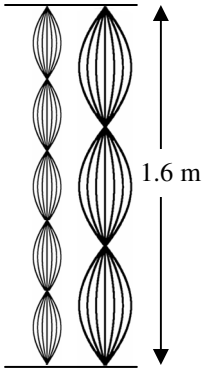
B-Day: Due Wed., Feb 7 (Assigned: 2/5)
A-Day: Due Thurs., Feb 6 (Assigned: 2/6)

Harmonic Motion 8 (Test Review)

1) What units must these variables be in: x is in ____; F is in ____; L is in ____; k is in ____; λ is in ___; v is in ___; f is in ____; T is in ____; m is in ____.
2) A 250 g mass is put on a spring. What mass do you put into the equation?
3) What is the force pulling on the spring?
4) A 35 cm pendulum has what length? (in correct units)

5) Which of the following will change the speed of a wave?

A. ____ Change the harmonic (*refer to the in class review)?*
B. ____ Change the length of the space?
C. ____ Grab a harmonic at one of the nodes?
D. ____ Tighten the string?
E. ___ Change the string's mass or thickness?
F. ___ Disturbing the string farther (more amplitude)?
G. ___ Change the temperature of the medium?



570 Hz

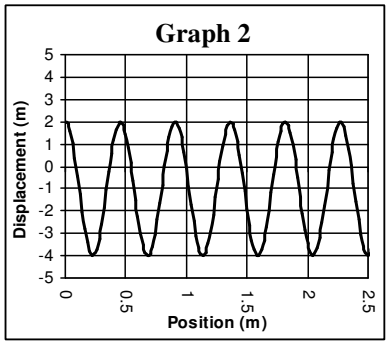
6) A) Find the wavelength of the fifth harmonic at the right.

B) Find the speed of the wave on the string.

C) Find the frequency of the third harmonic at the right.

D) Which harmonic would produce a louder sound?

E) Which has more energy?
F) Which has a higher frequency: a high note or a low note?
G) Which has a longer wavelength: a high note or a low note?
H) Which has a longer wavelength: the sound of a bird, or an elephant?

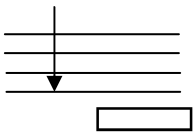


7) Use the graph at the left to answer the following.
A. Amplitude =
B. Where will it come to rest?
C. Find its wavelength.
D. If a sound wave, find its frequency.
E. How long would it take to complete 150 cycles?

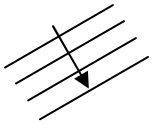
F. If Graph 2 is a sound wave mark compression and rarefaction on it (see Harmonic Motion Basics chart). (*Think of the word "rare" for rarefaction; in the rarefaction areas, the amount of matter is rare: not many of them.*)

8) Draw what will happen to these waves at the boundaries. And name which interaction is shown for each. (*See notes: "Wave Interactions".)*

A. _____

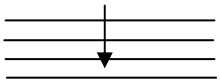


B. _____



Hard boundary

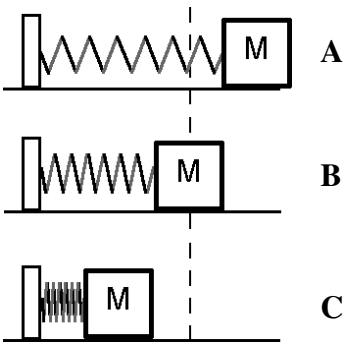
C. _____



Soft boundary (like cloth)

9) If you decrease the length of a pendulum, the period will increase or decrease?
10) If you increase the amount of mass on a pendulum the period will increase or decrease?
11) If you increase the mass on a spring, its period will increase or decrease?
12) If you increase its amplitude for a spring, its period will increase or decrease?
13) If you decrease the spring constant for a spring, its period will increase or decrease?
14) If you increase the spring constant for a spring, its frequency will increase or decrease?

Oscillating Spring



15) Use the graphic at the left to answer the following.

A ____ Ek = max	D. ____ x = -A	G._____where it will stop
B. ____ v = 0	E. ____ a = 0	H._____F = 0
C. ____ F = +max	F. ____ Ep = 0	I. ____a = -max

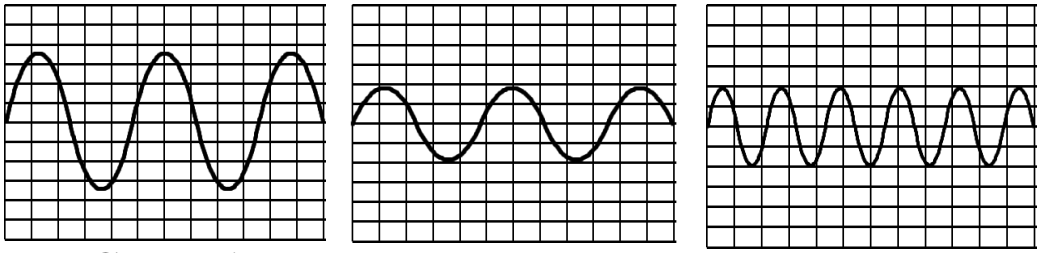
16) If the spring moves 10 cm from A to C, what is its amplitude?

17) How far will it move in one period?

18) Where will the spring come to rest?

19) Are A and C in-phase or out-of-phase from each other?

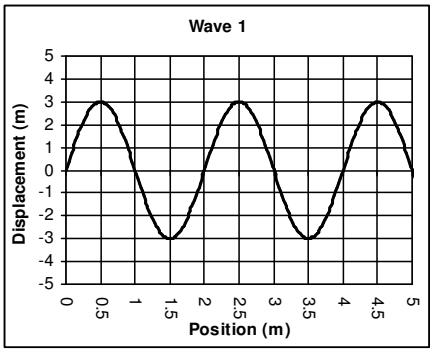
20) C is how much of a cycle away from A? (Use degrees.)

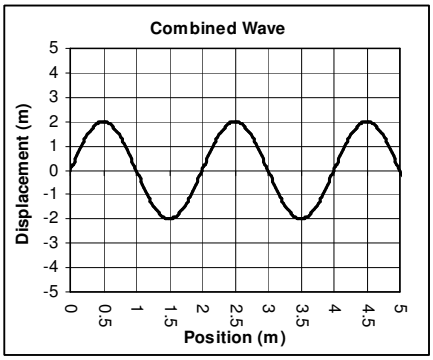


Graph 1 **Graph 2** **Graph 3**

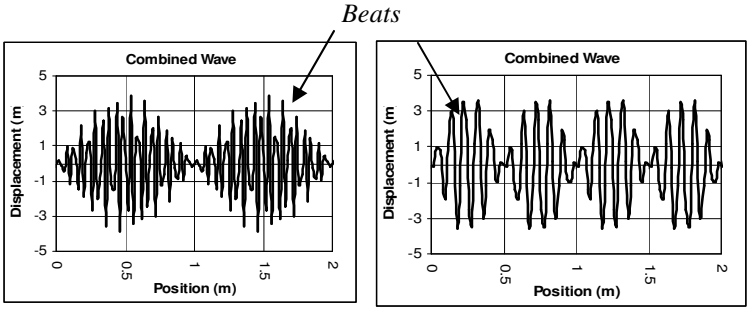
21) Which graph has the biggest amplitude?
22) Which graph has the shortest period?
23) Which graph has the highest frequency?
24) Does Graph 2 or 3 have the longest period?
25) If Graph 2 and 3 are pendulums, which is shorter?
26) If Graph 1 and 3 are springs of equal spring constant, which has the biggest mass?

27) For the graphs below, the graph for Wave 2 is missing. What is its amplitude to make the combined wave?
28) Would this be constructive or destructive interference?
29) In order to completely cancel out Wave 1, what would sWave 2's amplitude have to be?





30) *Notice the two graphs at the right. The parts of big amplitude are called "beats". Beats occur when the frequency of two notes are very close (they are almost in tune). The beats are moments of constructive interference. These are how musicians tune instruments. Both graphs show 2 seconds. Notice that the first graph shows only 1 beat per second. This would happen with these combinations of notes:*
354Hz with 353Hz; 26Hz with 27 Hz, etc: any two notes different by only 1 Hz.



A) How many beats are there per second on the second graph (right most graph)?
B) How different are the frequencies of the notes?
C) If one note of the right graph is 220Hz, give the two possible other notes.