

Semester Review: Physics and Baseball II

Pre-Class Questions

Problem Set (none)

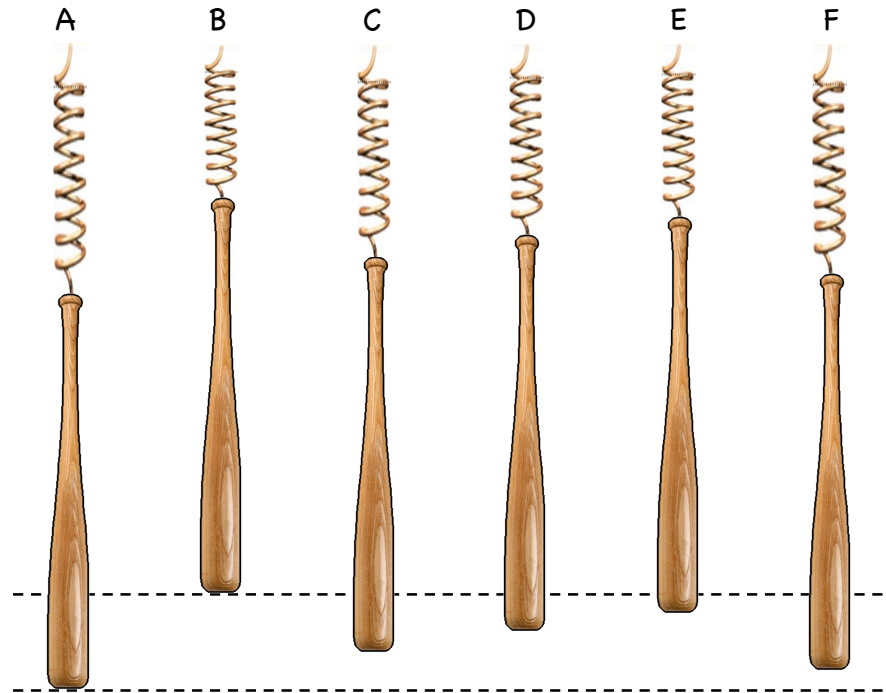
Lecture Outline

1. Simple Harmonic Motion
2. Waves
3. Fluids
4. Calorimetry
5. The Ideal Gas Law

Hanging Bats

Six different bats are hung from identical springs that stretch different amounts in equilibrium.

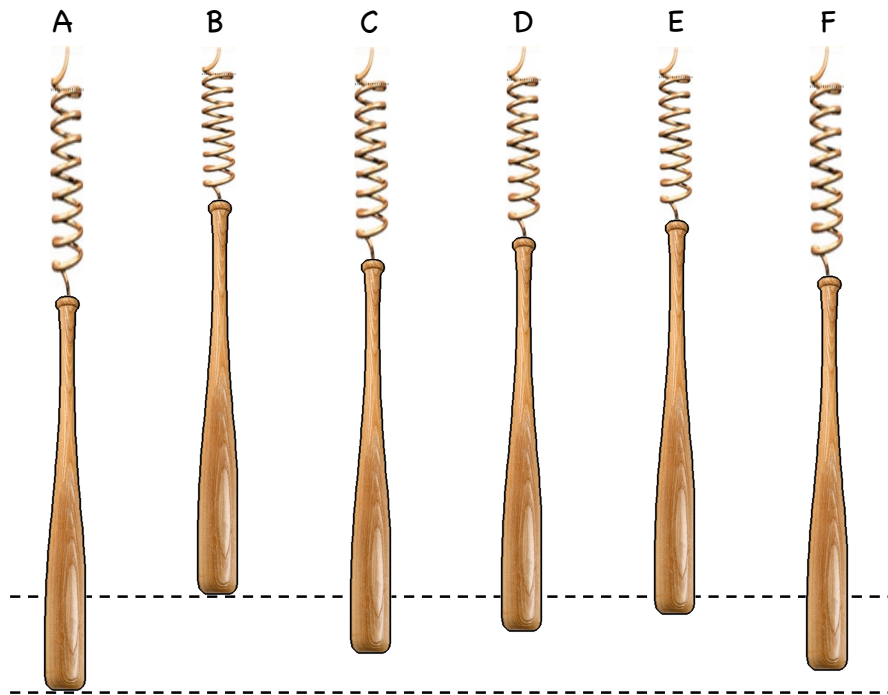
Rank these bats from greatest to least based upon their mass.



Bouncing Bats

Six different bats are hung from identical springs that stretch different amounts in equilibrium. When the bats are pulled down and released. They oscillate up and down.

Rank these bats from greatest to least based upon the frequency of oscillation.



Example 1: The speed of sound in a baseball bat is about 4000m/s. Treat the bat as a 95cm long string free at both ends. (a) Sketch the first three harmonics. (b) Find their frequencies.









Example 2: A homerun lands in McCovey Cove. The mass of the ball is 0.145kg and its radius is 3.68cm. (a) Will the ball float or sink? (b) If it floats find the fraction of the ball that will be under water.

Example 3: Last lecture we considered an average fastball heading toward the batter at about 92mph (41 m/s) that was hit for a homerun leaving the bat at about 110mph (49m/s). The mass of the is 145g and the bat had a mass of 36oz (1.0kg). The (center-of-mass) speed of the bat when it strikes the ball is about 50mph (22m/s) and the speed of the bat just after hitting the ball was 9.0m/s. (a)Find the heat generated and (b)the amount of water that could be heated from 20°C to 100°C with that heat.

It's A Long Fly Ball...

The distance a well hit ball can travel depends inversely upon the air density. The ball will go farther when the air is less dense. Below are three cities with their average summer temperature and atmospheric pressure.

Rank them based upon the distance traveled by a well hit ball.

City	Team	Average Summer Temperature (°C)	Average Atmospheric Pressure (kPa)
		28	101.4
		18	101.7
		28	101.6

Lecture 4I - Summary

Major Ideas in Mechanics

1. Simple Harmonic Motion
2. Waves
3. Fluids
4. Calorimetry
5. The Ideal Gas Law