Sounds of Music

Humans:

Table 7.02: Intensity of sound of different types

Jet engine	110-140 dB
Traffic	80-90 dB
Car	60-80 dB
Television	50-60 dB
Conversation	40-60 dB
Breathing	10 dB
Sound of mosquito	0 dB

Mosquito:

Written By: Mulan

*** 30 minutes ***

Name(s):

_____

Team Number:

_____

SCORE: _____ / 145

Multiple Choice (28 points)
Select ALL answers that apply.

1. A tuning fork resonates at a frequency of 441 Hz. When sounded with a second tuning fork, a beat frequency of 7 beats/s is produced. What is the frequency of the second tuning fork? (2)

a. 63 Hz
b. 126 Hz
c. 434 Hz
d. 448 Hz
e. 3,087 Hz

2. A wave travels from a steel core string to the wooden base of a violin. Which of the following characteristics remain the same? (2)

a. Young's modulus
b. Speed
c. Wavelength
d. Frequency
e. Bulk modulus

3. In which medium would sound travel the fastest? (4)

a. A solid with an elastic modulus of 144 GPa and a density of 7.87 g/cm^3
b. A liquid with a bulk modulus of 225 GPa and a density of 997 kg/m^3
c. Air at a temperature of 34 degrees Celsius
d. A stretched string with a tensional force of 315 N and a linear density of 0.06 g/cm^3
e. Same speed for all mediums

4. A sound wave has a wavelength of 1.3 m. What is the distance between the center of a compression and the next adjacent rarefaction? (4)

a. 0.33 m
b. 0.43 m
c. 0.65 m
d. 0. 86 m
e. 2.6 m

5. A musician blows harder into the mouthpiece of a clarinet. Which of the following increases? (4)

a. Timbre
b. Amplitude
c. Frequency
d. Velocity
e. Period

6. What is the sound intensity level of an orchestra playing at a sound intensity of 2.2×10^{-4} W/m^2? (4)

a. 2.2 dB
b. 34 dB
c. 83 dB
d. 337 dB
e. 22,000 dB

7. An ambulance is speeding towards a parked car at a velocity of 40.0 m/s. The ambulance emits a frequency of 457 Hz. What frequency is detected by the car? Assume that the speed of sound is 343 m/s. (2)

a. 403.7 Hz
b. 409. 3 Hz
c. 510.3 Hz
d. 517. 3 Hz
e. 577.7 Hz

8. An observer is R meters away from a speaker. What sound intensity I would the observer experience if the distance between the observer and the speaker was halved? (2)

a. $\frac{I}{2}$
b. I
c. $2I$
d. $4I$
e. $6I$

9. Speaker A produces a sound intensity level of 13 dB. Speaker B produces sound intensity level of 43 dB. Which statement(s) is true? (4)

a. Speaker B's sound intensity is 30 times that of Speaker A
b. Speaker B's sound intensity is 300 that of Speaker A
c. Speaker B's sound intensity is 1,000 times that of Speaker A
d. Speaker A's volume is ⅓ that of Speaker B.
e. Speaker A's volume is ⅛ that of Speaker B
f. Speaker A's volume is ⅛ that of Speaker B

Term Identification (18 points)

Match the term with the fitting description.

Adiabatic	Rarefaction	Frequency	Phase	Wavelength
Wavenumber	Anechoic	Acoustic	Sinusoidal	

10. _____ Type of feedback that is caused by a regeneration of sound leaving a speaker and entering a microphone. (2)

11. _____ The waveform of a sound wave. (2)

12. _____ Type of wave that transfers energy without the transmission of heat. (2)

13. _____ The complete absence of sound waves, typically created through dissipation and absorption. (2)

14. _____ The spatial period of a wave. (2)

15. _____ The inverse of period. (2)

16. _____ An area of low relative density in a longitudinal wave. (2)

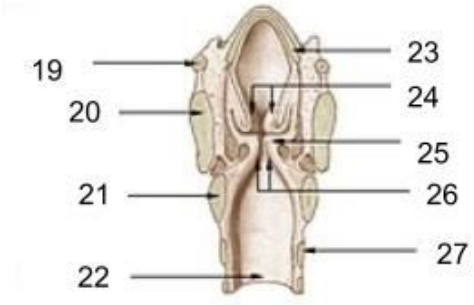
17. _____ In units of cycles per unit distance. (2)

18. _____ The location of a waveform at a certain point in time. (2)

Sound Principles (38 points)

Refer to the diagram of the larynx for Questions 19-27. (2 points each)

19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____



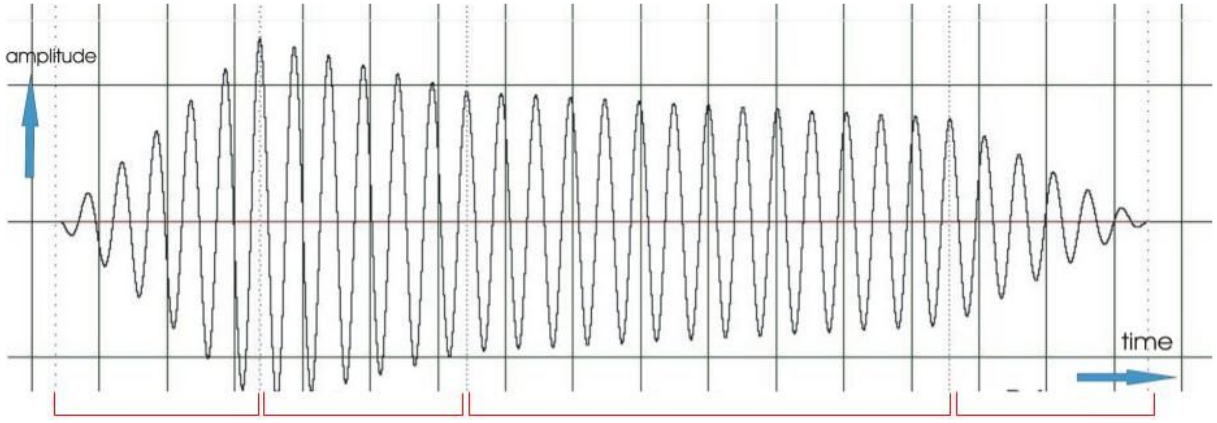
28. How is sound produced as air travels through the vocal folds? (4)

29. Describe the place theory and explain how vocal formants contribute to speech distinction. (5)

30. Compare specular and diffuse reflection. You may supplement your answer with a diagram. (4)

31. Describe the principle of wave theory. (3)

32. Label the diagram of the sound waveform below with the points of articulation. (4)



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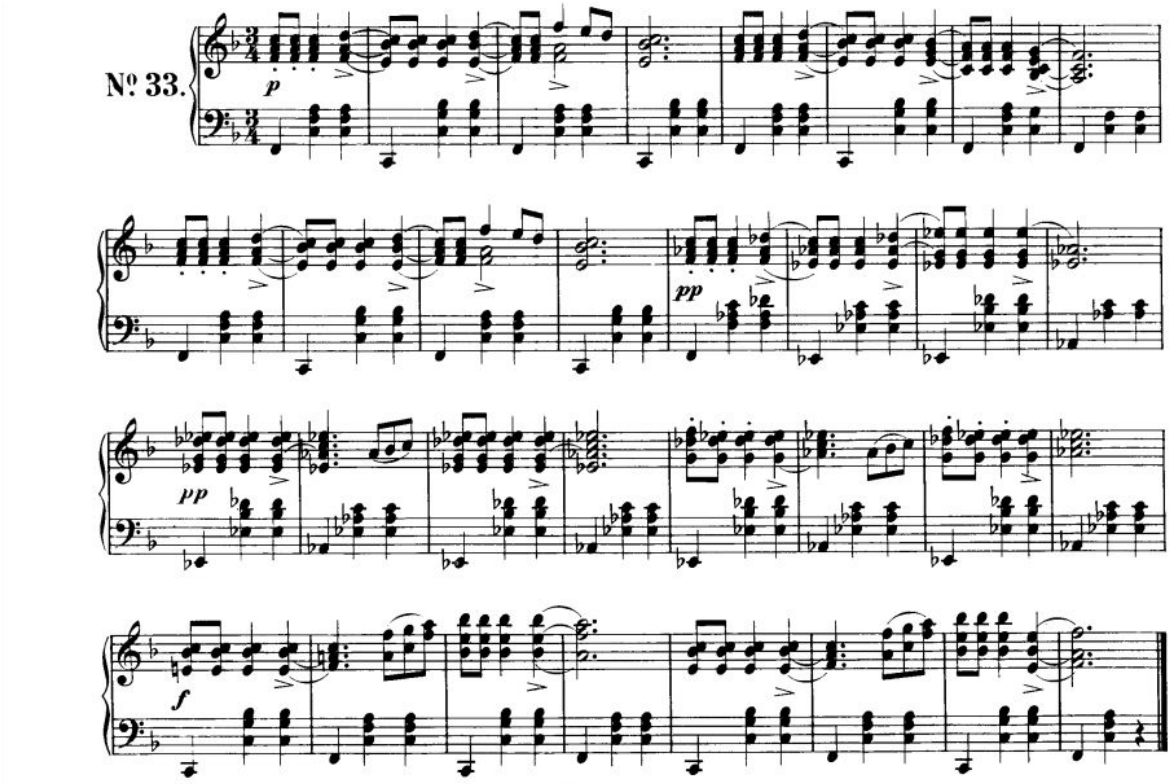
Music Theory (61 points * indicates no partial credit given)

33. Order the following cadences from weakest to strongest: Imperfect Authentic Cadence, Deceptive Cadence, Perfect Authentic Cadence, Half Cadence, Plagal Cadence. (5)

Refer to the composition below for questions 34 - 37



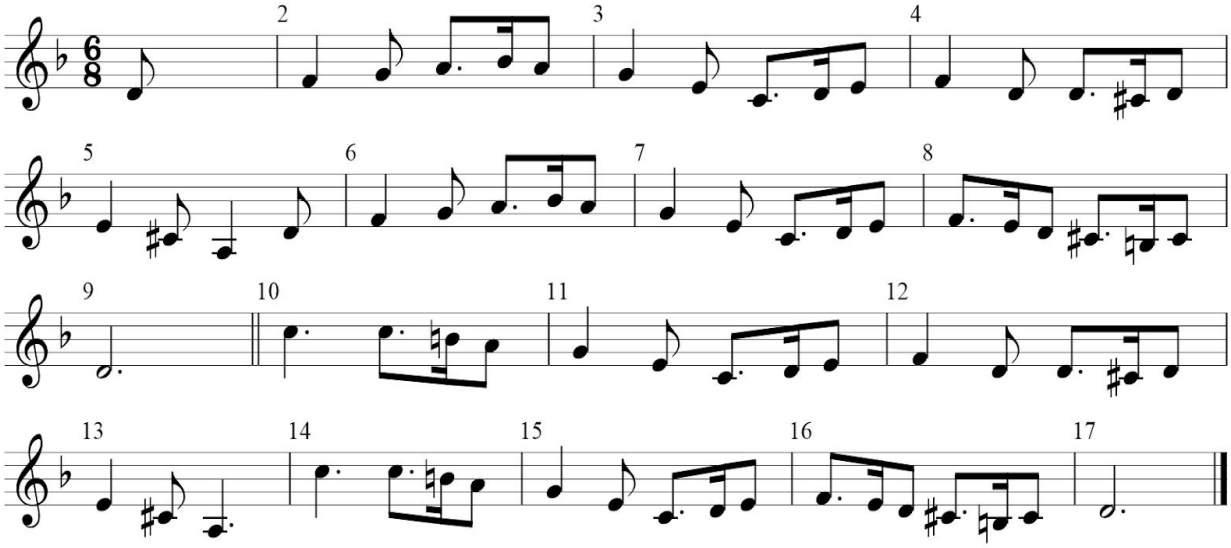
34. What key does the piece start in? (2)*

35. What key does the piece temporarily shift into in measures 14-24? (2)*

36. What cadence is seen in measures 15-16? (3)*

37. Write the Roman Numeral chord progression for measures 1-3. Include inversions, if any. (6)

Refer to the musical excerpt below for Questions 38 - 40

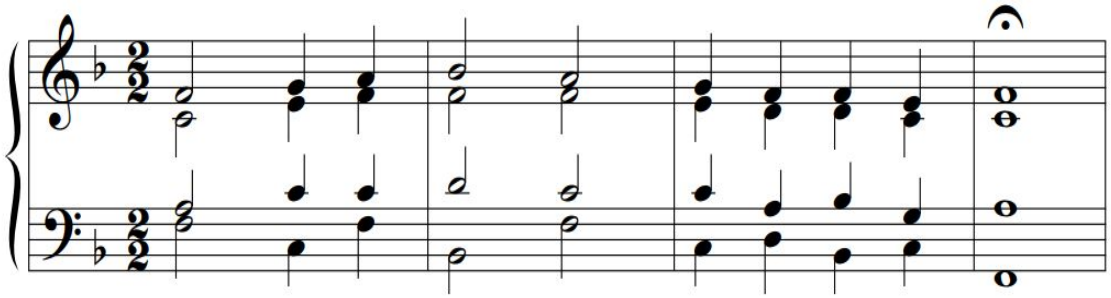


38. What meter is this piece in? (2)*

39. What mode is this piece in? (2)*

40. What is musical texture? Identify the texture of the piece above. (4)

41. Write the Roman numeral chord progression for the musical excerpt shown below. Include inversions, if any. (5 points total, +0.5 for each correct chord)



42. What meter is this excerpt in? (2)*

43. What is the relative minor of the key? (2)*

44. What cadence is seen at the end of the excerpt? (2)*

45. What is the difference between equal temperament, just temperament, and pythagorean temperament? (4)

46. Write the F# Phrygian mode in the staff below. (4)*

47. Write the Eb major pentatonic scale in the staff below. (4)*

48. Write out a half-diminished Eb chord in the first inversion. (2)*

49. Circle all of the unaccented passing tones in the excerpt below. (10 points total, +0.5 for each correctly identified PT)