

Music 170: Formula sheet and Problem Set #1 (due Oct. 2)

Problems (due Sept. 29)

1. A 600 kg car goes from 0 km/h to 100 km/h in 17 seconds. What is its acceleration (in m/s^2)? What net force on the car caused this acceleration?
2. A 1.2 kg watermelon is dropped from the roof of a tall building. It takes 2 seconds to reach the ground. What is its velocity immediately before impact? What is its kinetic energy immediately before impact?
3. A spring has a spring constant of K . If the spring is cut in half, what is the spring constant of the two half-length springs?
4. A mass-spring system with two equal masses has two modes of vibration (see textbook fig. 2.7, page 27). The lowest vibrates at 20 Hz. Find the spring constant and the frequency of the second mode of vibration.
5. A partially filled bottle has a mouth with a radius of 1 cm and a neck of length 2 cm. The drinker blows over the top of the bottle and produces a frequency of 684 Hz. After drinking some of its contents, the drinker blows across the top of the bottle and produces a frequency of 484 Hz. How many liters were drunk between producing the two frequencies?