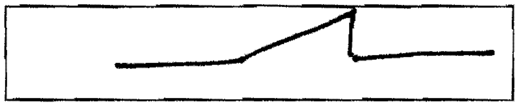
# 1-D Waves: Test Review

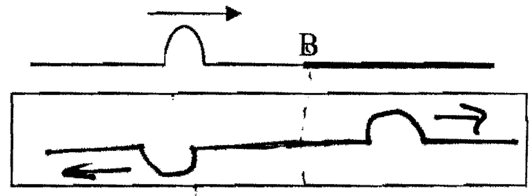
Name KEY
Date ________ Pd____

1. 

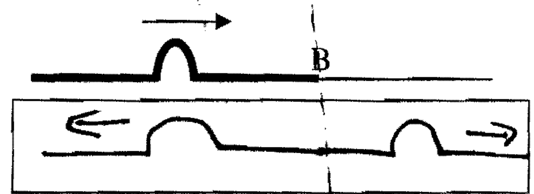
   a. Draw the pulse as it returns after reflecting from a free end (left box) and a fixed end (right box).



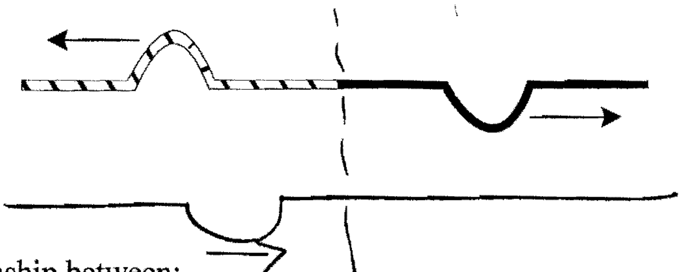
2. The diagram to the right shows a pulse traveling from one string to a denser string. In the box below, draw the reflected and transmitted pulses after the original pulse has reached point B.




3. The diagram to the right shows a pulse traveling from a denser string to another string. Draw the reflected and transmitted pulses after the original pulse has reached point B.



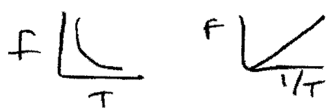

4. To the right is a two-rope system soon after a single pulse arrived at the boundary between the two ropes. If the "solid" rope is the denser rope, show with a sketch the original pulse that would have caused this result.



5. Express with words, symbols, and graphically the relationship between:

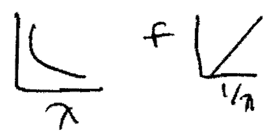
   a. period (T) and frequency (f) f + T are inversely proportional

   $f \propto \frac{1}{T}$ $T \propto \frac{1}{f}$



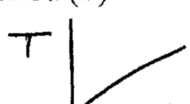

   b. wavelength (λ) and frequency (f) λ + f are inversely proportional

   $f \propto \frac{1}{\lambda}$



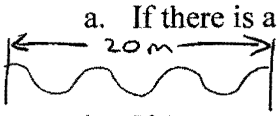

   c. wavelength (λ ) and period (T)

   $\lambda \propto T$ λ + T are directly proportional




6. A wave on Long Lake passes by two docks that are 20 m apart.

   a. If there is a crest at each dock and another 2 crests between the two docks, determine the wavelength.




   $\frac{1}{3}(20\text{m}) = \boxed{6.67\text{m} = \lambda}$

   b. If 5 waves pass ~~one dock every~~ 10.0 seconds, determine the period ~~and frequency of~~ the wave.

   $\frac{5 \text{ waves}}{10 \text{ sec}} = \boxed{0.5 \text{ Hz} = f}$ $T = \frac{1}{f} = \frac{1}{0.5} = \boxed{2 \frac{\text{seconds}}{\text{wave}} = T}$

   c. What is the speed of the wave?

   $v = f\lambda = (6.67\text{m})(0.5\text{Hz}) = \boxed{3.33 \text{ m/s}}$

7. The wavelength of a particular sound wave in this room is 1.05 m and its frequency is 325 Hz.
   a. What is the speed of the wave in the room?

   $V = f\lambda = (325\,Hz)(1.05\,m) = 341\,m/s$

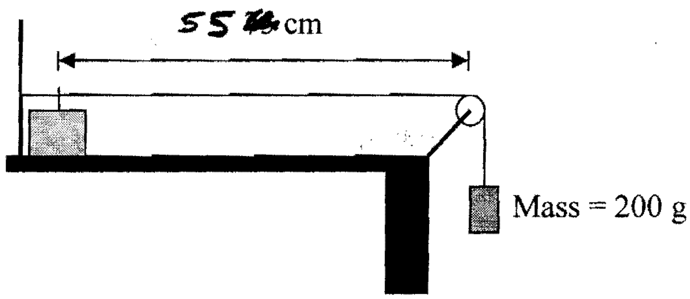
   b. If you double the frequency of the sound wave, does its speed change? If so, by how much?

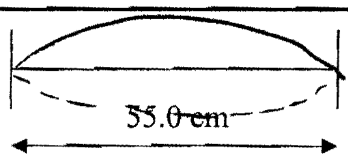
   The speed stays the same. Frequency is independent of the speed.

   c. What happens to the wavelength if you cut the frequency in half? How do you know?

   It would double. f + $\lambda$ are inversely proportional

8.

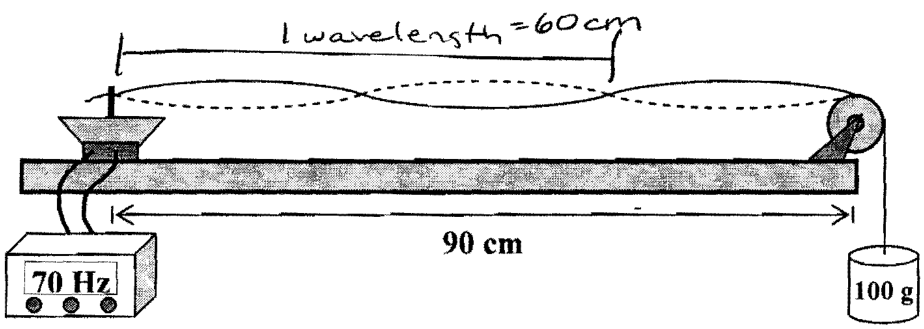



| Mode | Diagram | Wavelength, $\lambda$ | Resonant Frequency, $f$ | Wave Speed, v |
|---|---|---|---|---|
| 1[st] |   | 110 cm or 1.10 m | $f = \frac{V}{\lambda} = \frac{67.9\,m/s}{1.1\,m} = 62\,Hz$ | 67.9 m/s (speed is same) |
| 3[rd] |  | 36.7 cm or 0.367 m | 185 Hz | $V = f\lambda = (185\,Hz)(0.367\,m) = 67.9\,m/s$ |

9. The same string is attached to a hanging mass of 800 g. The linear density and the length of the string have not changed. Describe what would happen to the wave speed for the new situation.

   The increased mass would increase the tension, leading to a faster wave speed,

10. What is the speed of the waves in the string?




$\lambda = 60\,cm = 0.60\,m$

$f = 70\,Hz$

$V = f\lambda = (0.60\,m)(70\,Hz) = 42\,m/s$