

PHYSICS 198

Exam 3

Fall 1998

Name _____

Allowed: 3" x 5" card and calculator.

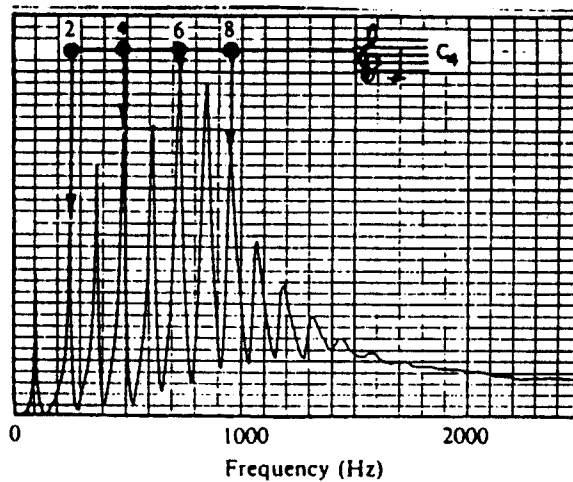
Not Allowed: notebooks and textbooks.

Use a No. 2 pencil and put your NAME and STUDENT SOCIAL SECURITY NUMBER on the scoring sheet.

Choose the most correct answer.

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1. The majority of sound that a listener hears from a violin is radiated into the air from the
- A) strings B) top and back plates C) bridge D) sound post
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The next two questions relate to the trumpet resonance spectrum shown in this figure:



2. In the resonance spectrum for a trumpet shown in the figure, the broad region of higher peaks centered around 600-900 Hz is due to _____ and the individual spectrum peaks are due to _____.

- A) tubing resonances; mouthpiece resonance.
 - B) tubing resonances; the effect of the bell.
 - C) mouthpiece resonance; the effect of the bell.
 - D) mouthpiece resonance; tubing resonances.
 - E) the effect of the bell; mouthpiece resonance.
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3. (See figure before.) On a trumpet it is easy to play C below the staff and hard to play C above the staff because there are more resonances

- A) coinciding with higher harmonics of high C.
 - B) coinciding with higher harmonics of low C.
 - C) coinciding with lower harmonics of high C.
 - D) spaced more closely together for high C than for low C.
 - E) if one plays with a "stiff upper lip" (Not the right answer!)
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4. The frequency of oscillation of a bowed stringed instrument is determined primarily by

- A) how fast the bow is moved.
 - B) how hard the bow is pressed on the string.
 - C) how fast the waves move on the string.
 - D) the type of rosin used.
 - E) the length of the player's arms.
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5. The patterns in the figure below represent

- A) resonances of the guitar strings occurring at different frequencies.
- B) resonances of the guitar top plate occurring at different frequencies.
- C) resonances of the guitar occurring at harmonically related frequencies.
- D) resonances demonstrating the "rule of eighteen" for guitars.



268 Hz (Q=52)

553 Hz (Q=66)

628 Hz (Q=83)

672 Hz (Q=61)

731 Hz (Q=72)

6. Of the energy expended playing a string or woodwind instrument, _____ reaches the audience as sound.

- A) only about one or two percent
- B) about a quarter
- C) about half
- D) the majority

7. A flute behaves approximately as a _____ having _____ and resonance frequencies with ratios _____.

- A) conical pipe; both ends open; 1,3,5,7,....
 - B) cylindrical pipe; both ends open; 1,2,3,4,....
 - C) conical; one end open; 1,2,3,4,....
 - D) cylindrical; one end open; 1,3,5,7,....
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8. The characteristic sound of a drum is mainly due to

- A) its resonances not being harmonically related.
 - B) its second harmonic having twice the frequency of its fundamental.
 - C) its second harmonic being stronger than the fundamental.
 - E) the flexible nature of the drum head.
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9. The oboe has

- A) no second harmonic in its spectrum.
 - B) second and third harmonics which are often larger than the fundamental.
 - C) a formant near 1000 Hz and, when played loudly, another near 3000 Hz.
 - D) both answers (B) and (C).
 - E) both answers (A) and (C).
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10. Which of these is fundamentally different from the others?

- A) resonances
 - B) partials
 - C) harmonics
 - D) overtones
 - E) no! --all have similar nature.
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PHYSICS 198

Exam 5

Fall 1997

Name _____

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Not Allowed: notebooks and textbooks.

Use a No. 2 pencil and put your NAME and STUDENT SOCIAL SECURITY NUMBER on the scoring sheet.

Choose the most correct answer.

1. The period of the fundamental mode of oscillation of a 341 Hz tuning fork is:

- A) 341 seconds B) 0.341 seconds C) 0.0177 seconds D) 0.00293 seconds

2. The majority of sound that a listener hears from a violin is radiated into the air from the

- A) strings B) top and back plates C) bridge D) sound post

3. Of the energy supplied to the bow by a string player, about _____ emerges as sound energy.

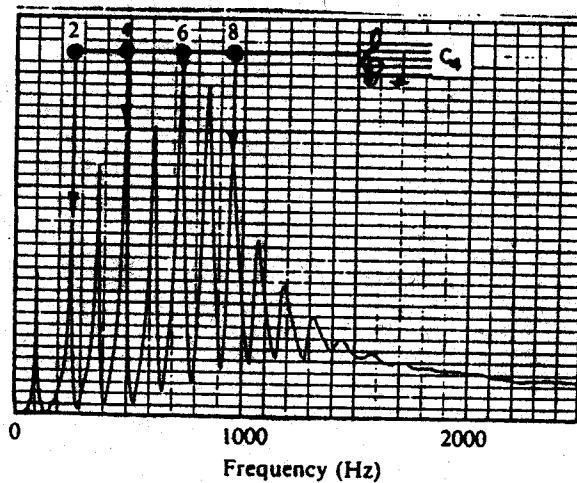
- A) 1-2% B) 40-50% C) 70-80% D) 98-99%

4. When a stringed instrument is bowed, the fundamental vibration frequency of the string is

- A) higher for faster bowing, because faster waves are produced on the string.
B) higher for slower bowing, because larger amplitude waves are produced on the string.
C) independent of bowing speed, because the frequency is determined by the speed of waves of the string.
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5. A trumpet behaves (roughly) like a cylindrical tube
- A) 0.4 meter long with one end closed.
 - B) 0.4 meter long with both ends open.
 - C) 1.4 meter long with both ends open.
 - D) 1.4 meter long with one end closed.
 - E) 0.4 meter long with both ends closed.

The next three questions relate to the trumpet resonance spectrum shown in this figure:



6. In the resonance spectrum for a trumpet shown in the figure, the individual spectral peaks are due to _____ while the broad region of higher peaks centered around 600-900 Hz is due to _____.
- A) tubing resonances; adding a mouthpiece to the tubing.
 - B) tubing resonances; adding a bell to the tubing.
 - C) adding a mouthpiece to the tubing; adding a bell to the tubing.
 - D) tubing resonances; adding spit valves to the tubing.

7. In the resonance spectrum for a trumpet shown in the figure, the lack of significant peaks above about 1500 Hz is primarily due to adding

- A) a mouthpiece to the tubing.
 - B) a bell to the tubing.
 - C) spit valves to the tubing.
 - D) valves to the instrument.
-

8. On a trumpet it is easy to play "low C" (below the staff) and hard to play "high C" (above the staff) because there are more resonances

- A) coinciding with higher harmonics of low C than high C.
 - B) coinciding with higher harmonics of high C than low C.
 - C) spaced more closely together for high C than for low C.
 - D)the player needs to practice more. (Don't answer this one!)
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