental frequency of 50 Hz. If we change the length so that the string is twice as long, but keep everything else the same, the new frequency of the string will be:
   (a) 25 Hz (b) 50 Hz
   (c) 100 Hz (d) 200 Hz

7. The shortest length of pipe, closed at one end, that resonates when a vibrating tuning fork is held near its open end is 10 cm. The wavelength of the sound is:
   (a) 10 cm (b) 20 cm
   (c) 40 cm (d) 80 cm

Use the following options to complete 8, 9 and 10.
   (a) The amplitude of the sound wave.
   (b) The distance of the sound wave to the source.
   (c) The frequency of the sound wave.
   (d) The shape of the sound wave.

8. Which option determines the pitch of a sound?

9. Which option determines the loudness of a sound?

10. Which option determines the quality of a sound?

PART B: MATCH (5 MARKS)

Match the definition from the 1st column to the best term in the 2nd column and place the matching letter in the appropriate space on your answer sheet.

1. The lowest natural frequency.
2. A sound that consists of one frequency.
3. Combinations of sounds of specific frequencies that are pleasing to the ear (music for example).
4. Sounds that differ in frequency by a factor of two.
5. Whole-number multiples of the fundamental frequency.

A) consonance
B) dissonance
C) fundamental frequency
D) harmonics
E) octave
F) overtones
G) pure tone
H) resonance

SPH3U-5 WAVES & SOUND: SOUND (PART 3) QUIZ#3

PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10

PART B: MATCH (5 MARKS)

1	2	3	4	5

PART C: SHORT ANSWER (15 MARKS)

Answer the following questions in the space provided.

{5} 1. Complete the following table.

# of Loops	# of Wavelengths	Scientific Name	Musical Name	Predicted Frequency
1	½			f
2				
3				

{4} 2. List four factors that affect the frequency of a vibrating string.

① _____

② _____

③ _____

④ _____

{6} 3. Complete the following table.

Air Column	Closed at One End	Open at Both Ends
1st Resonant Length		
2nd Resonant Length		
3rd Resonant Length		

PART D: PROBLEMS (30 MARKS)

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

1. The vibrating segment of a string playing a B note (247 Hz) is 75.0 cm long and under a tension of 150 N. {Hint: tension is a force!}

{4} (a) What tension would be required to produce a high C (523 Hz)?

{4} (b) How long should the segment be if the same string is to produce a G note (196 Hz)?

2. State what happens to the frequency of a vibrating string if there is a four-fold increase in the string's:

{2} (a) diameter

{2} (b) density

3. An organ pipe, 40.0 cm long, is open at one end.

{5} (a) If the speed of sound is 340 m/s, what is the fundamental frequency produced by that pipe?

{5} (b) If that pipe becomes open at both ends, what will its fundamental frequency become?

{8} 4. A tuning fork causes resonance in a closed pipe. The difference between the length of the closed tube for the first resonance and the length for the second resonance is 54.0 cm. If the frequency of the fork is 320 Hz, find the wavelength and speed of the sound waves.