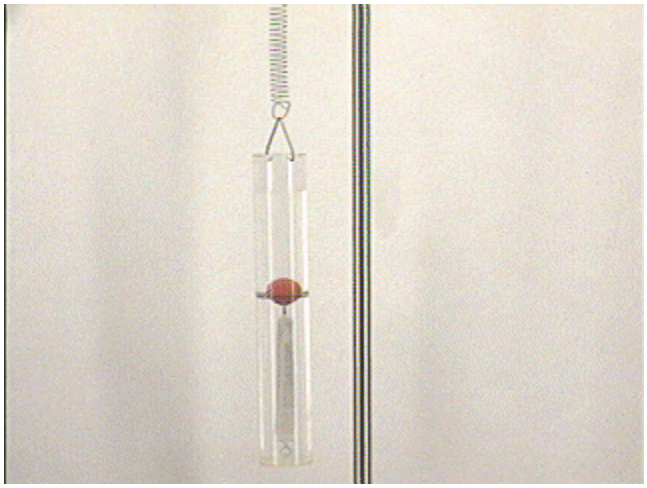
Question #95

This question is a sort of semi-related follow-up to Questions #69 and #70.

A pingpong ball is held in water in a cylindrical plastic container by a light spring attached to the bottom of the container, as seen in the photograph below. If the spring were not holding it down, the pingpong ball would float to the surface of the water. The pingpong ball is held at a position marked by a black line around the plastic container. The container itself is suspended from a fixed point on a large spring; it is shown at rest in its equilibrium position.



Now suppose that the container were lifted above its equiibriumm position and released, so that the entire container oscillates up and down, executing simple harmonic motion. The question this week involves possible motion of the pingpong ball in the water container as the container moves up and down.

There are three ways that the floater might move with respect to the water bath. It might move "*in phase*" with the motion of the container - that is, when the container moves **up** the floater might move **up** in the water so that it is above the line on the container. On the other hand, it might move "*out of phase*" with the motion of the container - that is, when the container moves **up** the floater might move **down** in the water so that it is below the line on the container. Or perhaps it will move in some way between these two extremes. Or perhaps it will not move at all, and will remain *at rest* with respect to the water in the container.

As the container executes vertical simple harmonic motion on the spring, the floater will undergo:

- (a) in phase motion with respect to the water.
- (b) out of phase motion with respect to the water.
- (c) some motion between these two extremes.
- (d) no motion at all with respect to the water surface.

Click here for Answer #95 after December 17, 2001.

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.