AP Physics – Wavin' Them Waves – 48 /45

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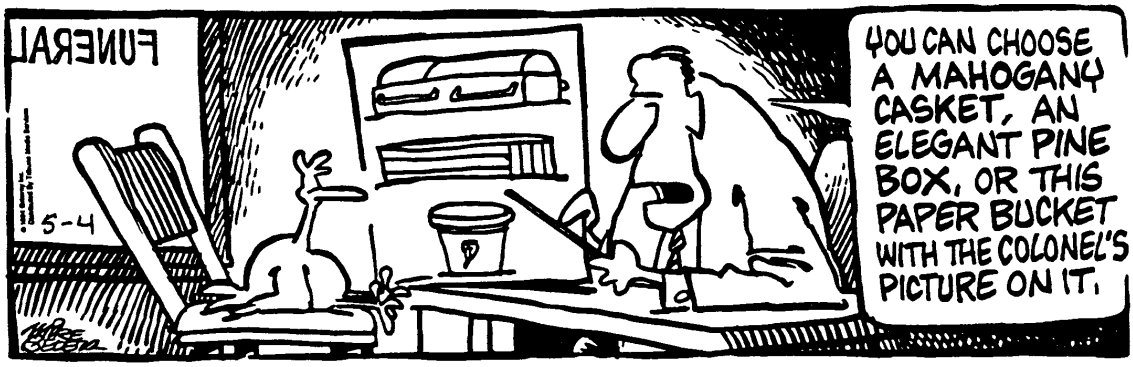


Yesterday is a dream, tomorrow but a vision. But today well lived makes every yesterday a dream of happiness, and every tomorrow a vision of hope. Look well, therefore to this day. -- Sanskrit Proverb

1. A lass on a skate board throws a 5.6 kg medicine ball away from herself, giving it a speed of 15.0 m/s. The girl/skateboard's mass is 36 kg. What is the final velocity gained by the young woman?

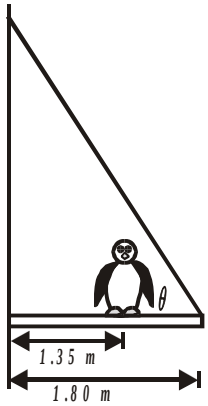
2. A 1250 kg car has 3 passengers with a combined mass of 135 kg. The car has four identical springs each supporting ¼ the mass of the car and having a spring constant of 18 500 N/m. (a) Find the frequency of vibration for the car when it goes over a speed bump. (b) How much time does it take for the car to go through 2 oscillations?

3. You are at a stop light in your car, stuck behind a red light. Just before the light is supposed to change, a fire engine comes zooming up towards you traveling at a horrendous 85.0 km/h. If the siren has a rated frequency 665 Hz, (a) what frequency do you hear? (b) What is the wavelength of the sound you hear?

4. A pipe is 155 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 first harmonic?

5. You spot a large pendulum that is swinging through a small arc. If the length of the pendulum is 5.5 m, what is its period?

6. You are on a train traveling at 105 km/h. You approach a stationary 455 Hz siren. What is frequency you hear?

7. You throw a 675 g ball straight up. If the ball takes 4.2 seconds to go up and down (where you catch it at the same height) and if we ignore wind resistance, then find: (a) How high the ball goes, (b) the ball's initial velocity, and (c) the kinetic energy just before you catch it.

8. A beam sticks out from a wall as shown. The mass of the uniform beam is 12.6 kg, the mass of the penguin is 1.25 kg. The angle of the cable is 65.0°. (a) Find the tension and (b) find the force exerted by the wall on the beam.