AP Physics – Waves Ain't Gone, Alas – 49

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School days, I believe, are the unhappiest in the whole span of human existence. They are full of dull, unintelligible tasks, new and unpleasant ordinances, brutal violations of common sense and common decency. -- H.L. Mencken

1. A 7.50 kg ball is thrown. It has an initial velocity of 8.468 m/s. It travels a horizontal distance of 7.3 m in 1.25 s. Find: (a) The weight of the ball. (b) The initial kinetic energy of the ball. (c) The angle of the ball's initial velocity with the horizontal.

2. You are on a train traveling at 55.0 km/h. You approach a stationary bell. The actual frequency of the bell is 725 Hz. What frequency do you hear?

3. Draw a picture of a pendulum showing its swing. Label the following points: (a) point(s) of maximum velocity, (b) point(s) of minimum velocity, (c) point(s) where the potential energy is greatest, (d) point(s) where kinetic energy is greatest, (e) if the period of the pendulum is 0.750 seconds, what is its length? (f) What is the speed of the pendulum at the bottom of its swing if the angle that it makes at its maximum displacement is 11.0°?
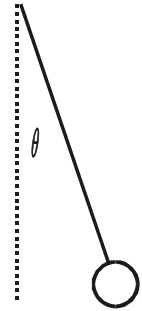
4. A pipe is 18.5 cm long and open on one of its ends. (a) What are the frequencies of the first three harmonics that resonate in the pipe? (b) What is the wavelength of the third harmonic?

5. An FM radio station's basic frequency has a wavelength of 2.67 m. What is its frequency?

6. A frictionless pulley has a light string over it attached to two masses as shown. The first mass, m_1, is 5.34 g and the second mass, m_2, is 5.39 g. Find (a) the acceleration of the system and (b) the tension in the string.

m_2

m_1
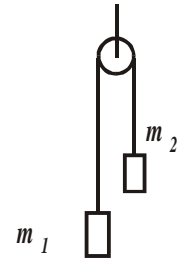
7. A 52.5 kg crate rests on a surface and has a coefficient of kinetic friction of 0.285. A rope is attached to it. You pull it sideways exerting a force of 145 N. (a) If the rope makes an angle of 25.0° with the horizontal, what is the acceleration of the crate? (b) How much time to drag it 2.50 m?