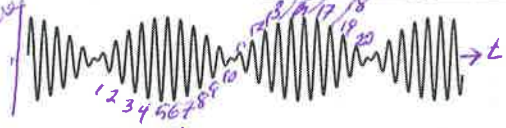
Big Exam #2 Name____________________

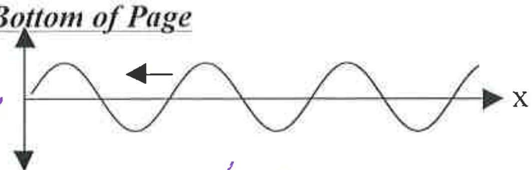
**Part I, Multiple Choice –** ***Choices Supplied at Bottom of Page***



Name Beats

Equation f) $y = A\sin(\omega_0 t)\sin(20\omega_0 t)$

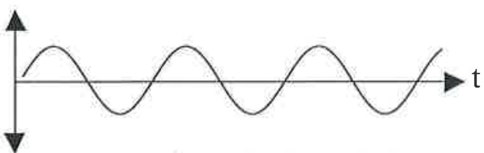
Description e)




Name traveling wave

Equation b) traveling -x direction

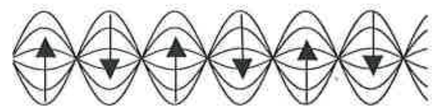
Description b) is transmitting power




Name motion of SHO

Equation b) $y = A\sin(\omega t + \phi)$

Description a)



Name Standing waves

Equation d) e) $y = A\sin(\omega t)\sin(kx+\phi)$ oscillating part, spatial part

Description d)

1) For the blank next to NAME: fill in one of the corresponding **letters**.
a) standing waves
b) beats
c) Correspondence Principle
d) Doppler Shifting
e) Critically Damnped Resonance
f) motion of a simple harmonic oscillator
g) traveling wave

2) For the equation, put in the letter of the appropriate equation from the following:
a) $y = A\sin(kx+\omega t)$
b) $y = A\sin(\omega t + \varphi)$
c) $y = A\sin(kx - \omega t)$
d) $y = A\sin(kx+\omega t) + A\sin(kx-\omega t)$
e) $y = A\sin(\omega t)\sin(kx+\varphi)$
f) $y = A\sin(\omega_o t)\sin(20\omega_o t)$

For FULL Credit, TWO of the above formulas are correct for one of the above wave forms. Please put both correct formulas in the space provided.

3) For the description, put in the letter of the appropriate description from below:
a) velocity of a particle as a sinusoidal wave goes by
b) Is transmitting power.
c) Is the result of a laser passing through a single slit
d) The result of two identical waves coming from opposite directions
e) The result of two waves of slightly different frequencies.

4) Put a star on the pictures of the wave form(s) above that are the result of interference.

5) Below, you see a tube that is open at only one end (open on the left). The tube is 1 m long. I resonate it at the **second lowest** frequency possible.

Lowest f — 2nd lowest f — displacement node

Displacement antinode

$L = 1m, = \frac{\lambda}{4}$ $\lambda = 4m$ $L = 1m = \frac{3}{4}\lambda$ $\lambda = \frac{4}{3}L = \frac{4}{3}m$

a) Please draw the wave function in the above drawing.

b) Briefly explain how you know to draw the function as you did above

I know displacement = 0 at node (closed end) ~~so~~ this is a node. Displacement is maximized at free end, ~~when~~ so this is an anti node. many different frequences will make this work.

c) Please find the frequency of the sound that results.

$V = \lambda f$ $340 \frac{m}{s} = \frac{4}{3}m(f)$ $f = 340\frac{m}{s}\frac{3}{4m}$

$= 85 \cdot \frac{3}{s} = 255 \frac{}{s}$.

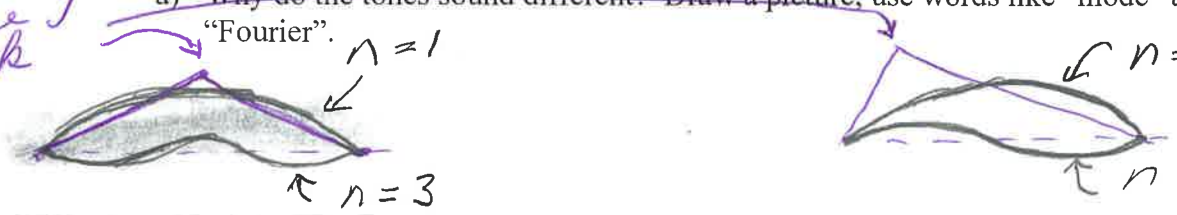
f = $255/s$

$340 \div 4 = 85$, $\times 3$ = 255

6) I'm playing my guitar. I pluck the string directly in the middle and then I pluck the string close to one of the ends of the string.

a) ~~Why do the tones sound different? Draw a picture~~, use words like "mode" and "Fourier".

where I Pluck




different harmonics are excited. In particular none of the 1st overtones are excited ~~in the~~ at left

b) Show in a picture where I should pluck the string to get a lot of sound from the first overtone (one octave higher than the fundamental frequency)

The first overtone is the n = 2 or λ = length of string. I should pluck it at an antinode, or $\frac{1}{4}$ from either end

here or here