

Exam 1
Science 265

Name: _____ Group: _____

Multiple choice each worth 3 points

- 1) Why does a tuba have lower sounds than a trumpet?
 - a) The large bell the sound comes out of
 - b) The fat tubes the sound waves move through before coming out
 - c) **The long distance the sound waves have to travel before they get out**
 - d) The way the musician blows into the tuba

- 2) Humans can hear sound with wavelengths that range from half an inch and to 50 feet. Bass notes are low on the musical scale and have
 - a) **longer wavelengths**
 - b) shorter wavelengths
 - c) The note does not depend on the length of the wave

- 3) The energy of sound waves is always very small and can only be detected by our ears or other sensitive instruments.
 - a) True
 - b) **False**

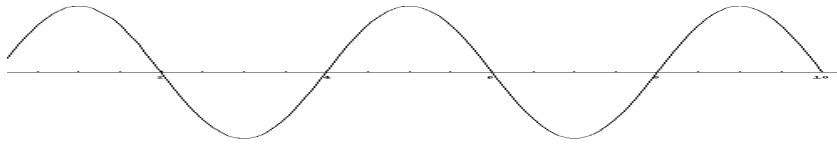
- 4) A vibrating guitar string causes the body of a guitar to vibrate. This is an example of
 - a) Natural Frequency
 - b) Resonance
 - c) **Sympathetic Vibration**
 - d) none of the above

- 5) A person blows in a flute and makes a nice C note. This is an example of
 - a) **Resonance**
 - b) Sympathetic Vibration
 - c) SONAR
 - d) None of the above

- 6) Of the following, sound travels fastest in
 - a) Air
 - b) Water
 - c) **Steel**
 - d) Equal in all three

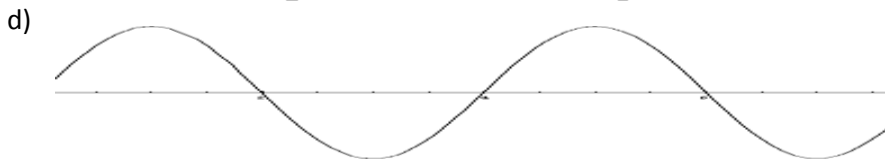
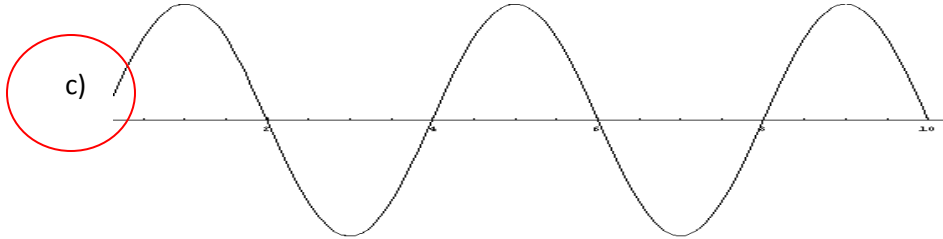
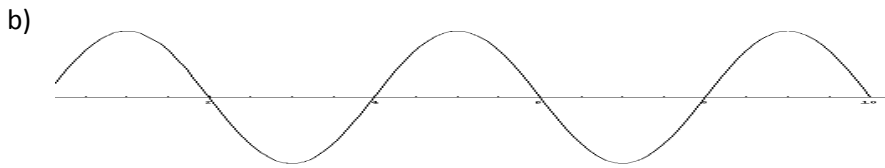
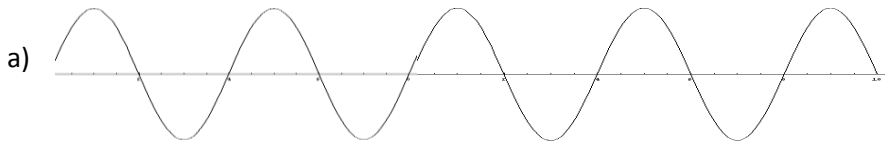
- 7) Sound vibrations travel into the ear canal and cause the ear drum to vibrate. In turn, the ear drum causes the _____ to vibrate.
 - a) Pinna
 - b) Cochlea
 - c) **Ossicles**
 - d) Hair cells





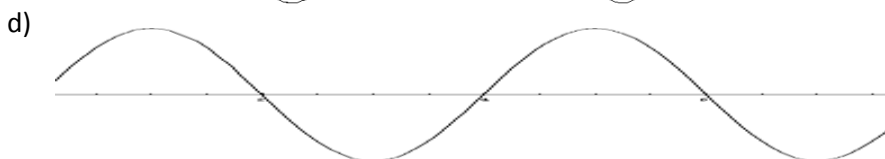
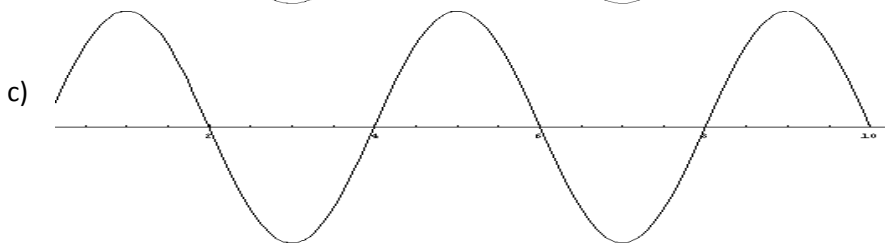
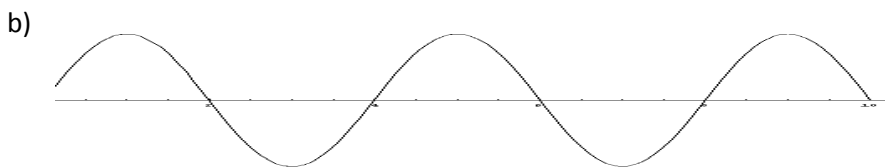
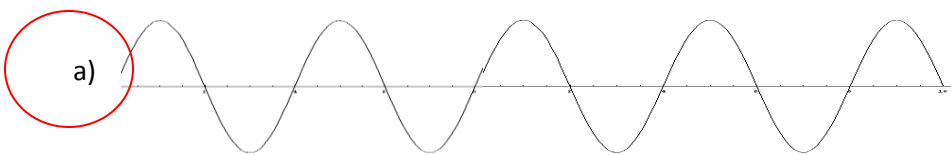
Use **wave A**, above, for the following two questions

8) Which of the following waves has a larger amplitude than wave A above?

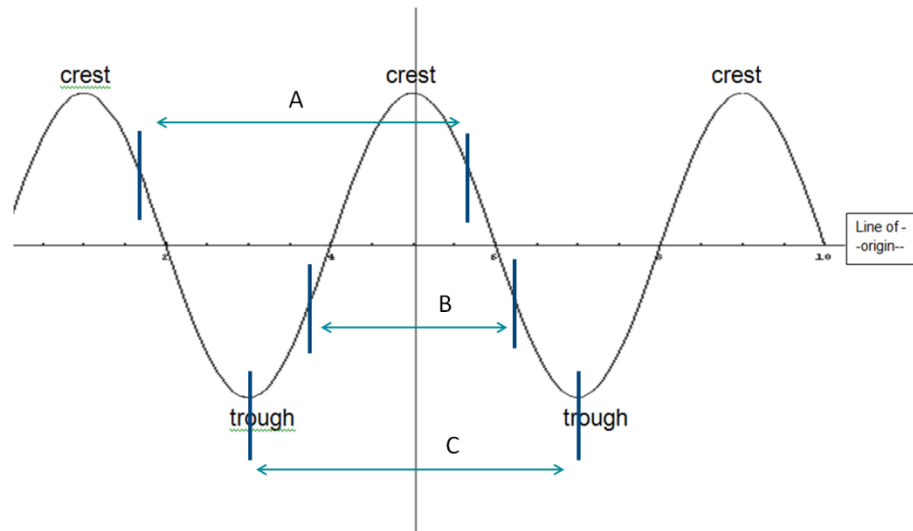


e) None of the above

9) Which of the following waves has a larger frequency than wave A above?



e) None of the above



10) Which distance(s), labeled above, is equal to **one** wavelength.

- a) A
- b) B
- c) C
- d) A & B
- e) **A & C**

11) When a wave travels through a medium, the medium

- a) travels with the wave
- b) **moves a short distance back and forth**
- c) does not move at all

12) What type of wave is a sound wave?

- a) Transverse
- b) **Longitudinal**
- c) Neither
- d) Both

13) Sound waves require a medium to travel

- a) **True**
- b) False

14) Electromagnetic Waves require a medium to travel

- a) True
- b) **False**

15) Echolocation is *only* useful for identifying objects

- a) at very close range (15 feet).
- b) at medium range (50 meters/yards)
- c) at long distances (200 meters/yards)
- d) **all of the above**

- 16) SONAR (SOund Navigation And Ranging) uses different science than echolocation.
- a) True
 - b) False**
- 17) When a person stands in a pitch black room and can “sense” whether they are in a small cave or a giant cavern, they are using
- a) Passive echolocation**
 - b) Active echolocation
 - c) Electromagnetic waves
 - d) None of the above
- 18) Bats and elephants
- a) hear the same sounds – same range of frequencies
 - b) hear mostly the same range of sounds with a few differences on the extremes (elephants hear lower pitches)
 - c) are deaf to the sounds each other can hear except for a few specific frequencies**
- 19) We see when
- a) Electromagnetic waves enter our eyes**
 - b) Our eyes sense light across the room, it doesn’t have to enter the eye.
 - c) Both of the above
 - d) None of the above
- 20) Bats are Blind
- a) True
 - b) False**
- 21) “Visible light” is the light that is visible to
- a) all living creatures
 - b) specifically humans, other creatures can also see light outside of the “visible range”**
 - c) mammals. Insects and snakes can’t see what we see
- 22) Chickens can see
- a) fewer colors than humans
 - b) the same colors as humans
 - c) more colors than humans**
- 23) Which cells in our eyes sense colors?
- a) Rods
 - b) Cones**
 - c) Both
- 24) Which of the following are **NOT** a type of electromagnetic wave?
- a) Visible light
 - b) Microwaves
 - c) Sound waves**
 - d) X-rays
 - e) All are examples of electromagnetic waves

25) What is in the bubbles of boiling water?

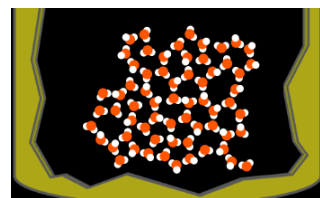
- a) Air
- b) Hydrogen Gas and Oxygen Gas
- c) Empty Space
- d) **Water vapor**

26) When substances go from liquid to solid,

- a) all substances expand
- b) all substances become more dense (take up less space)
- c) some expand and some are less dense
- d) **all are more dense except water which expands**

27) The diagram to the right is showing a substance in

- a) **solid form (water)**
- b) liquid form
- c) gas state
- d) Not enough information



28) What are the conditions that allow molecules to stop moving completely?

- a) When something is in solid form.
- b) When something is very cold
- c) **When something is at absolute zero, 0K.**

29) Consider a giant oak tree. Where does the largest fraction of the dry mass of the tree come from?

- a) Water
- b) Minerals in the soil
- c) Sun
- d) Oxygen from the air
- e) **Carbon from the air**

30) When you lose 15 lbs, how did the largest fraction of the weight leave your body?

- a) Water (sweat, urine)
- b) Solid waste
- c) Energy
- d) Respiration – water vapor
- e) **Respiration – carbon dioxide**

31) (*Extra Credit*) A nail sits out in the elements and rusts. Rusting is oxidation of iron where iron and oxygen combine to form iron oxide (rust). After rusting, the nail (including the rust)

- a) **Weighs more than before**
- b) Weighs the same
- c) Weighs less than before

Write your answer on this sheet for the following three questions. Show all work and explain each question clearly for credit

32) (5pts) Susan sucks air out of a bottle during physics lab. Her bottle has a mass of 80.22 g before she removes some air and then a mass of 80.03 g after. She then allows water to fill the empty space in the bottle. She finds that she has 200 ml of water. Determine the density of air from this data.

First determine the weight of the air that was removed: $80.22\text{g} - 80.03\text{g} = 0.19\text{g}$

Then we need the volume the air takes up. Susan measured that to be 200 ml.

Density is Mass/Volume so we get $0.19\text{g}/200\text{ml} = 0.00095 \text{ g/ml}$

33) (5 pts) How can echolocation be used to identify how far away an object is? Be specific and include diagrams.

An echolocator sends out sounds that hit objects and bounce back to the echolocator. Sound travels a specific speed in air (and a different speed in water). The sound takes time to reach objects and then bounce back. The longer the sound takes to return, the further away it is.

34) (*Extra Credit*) Describe the behavior of a substance that has a temperature of -20K? Explain why?

Temperature is a measure of the kinetic energy of molecules. A substance at 0K is no longer moving at all – no kinetic energy. This is why it's called absolute zero. It's not possible to go any lower. That means -20K is impossible.