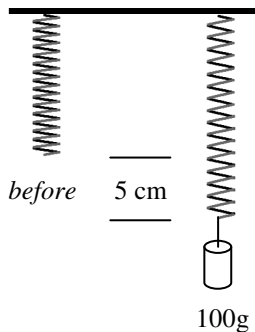
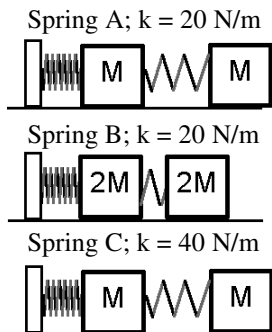


## 2009 Harmonic Motion 4

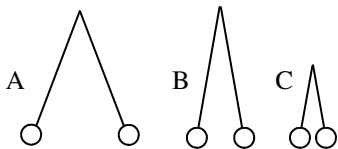


From "Spring-Mass Systems" notes:

- A 100 g mass is hung on a spring. The spring stretches 5 cm.
  - What is the mass of the object in kilograms?
  - How much force is pulling down on the spring (*think weight*)?
  - Calculate the spring constant of the spring.
  - Calculate the period of the spring.
- Given the same mass, does a strong or a weak force move it faster?
- So, does a strong spring or a weak spring move a mass back and forth faster?



- Using the pendulums and springs at the right, answer the following:
  - \_\_\_ Spring A or B has the biggest amplitude?
  - \_\_\_ Pendulum A or B has the smallest amplitude?
  - \_\_\_ Pendulum A or C has the quickest period?
  - \_\_\_ Spring A or C has the quickest period?
  - \_\_\_ Spring A or B has the quickest period?
  - \_\_\_ Pendulum B or C has the greatest frequency?
  - \_\_\_ Spring A or C requires more force to compress it?
  - \_\_\_ Spring B or C has the smallest amplitude?
  - \_\_\_ Which pendulum has the most energy?
  - \_\_\_ Spring A or B has the most energy?
  - \_\_\_ Spring A or C has the most energy?



- If  $M = 0.5$  kg, find the period of Spring A.

From the "Waves" notes.

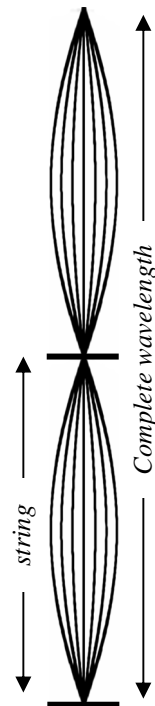
- Transverse or Longitudinal Wave?
  - The wave vibrates up and down and moves up.
  - The wave vibrates left and right and moves forward (away from you).
  - The slinky if you push it.
  - The slinky when you move your hand left and right.
- Which of these affects the speed of a wave: amplitude; frequency; medium?
- Calculate the frequency of a 14 m long wave traveling 120 m/s.

From "Standing Waves":

- How many antinodes equals one complete wavelength?
- The fundamental frequency (also known as the  $n$  \_\_\_\_\_  $f$  \_\_\_\_\_) has how many antinodes?

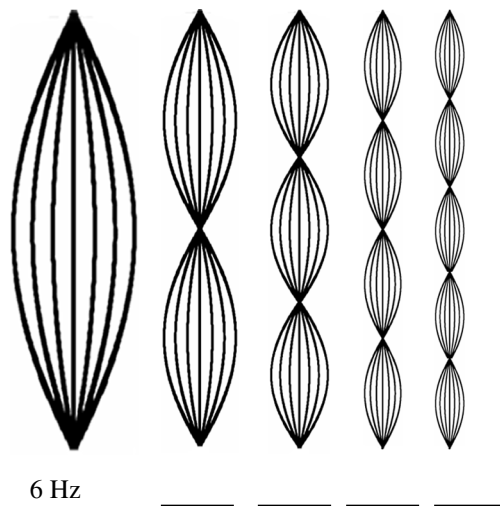
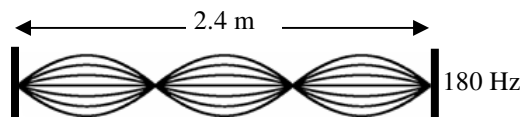
Notice the diagram at the right. The wavelength of the fundamental is always twice the length of the string.

- What is the wavelength of the fundamental frequency for a 1.2 m long string?



12. Write the frequencies underneath the harmonics on the graphic at the right.

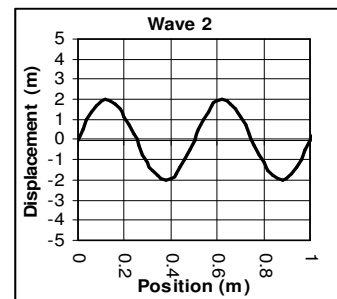
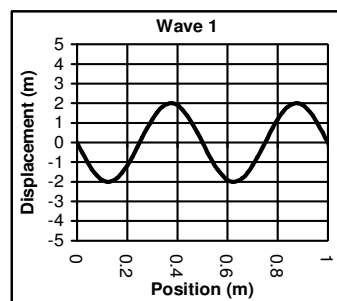
*The frequencies you just wrote are for this particular string length and tension. A different length or frequency will cause different frequencies.*



13. A different string vibrating at 180 Hz produces the above harmonic.
- Which harmonic is it?
  - How many nodes does it have?
  - If a high speed camera were to take its picture, draw what the string would look like on the diagram.
  - How many wavelengths is the harmonic?
  - What is the wavelength of the harmonic?
  - Calculate the speed of the wave on the string.
- F. What is the frequency of the first harmonic for this string?

*From the "Wave Actions" Notes:*

- If a wave hits a hard wall, it bounces off by:
  - If a wave hits a soft boundary, it dies by:
  - Waves bending due to different speed mediums:
  - A wave bends around a corner by:
  - A wave bends as it passes thru a boundary by:
  - Tile or marble makes for a loud room by:
  - Eyeglasses magnify objects by:
15. A. What is the amplitude of wave 1?      Wave 2?  
 B. Are they in-phase?  
 C. Together will they combine constructively or destructively?  
 D. What will be the amplitude of the combined wave?



*From the "Sound" Notes:*

16. Is sound a transverse or longitudinal wave?
17. How does loud sound cause deafness?
18. A note that we hear as higher (higher pitch) has a higher:
19. Louder notes have more:
20. How do we measure loudness?
21. If a sound is 40 dB loud. Answer how many dB these would be:
- A sound twice as loud:
  - A sound half as loud:
22. Which is a lower note: 120 Hz or 450 Hz?
23. Can we hear the frequency of the harmonic in Q13?      Why or why not?
24. What is the speed of sound in air?

*This is a constant at sea level. Keep it constant. ANYTIME we are talking about sound,  $v = 340 \text{ m/s}$ .*

25. What is the wavelength of a 440 Hz sound?
26. How far does sound travel in 25 seconds?

*I apologize, but we need 1 more page for TAKS.*

*You will need the new Biology notes from the website.*

27. Which of the following characteristics of viruses makes them difficult to treat with medications?
- A. Viruses are not living
  - B. Viruses are very small, making them hard to find
  - C. Viruses are very numerous
  - D. Viruses replicate rapidly and undergo many mutations
28. Bacteria that break down the wastes of remains of dead organisms in the environment are -
- A. Photosynthetic
  - B. Decomposers
  - C. Producers
  - D. Parasites
29. Parts of organisms that have a similar function but do not share similar structural characteristics are called -
- A. Homologous structures
  - B. Vestigial organs
  - C. Embryological structures
  - D. Analogous structures
30. Earth has undergone several ice ages in its history. Which types of organisms would natural selection favor if Earth underwent another ice age?
- A. Organisms that are able to swim.
  - B. Organisms that are predators.
  - C. Organisms that carry out photosynthesis
  - D. Organisms adapted for surviving cold temperatures
31. Which group of organisms transfers energy from the sun to food?
- A. Animals
  - B. Primary consumers
  - C. Secondary consumers
  - D. Producers
32. Organisms that make their own food are known as: a\_\_\_\_\_ or p\_\_\_\_\_.
33. Organisms that eat other organisms are h\_\_\_\_\_ or c\_\_\_\_\_.
34. You go to the grocery store. Is there more food or those buying the food?
35. In an ecosystem is there more food or those that eat the food?
36. In order for a wolf to gain 5 kg of mass,
- A. How many kg of prey does the wolf have to eat?
  - B. How many kg of grass are eaten by the prey for the wolf to gain the 5 kg?
37. What level of the biomass pyramid are we when
- A. we eat steak?
  - B. we eat salads?
38. When do we use more resources, when we eat meat or when we eat plants?