SCIENCE OLYMPIAD

─ AT THE ─

UNIVERSITY OF FLORIDA

Northern Regional: January 19th, 2019

Sounds of Music C Test

Name(s): _____

Team Name: _____

School Name: _____

Team Number: _____

Rank: _____

Score: _____

I. Multiple Choice (1 point each)

1) Playing a C major scale from C to C is an example of the _____ mode.
   A. Superlocrian
   B. Aeolian
   C. Ionian
   D. Dorian

2) This instrument is an example of a cylindrical pipe open at both ends
   A. Clarinet
   B. Saxophone
   C. Recorder
   D. Flute

3) True or False: An F major seven chord contains only notes found in the F major scale.
   A. True
   B. False

4) The notes Bb, D, F, and Ab make up a _____ chord.
   A. Gb^{-7}
   B. Gb minor seven
   C. Bb$^{\Delta 7}$
   D. Bb^{7}

5) "Common time" refers to what time signature?
   A. $\frac{7}{8}$
   B. $\frac{5}{4}$
   C. $\frac{4}{4}$
   D. $\frac{3}{4}$

6) The interval up **from** an A **to** an E is known as a:
   A. perfect fifth
   B. minor second
   C. major fifth
   D. diminished fifth

7) In $\frac{6}{8}$ timing, this note is equal to one beat:
   A. Eighth note
   B. Quarter note
   C. Sixteenth note
   D. Grace note

8) Jacob plays a killer solo on his electric guitar and notices the nearby snare drum begins to vibrate, this is an example of:
   A. Harmonics
   B. Reverberation
   C. The drum appreciating Jacob's nasty licks
   D. Resonance

9) To correctly determine wavelength, measure from:
   A. Crest to crest
   B. Barrel to barrel
   C. Lip to lip
   D. Axis to peak

10) The cavity in the inner ear responsible for converting sound vibrations into nerve impulses and ultimately converts sound vibrations to the perception of hearing?
   A. Inca
   B. Malleus
   C. Cochlea
   D. Semicircular canals

11) Which of the following is known as the "Stuttgart Pitch?"
   A. A = 432 Hz
   B. A = 440 Hz
   C. A = 415 Hz
   D. A = 325 Hz

12) What is the difference between an active and passive electric guitar pickup?
   A. Active pickups provide a distorted sound, while passive pickups do not.
   B. Active pickups contain a preamp, while passive pickups do not.
   C. Passive pickups contain coiled wire around a magnet, while active pickups do not.
   D. Passive pickups transmit signal digitally, while active pickups transmit analogue signal.

13) This chord is also known as a "fully altered" or "Alt" chord and can be outlined with a Superlocrian scale

A. Bb^{-7}

B. Ab^{7}

C. $Ab^{7\,(b3\ b5\ b7)}$

D. $Ab^{7\,(b5\ \#5\ b9)}$

14) True or False: In nature, sound can best be modeled as a sine wave.

A. True

B. False

15) A sound that is measured to be 50 dB is how much louder (or softer) than one that is 30 dB?

A. One hundred times louder.

B. Twenty times louder.

C. They have the same loudness.

D. Twice as loud.

16) The process of converting the air pressure from the lungs into audible vibrations is called:

A. Phonation

B. Belting

C. Consonance

D. Projection

17) What is the frequency of a wave that has a speed of 0.87 km/s and a wavelength of 20cm?

A. 2298 Hz

B. 5.34 Hz

C. 174 Hz

D. 4350 Hz

18) What is the sixth scale degree in an Db major scale?

A. Ab

B. Bb

C. C

D. B

19) If the frequency of a wave is reduced by a factor of 2 and the wavelength is doubled, what happens to the speed of the wave?
A. It is halved.
B. It is doubled.
C. It remains unchanged.
D. It is reduced by a factor of 4.

20) This is the ii^7 in the key of G major:
A. A maj^7
B. B min^7
C. Bb maj^7
D. A min^7

21) For open pipes, the formula for wave patterns at any given time can be given by a Fourier Sine Series, what is the angular frequency of the second harmonic?
A. $2\pi x / L$
B. $2\pi / L$
C. $L / 2\pi$
D. $2\pi * L$

22) A music box produces a tone of 400 Hz as a boy is running towards the music box at 2.3 m/s. What is the frequency at which the boy hears the tone? (velocity of sound in air = 343 m/s)
A. 401.006 Hz
B. 402.300 Hz
C. 397.007 Hz
D. 423.058 Hz

23) The chromatic scale is a(n) _____ scale:
A. Heptatonic
B. Pentatonic
C. Dodecatonic
D. Octatonic

II. Fill in the Blank (2 point each)

1) The particles of the medium are vibrating in the same direction as energy transport, in a _____ wave.
2) The particles of a medium are vibrating at right angles to the direction of energy transport, in a _____ wave.
3) The main factor that affects the speed of a sound wave is the _____.
4) A period of 21 milliseconds would be equivalent to a frequency of _____ Hz.
5) The frequency of a stretched string depends on the _____, _____, and _____.
6) The symbol, "maj^7" is read as: _____.
7) The range for human hearing is between _____ Hz and _____Hz.

III. Free Response

1) How does an electric guitar transmit sound when its strings are plucked? Explain in detail. (5 points)

2) Explain the mechanics behind producing **and** sustaining a note on a grand piano. (6 points)

3) Give the general equation for the "Doppler Effect" of two moving bodies and explain how it relates to sound. Give an example of an everyday occurance of this phenomenon. (6 points)

4) How does the Bernoulli Effect relate to singing? (3 points)

5) Why can't we hear the explosions of the sun? (1 point)

6) A. An arranger hears the lick below and wants to write it for alto saxophone. How should he/she write the line for Eb alto? Write on the staff provided on the answer sheet. (5 points)

B. What is the interval between the the original and transposed lines? (2 points)