

Phys 125 Assignment #2

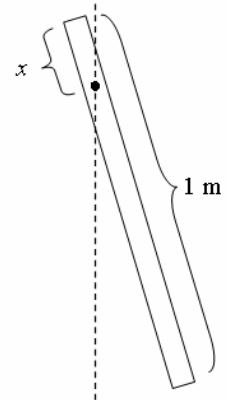
Due 26 January

1. (20%)

A student fires a bullet into a 4.648-kg wooden block resting on a frictionless surface, and attached to a spring of spring constant 142.7 N/m. The bullet, whose mass is 7.879 g, remains embedded in the wooden block. The student measures the maximum distance that the block compresses the spring to be 9.460 cm. What is the speed v of the bullet.

2. (20%)

A student wants to use a meter stick as a pendulum. She plans to drill a small hole through the meter stick and suspend it from a pin attached to the wall. Where in the meter stick should she drill the hole to obtain the shortest possible period? How short an oscillation period can she obtain with a meter stick in this way?



3. (20%)

A traveling wave on a cord is represented by $f(x,t)=0.22\sin(5.6x + 34t)$ where x is in meters and t is in seconds. For this wave determine (a) the wavelength, (b) frequency, (c) velocity (magnitude and direction), (d) amplitude, and (e) maximum speed of the particles of the cord.

4. (20%)

A transverse sinusoidal wave on a string has a period $T=25.0$ ms and travels in the negative x direction with a speed of 30.0 m/s. At $t=0$, a particle on the string at $x=0$ has a transverse position of 2.00 cm and is traveling downward with a speed of 2.00 m/s. (a) What is the amplitude of the wave? (b) What is the initial phase angle? (c) What is the maximum transverse speed of the string? (d) Write the wave function for the wave.

5. (20%)

A ski gondola is connected to the top of a hill by a steel cable ($\rho=7.8\times 10^3$ kg/m³) of length 660 m and diameter 1.5 cm. As the gondola comes to the end of its run, it bumps into the terminal and sends a wave pulse along the cable. It is observed that it took 17 s for the pulse to return. (a) What is the speed of the pulse? (b) What is the tension in the cable?