Study Guide Test on Circular Motion/Sound Waves

CIRCULAR MOTION: (Chapter 7, Section 1 & 2)
Linear Velocity (depends on radius), Angular velocity (stays the same)
Centrifugal Force (fictitious….. only perceived force making you go in circle)
Centripetal Force … real, pulling towards center.
CIRCLES

- Circumference = $2\pi r$ = WL
- Linear velocity = Circ/T
- Centripetal acceleration = v^2/r Force = m * a
- g = 9.81 m/s2
- Frequency (Hz) = 1/T,

Describe how (speed, acceleration, direction, etc…) your motion would change as you change position (distance from center, location) on a merry-go-round/carousel.

A Physics teacher swings a cup of water around his. How would you calculate: What is the centripetal acceleration needed to make sure that the water doesn't fall out?

What is the minimum speed at which he must swing it?

What is the period of his swing?

-For an amusement park ride like the pirate swing, draw a picture of how the energy changes over time.

How would you calculate the acceleration and speed at the bottom?

SOUND: (Chapter 13)
Longitudinal Wave, air, in all directions
Intensity varies as the area of the sphere. Decibels
Frequency=Pitch, Amplitude =Loudness, Quality= Type & # overtones

WAVES: Period $T=1/f$ $V=f$ *WL for any wave

Sound Open Pipe WL=2 L ,1L, 2/3L, 1/2L, 2/5L f, $2f$, $3f$, etc.
Closed Pipe WL=4 L, 4/3L, 4/5L, 4/7, f, $3f$, $5f$ etc...

Standing Waves f = nV/ 2L for strings, open pipes (n = number of antinodes) n=1 is the fundamental
f = nV/ 4L for closed pipes (n = number of antinodes)
Beats: $f=f1-f2$

V=331 m/s + .6 * Temp for Sound

Doppler Shift f=f0 (Vsnd + Vdetector)/(Vsnd-Vsrce)
10^{-12} Watts/m^2 = 0 decibels
10^{-11} Watts/m^2 = 10 decibels = twice as loud, 10 times as intense
10-10 Watts/m^2 = 20 decibels = four times as loud as original, 100 times as intense
Intensity = Power/Area

Describe how air vibrating makes musical sound waves in an instrument like a trumpet as compared to a violin. Be sure to use wave vocabulary words such as resonance, harmonics, closed pipe, standing waves, etc…

How can beats and resonance be used to find out if a guitar is in tune?

Draw a picture of what the waveform and sonogram would look like for a:
Tuning fork

Whistle being made on a train coming towards, then away from you.

White noise

Pipe Organ (open pipe with 3 very strong overtones)

Describe how to calculate the distance at which I could play my electric guitar and still cause pain from the volume. (decibels, loudness, intensity)

Describe the factors that could change the sound of a guitar string and why.