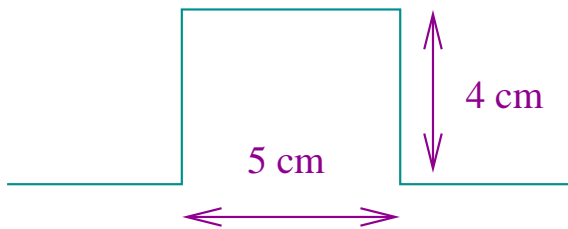


# PHYSICS 232 – SAMPLE TEST # 1

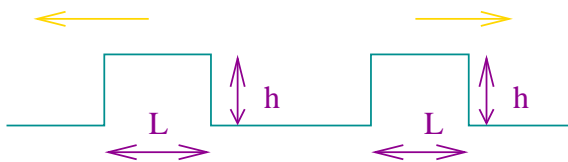
## Problem 1

(a) A mass  $m$  attached to a spring hanging from the ceiling oscillates with period  $T$ . If you cut the spring in half and attach the same mass to the half still hanging from the ceiling, will the period of oscillation increase, decrease, or stay the same? Justify your answer.

(b) A long stretched string is held at the position shown in the figure by nails.

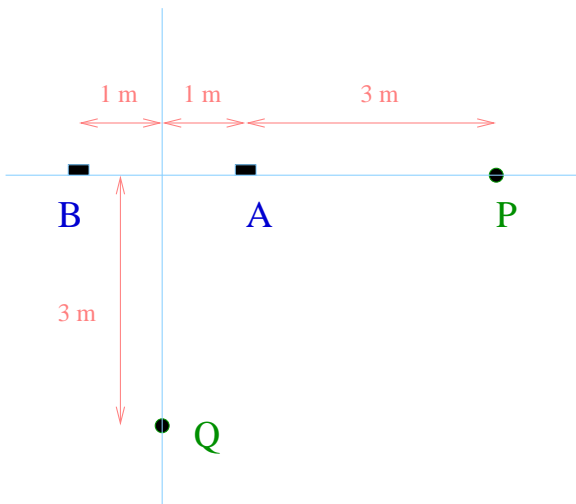


Suddenly the nails are removed. Two waves form as shown.



What is the length  $L$  and height  $h$  of each of the two pulses?

(c) Speakers  $A$  and  $B$  are driven by the same amplifier and emit sound of the same wavelength  $\lambda = 4$  m in phase.



What type of interference occurs at the point  $P$ ?

What type of interference occurs at the point  $Q$ ?

- (d) A large church has part of the organ in the front of the church and part in the back. A person walking rapidly down the aisle while both segments are playing at once reports that the two segments sound out of tune. Why?

### Problem 2

An object of mass  $m = 10$  gr moves along the  $x$ -axis with simple harmonic motion of amplitude  $A = 0.5$  m and period  $T = 5$  s. The object is at position  $x = +0.5$  m at time  $t = 0$ . The equilibrium position is  $x = 0$ .

- (a) What is the position of the object at time  $t = 1.5$  s?
- (b) What is the magnitude and direction of the force acting on the object at time  $t = 1.5$  s?

### Problem 3

At a distance of 1 m from a race car engine the sound intensity level is 90 dB.

- (a) What is the total power of the sound produced by the engine? Assume that the sound is spread uniformly over a hemisphere (no loss of power in the ground).
- (b) If this is a 400-HP engine running of full power, what fraction of the car's power output appears as sound energy? (1 HP = 746 W).